

**The Impact of a School-Based, Nurse-Delivered Asthma
Health Education Programme on Quality of Life,
Knowledge and Attitudes of Saudi Children with Asthma**

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List of Abbreviations

UK	United of kingdom
USA	United States of America
KSA	Kingdom of Saudi Arabia
CDSI	Central Department of Statistics and Information
UNICEF	United Nations International Children's Emergency Fund
AIRE	Asthma Insights and Reality in Europe
AIRIAP	Asthma Insights and Reality in the Asia-Pacific
GP	Genral Practioner
NAEPP	National Asthma Education and Prevention Programme
GINA	Global Initiative for Asthma
SINA	Saudi Initiative for Asthma
NACA	National Asthma Council Australia
AAP	Asthma Action Plan
STS	Saudi Thoracic Society
ICSs	Inhaled corticosteroids
LABA	long-acting beta-2 agonist
CRD	Centre for Reviews and Dissemination
MoE	Ministry of Education
MoH	Ministry of Health
PAQLQ	Pediatric Asthma Quality of Life Questionnaire
SCAS	Spence Children's Anxiety Scale
SPSS	Statistical Package of Social Sciences
AKQ	Asthma Knowledge Questionnaire
AAQ	Asthma Attitudes Questionnaire
ANOVA	Analysis of Variance
CI	Confidence Interval
DF	Degree of Freedom
SD	Standard Deviations

ABSTRACT

Background

In Saudi Arabia, more than 2 million people complain of asthma: 13% being aged 6-10 years. This makes asthma one of the most common illnesses among children in Saudi Arabia. Little has been explored about children's ability to learn more about their own asthma in Saudi Arabia.

Aims

The study was designed to assess the impact of a school-based, nurse-delivered asthma health education programme on asthmatic children's knowledge and attitude towards asthma, quality of life, anxiety level, and school absenteeism.

Methods

A quasi-experimental, non-equivalent group, pre-test post-test design was used. The education programme was developed from existing evidence. The Paediatric Asthma Quality of Life Questionnaire, Spence Anxiety Tool, Asthma Knowledge Questionnaire, and Asthma Attitude Questionnaire were employed for data collection in 2013. Intervention (n=130) and control (n=98) groups were drawn from 10 schools in Ha'il region, Saudi Arabia. Both descriptive and inferential statistics were used to examine differences between groups.

Results

The level of asthma knowledge was increased significantly more in the intervention group than in the control group ($F=26.5746$, $DF\ 2$, $p<0.001$). Attitude toward asthma was not changed by the intervention ($F=0.0490$, $DF\ 2$, $p=0.9522$). In the accumulative score, there was a statistically significant difference in the anxiety score between the three phases of intervention group ($F=3.7599$, $DF\ 2$, $p=0.0242$) but no statistically significant difference between pre-test and either post-test ($p>0.05$). Anxiety scores had reverted to those at pre-test at post-test II. Regarding quality of life, the intervention group scored higher in total quality of life scores compared to the control group ($F=87.6534$, $DF\ 2$, $p<0.001$). Finally, school absenteeism also reduced significantly after delivering the programme ($F=2.98$, $DF\ 2$, $p=0.003$).

Conclusion

The asthma education programme impacted positively on students' knowledge, anxiety, quality of life, and school attendance. However, asthma education did not change attitudes towards the condition. The results emphasise the benefits of provision of health education directly to children. Asthma education should be integrated into the Saudi national child health programme.

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Dedication

I dedicate this achievement to my beloved wife for her love, patience and the unlimited support and encouragement she has given me during this journey. I would not have been able to accomplish this work without her support.

This thesis is dedicated with love to my parents for their continuous support and encouragement throughout my doctoral studies. My parents instilled in me the courage to challenge myself and to set the highest goals and confidence to achieve them. They encouraged me to pursue my education as they recognised the value of academic knowledge and its significance for personal and work life opportunities.

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CHAPTER ONE: INTRODUCTION

INTRODUCTION

This chapter provides an overview of the thesis, beginning with an introduction about the topic and a brief description of the Saudi context. An outline of the aims and methods of the research is presented as well as the potential significance of the study.

BACKGROUND

Asthma is a common chronic inflammatory disease of the airways portrayed by variable and recurring symptoms, reversible airflow obstruction, and bronchospasm. Symptoms include shortness of breath, chest tightness, wheezing, and coughing (Smeltzer, 2010).

The prevalence of asthma varies across countries. For example, one in eleven children in the United Kingdom (UK) complain of asthma symptoms, 9.5% of American children suffer from asthma, and 12% of Australian children report asthma as a current long term condition (Asthma UK, 2013; Australian Bureau of Statistics, 2013; Centre for Disease Control and Prevention (CDC), 2013). Similarly, children in the Kingdom of Saudi Arabia (KSA) have a higher risk for asthma due to factors that are discussed in detail later. These statistics place asthma as an important disease in the context of children. Asthma is also a leading cause of death among allergic disorders (Skarpaas & Gulsvik, 1985; Robin, 1988).

Health education was found to be an integral part of the management of asthma in children (Boulet et al., 1999). Asthma education programmes for children, based on behaviour modification, have shown an improvement in health outcomes such as a reduction in asthma symptoms, a reduction in the frequency of attacks, reduced absenteeism, less health care use, and an increased ability to perform activities of daily living (Kostes et al., 1995). The extent of benefit derived from asthma education programmes seems to depend on the characteristics of the disease for individual children including the severity of the disease (Gibson et al., 2004).

Situation in the Kingdom of Saudi Arabia (KSA)

The discovery of oil in the Kingdom of Saudi Arabia (KSA) in the late 1930s launched the country on a path of rapid social and economic development causing a marked positive impact on health (Central Department of Statistics and Information [CDSI], 2012). However,

within the KSA, more than 2 million people complain of asthmatic symptoms or are diagnosed as having asthma, and 13% of Saudi children between 6 and 10 years complain of asthma. This makes asthma one of the most common chronic illnesses in the KSA (Al Frayh et al, 2001; Alamoudi; 2006; Ministry of Health [MoH], 2010).

Therefore, asthma is an important disease in the context of the KSA health care. However, even though the physical and social adverse effects of asthma are addressed in the global literature, the literature search for this study revealed a dearth of Saudi bio physical and social studies regarding asthma and the experience or outcomes for Saudi children living with asthma. Therefore, this area is under-researched and needs to be investigated further in the context of the KSA. Congruent with this, the Saudi government has included asthma as a major concern in their strategic health plan and have encouraged researchers to research this area (MoH, 2010).

So far, the focus of research in the KSA has been on establishing the prevalence of asthma among Saudi children. Several risk factors were found. Being a Saudi national was found to be one of main risk factors associated with asthmatic symptoms (Hijazi et al, 1998). It seems that Saudi children have specific genes significantly associated with asthma (5 single-nucleotide polymorphisms (SNPs) in the interleukin 17). Living in urban areas and in cities at sea level was another significant risk factor for having asthma (Al-Ghamdi, et al., 2008; Hijazi, et al., 1998). Belonging to a family with a parent who smokes was also a positive risk factor for having respiratory symptoms in general and asthma in particular (Al-Dawood, 2001; Bener, et al., 1991).

It can be argued that some of the risk factors could be avoided by providing children with sufficient education about asthma. Therefore, there is a need in the KSA to educate children with asthma about their illness and there is a need to test the effectiveness of these educational programmes in the KSA context.

CONTEXT OF KSA

Saudi demographics

The Kingdom of Saudi Arabia is one of the largest countries in the Middle East, with a population of approximately 28.5 million people which is expected to grow to 47 million by the year 2020 (CDSI, 2012). Currently, 29.4% are aged less than 14 years. The majority of people in the KSA speak Arabic, and around 98% of Saudis are Muslims. The median age of

the population in the KSA is 21.6 years, and the annual population growth rate is 2.7% (The World Fact Book, 2011). Improvements in both health and social services has increased life expectancy in the KSA from 52 years in 1970 to 73 and 74 years in 2009 and 2011 respectively; (CDSI, 2012).

Health and health services in the KSA

One of the major strategic goals in the KSA is providing accessible and high standard health care services to the Saudi population and foreigners working within the public sector in the country. Workers in the private sector are sponsored by their employers (MoH, 2010). Finance for healthcare in the KSA is provided mainly from the government budget, which is largely based on oil revenues (Al-Yousuf et al, 2002). It has been reported that 6% of the overall budget is allocated to health (UNICEF, 2009).

Hospitals and other health care facilities in the KSA are operated by government agencies and the private sector. The Ministry of Health (MOH) in the Kingdom is the government agency responsible for the Kingdom's health care by providing primary and tertiary health care services. The MoH provides primary health care through a network of primary healthcare centres throughout the Kingdom with a referral system to acute and advanced health care through a broad base of hospitals (Aldossary et al., 2008).

In addition other government agencies, such as the Ministry of Defence and Aviation, the Ministry of the Interior, the Saudi Arabian National Guard and the University Teaching Hospitals also provide health care services directly to their employees and employee dependents as well as to the general population (Aldossary et al., 2008).

MOTIVATION FOR THE STUDY

I am the manager of continuing nurse education in the Ha'il region of the KSA. I hold a Master's degree in nursing from Griffith University in Australia, a Bachelor's degree in nursing from the Applied Science University in Jordan, and a Diploma in nursing from the KSA. As a Saudi citizen, I am passionate about issues related to my community. As asthma has been identified as one of the major health problems in the KSA, contributions from this study may be used to enhance the life-style and health status for those children with asthma. This is important as children in the Ha'il region have a higher risk of being diagnosed with asthma. The Ha'il region is a large geographical location in the north of the Kingdom. It has

many environmental factors that trigger asthmatic symptoms. As noted earlier, the Saudi government has identified the need to understand more fully mechanisms that may be used to improve the health of those diagnosed with asthma.

On a personal note, additional motivation is provided by being a member of a family that has three members suffering from asthma. My father, (75 years old), my brother (11 years old), and my sister (9 years old) have asthma. It seems that despite determined efforts by the government to improve the treatment and management for those with asthma, children in the Ha'il region are receiving suboptimal treatment.

My role involves the implementation and audit of practice against national guidelines and it is clear from my experience that the implementation of guidelines on the management of asthma needs further work. Currently, children receive an annual lecture about the management of asthma. In addition, nurses are taught about the appropriate use of inhalers and asked to educate children on their use. It is hoped that the findings from this study will make a contribution to providing robust evidence that may be used to make a difference through the examination of the impact of an asthma education programme on outcomes for children living with asthma.

AIM AND OBJECTIVES OF THE STUDY

The aim of this study is to establish the impact of a school-based asthma health education programme on outcomes for asthmatic children in KSA as indicated by changes in quality of life, school absences, anxiety, knowledge of asthma, and attitude to asthma. The specific objectives of this study are detailed below.

Objectives

- To select a sample of schools from the north and south of the Ha'il region of Saudi Arabia and to assign these to the intervention or control groups.
- To recruit a sample of at least 150 boys and 150 girls with asthma from schools in the Ha'il region of Saudi Arabia.
- To establish pre-test measurements of children's knowledge, attitude, quality of life, anxiety, and school absences, and to repeat these at two post-test points.
- To implement a stable programme of specific health education in a child-friendly and age-appropriate manner to the intervention group.
- To explore the relationship between socio-demographic data and the outcomes data.

RESEARCH QUESTIONS

1. Is there a significant difference in the pre-test measurements of asthma-related in knowledge, attitude, quality of life, anxiety, and school attendance between children in the control and intervention groups?
2. Is there a significant difference in the post-test I measurements of asthma-related in knowledge, attitude, quality of life, anxiety, and school attendance between children in the control and intervention groups?
3. Is there a significant difference in the post-test II measurements of asthma-related in knowledge, attitude, quality of life, anxiety, and school attendance between children in the control and intervention groups?
4. Is there a significant difference between the measurements of the three phases (pre-test, post-test I, post-test II) in both groups in relation to the study variables?
5. Is there a significant difference between demographic categories (gender, age, income levels) in relation to the study variables (knowledge, attitude, quality of life, anxiety, and school attendance) before and after implementing the education programme?

SIGNIFICANCE OF THIS STUDY

This research sheds the light on one of the major issues in the KSA where environmental factors play the main role in triggering the incidence of asthma among children. At a national and international level, this study is one of few that include several health outcome instruments to test the impact of education on children with asthma and relate these outcomes to each other to develop new knowledge. The results will be used to influence national policy decisions regarding asthma education programmes for children living with asthma

RESEARCH DESIGN

A quasi-experimental, non-equivalent group, pre-test post-test design was planned. This is a commonly-used design when true randomisation of individuals is not possible and, therefore, equivalence of the experimental and control groups cannot be assumed (Polit and Beck, 2006). The structure of this design mirrors that of the randomised controlled trial, but without the initial randomisation of participants. In this case, the time-series of testing took the form of a pre-test immediately before the intervention, a post-test I after 1 month, and post-test II at 3 months. This design was useful to measure the change after the intervention and to test the cause and effect relationship (Dimitrov & Rumrill, 2003).

OVERVIEW OF THE THESIS

This section presents an overview of the content of each chapter of the thesis as described below.

Chapter 2: This chapter provides an overview of asthma, its progression, assessment, and therapeutic regimes. In addition, the prevalence of asthma in the KSA and the recent national and international asthma initiatives for asthma management are also addressed.

Chapter 3: This chapter provides a systematic review of the existing literature on asthma with an emphasis on the impact of education programmes. The chapter also addresses the gaps in knowledge in the existing literature regarding the effectiveness of using asthma education in children with asthma.

Chapter 4: This chapter details the design and methods used for this study. The education programme, study variables, study phases, methods of data collection, and methods of data analysis are also explained.

Chapter 5: This chapter presents the findings from the statistical analysis. Various statistical procedures were used assuming statistical power that is sufficient to make comparisons between groups. Results are presented in relation to the predetermined research questions.

Chapter 6: This chapter offers a critical discussion of the results in the context of current literature, noting what this study adds.

Chapter 7: The conclusion and recommendations chapter summarises the main findings from the study related to the impact of asthma education for children living with asthma. The implications of these findings for nursing and health care practice and areas for future research are highlighted. The limitations of the study are presented and the recommendations grounded in the study findings are addressed.

CHAPTER TWO: BACKGROUND

INTRODUCTION

This chapter provides an overview about asthma as a unique illness in children. The prevalence of asthma and factors associated with increasing asthma illness in children are also discussed. In addition, therapeutic strategies undertaken worldwide for managing asthma and barriers for implementing these asthma initiatives are emphasised.

Asthma a chronic inflammatory disease usually begins in childhood and is characterised by recurrent attacks of breathlessness and wheezing, which vary in severity and frequency from one person to another. Asthma is induced by long term inflammation of the airway passages due to the hypersensitivity of the nerve endings in the airways causing epithelial fragility, goblet cell hyperplasia, enlarged submucosal mucus glands, increased airway smooth muscle mass, and wall thickening (Bai & Knight, 2005). In the attack, the lining of the airway passages become swollen causing a reversible narrowing and obstruction in the airways which is clinically evidenced by wheezing, coughing, chest tightness, and shortness of breath (Bai & Knight, 2005; WHO, 2013).

In fact, the causes of asthma are not fully understood, but some potential contributory factors include environmental factors (i.e. respiratory virus infections, allergens, pollutants, medications or other irritants) (Wark & Gibson, 2006). Genetic factors (i.e. family history of asthma, racial and ethnic differences) (Eder, Ege & Mutius, 2006), and are also implicated long-term uncontrolled inflammation, and early life exposures to irritant substances (The British Thoracic Society, 2012; National Asthma Council Australia, 2011; Busse & Lemanske, 2001). The mechanisms are multifaceted, so it is probable that both environmental factors and genes determine asthma vulnerability (Busse & Lemanske, 2001; Ober, 2005). Clinically, asthma symptoms are shared with other diseases such as viral infections, particularly in young children and the elderly (Wark & Gibson, 2006). This feature makes it difficult to differentiate asthma from other respiratory disorders and difficult to estimate complications in many children leading to delay getting the diagnosis confirmed (Busse & Lemanske, 2001).

The treatment of asthma and maximum asthma control are impacted by patient knowledge, level of education, behavioural changes, adherence to management regimes, physician experience and confidence, and the availability of health care services (Masoli et al., 2004;

Ober, 2005). International and national evidence-based guidelines have been developed to assist both health care providers and patients to achieve optimal asthma control; their recommendations include enhancing corticosteroid prescription, minimizing β_2 agonist use, educating patients, and developing self-management skills (Wark & Gibson, 2006). Children are treated individually according to their drug tolerance, compliance to the therapeutic regimens, and response to the ongoing asthma plan (Masoli et al., 2004; Ober, 2005).

School age is a period of accelerated development in which new capacities and features are developed along with physiological, psychological and sociological changes appeared during this developmental stage (WHO, 2000). Children who suffer from a chronic health problem may develop a new sick role as a part of adaptation and coping with the new life experience leading to a distinctive response that may differ from other developmental stage (Kang & Weaver, 2010). Assessing children with asthma is one of the major concerns that are acknowledged to yield unique inferences and evidence that would help those delicate children to rebuild their self-esteem, body image, and confidence effectively.

PREVALENCE OF ASTHMA

Asthma is a worldwide significant health issue that needs various clinical and public health interventions. The estimated number of people suffering from asthma in the world is 300 million (Masoli et al., 2004). The prevalence of asthma increases as communities adopt western lifestyles (Masoli et al., 2004; Al-Ghamdi et al., 2008). Both morbidity and mortality from asthma are high despite treatment that is effective for the majority of patients. Even in developed countries where patients have easy access to treatment, asthma is often under-recognised and under-treated, and sometimes fatal (Masoli et al., 2004). It is estimated that asthma accounts for one in every 250 deaths worldwide (Al-Ghamdi et al., 2008). Many of these deaths are preventable and are due to suboptimal long-term medical care and delay in obtaining help during the final attack (SINA, 2012). The number of disability-adjusted life years (DALYs) lost due to asthma worldwide is estimated to be 15 million per year, which is similar to that for diabetes, liver cirrhosis, and mental disorders (Bousquet et al., 2005).

Although there is a varied picture of trends in asthma prevalence world wide, there are still some areas where little is known about the disease or no data have been collected. These include parts of Asia, Africa and South America. In areas where asthma prevalence has only been reported in single cross-sectional studies, there is also a scarcity of epidemiological data. These areas include Africa, Trinidad and Tobago, Dhakar, Albania, Greece, Nigeria, Israel,

Beirut, United Arab Emirates, Kuwait, Palestine, Tamil Nadu, India and Qatar (Anandan et al, 2010). Although asthma prevalence in many parts of the world is increasing, it is evident that there is a gap in the literature on asthma in Asia and the Middle East as indicated by the limited number of reports with conflicting results considering that the available evidence has rarely used cohort designs (Anandan et al, 2010).

RISK FACTORS FOR ASTHMA IN KSA

In Saudi Arabia, some factors increase the risk of asthma development or trigger symptoms in people with asthma, including both internal and external environmental elements such as infections, air pollutants, inhaled allergens, weather changes, chemicals, living in disadvantaged areas, occupational hazards, drugs, smoking, levels of exercise, educational status, economic status, emotional stress and certain foods (Saudi MoH, 2000; Al-Ghamdi et al., 2008; Hamilton, 2005). Indoor factors (in the home, school, and work place) are most commonly cited, as most asthmatic children tend to spend more time indoors (Samet, Marbury, Spengler, 1987). Other factors that aggravate asthma include under-diagnosis, lack of education, and poor health facilities and choice of treatment, along with poor adherence to the therapeutic regimes (Siersted et al., 1998).

Diet

Diet is a major source of allergen exposures for people diagnosed with asthma (Crapo, et al., 2004). Food can trigger an asthma attack due to an allergic response to foods such as peanuts, sesame, fish, dairy products, and eggs. Some people become wheezy when they have food containing certain additives such as tartrazine and histamine food (Fadillah, 2008). These food sources, which are common in use in the western-world as well as in Saudi traditional foods may exacerbate the situation and accelerate decline into an asthmatic attack. Knowledge about asthma was viewed as the most effective means to helping people to exclude nutrients that aggravate asthma symptoms from this diet. Evidence established by good quality clinical trials in the KSA revealed that children with better understanding and adherence to asthma nutritional regimes have significantly fewer of asthmatic episodes (Al-Ghamdi, et al., 2008; Fadillah, 2008).

Obesity

Obese children frequently experience severe or persistent asthma (Mosen et al., 2008). Obesity in children can also alter lung volume leading to rapid and shallow breathing patterns.

Obesity can also cause reduction of the peripheral airway diameter which leads to an increase in airway hyper responsiveness (Beuther, Weiss & Sutherland, 2006)

Infection

Infectious diseases impact on children's immune system development especially when children are exposed to viral, bacterial, or parasitic infection. Respiratory tract infection may lead to asthma. Infectious diseases from microbial agents may potentially aggravate the development of chronic asthma especially when it seems recurrent (Griswold, et al., 2005).

Smoking

Generally, tobacco smoke damages tiny hair-like projections in the airways (cilia). Smoking can also cause the lungs to produce excessive mucus which results in airway obstruction. In children, passive smoking, which is the most common, is a problematic issue that decreases the lung functionality and increases the symptoms of airway inflammation such as cough, wheezing, and increased mucous production (Sarnat & Holguin, 2007). Living in a family with parents that smoke, was also a positive risk factor for having respiratory symptoms in general and asthma in particular (Al-Dawood, 2001; Bener, et al., 1991). There is no obvious evidence about the rate of smoking among children in the KSA (Saudi MOH, 2000). However, many studies related the increase in the prevalence of asthma between children in KSA to the apparent smoking phenomenon between school children (Al-Ghamdi, et al., 2008; Fadillah, 2008). For that reason, asthma education about the role of smoking in aggravating asthma can contribute to increasing the awareness of that risk factor and decrease the overall cigarette consumption between school children.

Air pollution

Outdoor air pollution is usually associated with increased hospitalisation or emergency department visits for people with asthma. It also increases asthma mortality (Sarnat & Holguin, 2007). Environmental pollution stimulates asthma exacerbation, especially in big cities. It can increase the risk of an asthma attack and readmission to hospital (Arbex et al., 2007). In the KSA, air pollution is a major risk factor leading to asthma due to the accumulation of dust particles in the air which often exceed the upper limit recognized by the World Health Organisation (WHO, 2013). Increasing the level of desertification is the main cause of asthma in the KSA in addition to the toxic gas emissions from cars and industrial premises (Saudi MoH, 2000; Al-Ghamdi et al., 2008). It is emphasised that the only way to eliminate the effect of environmental factors is by decreasing the exposure to these risks as much as possible through increasing the individual orientation about the patterns and nature of these risks (Sarnat & Holguin, 2007).

Changes in weather

A sudden change in outside temperature can trigger an asthma attack such as cold air, windy weather, poor air quality, and hot or humid days (Mireku et al., 2009). Further to the previous facts, Saudi communities suffer from the fluctuation in weather which is a common trait of all gulf countries. Variation between day and night temperatures, sudden fluctuation in humidity, and differences in altitude (refers to the height above sea level), are the most common environmental factors associated with the development of asthma in the KSA. While it is not possible to modify the weather in the KSA it is possible to increase the likelihood of children's ability to modify their life style or change their personal habits (e.g. type of playing), strategies that family members can contribute to reducing the effect of the weather on their health status.

Exercise

Exercise induced asthma occurs when the airways narrow as a result of exercise (Henneberger et al., 2002). Exercise-induced symptoms occur commonly when the inhaled air is cold or dry due to air changes during vigorous activities. Typical symptoms of asthma present, such as shortness of breath, chest tightness, and cough (Carlsen & Carlsen, 2002).

Exercise can be a trigger for children when their asthma is not under good control, however, this does not mean that children with asthma should avoid exercise. As long as their asthma is under control, exercise is recommended to keep their lungs and body shape in a good posture and enhance normal growth and development. When asthma is controlled well or effectively, exercise will strengthen respiratory muscles, improve the immune system and help to sustain a healthy body weight. Swimming is one of the best forms of exercise for children with asthma because it usually causes the least amount of chest tightness especially in the KSA there are a plenty of beaches and swimming facilities available (Fanta & Fletcher, 2009).

Linked to the previous sections, changing personal life style and establishing habitual healthy patterns of behaviour may contribute to maintaining body fitness and relieving asthma symptoms altogether.

Stress

Physiologic stress such as inflammation or contagious diseases can cause wheezing and more vigorous asthmatic signs (Kang & Weaver, 2010). Psychological stressors such as anxiety can also result in shortness of breath and exaggerate asthma symptoms. On the other hand, stress can develop as a result of persistent wheezing and coughing which may contribute to further psychological stressors and depression (Schmitt diel et al., 2004).

Other risk factors related to the Saudi culture

Other risk factors are also associated with a high prevalence of asthma among Saudi children such as illiteracy of the parents, having a child in a family with a low income, the use of coal and wood for heating, living in a mud or tent house, lack of electricity inside dwellings, and the presence of sheep (Al-Ghamdi, et al., 2008; Alshehri et al., 2000). In the KSA, the nature of this life may characterise the vast majority of people especially who live in the rural and Bedouin. It is argued that many of the risk factors could be avoided by providing families and their children with sufficient knowledge about how to avoid the triggers that cause asthmatic symptoms (Al-Ghamdi, et al., 2008; Hijazi, et al., 1998).

ASTHMA GUIDELINES

Asthma cannot be cured, however, symptoms can be prevented and controlled in most cases when early detection of the disease is established, therapy guidelines are adhered to, and levels of knowledge are improved (National Asthma Education and Prevention Programme, 2007). To improve care, international guidelines (such as Global Initiative for Asthma (GINA), Global Asthma Initiative (The British Thoracic Society, 2012), Australia National Asthma Treatment Guideline, Canadian Thoracic Society (CTS) Asthma Committee) and national guidelines (KSA guidelines, 2012) for asthma diagnosis and treatment have been developed and updated to help physicians and patients achieve treatment goals and objectives of asthma. This includes preventing chronic symptoms, minimizing morbidity and mortality rates, maintaining a normal children daily activity levels, and decreasing hospital admissions and emergency visits. In addition, they contribute to reducing exacerbations of that disease, maximising lung function levels, prescribing suitable drugs to minimize adverse effects, reducing patients' negative perceptions, and saving time and money (Schmittdiel et al., 2004).

The guidelines are based on robust evidence, and studies show that they have helped to achieve the major objectives as well as diagnosing and treating asthma (Bateman et al., 2004; Dashash & Mukhtar, 2003). However, other studies such as Asthma in America, Asthma Insights and Reality in Europe (AIRE) and Asthma Insights and Reality in the Asia-Pacific (AIRIAP) indicate that asthma management falls well short of that recommended by the guidelines (American Lung Association, 2013).

For instance, the National Asthma Education and Prevention Programme (NAEPP) were established in the United States of America (USA) in 1991 to counter the continual increase

of asthma. The first expert panel guidelines focused on Asthma management and the main four components of effective asthma management are summarised in the table below.

Table 1: components of effective asthma management

National Asthma Education and Prevention Programme, 1991
<ul style="list-style-type: none"> • Use of objective measures of lung function to assess the severity of asthma and to monitor the course of therapy. • Environmental control measures to avoid or eliminate factors that precipitate asthma symptoms or exacerbations. • Patient education that fosters a partnership among the patient, his or her family, and clinicians. • Comprehensive pharmacologic therapy for long-term management designed to reverse and prevent the airway inflammation characteristic in asthma as well as pharmacologic therapy to manage asthma exacerbations.

The NAEPP recognised the importance of testing and updating the previous guidelines according to the best available evidence. Hence, the second Expert Panel came into existence in 1997 resulting in: “Expert Panel Report: Guidelines for the Diagnosis and Management of Asthma—Update on Selected Topics 2002” (Bethesda et al., 1997, 2002). The “Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma—Full Report, 2007” was the latest update of Asthma Diagnosis and Management (National Heart Lung and Blood Institute & National Asthma Education and Prevention Programme, 2007).

During 2002, a major change occurred in NAEPP guidelines as the practice of asthma relied heavily on the severity of the attack (Pollart & Elward, 2009). The 2002 guidelines divided the patients into groups according to the severity of their asthma and suggested treatments according to the new classification (Bethesda et al., 2002). This classification depended on evidence provided from the recent guidelines. However, it was found that patients with a pre-existing asthma diagnosis were more difficult to classify (Bethesda et al., 2002). The issue was that patients who received treatment when their asthma was not controlled were difficult to classify because these patients were more likely to receive more medication than usual and thus, it was difficult to determine the level of severity (Pollart & Elward, 2009). However, a

large number of patients were grouped together according to their exposure at the time of classification (Pollart & Elward, 2009). For instance, the patient during the allergic season may present with symptoms of a severe form of asthma according to guidelines which in other seasons may not appear.

Thus, the new guidelines did not work as expected due to the dependency placed on classifying patients with asthma according to the severity of the disease. Therefore, NAEPP members established new guidelines in 2007 to allow practitioners to classifying such special cases. A set of new concepts were integrated into the guidelines (Pollart & Elward, 2009). These concepts were: severity, control, and responsiveness to treatment. First, the clinicians initiated treatment according to the severity of symptoms then physicians had to monitor and adjust the therapy to control asthma according to response to this therapy (Pollart & Elward, 2009). The major differences between 2002 and 2007 guidelines are summarized in Table 2

Table 2: Overview of Changes to Asthma Guidelines: Diagnosis and Screening

Dimension of guidelines	2002	2007
Emphasis:	Classification of patient by severity	Asthma management based on clinical control
Definition	Impact of the disease on lung function <ul style="list-style-type: none">- Airflow limitation- its reversibility- Airway hyper-responsiveness	clinical, physiological and pathological characteristics <ul style="list-style-type: none">- Episodic shortness of breathing.- wheezing- cough
Diagnosis:	Reversibility of measurements of lung function enhances confidence in making a diagnosis of asthma	Often prompted by symptoms: <ul style="list-style-type: none">- episodic breathlessness wheezing, cough, chest tightness- Assessment of the severity of airflow limitation- Reversibility and variability confirms the diagnosis of asthma
Asthma Severity:	Amount of daily medications required for optimal treatment	Asthma severity is measured NOT by severity of the underlying disease BUT its responsiveness to treatment
Inhaled corticosteroids	Not mentioned as form of Therapy	Medication is shown to reduce exacerbation in children ≥ 4 years with moderate & severe asthma
Leukotriene-modifier	ADD-ON” Treatment Option	Controller Option

Since, many institutions and organisations have been established such as the Global Initiative for Asthma (GINA) that aim to increase public awareness of asthma. GINA was established in

1993 as a result of collaboration between National Heart, Lung, and Blood Institute, National Institutes of Health, and the World Health Organization (The Global Initiative for Asthma, 2012). The objective of GINA is to (1) increase public understanding of asthma; (2) find the reasons for the increased prevalence of asthma; (3) support research in the area of asthma and the environment; (4) reduce asthma morbidity and mortality and (5) find new strategies to manage asthma (GINA, 2012).

According to the National Asthma Council Australia (NACA) and Medicare Australia, an integral part of the Asthma Cycle of Care is the development of a written Asthma Action Plan (AAP), which assists the patient or carer in recognising the aggravation of asthma symptoms and, in an effort to prevent severe exacerbations, adjust asthma therapy accordingly, (NACA, 2007; Medicare Australia, 2011). On the whole, the Asthma Cycle of Care must include:

- At least two asthma related consultations within 12 months for a patient with moderate-to-severe asthma;
- At least one of these consultations (the review consultation) to have been planned at a previous consultation;
- Documentation of diagnosis and assessment of asthma severity and level of asthma control;
- Review of the patient's use of, and access to, asthma related medication and devices;
- A written asthma action plan (or documented alternative if the patient is unable to use a written action plan);
- Provision of asthma self-management education; and
- Review of the written or documented asthma action plan.

Although there is a paucity of research in the KSA conducted in the area of asthma control and prevention, the Saudi Thoracic Society (STS) has been established and uses current evidence derived from good quality research conducted outside of the KSA to develop programmes and guidelines to prevent and assist in early diagnosis of Saudi children with asthma. The Saudi Initiative for Asthma (SINA) group is a non-profit organisation which is responsible to the Saudi authority for creating guidelines and conducting research in the field of asthma in Saudi Arabia. SINA consists of a group of physicians and academics who have long-standing experience in the field of asthma (Dashash & Mukhtar, 2003). In the last few years SINA has accomplished many tasks. SINA was responsible for creating many education programmes and teaching asthma therapeutic strategies for children in primary care settings. It has created a useful internet website that has information about asthma in English and

Arabic (The Saudi Initiative for Asthma [SINA], 2012). This is hosted as a web based community through which physicians and academics share their experiences with each other. Researchers who are members of SINA take the lead in research into the impact of asthma on several aspects of children's lives (The Saudi Initiative for Asthma [SINA], 2012).

Abundant studies indicate that the guidelines are not completely implemented by health care providers: two studies in KSA alone reflect this: the first conducted in the Emergency Department in King Fahd National Guard Hospital and the second in the National Guard Iskan Primary Care Centre (Al-Jahdali et al., 2004; Dashash & Mukhtar, 2003). Reasons for the lack of implementation of the guidelines and a poor compliance to specific aspects of the guidelines are identified; they include the under-diagnosis of asthma, patient perceptions of asthma and its management, inappropriate medication choice, and the type and quality of the health care facility which includes the qualifications of the professional employees, the presence of health education programmes, and the cost of treatment in the hospitals (Dashash & Mukhtar, 2003). There is no evidence of using the Asthma Cycle of Care in Saudi Arabia. Rather, the action plan currently used does not match any established guideline.

ASTHMA CONTROL

As noted, the assessment of asthma control has become pivotal in the management of asthma. However, several surveys in developed nations have shown that the majority of patients with asthma do not experience adequate asthma control (Lai et al., 2003). Asthma control and the degree of severity of symptoms are related, however, they are different. Control is defined as sufficient disease treatment; while severity is concerned with the fundamental process of the disease (Carlton et al., 2005). Interestingly, some studies support the use of asthma control based on an asthma management approach rather than on severity (Yawn et al., 2006). Five symptoms, namely being awoken at night, limitations of daily activities, morning waking with symptoms, dyspnoea, and wheezing, as well as short β_2 acting agonist use and deficiency of lung function, are considered as the most important indications for control assessment in national guidelines in many countries (GINA, 2002; Saudi MoH, 2000; Australian National Asthma Council, 2004, British Guidelines on the Management of Asthma, 2013).

Asthma control is the main concern of treatment underpinning asthma management guidelines. It refers to the control of the clinical manifestations of the disease, and is the ultimate goal of asthma management (GINA, 2010). Suggested measures of asthma control include minimising day and night symptoms, bronchodilator use, and hospitalisation or

emergency department visits; preventing asthma attacks, and maintaining normal daily activity levels as well as normal lung function (Nathan et al., 2004).

A Turkish study involving 239 children implemented the Asthma Insights and Reality (AIR) survey to estimate asthma control levels based on the GINA guideline classifications (Sekerel et al., 2006). In this study just 1.3% of patients were found to have achieved an optimum control level, and around 75% and 90% of children and adults respectively were experiencing daytime symptoms. Inhaled corticosteroids (ICSs) have been recommended in persistent asthma regardless of the severity of symptoms (mild, moderate, and severe), but the success of asthma control is largely dependent on adherence to ICS daily use (Sekerel et al., 2006). Other self-management activities, such as education, Peak Flow Meter (PFM) use, monitoring of medication, trigger avoidance, inhaler practice, and use of Asthma Action Plans (AAPs) are also mentioned as contributory factors for relieving asthma symptoms (Williams et al., 2004; GINA, 2002; Rabe et al., 2000). Therefore, adherence to the therapeutic regime is a main goal in any asthma action plan. That said; there is a clear relationship between asthma severity and asthma control. The underlying severity of asthma in a patient may be modified by changes in the environment and by the treatment strategies which are based on strong asthma evidence. Ultimately, the changes in these environmental and treatment factors may impact on children's symptoms and their ability to function. Asthma control reflects the combined effects of underlying disease severity, environmental exposures and the effectiveness of treatment (Humbert et al., 2007).

A number of patient-related variables may influence asthma control. Laforest et al. (2006) conducted a cross sectional study to identify factors associated with asthma. The study found several independent patient-related determinants of inadequate asthma control, including female gender, active smoking and overweight. Control also varied according to the type of asthma supervision. Patients treated exclusively by specialists were more likely to have their asthma well controlled compared to those who were treated by a General Practitioner (GP). Patients who were dispensed combined long-acting beta-2 agonist (LABA) and ICS therapy were also more likely to have their symptoms properly controlled, particularly at higher doses of these drugs (Laforest et al. 2006). This good quality study controlled for the confounding variables, making the findings transferable to other settings.

Assessment of both asthma control and severity can depend on one or more of the following factors: symptoms, changes in expiratory flow, and airway inflammation. Assessments of

results vary depending on the methods used. As asthma is a chronic disease with varying severity and levels of control over time, it can be difficult to accurately assess it with one method at a particular point in time (Humbert et al., 2007; Rabe et al., 2004; Sekerel et al., 2006); therefore, the use of more than one method has been recommended in asthma control.

BARRIERS TO ADHERENCE TO ASTHMA MANAGEMENT GUIDELINES

Studies have reported some barriers that may reduce patient adherence to asthma treatment in general and to treatment with ICS in particular. These barriers are related to the medication (corticosteroid), the patients and their families, and physicians and other health team workers (Conn et al., 2005; Cote et al., 1997; Modi & Quittner, 2006), and income status (Bender et al. 2000).

Asthma has a measurable impact on how people assess their overall health status. The 2004-2005 National Health Survey in Australia showed that among people with asthma, 42% rated their health as 'excellent' or 'very good,' compared to 58% of people without asthma. At the other end of the scale, 28% of people with asthma rated their health as 'poor' compared to only 14% of people without asthma (ACAM, 2007). Most of the impact of asthma is on physical functioning and on the ability to perform social roles, such as work or study.

Several barriers have been shown to reduce the availability, affordability, dissemination and efficacy of optimal asthma therapies. As well as the patient barriers identified (such as poor education, culture differences and low income), the lack of symptom-based guidelines and low public health priority have been recognized as barriers to reducing the burden of asthma (Bousquet et al., 2005). Regarding children, ongoing asthma assessment is evidently deficient in the most of health care systems. Lack of early detection of asthma among school children or lack of the assessment of risk factors may contribute to low level of awareness and thus higher incidences of asthma (Suissa et al, , 2002; Modi & Quittner, 2006; GINA, 2010).

ASTHMA IN SAUDI ARABIA

Saudi Arabia is one of the largest countries in the Middle East and has one of the largest oil reserves in the world (Independent statistics and Analysis & U.S. Energy information Administration, 2012). The discovery of oil in the Kingdom in the late 1930s launched the country on a path of rapid social and economic development causing a marked impact on health (CDSI, 2012). Although the Saudi Government pays special attention to health, there

were no official organised statistics regarding asthma in Saudi Arabia (Al Frayh, 2012). More than 2 million people in Saudi complain of asthma attacks before being diagnosed as having asthma, which makes asthma one of the most common chronic illnesses and this prevalence is increasing (Al Frayh et al., 2001; Alamoudi, 2006).

A few studies have been conducted in the last 15 years to measure the prevalence of Asthma in children in Saudi Arabia (Al Frayh et al., 2001; Al-Ghamdy et al., 2000; Nahhas et al., 2012). A cross-sectional study was conducted in 2000 to explore the socio-clinical profile of asthmatic children and the impact of asthma symptoms on their life style in Al-Majmaah (n= 606; age= children \leq 13 years of age) (Al-Ghamdy et al., 2000). About 88% of the children presented with a combination of symptoms, a typical presentation of asthma in children. Of these, 51% presented with cough, 78% with dyspnea, and 91% with wheezing (Al-Ghamdy et al., 2000). Another cross-sectional study aimed to investigate the changing prevalence of asthma in Jeddah, Riyadh, Hail and Gizan regions of KSA (n=2123; age=8– 6 years old) using an internationally designed protocol in 1986 and 1995 (Al Frayh et al., 2001). The prevalence of asthma increased significantly from 8% in 1986 to 23% in 1995 ($P<0.0001$) (Al Frayh et al., 2001). However, due to the cross-sectional nature of the above two studies, the validity of the results could be impacted by the snap shot effect of these studies.

Another study with larger sample size was conducted to study the prevalence of asthma in school children (n=5663 age=6-16 years) in the KSA. The combined data revealed varying prevalence of asthma with the highest 24% being in a coastal city bordering Yemen called Gizan (n=362) followed by Taif 23% (n=594) and Hail 22% (n=507). The prevalence rate of asthma in other places was: Al-Qassim 16% (n=384), Abha 13% (n=485), Dammam 12% (n=889), Hofuf 14% (n=923), Jeddah 12% (n=531) and Riyadh 10% (n=988) (Al-Frayh & Hasnain, 2007). A very recent study was conducted to study the prevalence of Allergic Disorders among Primary School-Aged Children in Madinah (6–8 year old; n= 6,139). The results showed a high prevalence of asthma in children between 6-8 years, around 23.6% of school children in Madinah have asthma (Nahhas et al., 2012). However, another study has reported the overall prevalence in the KSA as 10% (Masoli et al., 2004).

Figures from Nahhas et al., (2012) study showed that Saudi Arabia is considered one of the highest risk regions in the world for asthma. These findings were augmented in previous research (Al-Dawood, 2001; Alshehri et al., 2000). The possible explanation for the increased prevalence of asthma in Saudi children could result from the increase of air pollutants caused

by larger vehicles the number and existence of factories close to housing unit's responds to the remarkable increase in the Saudi populations.

Although all previous studies were descriptive and cross sectional, they reflect the prevalence of asthma in the KSA and provide enough information about the distribution of cases over different regions in the Kingdom.

A number of studies, in Saudi Arabia, were conducted to investigate the reasons behind the significant prevalence of asthma among Saudi children. Several risk factors were found (Al-Ghamdi et al., 2008; Bazzi et al., 2011; Hijazi et al., 1998). Being a Saudi national was found to be one of main risk factors associated with asthmatic symptoms (Hijazi et al., 1998). It seems Saudi children have specific genes significantly associated with asthma (5 single-nucleotide polymorphisms (SNPs) in the interleukin 17 (*IL17*) gene—rs17880588 (G/A) and rs17878530 (C/T) in *IL17A* and rs763780 (T/C), rs11465553 (T/C), and rs2397084 (G/A) in *IL17F*—and a difference in the compared levels of the proteins (IL17A and IL17F) make them more susceptible to having asthma (Bazzi et al., 2011).

Living in urban areas and in cities at sea level is another significant risk factor for having asthma (Al-Ghamdi et al., 2008; Hijazi et al., 1998). A study was conducted to test the differences between the prevalence of allergic symptoms in children living in urban and rural areas of Saudi Arabia (n =1444; age 12 years old children). Logistic regression analysis highlighted that “urban residence” was one of the main risk factors responsible for asthmatic symptoms (Hijazi et al., 1998). One of the main causes of this finding can be the presence of *Alternaria* spores in urban areas, which is one of the main fungal spores that cause asthma (Kothari, 1993). A clinical study was carried out in several regions in Saudi Arabia to test the role of airborne *Alternaria* spores in causing asthma. A significant positive relationship was found between the presence of *Alternaria* spores and having asthma. *Alternaria* spores constituted between 1.9%-9.6% of the total fungal air spore, and the maximum concentration exceeded 5×10^2 spores per m^3 of air in Jeddah, followed by 4.9×10^2 spores per m^3 in Al-Khobar (Hasnain et al., 1998).

Belonging to a family with parents who smoke was also found to be another positive risk factor for having respiratory symptoms in general and asthma in particular (Al-Dawood, 2001; Bener, et al., 1991). Al-Dawood (2001) has studied risk factors for asthma by distributing a questionnaire to asthmatic children and asked some questions about smoking of

parents. In this study, it was found that the smoking rate among parents of children without asthma was significantly lower than that of parents of asthmatic children (Al-Dawood, 2001). Many other risk factors were found to play a major role in the asthmatic children in Saudi Arabia such as illiteracy of the parents, having a child in a family with a low income, the use of coal and wood for heating, living in a mud or tent house and lack of electricity inside dwellings (Al-Ghamdi et al., 2008; Alshehri et al., 2000). It can be observed that many of the risk factors mentioned in the above studies, apart from the genetic one, are modifiable and could be avoided by providing families and children with sufficient knowledge about how to avoid the risk factors that may trigger the asthma symptoms. For example, children illiterate of parents can be educated by both verbal and direct communication. Therefore, there is a need in Saudi Arabia for research that focuses on providing children with asthma with knowledge that they can use to promote their own health and prevent asthma attacks.

Several problems are associated with poor asthma management in Saudi Arabia. Children with asthma are more likely to be absent from school and are less likely to participate in physical activity compared to their healthy counterparts (Al-Dawood, 2002; Bener et al, 2007; Mohangoo, et al., 2007). Poor asthma management was also significantly associated with poor quality of life (QoL) scores. A strong negative correlation was found between QoL and the severity of asthma. As asthma severity increases, patients' QoL decreases (Horner, et al 2006; Mohangoo, et al., 2007; Rydström, et al., 2005; Van De Ven, et al., 2007). The adverse effect of poor asthma management extends to affect parents' QoL as well as that of the children (Gerald et al., 2006).

Most of the previous research conducted in Saudi Arabia focused on establishing the prevalence of asthma (Al-Ghamdy et al., 2000; Al Frayh et al., 2001; Nahhas et al., 2012) and also the risk factors that lead to high prevalence of asthma in Saudi Arabian children (Al-Dawood, 2001; Al-Ghamdi et al., 2008; Alshehri et al., 2000; Bener et al., 1991; Hijazi et al., 1998). Some researchers have tried to establish a cause and effect relationship between asthma and specific variables such as the presence of specific genes in Saudi children thought to be responsible for asthma (Bazzi et al., 2011), while others have studied the relationship between specific foods and triggering of respiratory symptoms (Farchi et al., 2003; Hijazi, Abalkhail, & Seaton, 2000). The aforementioned studies have mainly focused on the biomedical treatment and the physical health of the asthmatic patients without addressing other perspectives. Studying the illness from biomedical angle only is not enough as the other dimensions of care such as the psychosocial perspective are equally important. There is a need

to study the asthma and children from a wider perspective to ensure the quality of life of the children is improved while receiving the current therapeutic plan.

SUMMARY

The studies confirmed that asthma treatment is heavily reliant on health education as a source of disease prevention (primary-secondary-tertiary prevention approach). Children in the KSA may suffer from the disease more than those elsewhere because of the ecological, demographic characteristics, the prevalence of the asthma disorder, and the availability of medical and rehabilitation programmes (Al-Dawood, 2002; Bener et al, 2007; Mohangoo, et al., 2007). However, school children may benefit from better physiological and psychosocial performance when enrolling in health education sessions that help to promote their quality of life and improve their performed daily activities (Al-Ghamdi et al., 2008; Hijazi et al., 1998)

In summary, there have been a number of attempts to measure the prevalence of asthma and its impact in Saudi Arabia. However, the above studies did not unveil the outcomes of this illness among children in Saudi Arabia. Therefore, further research is required to shed light onto the outcomes for school children and strategies that should be undertaken to improve their quality of life.

CHAPTER THREE: EFFECTIVENESS OF EDUCATIONAL PROGRAMMES FOR CHILDREN WITH ASTHMA: SYSTEMATIC REVIEW

INTRODUCTION

In this chapter a systematic review is presented of the effectiveness of school-based educational programmes for children with asthma. The chapter is divided into two main sections: the methodology used to search for, categorise and appraise the quality of studies, and discussion of the evidence that is offered by the studies. The first part includes justification for the use of systematic review methods, search process, method used in assessing the quality of included studies and issues related to the quality of the excluded studies. The second part details the evidence relating to issues of importance to asthma education programmes. The chapter concludes with a discussion of the gap in current evidence based on the reviewed studies.

THE PURPOSE OF A SYSTEMATIC REVIEW

A systematic review is defined by the Cochrane online Handbook as: *A review of a clearly formulated question that uses systematic and explicit methods to identify, select and critically appraise relevant research, and to collect and analyse data from the studies that are included in the review (Higgins and Green, 2011).* A systematic review uses a rigorous method for searching, evaluating and synthesising evidence from literature to minimise bias. It answers a specific question rather than a general issue (Garg et al., 2008). A systematic review has precise objectives, overt criteria for inclusion and exclusion of studies, careful analysis of design factors, and detailed conclusions about the strength of evidence on a topic (Khan et al., 2011). Systematic review processes are used to locate, evaluate, and synthesis the available studies on a given topic using a rigorous scientific design, which must itself be reported in the review (Abalos et al., 2001).

The focus of systematic review is to provide a summary of findings for selected research studies in a predetermined area. It identifies variations in the research design used by the studies examined, giving an evaluation of study quality in each case and considering the suitability of the findings for generalization. In this way systematic review allows the highest quality evidence to be implemented into clinical practice, through answering health professionals' clinical questions. In this regard, systematic review method was used in this

study to assess the existing literature about the effects of educational intervention on children with asthma, answering the review questions and finally, identify areas which require further research. This would help healthcare providers; families and policy makers to improve the care provided for children with asthma.

METHOD

Search strategy

Systematic searching is a strategy used to locate and find the evidence of interest (Khan et al., 2011). The process of conducting a systematic review includes strict obedience to inclusion criteria during the process of study selection, through which bias in the data collection process is avoided and the research aim achieved. There exist clear procedures to guide the formulation of a systematic review, and following these creates a work which is transparent as to the processes that support the conclusions that are drawn (Morse and Richards, 2002).

In this study the Centre for Reviews and Dissemination (CRD) recommendations for guiding the literature search were followed. The PICOS framework was used to set the review question (CRD, 2009): Population, Intervention, Comparison, Outcomes and Study design. This framework ensures that the questions is focused, comprehensive and unambiguous and that the review is rigorous and thorough. The elements of PICOS are explained as follows.

P: Population. This is concerned with the target population who are approached by the researcher (CRD, 2009). This study is concerned with children suffering from asthma and aged ≤ 13 years from both sexes.

I: Intervention. This sets the nature of the intervention in the studies to be selected. The intervention of interest for this review was school-based educational programmes for children with asthma regardless of the means of delivery whether face-to-face classes, pamphlet, role-play, or online.

C: Comparison. This refers to the use of comparative interventions in establishing the effectiveness of an intervention. Studies that compared the educational intervention with no intervention (usual practice) were used.

O: Outcome. These details the dependent variables that the researcher wants to measure as a result of the intervention used in the study.

S: Study design. The research methods used in testing the proposed intervention should be stated. Only systematic reviews, randomised-controlled trials (RCT) or quasi-experimental studies were included in this review. These designs can establish a cause-effect relationship, establishing the effects of education interventions on children with asthma.

Overall, the PICOS was a means to set the review question as follows:

What are the effects of school-based educational programmes (I) on the knowledge, attitudes and perceptions (O) of children with asthma (P) when measured over time (S) compared to the usual practice of no planned intervention (C)?

Restricting the types of evidence to be included

Including only one type of study design in a review would reduce the risk of bias by increasing the homogeneity of the included studies (Higgins and Green; 2011). Although using restrictive design inclusion criteria resulted in returning fewer studies compared to allowing more heterogeneous study design inclusion criteria, the latter would have increased the risk of bias and additional confounding variables. The validity of the resulting evidence would be at risk.

Databases and Justification

The selected databases had advanced searching and filtering tools (Facchiano and Snyder, 2012b, Creswell, 2013). They were comprehensive databases, containing large numbers of journal articles related to the focus of this review. Table 3 summarises the databases used for aggregating studies from the literature.

Table 3: Databases and data sources searched, with related focus

Data Sources	Focus
Cumulative Index of Nursing and Allied Health Literature (CINAHL) via EBSCO	Captures items in English language which are sometimes missed by Medline, and also includes allied health professions literature which may be relevant to this review (for example, dietetics). Distinct US bias had been noted.
Database of the National Library of Medicine (MEDLINE) via OvidSP	A wide-ranging, international database which identifies most items from medical research presented in English. Distinct US bias has been noted.
American Psychological Association (PsycINFO)	Specific to psychological issues, but also with US bias.
Cochrane Central Register of Controlled Trials (CENTRAL),	The most important site for locating RCTs.
Cochrane Database of Systematic Reviews (CDSR)	Specific to systematic reviews
The British Education Index (BEI).	This British database redresses some of the problems of US bias in other larger databases.
Google Scholar	This indexes web pages rather than journal articles but is useful for its wide-ranging search and ability to identify references to studies that may have been omitted from other searches, allowing for academic search of published reports of the identified studies

Other sources

In addition to items retrieved from databases, publications cited in the retrieved reports were identified. This was done to ensure completeness and comprehensiveness of the search. Since

systematic reviews, RCTs and quasi-experimental research would be expected to be reported in journals, no search was made for grey literature.

Search Terms (Keywords)

Thesaurus searching involved the keywords listed in table 4. The search included the combination of these terms using Boolean logic (AND, OR) in order to ensure that researcher-identified combinations of terms or alternative terms would lead to retrieval of the most relevant studies, encompassing the factors clarified in the search question.

Table 4: List of keywords searched based on PICOS

PICOS	Applied to this review	Key words
Population	Children with asthma in Saudi Arabia	Children, Asthma, Saudi Arabia, School Student
Intervention	Educational programme	Education Intervention, Education programme
Comparator		Control, intervention
Outcomes	Factors affecting asthmatic child life	Self-efficacy, Quality of life, Anxiety, Attitude and belief, Knowledge of asthma, School absenteeism
Study design	Selected study design	RCT and Quasi experiments

Inclusion and Exclusion Criteria

Inclusion criteria

Reports of studies which met all of the inclusion criteria were eligible.

- 1) Experimental studies (including systematic review, RCT or quasi-experimental)
- 2) Focused on children with asthma
- 3) Intervention formed by an education programme
- 4) Intervention focused on schools
- 5) Reported within the previous 10 years. (Dramatic advances had been made in the treatment of asthma over the previous decade, so practices were likely to have changed significantly since such evidence was produced.)

Exclusion criteria

Of those reports which met the inclusion criteria, any which also met any of the exclusion criteria was eliminated.

- 1) Reports published before 2003.
- 2) Reports not in English language. (Most research studies conducted in the Arabic region are published in English due to lack of Arabic indexed journals.)
- 3) Reports of studies in which children diagnosed with additional chronic illnesses were included. (This could add ambiguity to the effect of each disease separately (Levy et al., 2006).
- 4) Reports of studies conducted in home, healthcare and community-based settings. (These were likely to include the influence of family and community members on the effectiveness of the programme as a third party.)
- 5) Reports of studies that focused on the views of knowledge only of teachers, parents, or guardians of children with asthma rather than on children themselves.)

Results of the search

Initially, the search resulted in 1256 items being identified. Application of the inclusion and exclusion criteria to review of titles and abstracts of these, together with identification of duplicates resulted in elimination of 1185. (See Figure 1.) The reasons for these exclusions were varied. Most were due to irrelevant citations (n=354) including studies that assessed asthma education but in the light of other research purposes such as medical advancement, policy development, and medical equipments innovations. The second most common reason for exclusion was the quality of the evidence: 303 studies were neither RCTs nor well-designed controlled trials. No systematic reviews were identified. A considerable number were descriptive, comparative cohort, and case control studies. A third reason for exclusion (n=64) was presentation in languages other than English. (In many cases, the abstract would be in English but the full text in another language.)

The remaining 71 studies were assessed further on the basis of full-text reviewing, resulting in the exclusion of a further 53 items. Nine were non-systematic reviews, while ten focused on cases which included additional chronic illnesses. Twelve studies were excluded because they were medical health education trials, and fifteen were removed since they were based on assessing the use of newly developed inhalers or pulmonary function tests. A further seven were discounted because they reported the assessment of effectiveness of using

communication technology or a treatment protocol rather than assessing the impact on children's quality of life.

The outcome of this process was that of 1256 items originally identified, 1238 were eliminated, so that 18 studies were included in the review (Figure 1). These are detailed in Table 5. The process of evaluating the whole search strategy was carried out by another independent researcher who was competent in systematic review to ensure the accuracy and comprehensiveness of retrieving studies from databases.

Figure 1: Process of selecting studies from databases search

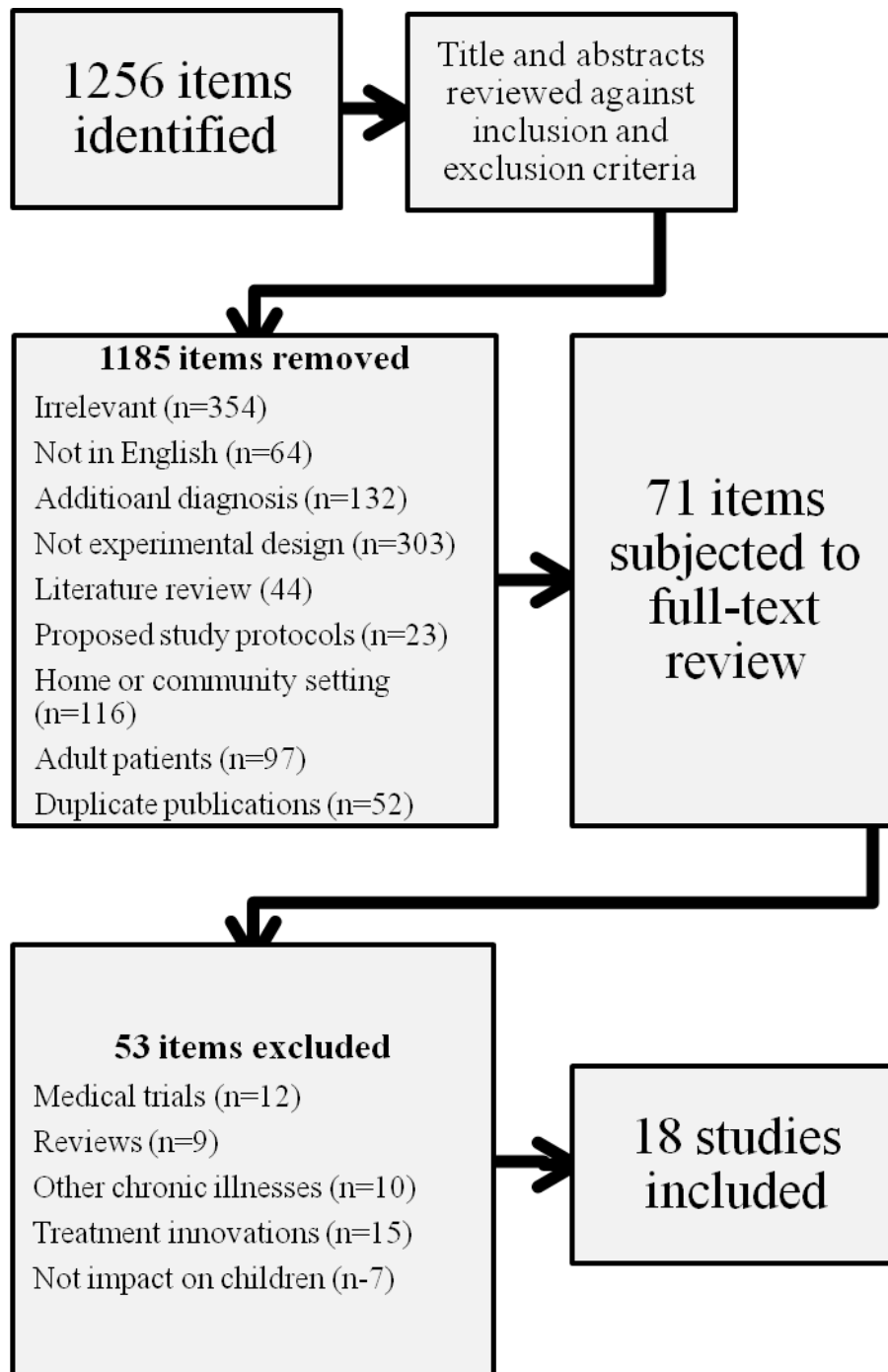


Table 5: Studies included in the review

Bartholomew, L., et al., (2006). Partners in school asthma management: evaluation of a self-management program for children with asthma. <i>Journal of School Health</i> , 76 (6): p. 283-290.
Bowen, F., (2013). Asthma education and health outcomes of children aged 8 to 12 years. <i>Clinical Nursing Research</i> , 22 (2): p. 172-185.
Butz, A., et al., (2005). Rural children with asthma: impact of a parent and child asthma education program. <i>Journal of Asthma</i> , 42 (10): p. 813-821.
Clark, N.M., et al., (2005). A trial of asthma self-management in Beijing schools. <i>Chronic Illness</i> , 1 (1): p. 31-38.
Clark, N.M., et al., (2004). Effects of a comprehensive school-based asthma program on symptoms, parent management, grades, and absenteeism. <i>CHEST Journal</i> , 125 (5): p. 1674-1679.
Cicutto, L., et al., (2013). A randomized controlled trial of a public health nurse-delivered asthma program to elementary schools. <i>Journal of School Health</i> , 83 (12): p. 876-884.
Cicutto, L., et al., (2005). Breaking the access barrier: Evaluating an asthma centers efforts to provide education to children with asthma in schools. <i>CHEST Journal</i> , 128 (4): p. 1928-1935.
Gerald, L.B., et al., (2006). Outcomes for a comprehensive school-based asthma management program. <i>Journal of School Health</i> , 76 (6): p. 291-296.
Horner, S.D., (2004). Effect of education on school age children's and parents' asthma management. <i>Journal for Specialists in Pediatric Nursing</i> , 9 (3): p. 95-102.
Kintner, E.K. and A. Sikorskii, (2009). Randomized clinical trial of a school-based academic and counseling program for older school-age students. <i>Nursing Research</i> , 58 (5): p. 321.
Levy, M., et al., (2006). The efficacy of asthma case management in an urban school district in reducing school absences and hospitalizations for asthma. <i>Journal of School Health</i> , 76 (6): p. 320-324.
McCann, D.C., et al., (2006). A controlled trial of a school-based intervention to improve asthma management. <i>European Respiratory Journal</i> , 27 (5): p. 921-928.
McGhan, S.L., et al., (2010). A children's asthma education program: Roaring Adventures of Puff (RAP), improves quality of life. <i>Canadian Respiratory Journal: Journal of the Canadian Thoracic Society</i> , 17 (2): p. 67..
McGhan, S.L., et al., (2003). Evaluation of an education program for elementary school children with asthma. <i>Journal of Asthma</i> , 40 (5): p. 523-533.
Patterson, E.E., et al., (2005). A cluster randomised intervention trial of asthma clubs to improve quality of life in primary school children: the School Care and Asthma Management Project (SCAMP). <i>Archives of Disease in Childhood</i> , 90 (8): p. 786-791.
Velsor-Friedrich, B., et al., (2005). A practitioner-based asthma intervention program with African American inner-city school children. <i>Journal of Pediatric Health Care</i> , 19 (3): p. 163-171.
Velsor-Friedrich, B., et al., (2004). The effects of a school-based intervention on the self-care and health of African-American inner-city children with asthma. <i>Journal of Pediatric Nursing</i> , 19 (4): p. 247-256.
Walker, J., et al., (2008). Factors that influence quality of life in rural children with asthma and their parents. <i>Journal of Pediatric Health Care</i> , 22 (6): p. 343-350.

Data Extraction

A data extraction sheet was prepared based on piloting one study out of the 18 studies (See table 8). Piloting helped in checking that the correct data structure was built and set up for exporting of data extracted from the studies. The sheet was developed to summarise information about each article included in this review. The extraction sheet was used to provide consistency in the systematic review (CRD, 2009). Data categories extracted were based on the CRD framework adopted in this study as described above. The aggregated information included article author; year of publication; place; type and size of sample; comparisons; type of intervention; main findings; and comments of study quality. A table which compiles summaries about all studies included in the systematic review was developed to show the strengths and weaknesses of each study. Data extraction was carried out by the researcher and checked independently by one of the supervisors to ensure internal consistency.

APPRAISAL OF STUDY QUALITY

Assessing study quality for validity and reliability enables researchers and healthcare providers to endorse the best available research evidence into practice (Facchiano and Snyder, 2012). It also highlights the strengths of study findings (Facchiano and Snyder, 2012b). Quality assessment required assessment of the suitability and appropriate application of the adopted methodology to answer the declared research questions (Facchiano and Snyder, 2012, Smith et al., 2011, Hemingway et al., 2012, Van Tulder et al., 2003). This is known as critical appraisal and comprises three main components: evaluating for validity, reliability of the research design, and applicability of the findings to the national or international population (Facchiano and Snyder, 2012, Smith et al., 2011, Hemingway et al., 2012, Van Tulder et al., 2003). Hence, this process involves evaluating the internal and external threats to validity and possible bias for each study included in this review.

HIERARCHY OF EVIDENCE

Although disputed (Facchiano and Snyder, 2012b), a hierarchy of source of evidence for medical and health interventions is often applied. According this hierarchy, the quality of the evidence (research findings) is classified based on a weight given to research designs used to generate the results of interest (Craig & Smyth, 2007). In this study, the recommendations of the Joanna Briggs Institute for Evidence Based Nursing and Midwifery were used to score evidence according to its methodological characteristics (The Joanna Briggs Institute, 2002).

As shown in Table 6, the best quality of evidence is drawn from systematic reviews (see table 6), followed by RCTs, followed by well-conducted quasi-experimental designs (Facchiano and Snyder, 2012a). In this review, RCTs were graded as being Level II evidence, while quasi-experimental studies were graded at Level III. Studies which would score IV-VI were not included in this review.

Table 6: Levels of evidence by Joanna Briggs Institute

Level	Description
I	Evidence taken from a systematic review of all good quality and relevant RCTs.
II	Evidence taken from at least one appropriately designed RCT.
III	Evidence taken from well-designed controlled trials, not randomized.
IV	Evidence taken from comparative studies such as cohort studies, case control studies from more than one research group or centre.
V	Evidence taken from single descriptive or qualitative studies
VI	Evidence taken from opinion of respected authorities, based on clinical experience, or reports of expert committees.

Critical appraisal

Regardless of the study design, it is not all RCTs are of the same quality (CRD, 2009). Thus, findings should not be implemented without assessing the quality of the selected studies. Hence, a plethora of tools have been developed to help researchers in assess the quality of research studies (CRD, 2009, Creswell, 2013, Brink and Louw, 2012). Of these tools, the tool developed by Hawker et al. (2002), was used to assess the quality of included trials in this review. This tool was used because it is applicable to quantitative studies such as RCTs and quasi-experimental studies. Further, a clear score would inform the reader about general quality of a given study, and assign it to a continuum of quality (Hawker et al., 2002). According to this tool, quality assessment is based on various factors, each factor is assigned a score, from 1, which indicates very poor to 4, which indicates good quality. It assesses the following items that include the abstract, title, introduction, aims, method, data collection, sampling, data analysis, ethics, bias, findings/results, transferability, implications, and usefulness (see Appendix 1) (Hawker et al., 2002). Each included study was given a total

score falling into one of the following categories: very poor (0-10points), poor (11-20 points), fair (21-30 points) and good (31-40 points). (See table 7).The main common problems and comments related to quality of the included studies are discussed in next, while the scoring of the studies will be explained later in the synthesised evidence tabe.

Table 7: Level of evidence and quality of the included studies

No.	Study	Level of evidence	quality score /36
1-	(Bowen 2013) USA	Level II	33 (Good)
2-	(Cicutto et al. 2013) Canada	Level II	26 (Fair)
3-	(McGhan et al. 2010) Canada	Level II	33 (Good)
4-	(Kintner and Sikorski 2009) USA	Level II	34 (Good)
5-	(Walker et al. 2008) USA	Level II	24 (Fair)
6-	(McCann et al. 2006) UK	Level II	31 (Good)
7-	(Gerald et al. 2006) USA	Level II	20 (Poor)
8-	(Bartholomew et al. 2006) USA	Level II	25 (Fair)
9-	(Levy et al. 2006) USA	Level II	23 (Fair)
10-	(Patterson et al. 2005) UK	Level II	31 (Good)
11-	(Butz et al. 2005) USA	Level II	31(Good)
12-	(Clark et al. 2005) China	Level II	23 (Fair)
13-	(Cicutto et al. 2005) Canada	Level II	31 (Good)
14-	(Velsor-Friedrich et al. 2005) USA	Level III	27 (Fair)
15-	(Horner 2004) USA	Level III	23 (Fair)
16-	(Clark et al. 2004) USA	Level II	32 (Good)
17-	(Velsor-Friedrich et al. 2004) USA	Level III	19 (Poor)
18-	(McGhan et al. 2003) Canada	Level II	28 (Fair)

REVIEW OF THE RIGOUR OF THE STUDIES

This review included 15 RCTs and 3 quasi-experimental studies. The following is the assessment of strength and weakness of studies.

Randomisation

All of the included RCTs randomised to a certain level of concealment. Randomisation was conducted on a school level to avoid contamination that could result as students from different study groups mixed within the same school. However, none of them overtly report how they randomly assigned participants to either intervention or control groups. The risk of confounding bias remains unknown (CRD, 2009, Rothwell, 2006).

Concealment

Concealment of group allocation to control or intervention is used to exclude selection bias (Schulz and Grimes, 2002). Sixteen studies failed to use concealment of allocation or did not report on the use of satisfactory technique to maintain splitting of the sample (Bowen, 2013, McGhan et al., 2010, Kintner and Sikorskii, 2009, Walker et al., 2008, McCann et al., 2006b, Gerald et al., 2006, Bartholomew et al., 2006, Levy et al., 2006, Patterson et al., 2005, Butz et al., 2005, Clark et al., 2005, Cicutto et al., 2005, Clark et al., 2004, McGhan et al., 2003, Horner, 2004, Velsor-Friedrich et al., 2004). These studies have increased risk of selection bias or they have (Horner, 2004) allocation bias (Velsor-Friedrich et al., 2004, Higgins and Green, 2008). Studies were examined for efforts to reduce or limit the researcher bias by blinding of investigators (Kintner and Sikorskii, 2009, Levy et al., 2006). However, no full or clear description of the blinding procedures was given by the researchers. Blinding of research assistants was reported in only one study (Kintner and Sikorskii, 2009), and of medical record auditor in one other study (Levy et al., 2006). The role of these personnel in conducting the studies was not fully described to enable the reader to judge the risk of bias or whether it was, indeed, possible to blind them this would depend upon whether they were involved in the intervention or only in collecting data. Therefore, I assume the studies are flawed to certain content in terms avoiding of bias.

Power

Sample size power calculations and measurement of confidence interval (CI) are crucial for adequate interpretation of findings, offering a guide to how likely the study results are to reflect the same characteristics in a general population (Hemming et al., 2011). However, only 2 studies (Patterson et al., 2005, Kintner and Sikorskii, 2009) of the 18 included in the review reported the use of power calculations. Doubt remained then about the adequacy of the samples in the remaining studies to support the conclusions that were drawn (Hemming et al., 2011). Moreover, one of the main issues to be considered in RCTs is attrition bias. Attrition bias refers to "systematic differences between the comparison groups in terms of participants withdrawing or being excluded from the study" (CRD, 2009, p 36). In this regard, unintentional bias can be introduced especially if the attrition rate is related to a consequence

or side effect experienced due to the intervention (CRD, 2009, Rothwell, 2006)., Loss to follow-up was reported in eight studies (Cicutto et al., 2005, McCann et al., 2006b, McGhan et al., 2003, Gerald et al., 2006, Horner, 2004, McGhan et al., 2010, Patterson et al., 2005, Butz et al., 2005) and ranged from zero in Velsor-Friedrich et al., (2005) to 27% in McGhan et al., (2010). The reasons for attrition were not always revealed but they were most often reported to be family relocation, worsening asthmatic condition, no longer suffering asthma, failed to return completed questionnaire, and lack of response to attempted contact.

SYNTHESIZING THE EVIDENCE

Four major areas of evidence were identified from the review: knowledge of asthma, children's absence from school and interruption of education, quality of life, and self-management of asthma.

Knowledge of asthma

Regarding the impact of asthma education on children's level of knowledge, four studies were evaluated as offering good (strong) positive evidence to support this relationship and to support the implementation of asthma education for all children with asthma (Bowen, 2013, Cicutto et al., 2005; Kintner 2009, Patterson et al., 2005,). Another three studies were found to be fair (moderate) level to support the impact of asthma education on children's knowledge (Velsor-Friedrich. 2005; Bartholomew. 2006; Levy et al., 2006). The rest of the studies were found to provide (weak) level of evidence to support positively this relationship and must be considered with caution.

A number of studies reported evidence that education increased children's knowledge of asthma symptoms, medication and the effective use of devices and hence this optimized control of their symptoms and reduced the impact of the disease (Bowen, 2013, Gerald et al., 2006). Further, Gerald et al. (2006) evaluated the impact of a comprehensive school-based asthma management programme on children's knowledge of asthma and school absence. The Open Airway for School programmes (OAS), developed by the American Lung Association (1986), and was taught to the children in six sessions of forty minutes duration over six weeks. It contained basic facts about medication use, the monitoring of symptoms and triggers asthma. Significant improvements in knowledge were reported in the immediate intervention group ($p < 0.001$). However, the study were sufficiently flawed to represent little reason to accept the findings. The authors did not report sample size or a power calculation to justify the study sample. The methods and instruments used in data collection were not

detailed and no concealment of allocation was used to minimize selection bias. This study supported findings by the results of a previous randomised controlled study that was also conducted in the USA by Butz et al. (2005) in which a four hour education programme was delivered over two sessions to children with asthma to evaluate its effectiveness in improving knowledge of asthma, self-efficacy, and health-related quality of life. After 10 months, children in the intervention group reported higher mean scores on asthma knowledge (mean=12.45) than those in the control group (mean 10.8) $p<0.001$). Bartholomew (2006) found similar results and reported that children who were treated with an asthma self-management programme had greater knowledge than those in the control group ($t=453$, $p=0.0001$).

Significant and positive outcomes from an education programme was reported in trials where education was combined with another intervention such as counselling and health status monitoring (Kintner and Sikorskii, 2009, Levy et al., 2006). Kintner and Sikorskii (2009) tested the efficacy of a school-based academic (teaching) and counselling programme for 60 children with asthma from grades 4 to 6 in the USA (intervention $n=38$, control $n=22$). The study showed an improvement in children's asthma knowledge in terms of reasoning about asthma, use of risk-reduction behaviours, and participation in life activities with significant difference between those children who received the programme and those who did not ($p<0.01$) (Kintner and Sikorskii, 2009). This was a randomised controlled trial with reported sample size calculation, power calculation, and random assignment to intervention group and control group. Three years earlier, another RCT evaluated implementation of a case management programme in urban school districts in the USA (Levy et al., 2006). This case management programme comprised an asthma education programme, weekly monitoring of student health status, and coordination of care. In the study, 243 children were randomly assigned to an intervention group ($n = 115$) or control group ($n= 128$). A knowledge test as well as a telephone survey were used to audit of hospital and emergency department visits and school attendance. The researchers reported a significant difference in improvement in knowledge score directly after the education programme between intervention and control groups ($P<0.001$). The intervention consisted of delivery of the OAS curriculum to students in a weekly group setting at school, weekly monitoring of students' health status (following up on absences and symptoms with students, families, and teachers), and coordination of care (contacting students, family members, school personnel, and medical providers to facilitate disease-management and to mitigate environmental triggers at school and at home).

More recently, an RCT was conducted on children living in urban area in USA to evaluate the impacts of a school-based educational programme on children's knowledge of asthma and to measure their health status (Bowen, 2013). A total 32 children (intervention group n=15, control group n=17) with a mean age of 9 year) formed the sample. The intervention was the modified OAS programme. In this course children (aged 8-11 years) were instructed in physiology of asthma, detecting warning signs of asthma, device use, and avoidance of triggers. It was conducted as weekly 90 minutes sessions for three weeks. Asthma Control Test, Paediatric Asthma Quality of Life Questionnaire, and Spirometry Machine were used to measure outcomes. The findings showed that the baseline knowledge score in the intervention group was 70%. The knowledge score was significantly increased to 80% at first follow up and to 90% in the second follow up compared to 50% in the control group ($F= 19.028$, $P< 0.001$).

However, improvement in children's knowledge of asthma was not reported in all trials. A quasi-experimental study conducted in USA to examine the effects of a school-based education programme on children's knowledge of asthma and self-management practice reported no significant improvement in levels of knowledge or self-management practice (Velsor-Friedrich et al., 2004). A total 102 children (intervention group n=40, control group n=62) aged 8-13 years were recruited and the OAS was employed. It was not clear whether the findings of this study were sufficiently rigorous as no randomisation, concealment, sample size or power calculations were reported. With moderate (fair) evidence on the effect of education programmes, the lack of concealment and justification of study design, the evidence was not adequately rigorous to be considered.

Children's absenteeism and attendance interruption

Four studies showed a fair evidence level to support that children's absenteeism and attendance interruption were reduced through asthma education (Walker et al., 2008, Levy et al., 2006, Clark et al., 2005, McGhan et al., 2003). Two studies with good evidence showed a strong positive relationship between asthma education and school absenteeism Cicutto et al., 2005, Cicutto et al., 2013).

All six studies reported significant likelihood ($p<0.05$) that children who attended asthma education programmes would be less likely to be absent compared with students who did not (Cicutto et al., 2013, Walker et al., 2008, Levy et al., 2006, Clark et al., 2005, Cicutto et al., 2005, McGhan et al., 2003). A Canadian RCT by Cicutto et al. (2005) examined the effects of an asthma education programme (Roaring Adventure of Puff programme) on children's

performance in terms of absence and quality of life in elementary schools. The programme was delivered to children through a one hour session every week for six weeks. The researchers recruited 256 children (intervention group n=132, control group n=124) from grades 2-5 (age 8-11 years) in 26 schools. Two years after the programme, there was a significant difference in the mean number of missed school days between the children in intervention group (Mean 3.0, SD 4.4) and the control group (Mean 4.3, SD 5.7) showing less absenteeism in the intervention group. For children with severe asthma symptoms, the researchers reported a significant reduction in the number of interrupted days in the intervention group compared to control group (6.2, SD 7.3; 9.1, SD 10.3 respectively) (Cicutto et al., 2005). Similarly, a study by McGhan et al. (2003) in Canada also showed significant difference in mean scores for the number of missed school days for children with less missed days in the treatment group (mean 53.4 days/year) than those in the control group (mean 64 days/year; $p < 0.05$) (McGhan et al., 2003).

A further study in the USA assessed the effects of a comprehensive school-based education programme on children with asthma and measured school absence and academic performance (Clark et al., 2004). In this study, the researchers recruited 835 children aged 7-11 years from grades 2-5 (intervention group 7 schools, 416 children; control group 7 schools, 419 children). The OAS programme was introduced to the intervention group with no significant difference between groups in terms of the number of missed school days ($p > 0.05$). The only course that showed a significant difference in scores between groups was the science course in which children in the treatment group scored higher grades than their counterparts in the control group (mean 0.27, 0.44, $p = 0.02$). This effect was attributed to the content of the education programme that was pertinent to science such as pulmonary system anatomy and physiology and the problem-solving programme activities that were thought to enhance the children's ability to solve and deal with science problems (Clark et al., 2004).

On the other hand, the remaining two studies with a good evidence level reported that education programmes were not effective and that no significant difference was found between treatment groups and control groups (McGhan et al., 2010, Clark et al., 2004,). This evidence was also shown by four studies with fair evidence (Walker et al., 2008; Bartholomew et al., 2006; Horner, 2004, Velsor-Friedrich et al., 2005) and two poor studies (Gerald et al., 2006; Velsor-Friedrich et al., 2004). For example, the study by Gerald et al. (2006) measured school absence as the main outcome and showed no significant reduction in the mean of school missed day in the intervention group ($p > 0.05$).

Since the majority of good and fair studies reported no significant effect of education programmes on absenteeism and attendance interruption, and those which reported a significant effect were mostly of weaker quality, then it had to be concluded that the evidence was still not clear and further investigation was required.

Education and Quality of life

In relation to the impact of asthma education on the quality of life, different levels of evidence were concluded. Of those eight studies which investigated this relationship, four suggested that asthma education programmes for children could improve their quality of life in terms of activity level, symptoms, and emotional domains. Two of these studies were considered to provide a good level of evidence (McGhan et al., 2010, Cicutto et al., 2005), and the others were appraised as offering fair evidence (Cicutto et al., 2013, McCann et al., 2006).

A Canadian RCT followed up a group of 206 children with asthma age 6-13 years (intervention group n=104; control group n=162,) 6 and 12 months after commencing an education programme, and assessed the feasibility and outcomes of the programme (McGhan et al., 2010). The study measured children's quality of life as the main outcome using the Paediatric Asthma Quality of Life Questionnaire, although school absenteeism, symptoms experienced, medication use and hospitalisation were also reported in the study. The education programme was a standardised national programme called "The Roaring Adventure of Puff". The programme comprised six parts (40 to 60 minutes sessions) covering different topics related to asthma. Results showed improvement and significant difference in total quality of life score for children in the intervention group (mean 5.9) compared to the control group (mean 4.9, $P < 0.05$) at 12 months follow up.

Four years earlier, a similar RCT in the UK with good quality tested the relationship between quality of life and the education programme for children aged 7-9 years (n=193) (McCann et al., 2006a). Similar to the findings of McGhan (2010), the quality of life of the treatment group improved significantly compared with the control group: 42% of children in the intervention group showed improvement and significant difference in quality of life score compared to only 27% in the control group (Chi-Squared 8.1, $p=0.02$). Further, Clark et al. (2005) tested the effects of the OAS programme (Chinese version) on quality of life of children with asthma in selected Chinese schools (N=639, age 7-11 years). Children were tested at baseline and one year after the programme with improvement and significant

difference in quality of life scores between groups (mean change: -0.132 intervention group v.-0.577 control group, $p = 0.04$).

In another RCT in Canada, Cicutto et al. (2013) evaluated a school-based asthma education programme delivered by a public health nurse ($N=1316$, mean age 8.2 years). They measured the effects of the programme on quality of life; symptom control and school absenteeism. In the one-year follow up, the results showed significant difference between groups with improvement in the intervention group in regard to quality of life (intervention mean 5.8, SD 1.2; control mean 5.4, SD 1.4, $P<0.0001$) and effective inhaler use (Mean= control 2.5 SD=1.2 v. intervention 3.4 SD=1.2 $p< 0.0001$).

However, improvement of quality of life was not shown in four studies, three of which were rated as good studies (Bowen, 2013, Patterson et al., 2005, Butz et al., 2005), and one which was rated as fair (Walker et al., 2008). For instance, the American study by Walker et al. (2008) evaluated the factors with high effect on quality of life of children with asthma ($N=222$, mean age 8 years, SD 1.7). Children in the intervention group were given an education course in form of a short workshop, asthma device training and booklets. The quality of life for children was measured using the Juniper's Paediatric Quality of Life Questionnaire before the intervention and 10 months later. No significant difference was found between groups ($p>0.05$) indicating no improvement of quality of life.

Similarly, another RCT was conducted by Patterson et al. (2005) in the UK tested the effectiveness of an education programme on quality of life for 173 children with asthma aged 7-11 years. The programme comprised sessions for 8 weeks, and quality of life was measured before and after the education programme. No significant difference was detected in the mean quality of life score between the intervention and control group (mean of difference $p=0.20$). This study matched groups to reduce potential bias.

With these conflicting findings, it is not still clear that such education programmes would have an effect on children with asthma in a different culture such as that of Saudi Arabia.

SELF-MANAGEMENT OF ASTHMA

Self-management of asthma for children was also an important issue that could be influenced by asthma education and it was represented in two main aspects: self-efficacy and parental involvement in children's self-management of medication use.

Self-efficacy

Self-efficacy is defined as the belief and goals that individuals hold regarding their life and abilities and their capabilities to achieve these goals (Ormrod, 2006). Of the eighteen studies in this review, only 5 evaluated children's self-efficacy and acknowledged that effective education programme might improve self-efficacy of children with asthma. Four of them were conducted in the USA and one conducted in Canada: two good quality studies (Butz et al., 2005, Cicutto et al., 2005), two fair quality studies (Velsor-Friedrich et al., 2005, Bartholomew et al., 2006), and one poor quality study (Velsor-Friedrich et al., (2004).

Velsor-Friedrich et al., (2004) reported that children in the intervention group that attended an asthma education programme showed a significant improvement in self-efficacy scores measured by the Asthma Belief Survey. The baseline score was 4.03, SD 0.10, which increased significantly to 4.23, SD 0.10 after five months ($p=0.046$). Children in the intervention group had a higher self-efficacy perception score and improved self-management practice which correlated with improved asthma control (Velsor-Friedrich et al., 2004). Regardless of the poor evidence this finding may indicate that education influenced and improved children's ability to control and manage asthma.

One year later, Butz et al. (2005) acknowledged a significant improvement in children's self-efficacy after implementing an asthma education programme (mean score change +2.62, SD 6.3, $p=0.005$) The study conducted on 210 children and their families, of them 105 were included in the educational intervention.

Bartholomew et al. (2006) reached the same conclusion on reporting similar findings after the implementation of an educational programme for school children with asthma in the USA ($N=982$, mean age 7.7 years). Although the study is fair evidence, it reported significant improvement in self-efficacy ($p=0.027$) and knowledge of asthma ($p < 0.0001$) in the intervention group compared to the control group. In addition, some aspects of self-management practice and behaviours such as recognising triggers, adhering to medications and identifying asthma symptoms were also measured using the Usherwood Symptom Questionnaire, analyzed using factor analysis and reported to be positively affected by the education programme (Bartholomew et al., 2006).

It appears that there may be a relationship between the improvement in knowledge of asthma, self-efficacy and management practice. This was observed in the form of fewer symptoms and fewer asthmatic attacks reported in children that received the education intervention in this study and an other four studies (Bartholomew et al., 2006, Velsor-Friedrich et al., 2004, Butz et al., 2005, Cicutto et al., 2005, Velsor-Friedrich et al., 2004).

Parents' involvement in child's self-management

Parents involvement in asthma management for their child was improved after school-based education programmes, and a significant difference was reported between parents who received the programme and those who did not ($p=0.003$) (Horner 2004). This study also found that children's self-management behaviour improved in children who received a self-management programme with significant difference from those in the control group ($p=0.003$).

One year later, asthma self-care practice was found to be influenced by an education programme shown by the higher scores in the treatment group ($F_{1, 49}=7.62$, $p=0.01$) (Velsor-Friedrich et al., 2005). Further, the study by Butz (2005) also showed that symptoms identification as part of symptom management by parents and self-management skills was significantly improved from pre-intervention to post-intervention for all variables (give child asthma medication when child starts to have cough, wheeze, and inability to talk; count child respirations when child is coughing or wheezing; and make an appointment with child's physician for asthma care even when child is not sick) ($p=0.05$). Moreover, a year later, similar findings were also reported by Bartholomew et al., (2006) who found that children who received an asthma self-management programme had significant improvement in self-management of asthma episodes than controls ($T_{1188}=2.63$, $p=0.0087$).

It seems that different interventions had different effects. Bowen (2012) introduced an intervention over 3 weeks, with one 90-minutes interactive session per week. The intervention was a modified version of the OAS programme, a culturally relevant, interactive group programme designed to be delivered to school-age children during school hours. The study found no significant difference between children who experienced a modified OAS and those in the control groups ($F=1.001$, $p=0.32$).

DISCUSSION AND IMPLICATIONS

The results show that the outcomes of interest were not measured in all included studies. In this regard, the majority of the studies (7 of 8) demonstrated that education interventions would improve children's knowledge, self-efficacy (5 of 8), and quality of life (4 of 8). However, 8 studies out of 14 found no significant reduction in school absenteeism in children who attended an asthma education programme.

Eight of included studies were found to be of good quality, eight of fair quality, and two of poor quality. Overall, the quality of the evidence that can be drawn from this review must be considered to be of fair to good quality. However, a number of concerns need to be taken in account when applying the results of this review in clinical practice. Authors did not report the use of concealed allocation or blinding, Further, the results of the review demonstrated considerable inconsistencies in terms of methodology, interventions, outcome measurement instruments, and number and type of outcomes measured. This produced incompatible results where some results were apparently conflicting. Therefore, it is difficult to make many helpful conclusions from the synthesized research evidence.

Psychological stressors such as anxiety can result in worsening health status of children with asthma. For example; children with asthma reported feelings of stress and anxiety when wheezing and coughing. Despite the important role of stress and anxiety in the management of asthma, anxiety level was not measured as outcome in the included trials. This is a serious gap in the evidence base.

Additional complexity is added to interpretations of studies due to the inclusion of parents in some studies, though children were usually assessed separately. While parental influence is likely to be a major factor in asthmatic children's knowledge, attitudes, and behavior, it was important to understand how much children can understand, learn and change behavior as their specific part of the interaction. While it is difficult to establish this from the reviewed literature, this was the intention in the study reported in this thesis.

In common with some previous reviews, this systematic review showed effectiveness of school-based education programmes for management of asthma. There are many implications of this review for clinical practice. Several questions have been raised that should be addressed.

- Why are there different effects of programme elements on educational programme for asthmatic children in schools?
- Why do results vary in different countries and cultures?
- Why do results vary from the different outcome measures?
- What is the effectiveness of the educational programme if applied on a large or small scale?
- Would additional or different findings have been discovered if other research designs had been include in the review?

LIMITATIONS OF THE REVIEW

This systematic review excluded non-English publications which may create a publication bias and missed more detailed cultural perspective on the effectiveness of educational programmes on management of children with asthma. However, the majority of Gulf health publications are disseminated in English rather than Arabic. Despite this, this review was able to compare study studies from different methods through a systematic appraisal process.

SUMMARY

Regardless of the limited number of the studies included in this review, knowledge about asthma, absenteeism, quality of life and self-management of asthma were the most important issues investigated when seeking the impact of asthma education programmes on children with asthma. It was concluded that the evidence had inconsistent levels of quality to support that asthma education programmes had a positive effect on children's knowledge. Studies were, sometimes, deficient to providing robust methodological characteristics to enable acceptance of their findings. There was a lack of concealment throughout the majority of studies. The evidence on the effect of educational programme on children's absenteeism and interruption was not clear but seems to be moderate. Further, the evidence that asthma education programmes improves children's quality of life in terms of activity level, symptom, and emotional domains was also inconsistent. Therefore, there is still a need for further attempts to test the effect of education programmes in other cultures such as the KSA.

A range of information gained from this systematic review was useful for the development of asthma education in this study. Methodological shortcomings observed in the reviewed studies have encouraged stressing on issues surrounding concealment, quality and components of asthma education materials. In this study where asthma education took place

in school children community, all factors found to be influenced by asthma education were introduced. Quality of life, knowledge of asthma, attitudes towards asthma, anxiety level, and school absenteeism were all integrated in this study. While a number of the reviewed studies failed to control some confounders, this study addressed these issues and controlled the implementation of the study intervention in a way to that maintains consistency and in both control and intervention groups.

Table 8. Data Extraction sheet of the reviewed studies

Study	Methods			Impact of education on the measured outcomes.
	Design	Sample	Level of concealment (RA**, AC*, B* _v)	K=Knowledge SM=Self Management QoL= Quality of life A= Absenteeism
1- (Bowen, 2013) USA	RCT	N=32 I=15, C=17 AR= NR Age= 8-12 years	RA** For Schools AC* = NR B* _v = NR	K= Improved (p<0.001) QoL= NS
2-(Cicutto et al., 2013) Canada	RCT	N= 170 schools with total of 1316 children I = 85 schools C=85 schools AR= 11% Mean of age = 8.2 years	RA** For schools AC* = NR	QoL= Improved (p <0.0001) Improved activity level, symptom awareness, and emotional status A= Reduced (p <0.01)
3-(McGhan et al., 2010) Canada	RCT	N=206 I=104 C=162 AR= 27% Age= 6-13 years	RA** For Schools AC* = NR B* _v = NR	QoL= Improved (p<0.05) symptoms, emotions A= NS
4-(Kintner and Sikorskii, 2009) USA	RCT	N= 60 I =38 C= 22 AR =NR Age= 9-12 years	RA** For schools AC* = NR B* _v for both recruiter and evaluator	K= Improved (p<0.01) public awareness and knowledge about asthma QoL= Improved (P < 0.05) Unrestricted participation in life activities A= NR (But recommended in the study for future research)

5-(Walker et al., 2008) USA	RCT	N= 221 I=130 families C=91 families AR= NR Mean Age= 8 years, SD 1.7	RA** For schools AC* = NR B* _v = NR	QoL= NS A= Reduced (p<0.05)
6-(McCann et al., 2006) UK	RCT	N= 219 I=12 schools (106 pupils) C=12 schools (113 pupils) AR= 22% Age= 7-9 years	RA** For schools AC* = NR B* _v = NR	NS QoL= Improved (p =0.02) Physical activity A= NS
7-(Gerald et al., 2006) USA	RCT	N= 736 Age= No age given 3 cohorts over 3 years Grad 1 to 4 AR=7%	RA** For schools and cohorts AC* = NR B* _v = NR	K= Improved (p <0.001) A= NS
8-(Bartholomew et al., 2006) USA	RCT	N=982 I = 260 children C=243 children AR: 479 Mean of age =7.7 years Grades 1 to 4	RA** For schools AC* = NR B* _v = NR	K= Improved (p <0.001) Self management of asthma exercise pretreatment self-management SM= Improved (p <0.027) A= Declined. P=0.02
9-(Levy et al., 2006) USA	RCT	N= 243 I=115 children C=128 children AR= NR Age 6-10 (Mean=7.7 years) Grades 1 to 4	RA** For schools AC* = NR B* _v Only during medical record audit	K= Improved (p <0.001) Symptoms recognition A= Reduced (p <0.05)

10-(Patterson et al., 2005) UK	RCT	N= 174 I=Immediate group (11 schools) C= Delayed group (11 schools) Age = 7-11 years AR= 1.7%	RA** For schools AC* = NR B* _v = NR	QoL= NS Confident interval= -0.02 to 0.61
11-(Butz et al., 2005) USA	RCT	N= 210 (Child/parent families) I=105 families C= 105 families AR= 9% Age = 6-12 years	RA** For schools AC* = NR B* _v = NR	K= Improved (p <0.001) SM= Improved (p =0.005) QoL= NS
12-(Clark et al., 2005) China	RCT	N= 639 children from 21 schools I and C not clear AR= reported as number Age = 7-11 years	RA** For schools AC* = NR B* _v = NR	QoL = Reduced (p=0.04)
13-(Cicutto et al., 2005) Canada	RCT	N= 256 I= 132 children C=124 children AR= 3% Age = 6-11 years	RA** For schools AC* = NR B* _v = NR	SM= Improved, (p <0.05) QoL= Improved, (p <0.05) Activity, symptom and emotional A= Reduced, (p <0.05)
14-(Velsor-Friedrich et al., 2005) USA	Quasi- Experi- mental	N= 52 I= 28 children C=24 children AR= 0% Age = 8-13 years	RA**= NR AC* = NR B* _v = NR	K= Improved (p= 0.03) SM= Improved (p= 0.01) A= NS

15-(Horner, 2004) USA	Quasi- Experi- mental	N= 44 I and C not clear Age = 7-11 years AR= 24%	RA**= NR AC* = NR B* _v = NR	A= NS
16-(Clark et al., 2004) USA	RCT	N= 674 I=7 schools-416 children C=7 schools- 419 children AR=NR Age = 7-11 years	RA** For schools AC* = NR B* _v = NR	NR A= Reduced (p=0.02)
17-(Velsor-Friedrich et al., 2004) USA	Quasi- Experi- mental	N= 102 Eight schools but conveniently assigned to groups, I= 40 children C=62 children AR= NR Age = 8-13 years	RA**= NR AC* = NR B* _v = NR	K= NS A= NS
18-(McGhan et al., 2003) Canada	RCT	Eight schools with N= 162 I = 76 students C= 86 students AR= 16% Age = 7-12 years	RA** For schools AC* = NR B* _v = NR	A= Reduced p<0.05
AC*: Allocation concealment, RA **: Random allocation, B*_v: Blinding ; AR: Attrition Rate, NS: Not significant, NR: Not Reported. I: Intervention group, C: Control group				

CHAPTER FOUR: METHODOLOGY

This chapter justifies the quasi-experimental research design used in this work. It also discusses critically the instruments used to measure outcomes and how two of these were translated into Arabic. In addition, key concepts from Social Cognitive Theory are used to critically determine the methods of delivery for the asthma education programme and to support the notion that children can learn about asthma and that such learning may be used to benefit their health and well-being. It is anticipated that the results from this study will add to the current body of knowledge regarding the usefulness of a school-based asthma education programme designed and delivered to Saudi children and that the results will further understanding about the impact of this in the context of Saudi culture. Moreover, the results from this study will inform the development of national policy and practice regarding Saudi children living with asthma.

The systematic review presented in the previous chapter highlighted the relationship between asthma education and beneficial outcomes for children related to their well-being, quality of life and academic achievements. The extent to which children living with asthma acquire knowledge and benefit from effective health education is explained in part by the concept of self-satisfaction, derived from Bandura's (1986) Social Cognitive Theory. This, combined with the notion of children's agency underpins the expectation that children living with asthma can learn something about their asthma and use this learning to benefit their health and well-being. However, while asthma education has been studied in different cultural contexts, the issue remains largely unexplored in the KSA. The cultural and social norms within Saudi society might impact on the intended outcomes of asthma education reported from research undertaken elsewhere. It is argued in this chapter that experimental studies are needed to examine the outcome of health education given the complexity of the relationship between culture and social norms and individual children's responses.

Previous studies relating to children living with asthma in the KSA have focused on technical manipulations in clinical practice. Others conducted elsewhere have not considered the impact of factors associated with variations in health care systems, such as differences in primary school education, students' follow-ups, and regular asthma screening. This study takes account of these factors and will further understanding about health education approaches and how they function in the unique Saudi context.

As noted in chapter 3, randomised controlled trials (RCT) are considered the ‘gold standard’ to generate high quality evidence for practice and policy (Facchiano and Snyder, 2012a). However, while the results of this study will influence and inform the KSA national policy on health education for school children, it was not feasible or desirable to undertake a RCT in the context of a programme developed for delivery in schools. While it may have been possible to randomly allocate children into the intervention and control groups within in local schools, the risk of contamination between groups would have adversely impacted on the reliability of the results. The following discussion explains the reasoning behind the choice of a quasi-experimental design.

RESEARCH DESIGN

This study was undertaken using a non-equivalent pre-test post-test quasi experimental design. Quasi-experimental designs were popularised by Campbell and Stanley (1963). Quasi-experimental designs are similar to RCTs as they are used to establish the relationship between an intervention and an outcome but with a difference in the strategies of having a control group or the random allocation of the sample to the intervention or control group (Reichardt, 2009). According to Shadish et al. (2002), there are 4 design types that are consistent with quasi-experimental studies: quasi-experimental designs without control groups; quasi-experimental designs that use control groups but no pre-test; quasi-experimental designs that use control groups and pre-test and interrupted time-series designs without randomisation. In particular, quasi-experimental designs may not satisfy the assumption of randomisation while selecting study subjects due to obligated conditions (Harris et al., 2006).

Quasi-experimental studies are often used to examine the effects of certain interventions on a specific population (Campbell and Stanley 1963). Furthermore, quasi-experimental designs allow for comparisons between groups using statistical analysis, which enables a detailed examination of any difference between the treatment and control groups (Harris et al., 2006).

In this study, each specific design was considered (control group, pre-test/post-test, and time-series). As the current study was designed to determine the effect of a school-based asthma education programme on outcomes for children living with asthma it was not possible or desirable to randomise children to an intervention or control groups. The intention was to recruit children from individual schools and deliver the asthma education programme to the entire sample within that school. The reason for not recruiting the study groups randomly is that the possible risk for contamination which might occur at school level as well as at the level of the individual child. It was noted that in the North area of the selected region there are

many schools at close locations, so some children who had not had the intervention ideas might still have been communicated with. Furthermore there was a potential risk for sampling bias as the schools for each region were not randomized into intervention and control groups and children from each selected school were also not randomized accordingly. This may have introduced the risk of bias because of the sampling methods used in this study. As noted by Reichardt, (2009) random allocation of the sample to different groups within the same school would have risked contamination between the groups and the validity of the findings. A quasi-experimental design also satisfied ethical concerns about excluding children who may see others benefit from the intervention. That said, the health education programme was to be delivered to those children allocated to the control group on completion of the final measures. This is discussed in more detail later in this chapter. Added to this, the quasi-experimental design allowed for comparisons between the groups using statistical analysis, to enable a detailed examination of any difference between the intervention and control groups (Harris et al., 2006). This is of particular importance in this study as the findings are to be used to inform a national strategy regarding asthma education programmes.

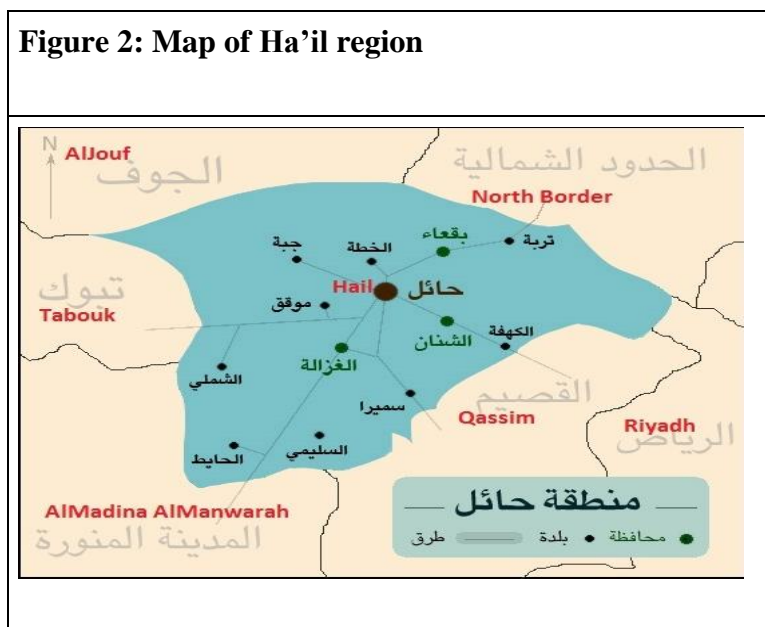
However, there were other challenges to be faced. The critical appraisal of others' studies had highlighted a number of potential threats to the validity of the study findings. As presented in the previous chapter, the importance of coherence and consistency in design were key in producing good quality research. Producing valid and reliable findings in quasi-experimental designs is much more complicated than in correlational studies. An important aspect is defining the relationship between the variables under study as not doing so would limit the methodological coherence. For this reason, the variables used in this study were drawn from careful consideration of previous research to ensure that there was no negative or detrimental conceptual influence between the concepts. As noted by Dimitrov and Rumrill (2003) study variables should be complementary in a way that justifies all elements of the intervention.

As quasi-experimental research can be expensive it was important to assess the resources required to make sure these were available before committing to the design. Moreover, quasi-experimental designs can be intricate, complex and time consuming prior to achieving reliable results (Dimitrov & Rumrill, 2003). However, the evidence obtained from these studies is highly regarded in respect of the hierarchy of evidence.

THE STUDY LOCATION

This study was undertaken in Ha'il; a city located in the northern region of Saudi Arabia.

Figure 2 illustrates the geographical location of Ha'il city.



The education of children in Ha'il is delegated to two educational directorates; one is responsible for the north of Ha'il and one is responsible for the south of Ha'il. In total, there are 298 public schools and 4 private schools which provide primary education for 29,553 Saudi male pupils and 1,475 non-Saudi male pupils. For girls, 249 public schools and 4 private schools provide the primary education. There are 28,043 Saudi female pupils and 1,353 non-Saudi female pupils (MoE, 2014). As discussed in chapter two, the population of Ha'il according account for 22% of those diagnosed with asthma (Al-Frayh & Hasnain, 2007). On a more practical level, it is where I reside and work, it thus presented an ideal location for the study.

ETHICAL APPROVAL

It was a requirement that the study receive ethics approval from the University of Salford and the Ministry of Education (MoE) in KSA before any research work commenced. In KSA it is mandatory that all researchers that intend to work with school children apply for and are granted ethics approval. An application was submitted to the MoE detailing the aim of the research, the intended participants and the region that had been selected to conduct the study.

The committee approved the application on condition that evidence of ethics approval from University of Salford was received (see appendix 2).

At the University of Salford, the Health and Social Care Research and Innovation Committee have delegated responsibility for ethics approval to the Staff and PGR College of Health and Social Care Research Ethics Committee. Part of the submission required a detailed research design with justification for the sample size and participants, consideration of potential risks or harms and detailed participant (and in this case) parent information leaflets.

The research proposal went through several iterations between April 2012 and April 2013 before the final draft was completed. Advice was sought from academic supervisors and researchers undertaking similar work to ensure that the methods addressed the study's aim and objectives. The recommendations highlighted the need to describe any risks posed to the children involved, the potential benefits accrued as well as the potential benefits to society. After responding to all suggestions made, the Salford University Research, Innovation and Academic Engagement Ethical Approval Panel confirmed its approval at the meeting held on April 10, 2013 and assigned HSCR12/85 as evidence of this (please see appendix 3).

TARGET POPULATION

The target population for this study was children aged 7 to 12 years, living with asthma attending primary school in the Ha'il region. It was decided to recruit children from the south and assign them to the control group, while those recruited from the north were assigned to the intervention group. Selection of potential participants was done by establishing how many children in the first school in the region had asthma. Once those meeting the inclusion and exclusion criteria had been identified and recruited to the study, the next nearest school was identified and the selection and recruitment process repeated. This process was followed until the number of children determined by the power calculation (discussed later) had been recruited to the intervention and control groups. A total of 5 schools in the south and 5 schools in the north were needed. Assigning children to groups by region was done to minimise the risk of contamination between the control and intervention groups as mentioned earlier. Although there was no statistically significant difference between the control groups, a potential threat to validity of the study was lack of randomisation of schools while recruiting children for the study sample. The decisions taken to prevent compromise of the study by students from control and intervention groups having verbal contact resulted in the control group being taken from schools in the south of Ha'il and the intervention group being taken from students in the north of Ha'il were based on the assumptions that the two groups of

children were similar. However, ideally participants from both control and intervention groups should have been taken from both north and south and randomised within each group. This would have eliminated any perceived threats to validity in relation to age differences and possible greater existing knowledge about asthma, anxiety and quality of life.

Inclusion and Exclusion Criteria

As discussed earlier, the incidence of asthma among school children in KSA is remarkably high and this places a considerable burden on the health care system in the Kingdom. Policy makers have raised concerns about the management of asthma among school children and are developing a strategy to decrease unexpected complications in the future. For that reason, this study focused on school children with asthma to assess the impact of asthma education on children at this developmental stage.

Inclusion Criteria

To be included in the study all participants had to meet all of the inclusion criteria. The inclusion criteria for eligible children were as follows:

- They had to be attending primary school.
- They had to be resident and attending school in Ha'il City.

They had to be diagnosed with asthma.

Exclusion Criteria

If any of the exclusion criteria were met, then the potential participant had to be excluded.

- Aged 6 years or less or 13 years or older.
- Unable to speak Arabic
- Currently attending or previously attended an asthma education programme.

SAMPLE AND SAMPLING METHOD

Convenience sampling was used to recruit children into the study. This sampling strategy is a non-probability sampling technique where subjects are selected based on their accessibility and proximity to the investigator (Polit and Beck, 2008). Reasons for not recruiting the study sample randomly related to the inability of the researcher to split children into two discrete groups while providing the asthma education programme in the same setting. For that reason, the sample was recruited conveniently for both control and intervention groups.

The process of recruiting the study sample for both groups started with assessing the medical records of the children (which are held by the school) to determine an initial number of those diagnosed with asthma. However, acknowledging that not all records were up-to-date, for instance when students had recently transferred to the school, students between the ages of 7 and 12 years were also asked if they had asthma. This process identified additional children. The latter group was also subject to further checks for medical history and using the following questions:

- Have you ever had an attack of wheezing (a whistling noise that comes from the chest)?
- Have you ever had attacks of shortness of breath with wheezing?
- Does your breathing become normal in between attacks?

If the child responded positively to all three these questions they were considered asthmatic.

Once identified permission from the children's parents was sought before any further contact with the children was made. All students mentioned in the list that met the above criteria were selected conveniently for participation. Thereafter, the process of obtaining informed consent from both participants and parents is considered later in this chapter.

SAMPLE SIZE

It is estimated that there are 10,000 children aged 7-12 years in the Ha'il region of Saudi Arabia and that 2200 (22%) of these have asthma (Al-Frayh & Hasnain, 2007). Based on the data supplied by Juniper & Styles, (1996), the smallest clinically significant difference in the total score for quality of life in the PAQLQ is 0.42 points, with an SD between subjects of 0.71 points. Following guidance by Campbell et al (1995), it is calculated that to reach 80% power and significant level of $p=0.05$, the minimum sample size to ensure statistically significant results would be 45 in each group. The major reason for selecting power at this level of significance is to avoid type I and type II errors. However, in order to consider differences between age groups and to avoid exclusion of children from participating schools, a sample size of up to 150 boys and 150 girls in each arm was planned: a total sample of up to 300 children (14% of the children with asthma).

Alternatively, sample size can be determined based on the proportion of children who suffer from asthma in this region. As proportion is estimated at 22%, sampling equation will be as follows (Daniel, 2009): $n=z^2pq/d^2$ where (z) is the statistical z score based on 95% confidence

interval and is equal to 1.96; (p) is the estimated proportion; (q)= 1-p; and (d) is equal to α at 0.05. Based on this, the measurement of sample size was $n = (1.96)^2 (.22) (.88) / (0.05)^2$ **n= 297.49 which is equal to 298 subjects**

Critical appraisal of studies included in chapter 3 revealed that researchers failed to avoid type I error (rejecting a true null hypothesis) due to setting an improper α level when using either one or two tailed hypotheses. It has been argued that type II errors (accepting a false null hypothesis) occur more frequently in social and medical studies due to improper study power β , which can be avoided by increasing the sample size. Smaller sized samples noted in studies considered in chapter 3 failed to do this; consequently the results had to be viewed cautiously.

An additional factor was the variations in the number of students for each gender. There are more males in Ha'il region in the age group of interest. Since the participating children would be predominately male, increasing the sample size would mitigate this. In total a sample of 228 subjects, 122 males and 106 females of which 130 subjects were from the north (75 males and 55 females) while the remaining 98 subjects (51 males and 47 females) from the south was achieved.

RECRUITING THE RESEARCH ASSISTANTS

The cultural practice of selecting children by gender for education was also of significance in this study. It is a general rule in the KSA to separate male and female students into completely isolated premises and education staff. Males are not allowed to access those premises used by girls under any conditions in accord with the local culture and social norms. Consequently, it was not possible to have a single person deliver the asthma education programmes to both girls and boys. Rather, it was necessary to recruit a woman for this purpose. Therefore, one male and one female research assistants were recruited. However, to avoid personal bias a decision to recruit two research assistants was taken with myself acting as a liaison and providing training for the research assistants to maintain consistency in the delivery of the educational materials. A further cultural consideration was that selecting research assistants from the same cultural milieu as the children would improve their access to schools and acceptability to parents.

The selection of research assistants involved a meeting with the head nurse of the King Khalid Hospital, which is the main referral hospital in the Hai'il region. During this meeting the research was discussed and his assistance sought. Following this, recruitment flyers (see

appendix 4) were posted on the nursing notice board on the paediatric floor. The recruitment flyer explained the purpose and aims of the study along with the researcher's contact information. The flyer reported that only two nurses would be recruited, one from each gender. Recruitment criteria were agreed with the head nurse as follows:

1. A Saudi national. This criterion was set to make sure that he/she understood the Saudi culture and context and that they would be fluent in Arabic. This ensured that the research assistants would have the relevant background information to encourage participation during delivery of the asthma education programmes. Previous researchers have not provided clear justification about the identity of research assistants or the person delivering the health education. However, as noted earlier, it was necessary to pay due regard to cultural expectations and norms.
2. Have a BSc in nursing. This criterion was set to ensure that those recruited would be familiar with the management and treatment regimes for children with asthma. In addition it was agreed with the head nurse that a nurse with a BSc qualification would have the advantage of an appropriate education background that included research awareness and that they would have more experience of working with sick children in the hospital.
3. Have at least two years of experience in dealing with children diagnosed with asthma. This criterion was agreed so that those recruited would be familiar with the signs, symptoms and treatment options. This criterion was also set to ensure that the research assistants would feel comfortable when working with the children in a classroom setting.

In the first week, five nurses (all males) contacted the researcher and expressed their willingness to participate in the research. Despite all five nurses being Saudi nationals and having worked with children, none met the criteria. Two held a diploma in nursing and had less than two years experience; the remaining three had no experience of working with children with asthma. Although disappointing, the five responses indicated that there was interest from the staff in the hospital in contributing to this work. A week later, a further six nurses (4 males and 2 females) contacted the researcher and expressed their interest in becoming involved in the study. Of these, two (one male and one female) met the criteria and were recruited. The male nurse had 5 years experience working as a qualified nurse while the female nurse had 3 years experience in working with children diagnosed with asthma. In fact,

there was no financial benefit gained from participation in the study as research assistants. Rather, nurses were keen to join this study to acquire experience in this uncommon interventional research in the region, something is acknowledged as credentials for them according to their point of view.

PREPARING THE RESEARCH ASSISTANTS

The next step was to arrange meeting with the research assistants to plan for their preparation. The purpose of the meeting was to explain what was intended and to discuss their role as research assistants would be. It was important for them to have sufficient time to reflect on these discussions before asking them to become fully involved. Four meetings followed (each lasting for 4 hours) during which their preparation was completed. In the first meeting, they were introduced to the research topic, provided with an overview about the study, a copy of the research protocol and explanation of the inclusion and exclusion criteria that would apply to the children. The recruitment process was discussed in detail in the second meeting. This involved the practical issues that needed careful consideration when assessing the eligible participants. Following this, target dates and the key requirements of the research were discussed. In addition, the assistants agreed on dates that they would be available to deliver the asthma education programmes and undertake data collection activities. Following this, the final two meetings focused on the content of the asthma education programmes. It was important that their competence in delivery of the content and their ability to successfully work with children in schools was established. A list of possible risks to the study was also discussed to mitigate these. Finally, using evidence based guidance on the content of asthma education programmes collaborative agreement on the most appropriate manner to implement and deliver the programme was reached. However, regular follow-ups after taught sessions were held to discuss what had happened and ensure consistency in delivery.

OUTCOME MEASURES

As discussed earlier in this thesis, asthma can impact on several aspects of children's lives including their physical and emotional well-being. As discussed in chapter 3, health education is acknowledged as a major part of the effective management of asthma; especially for children (Phipatanakul, 2004). The purpose of most health education is to improve knowledge and change behaviour and attitudes in people who have partial or complete deficit in issues related to their health. The purpose of the health education intervention proposed in this study was to enhance outcomes related to children's knowledge, attitudes, and behaviours, and their

quality of life. In addition its contribution to lowering anxiety levels and school absenteeism was sought. As such, four standard instruments were selected to ensure that the impact of the intervention on these outcomes could be examined. This also meant that recommendations arising from this study would be grounded in the findings of a good quality experimental study.

Paediatric Asthma Quality of Life Questionnaire

In order to develop this tool, Juniper & Styles, (1996) explored the functional problems associated with asthma with regard to physical, emotional, and social well-being through a review of the literature and discussion with children, their parents, and their physicians during clinic visits. Almost 100 problems initially emerged; these were reduced to generate a questionnaire for review by children of 7-17 years. Twenty-three questions over three domains were identified and tested through cognitive debriefing to ensure understanding and acceptability among children and young people with asthma in this age range. Cognitive debriefing technique was used to trigger children's thinking process and to enhance their ability to elicit their life experiences (Raat et al., 2005).

This tool was specifically designed for children between 7 and 17 years of age, and it can be completed by children themselves (Raat et al., 2005; Tauler et al., 2001). The authors of this instrument are not alone in arguing that children with asthma are the only individuals who on reflect their problems (Juniper & Styles, 1996). The reliability of this instrument has been tested in many studies from several countries Sweden (Reichenberg & Broberg, 2000), Spain (Tauler et al., 2001), and the Netherlands (Raat et al., 2005). An added bonus was that it was also available in Arabic (Juniper & Styles, 1996). To ensure the validity of the Arabic version, cultural adaptation and linguistic validation was undertaken (Juniper & Styles, 1996). The Paediatric Asthma Quality of Life Questionnaire (PAQLQ) was designed to test the functional problems (physical, emotional and social) that are most worrying to children with asthma (Juniper & Styles, 1996). The questionnaire consists of 23-items measuring the child's symptoms (10 questions), emotional function (8 questions), and activity limitation (5 questions). When completing this questionnaire, children are required to recall their last week and answer the 23 questions on a 7-point scale (7=not bothered at all, 1=extremely bothered). It is claimed that the instrument is able to detect small, clinically significant differences in severity of symptoms between children. This adds further rigour to the psychometric properties of the instrument that eliminate any possible threats to the validity of the findings. In fact, further explanation of how quality of life is being improved is critical to understand in which aspect the participants gained improvement and therefore, which element is most

affected by asthma education. This instrument was used after gaining permission from the author (see appendix 5)

Spence Children's Anxiety Scale (SCAS)

Anxiety is one of the concepts that have received little attention in the context of asthma education. While there are many relationships that determine anxiety level, asthma was assumed to be the major factor aggravating anxiety in those children. Although anxiety is a substantial part in the quality of life measurement, measuring anxiety individually may also support the results gained from other instruments and add further understanding to the experiences of children living with asthma.

The SCAS scale evaluates the level of anxiety symptoms broadly aligned with the aspects of anxiety disorder proposed by the DSM-IV (Ishikawa et al., 2009; Spence, 1998). Similar to PAQLQ, this tool was developed through a collection of 80 items developed by searching the literature, drawing on the clinical experience of four clinical psychologists who specialised in anxiety disorders, existing child anxiety assessment measures, structured clinical interviews, and the DSM diagnostic criteria. The SCAS had been rigorously translated and tested in Arabic by Al-Baini (2010) and found to be culturally acceptable and valid for use in this study. In addition, all items included in the scale have no cultural-based issue which makes this scale applicable to other people and settings.

The final number of items for this scale was 44 items (Appendix 6). The SCAS consists of six sub-scales and a total of 44 items distributed as follows: six items each for separation anxiety, social phobia, obsessive compulsive problems, panic, and generalized anxiety/over-anxious symptoms, three items for agoraphobia, five items for fears of physical injury, and 6 items considered as positive filler items to reduce negative response bias. Out of the total 44 items, 23 questions were further developed and pre-tested for cognitive debriefing to ensure that children were able to understand all questions easily while ensuring that older children would not be insulted. Children are required to answer the 44 questions on a 4-point Likert scale (0=never, 3= always).

The validity of this scale was attained by evaluating the convergent, discriminate validity, and test-retest reliability. Moreover, construct validity of the SCAS was obtained through a comparison of two groups of children, one group clinically diagnosed with anxiety disorder, and the other not. The internal reliability co-efficient alpha was 0.93 (Spence, 1998). The

Spence Children's Anxiety Scale is valid to use for children who are aged between 7 and 12 years old.

Asthma Knowledge Questionnaire (AKQ)

This instrument was developed to measure primary school children's (8-10 years old) level of knowledge about asthma (AlMotlaq & Sellick, 2011), (Appendix 7). The instrument consists of 24 questions (23 true/false items and one open-ended question). The original Newcastle Asthma Knowledge Questionnaire aimed to assess the knowledge of parents of children with asthma. The instrument was initially tested through the face validity and appropriateness of the 31 items on the NAKQ for the target population (Fitzclarence and Henry, 1990). The final version of the NAKQ consists of 25 true/false items and six open ended questions that provide a comprehensive assessment of the key domains of asthma knowledge including: general data about asthma, triggers, symptoms, and asthma treatment and management. The tool has been used extensively by the researchers to test adults with and without asthma (Allen et al., 2000), the child care workforce (Hazell et al., 2006), asthma educators (Allen et al., 2000), teachers (Gibson et al., 1995; Henry et al., 2004) and parents of children with asthma (Fall et al., 1998; Ho et al., 2003; Khan, 2003). The domains of the NAKQ are well constructed, with evidence of construct and discriminate validity, high internal consistency of items and test-retest reliability (AlMotlaq & Sellick, 2011).

AlMotlaq & Sellick (2011) have checked the wording of items in their study to ensure clarity and visibility to the target population. Ten items were excluded because these items used technical terms or difficult language that would not be understood by an 8 to 10-year-old child, or were designed to assess parents' understanding of asthma treatment or doctors' rating of the severity of asthma. The remaining 21 items included 18 that needed a true/false response and three open-ended questions. To ensure that key domains of asthma knowledge were covered (general facts, triggers, symptoms, treatment, and management), eight items from existing asthma knowledge instruments (Meyer et al. 2001; Bahari & Abdrahman 2003; Ho et al. 2003; Martinez & Sossa 2005) were added. The second step was to test that the wording of the 29 items could be understood by primary school-age children, and to identify any item repetition. This process resulted in the rewording of some items and merging of others to produce a final list of 23 true/false items and one open-ended question.

The modified version included 23 true/false items and one open ended question that asked 8- to 10-year-old children to list three symptoms of asthma. For the purpose of the this study, the modified version of the original AKQ developed by AlMotlaq & Sellick,(2011) was used

after gaining the permission from the authors (see Appendix 8). However, this modified version is only available in English and therefore translation into Arabic was needed. The translation process will be described later in this chapter.

Asthma Attitudes Questionnaire (AAQ)

This instrument consists of 15 questions on a 6-point Likert scale ranging from 1=Strongly Agree to 6=Strongly disagree (Gibson et al., 1995) (See Appendix 9). It assesses attitudes towards asthma in four main domains: (1) tolerance towards asthmatics (eight questions), (2) locus of control which is based on internal control and stands for the degree to which persons believe that their own decisions and actions influence their illness and its consequences (Wallston et al., 1978) (two questions), (3) powerful others which examines the degree to which persons believe that their scope for action towards asthma is under the control of other people such as a doctor or a teacher (three questions), and (4) chance domain which proposed that asthma and its effects are a result of chance (two questions).

For the purpose of confirming validity and reliability of AAQ, the locus of control items were based on previous work with an asthma-specific locus of control questionnaire (Gibson et al., 1993). The items relating to the tolerance domain were extracted from responses of older children with asthma during a focus group discussion. They were screened for face validity by a multidisciplinary team, and the questionnaire was pilot-tested in a neighbouring school before being used in the study (Gibson et al., 1995). The AAQ was used after gaining permission from the author (see appendix 10) The AAQ is not available in Arabic, so translation and testing was required.

School attendance

Finally, the children's attendance records were monitored to establish if the education programme had any impact on school absenteeism? Attendance records were obtained directly from school staff and permission to access this data was sought from parents. The duration of attendance monitored was 3 months (the whole study duration).

The next sub-section of the chapter presents a detailed description of the process of translating both the NAKQ and AAQ.

TRANSLATING INSTRUMENTS

As noted, two of the questionnaires were already available in the Arabic language; PAQLQ (Juniper & Styles, 1996) and the SCAS (Al-Baini 2010). As the Asthma Attitude

Questionnaire AAQ (Gibson et al., 1995) and the Asthma Knowledge Questionnaire NAKQ (AlMotlaq & Sellick 2011) had not been translated, both were translated into Arabic using the World Health Organization's (WHO) process of translation and adaptation of instruments (WHO, 2007) (please see Appendix 11).

Forward translation

This is the first stage where a professional independent translator in the KSA performed the translation of the AAQ (15 items) and NAKQ (24 items). This resulted in the first Arabic version of both AAQ and NAKQ (Appendix 12, Appendix 13, respectively).

Reverse or panel back-translation

Reverse translation or panel back-translation followed where a committee fluent in English and Arabic took part. The committee consisted of the translators who performed the forward translation and a paediatrician who had experience in treating children with asthma. In addition myself, and a schoolteacher who was fluent in Arabic and English joined the panel. The teacher checked for the accuracy of the translated version of the questionnaire against the original questionnaire in English. The teacher also tested the level of the language used against the expected cognitive abilities of the children that would be recruited into the study. Cognitive testing was important as it ensured relevance of the tool and that it was an objective measure for the purpose of collecting data. It was also useful to assess the applicability of the instrument for the study age group (Burns and Grove, 2008)

The committee approached the questionnaire with the following objectives: to check the accuracy of the translation; that the translated instruments reflected the original meaning in English; and to use words and descriptions that would be easily understood by children.

During the meeting, all panel members questioned the accuracy of the vocabulary, especially the health-related vocabulary, which might be interpreted differently by some children due to the various dialects that are common in all Arabic speaking countries. This resulted in some challenges throughout the translation process. For example, in Arabic the word for "asthma" is "Al Rabo"; however, given differences in dialect and language, not all people in Saudi Arabia would use or know this term. Therefore, the committee recommended that each time asthma was written, it was accompanied by "Al Rabo" between brackets (Please see appendix 14 and 15, second version of the AAQ and the NAKQ).

Following a review of the Arabic versions of the AAQ and NAKQ, panel members were instructed to record their responses in the content validity questionnaire (Polit & Beck, 2006). This aspect of the translation protocol involved the following steps: panel members were asked to rank each item for its clarity and representativeness on a four point ordinal scale: (1) item is not representative / clear; (2) item needs major revision to be representative / clear; (3) item needs minor revision to be representative / clear; and (4) item is representative / clear. Additional space on the form was available for comments and suggestions. After ranking by panel members, the researcher amended variables that required minor revision according to the suggestions made by panel members in discussion with the researcher. For example, some of the AAQ such as questions that are concerned with the perception towards asthma were simplified using simple words and description to reflect the figurative meaning of these questions. For instance, questions such as “what are your perceptions towards methods of asthma management” was simplified to “what are your opinions on the methods of asthma management familiar to you?”

The accuracy of the developed versions of the questionnaires enhanced the reliability and validity of the questionnaires used in the study. The accuracy also ensured cultural adaptation of the translated versions of the questionnaires making them suitable to the Saudi context. Finally, it allowed for the optimisation of the response rate.

VALIDITY OF INSTRUMENTS

According to Liljequist (2010), validity of the research instruments is important as it allows for effective analysis of the collected information and usefulness and meaningfulness of the study. In other words, validity means to what extent the selected instrument measures the intended research objectives (Polit and Beck, 2008). Validity can be divided in two types; internal and external validity. While internal validity means the extent to which the independent variable significantly causes and influences the dependent variable (Polit and Beck 2008), the external validity is that validity which reinforces the meaning of generalisation which can be fulfilled by maintaining the sample representativeness (Metzger & Wu 2008; Bannigan and Watson 2009). Face validity and content validity are concerned with the contents of the instruments as mentioned previously.

CONTENT VALIDITY

According to WHO (2007), content validity encompasses the demonstration of the existence of a strong relationship between the content that was used in the study and the variables under investigation. As such, it provides information related to the representation of the population by a specific study sample. Content validity analysis was performed to determine the appropriateness of the language, content, and structure of the Arabic versions for measuring the research variables. The variables included attitudes and knowledge about asthma in children. The snowballing technique was used to recruit a panel including six experts to perform a content validity analysis of the questionnaires. The process entailed contacting a small group of people with experience in asthma management who were known to the researcher, those people identified other colleagues who were then invited to participate in the content validity assessment. The process was done in accordance with the procedure described by Polit and Beck (2006). The six individuals included two general practitioners experienced in the management of childhood asthma, two nurses that have regular contact with asthmatic children, one primary school teacher, and one social worker. This was a sufficient number of experts to perform the process of content validity as acknowledged by Polit and Beck (2006). Each panel member was sent a questionnaire that included the revised list of asthma knowledge items and asthma attitude items, and asked to rate each item using a 5-point Likert scale for appropriateness (1=not appropriate to 5=most appropriate). Panel members were also invited to comment on the wording of items and response format, and to suggest other items to be added to the instrument.

The approach to establishing the Content Validity Index (CVI) was identified in Polit and Beck (2006). The CVI consists of two domains. The representativeness domain (R-CVI) which identifies to which extent the item is representative of a scale within an instrument, and the clarity domain (C-CVI) which identifies the clarity of the item to the reader.

Both the R-CVI which relates to the representativeness and the C-CVI which relates to the clarity are applied to each item and then to the scale as a whole in the form of the Item CVI (I-CVI) and the Scale CVI (S-CVI). The I-CVI is the proportion of experts who rate an item as relevant, while the S-CVI is the proportion of items rated as relevant by all raters (Polit & Beck, 2006). The I-CVI agreement proportion of .78 or above indicates acceptable content validity (Polit et al., 2007). The overall S-CVI score is calculated by taking the average of the items scores (Lynn, 1986).

Content validity index report

In the AAQ, the representativeness analysis identified two items with 89% representativeness and three items with 92% representativeness in NAKQ. The remaining items demonstrated 100% representativeness in both questionnaires. Subsequently, all items were retained in the translated questionnaire.

Content validity analysis was done by summing I-CVI results as percentages and dividing the results by the number of items in each of the questionnaires. Content validity analysis revealed high representativeness and clarity outcomes reporting representativeness score (R-CVI) of 99% and clarity score (C-CVI) of (98%). These scores indicate good agreement between panel members. The panel members' comments were very helpful in providing a wider perspective about the translation process. The result of the validation process was the third version of the Arabic AAQ and NAKQ (Appendix 16 and 17 respectively).

Reliability of the instruments

To determine the feasibility and if any modifications were needed before using the instruments in the main study, a pre-test pilot study using the AAQ and NAKQ was conducted with 20 children diagnosed with asthma. The recruitment of 20 children rested on the recommendations of Lackey and Wingate (1998) that a pilot test should be carried out the equivalent of one tenth of the main sample. Pilot testing is conducted to refine a tool or instrument to ensure clarity, understanding, and acceptability (Polit and Hungler 1999). In this case both the AAQ and NAKQ were tested. The group consisted of 12 male and 8 female children diagnosed with asthma and living in the Ha'il region, KSA. Their ages ranged between 7 to 12 years. The answers of the pilot study population suggested that all items in both AAQ and NAKQ and their options for response were clear and understandable.

Reliability means the extent of measurement for certain participants is similar on applying this tool at different time (Polit and Beck 2008). So, it can be achieved when keeping results at a consistent level despite changing of time and place. Internal consistency comprises testing the homogeneity that assesses the extent to which personal items are inter-correlated, and the extent to which they correlate with overall scale findings (Polit and Beck 2008). This can be performed by using Cronbach's alpha test. Many references state that an alpha 0.85 or above indicates adequate internal consistency, meaning, findings are consistent, so the items are representative (Polit and Beck 2008). Cronbach's Alpha for both scales from the pilot testing

were measured and revealed high internal consistency values in NAKQ (0.882) and AAQ (0.935). These results established that there was no further need to modify any of the questionnaires before field-testing with the target population. However, it is important to note that the children that took part in the pilot test were not considered eligible for the main study. This was simply carried out when establishing the final list of eligible students (mentioned earlier in sampling section). However, those included in the pilot study were given the chance to attend the asthma education programmes but they were not allowed to contribute to the study findings through completing the study instruments.

Negotiating Access to Schools

The researcher met the school principal and the social worker (normally employed in each school in KSA to provide psychosocial counselling for the students who were to take part from the targeted schools) and showed them the ethics approval gained from the Head of MoE in Ha'il Region. The researcher explained to them the aim of the study, explained the process of conducting the study and its stages in their schools, and gave them a detailed description of each step. Sufficient information about the whole study was provided to the intervention and control schools to create awareness and enable them to assist children in making a decision regarding whether or not to take part.

Strengthening support from the key stakeholders was an important part of ensuring the success of the research. The success of any study often depends on the contribution of the gatekeepers. The gatekeepers play the role of representing the interests of the host organisations, and their members (Burns and Grove, 2010).

The education programme was started after the children and parents had been informed about the study requirements and had given their consent.

RISK-BENEFIT ANALYSIS

Risk-benefit analysis is one of the most important ethical considerations to which researchers have to pay attention (Long & Johnson, 2007). The degree of risk to be taken by participants in any research should never exceed the potential benefits of their participation (Polit & Beck, 2004), otherwise, participation is no longer be accepted. With respect to research risks, Long & Johnson, (2007) recommended researchers to identify the potential risks and set out planned measures to avoid, minimise, or treat any possible risk that ensued. Additionally,

Polit & Beck (2004) argued that participants should be informed of any possible harm to allow them to make an informed decision regarding their participation in the study.

Key in this study was minimising any potential risk. Throughout respecting the rights and dignity of the participants was paramount and assessed using the universal guidelines (Polit and Beck, 2008) presented in nursing references rather than complying with any national Act. The following are descriptions of the ethical considerations undertaken to preserve participants' rights.

Once the potential participants were identified, a letter and information sheet outlining the study was sent to parents by the school administrator (See appendices 18 C and D). Potential participants were given the opportunity to discuss their children's participation in the study and to ask any questions by contacting the researcher directly by telephone or email within two days if they had any queries. To ensure that the information was accessible for parents and children two information sheets were provided; one targeted at the children and the other one targeted at the parents. The information sheet was offered in Arabic; the common language of people in Saudi Arabia. Those parents that consented to their children's participation in the study were asked to sign the consent form and return it to the school. The children were also asked to signal their consent by signing or making a mark on the consent form. Even when parents gave consent for their children to participate, no pressure was put on the children at any time to do so should they state or signal their wish to decline. The consent forms were also written in Arabic to ensure understanding.

Participants were assured that the information they provided would be handled in a private and confidential manner. Each child was identified by a research number. Personal details and signed consent forms were stored separately from the data in a secure, locked filing cabinet in the researcher's office before being transferred to a locked filing cabinet at the University of Salford. The data will be stored for five years and then destroyed in line with the perceived risks for non-clinical studies considered by the NHS. During the study, data were stored in a password-protected computer at the university for the student's use, with materials archived to a non-rewritable CD each week and stored by the supervisor in case of technical failure. Data was not disclosed to third parties without the consent of the individual participant. This was maintained until the study finished and will be treated in the same manner for future purposes in accordance to the University of Salford regulations. In case of using the data for the

purpose of publications, conference presentations and for teaching purposes no names or personal details will be disclosed in these circumstances.

According to the beneficence and non-maleficence ethical principles, preventive measures that maintain maximum benefit and minimised harm were used. For instance, virtual devices were used safely to prevent any transmission of micro-organisms between children while performing inhaler practice. In addition, none of the children were excluded deliberately from group discussion because of his/her misbehaviour to prevent negative psychological impact of censure. In addition, those children in the control group were given the same opportunity to benefit from asthma education programme at the end of the study to ensure that they could also benefit.

POTENTIAL FOR COERCION

According to Polit & Beck (2004, p.147), coercion is defined as “*an explicit or implicit threat of penalty from failing to participate in a study or excessive rewards from agreeing to participate.*” Coercion violates codes of research ethics such as openness and straightforwardness alongside honesty during the research. With respect to this ethical issue, the voluntary nature of participation in this study was addressed in the information sheet for the children in that they were informed that their agreement to participate in the study was voluntary and that they could decide to opt out of the study at any time without any consequence.

As mentioned earlier, all shortlisted children were only approached once permission to do so had been given by their parents. The information sheet designed for parents included a clear statement detailing their right to withdraw permission for their child’s continued participation in the study at any time. This ensured that both the parents and children knew that their participation was voluntary. In addition, the parental participation leaflet provided details of compliance with all ethical and legal aspects related to the study including that the researcher would provide accurate teaching materials and protect information from disclosure. However, some parents expressed their reluctance to give permission for their children to participate as they questioned the benefits derived from taking part. However, informal meetings with those parents were conducted to further explain what was being proposed. Still, some declined permission, and their decision to do so was respected.

In regard to the children whose parents were illiterate, the researcher and the assistants provided face-to-face communication about the study and what would be expected of them and their children. The children had been told that should their parents need help with reading, to contact the research assistants who would help. A total of 10 parents contacted the research assistants for help. The information sheet was read to them and their questions answered. No child was excluded on the grounds of their parents not being able to read.

Thereafter, children whose parents had given the approval for their participation were also asked to declare their acceptance and readiness to participate in the study using simplified informed consent mechanisms. The children's participation information leaflet was used to introduce the study before asking if they wished to take part. The schools' administrators helped in this process and were informed to keep returned consent forms until collected by the researcher or his assistants.

At the end of this process, 228 (out of 372 potential participants) agreed to participate, giving a 61% acceptance rate and a 39% rejection rate. However, the main reason given for children declining the offer of participation was that 3 months was a long time and that there was no incentive for them to take part. For these children, further emphasis was given to re-iterating that their decision to decline would not affect their treatment by their teachers or school administrators. Those that agreed to participate were reminded that they could withdraw from participation at any time.

INTERVENTION: THE ASTHMA EDUCATION PROGRAMME

It is known that health education can enhance knowledge, and change attitudes and behaviours. According to Bloom's taxonomy, educational objectives can be divided into three main categories or domains: cognitive, affective, and psychomotor. These learning domains are normally integrated with each other and can be experienced simultaneously (Gilbert et al., 2011). In each domain, there is a range of suggested learning strategies that can be used to improve the effectiveness of teaching strategies targeting one domain over another. For instance, some domains need informal methods for learning rather than formal methods such as gaming and role-playing in the affective domain while lecturing is commonly used for the cognitive domain and demonstration and re-demonstration are used for the psychomotor domain (Gilbert et al., 2011).

These recommendations were given careful consideration when designing and developing the classroom based asthma education programme for children aged 7 to 12 years. A health educator should have the responsibility for understanding barriers impeding learning processes. For children with asthma health education that is learner-centred provides the most effective means to ensure an active participation in the learning sessions.

An education programme of three days duration was employed (two hours per day). The educational sessions integrated cognitive theory with the information provided by the British Thoracic Society and Saudi Initiative for Asthma (see appendix 19).

The Intervention

In this study the intervention being tested was a specific health education programme delivered over three days using two-hour sessions per day. The critical analysis of research into specific health education programmes for children with asthma (see previous chapter) supports the contention that educating those diagnosed with asthma about asthma and how this can be managed enables potential health and well-being benefits (Gibson, Shah & Mamoon, 1998). In this section, Social Cognitive Theory (Bandura, 1986; Clark, 1989) is used to examine why measuring outcomes beyond knowledge acquisition are important in establishing the impact of an asthma education programme on outcomes for children.

SOCIAL COGNITIVE THEORY

Social Cognitive Theory was developed by the Canadian psychologist Albert Bandura. Bandura conducted a series of studies with his students and colleagues to discover why and when children display aggressive behaviours (Bandura, 2001). These research projects demonstrated the value of understanding individual behaviours which was later explored in Bandura's (1986) seminal article and book (Bandura, 1986; Bandura, 1989 Clark, 1989). Bandura claimed that Social Cognitive Theory showed a direct correlation between a person's perceived self-efficacy and behavioural change. The findings derived from Bandura's early work (Bandura, 2001, Boulet, et al., 1999) laid the foundation for further refinement and development of the theory which has become the theoretical framework of choice for many researchers interested in measuring the outcomes of health education programmes (Clark & Zimmerman, 1990; Bandura, 2001; Miller, 2005; Humbert et al., 2007). For instance, Ahmad (2009) who investigated the effect of a breastfeeding education programme on breastfeeding outcomes among mothers of preterm infants selected Social Cognitive Theory as the theoretical framework to develop the intervention (Ahmed, 2009). Other researchers have

used Social Cognitive Theory in implementing co-operative learning and continuing education for community services (Alansari, 2006) and the identification of psychosocial constructs to explain physical activity behaviours among employed women (Tavares et al, 2009).

Social Cognitive Theory is a learning theory based on the claim that people learn in part by observing each other (Boulet, at al., 1999). For instance, observed behaviour of others can change an individual's way of thinking (Bandura, 2001). However, the premise that Social Cognitive Theory is particularly appropriate in explaining how children learn is important for this study. A central tenet of Social Cognitive Theory is that change in children's individual behaviours is due to their own learning capabilities. This is consistent with the notion of children as active agents in their own learning.

Social Cognitive Theory consists of several assumptions in relation to learning and behaviour. The first assumption rests on the understanding that environmental, behavioural and personal factors influence each other in a reciprocal fashion. According to Social Cognitive Theory, learning in a classroom situation rests on a set of complex interactions between several factors; each impacting on the others to shape the learning process. This means that the thoughts and self-belief of students interact with their general perception of the classroom context and that all affect learning. The reproduction of the observed behaviour is influenced by the interaction of these determinants as follows. The first determinant is personal, in which the individual possesses high or low self-efficacy toward the behaviour or the learner's belief in his or her personal abilities to undertake that behaviour. The second determinant is behavioural, in which the individual has a certain response after performing that behaviour. It is believed that this provides chances for the learner to experience successful learning resulting from the correct performance of the behaviour. The third determinant is environmental, in which the individual is influenced by the environment or setting to enhance his or her ability to successfully complete a behaviour. Environmental conditions act to improve self-efficacy by providing appropriate support and materials (Miller, 2005; Bandura, 2001).

The second assumption postulates that children have the ability to influence the environment and their own behaviour in a meaningful goal-oriented fashion. This acknowledges the role of the environment in modifying behaviour, while also acknowledging the importance of self-reflection, self-regulation and forethought processes. It is assumed that factors determining

the extent of environmental influence on education outcomes is entirely based on personal ability to accommodate learning within the surrounding environment. So, children with asthma are in a position to benefit from an Asthma Education Programme when they are actively engaged and supported with what is being taught and learned rather than receiving education passively in an unsupportive environment.

The third assumption postulates that learning can take place without behaviour change (Bandura, 2001). This means that students can learn but that they may need additional support to complement the means of the desired behaviour in order to demonstrate that learning. It is acknowledged that measuring behavioural change is not always sufficient to predict success or failure of health education. Social Cognitive Theory offers other constructs that can be used for this purpose. For instance, self-efficacy and social support are significant predictors of behaviour, and the physical environment construct warrants empirical attention to predict the change in behaviour (Miller, 2005). As discussed earlier, the environmental aspect of health education is a key influence of behavioural outcomes. Consistently, writing on Social Cognitive Theory (McGhan, 1998; Bandura, 2001; Miller, 2005) integrates a number of discrete constructs into a robust conceptual framework to present a theoretical understanding of human functioning and its application across a wide range of cultural and demographic characteristics (Bandura, 2001). Those related to this study are now explained in more detail.

Observational Learning/Modelling

This concept suggests that children learn through observation. Learning by observation is not merely a repetition of action as it is being observed, but it is that process in which the learner integrates their knowledge, attitudes, perception, and skill into performed behaviours (Zimmerman & Schunk, 2001). Thus, learning from observation rests on four processes; attention; retention; motivation and production (Zimmerman & Schunk, 2001).

- Attention processes are vital, as children have to attend to what is being taught to enable learning. The level of attention varies from one child to another. It has been argued that attention can be improved by using high levels of “reinforcements”; the stronger the reinforcement the higher level of attention (Gilbert et al, 2011). For children living with asthma, the degree to which their symptoms are bothersome may yield different levels of attention during any educational programme.

- Retention describes the process of transforming the observations into temporary storage for future use (Zimmerman & Schunk, 2001). This is a mental process through which the learner

attempts to approximate their previous reinforcements to learned behaviours for future application. This association is retained into the learner's memory and holds priority until full comprehension is reached.

- Motivational processes determine the ability of the children to use the new skills appropriately. The last stage of the learning process is that of production. Production enables children to relate the retained observation into new behaviour (Tavares et al, 2009). Once this stage is commenced, the output of all previous stages (attention, retention, and motivation) is inherent in the overall learner response to that trigger. Therefore, the effectiveness of the preliminary stages of learning by observation are subsequently reflected in the production of new behaviour in the future.

While this is a consistent learning process, children who are learning new behaviour will be subject to these steps regardless of variations in the learning environment. In the light of this study, learning by observation is the key for acquiring behaviours, considering that the learning objectives are attainable given the cognitive and competency level of children. In the next section, learning expectations will be discussed based on the taxonomy of behavioural objectives.

Outcome Expectations

According to Banudra (2001) outcome expectations refer to the general beliefs that children hold in relation to the likelihood that certain consequences may follow certain behaviours. Such beliefs are developed through previous experiences as well as from the observation of others. For example, children may believe that if they score during a football tournament, the crowd will cheer them and in turn, they will win admiration from other students. Outcome expectations are important as they shape individual decisions regarding actions as well as informing which behaviours to suppress (Zimmerman, 2000). The importance of outcome expectations for the current study lies in understanding that changes in behaviours are highly dependent on the perceived outcome expectations. Outcome expectations relate to the intended learning outcomes gained from the asthma education programme in the cognitive, affective, and psychomotor domains. According to Blooms Taxonomy, behavioural objectives should be divided into three domains: cognitive, affective, and psychomotor as doing so can increase the potential for learning (Gilbert et al., 2011). These learning domains are normally integrated with each other and can be experienced simultaneously.

Self-efficacy

Self-efficacy is a product of past performance, present psychological state and experience combined with perceived outcome expectations of others in the same environment to achieve certain levels of success after the completion of particular tasks (Bandura, 1997). Self-efficacy arises from four sources: performance accomplishments, vicarious experience, verbal persuasion, and physiological states (McGhan, 1998; Miller, 2005). Bandura postulated that children with greater self-efficacy had more confidence in their abilities to perform well and succeed compared to those with lower self-efficacy. This suggests that any asthma education programme should integrate strategies and learning that promote self-efficacy in children to enhance greater involvement in learning.

Goal Setting

Goal setting processes in the context of Social Cognitive Theory reflect the cognitive representation of desires, anticipation or preferable outcomes. This implies that people learn while visualising their future and developing a plan of action. According to Gilbert et al, (2011) goals relate to the overall outcome expected from children against which they can assess their success as well as providing a benchmark against which to evaluate progress. However, goal setting is intimately linked with self-regulation as explained below.

Self-regulation

Self-regulation is the process whereby an individual attempts to control environmental, personal, and behavioural factors in order to achieve a certain goal (Clark & Zimmerman, 1990). Initially, the concept of self-regulation focused on three distinct sub-processes. Self-observation, which relates to children's ability to constantly check their own behaviours and monitor their outcomes; self-judgment, which defines the process whereby children assess their actions and determine whether they align with their goals; and self-reaction, which describes children's response following their evaluations (Bandura 1991). Self-regulation involves that children with asthma are able to examine their condition and take action in order to prevent or improve problems. Bandura emphasised the influence of personal factors represented by self-regulatory mechanisms to determine the efficiency of learning processes. According to Social Cognitive Theory each of the previous sub-process plays an integral part in formulating the perception towards the retained knowledge. In addition, Zimmerman & Schunk, (2001) asserted that self-regulation is associated with the concepts of self-efficacy and goal setting. It is acknowledged that to attain higher self-regulation, children should believe that the desired goal is achievable. In this context, the asthma education programme was designed to stimulate thinking in children living with asthma to facilitate the process of self-regulation according to their capabilities to enhance better learning outcomes.

Environmental support

As noted earlier, environmental support is one of the key factors that influence learning processes. Environmental support incorporates social factors such as peers, friends, and families; and in the case of children living with asthma it also includes environmental triggers, including pollutants (Miller, 2005; Martin & McCaughy (2008). For instance, in the school setting, children may be exposed to many different triggers such as dust, moulds, exposure to exhaust fumes, and pets. Some children living with asthma may react to some or all of these. The home environment is also implicated in this. However, it may be possible to identify, modify or minimise children's exposure to these irritants. The research studies appraised in the previous chapter (Arbex et al., 2007; Sarnat & Holguin, 2007; Al-Ghamdi et al., 2008) indicated that indoor allergens and outdoor moulds pose the greatest risk towards the development of asthma (Gibson et al. 2004).

While environmental support is given a high priority in Social Cognitive Theory, Bandura (2001) explained that changes in behaviour alone are insufficient without controlling environmental obstacles (Graham & Logan, 2006). Although the presence of some environmental stimuli is considered positive, some stimuli such as peers, family, and health care providers may negatively influence learning process (Stewart et al, 2011). Therefore, in the education programme the potential negative impact on learning from negative stimulus was explored by the learners in order to minimise that impact (Graham & Logan, 2006; Stewart et al, 2011).

Whether school or community-based, it seems that children's capacity to change their behaviour and benefit from learning can be explained by Social Cognitive Theory. For instance, Social Cognitive Theory explains why children may be motivated to become healthier when they witness their peers success following certain behaviours (McGhan, 1998; Miller, 2005). Social Cognitive Theory has been successfully applied in different areas of human functioning such as individual behaviour, mental and physical health and career choice (Graham & Logan, 2006) (Figure 3). More recently, Social Cognitive Theory has been used to help to modify individual's perception about the usefulness of modern therapeutic regimes for a number of diseases (Becker et al, 1994; Bandura, 2001; Alansari, 2006). Of particular note for this study is the useful application of Social Cognitive Theory in relation to specific asthma health education programmes for children (McGhan et al, 2003; Tavares et al, 2009; McGhan et al, 2010; Stewart et al, 2011). Social Cognitive Theory links individual behaviours to the predisposing factors, enabling factors, and reinforcing factors along with the considerations of environmental conditions (Simon et al, 1995). It is especially useful when

working with children diagnosed with asthma as asthma is a chronic disease that does not rely on medical treatment alone but requires positive actions from the children.

Understanding children's active learning in this way helped in the design and delivery of the asthma education programme used in this study. Incorporating the central tenets of Social Cognitive Theory into the classroom-based asthma education programme provided a strong theoretical basis in support of the claim that the intervention would make a difference to the health and well-being outcomes for children in the intervention group. Moreover, this claim is consistent with the realist approach adopted for this study that acknowledges that those health and well-being outcomes can be measured. In addition, Social Cognitive Theory provided guidance related to the need for the asthma education programme to be culturally relevant both in content and delivery such that it was meaningful to those taking part in the KSA. Social Cognitive Theory also supports the notion of children as active agents in their learning, accepting that children and young people between the ages of 7 and 12 years can learn something about asthma and use that learning to adapt and change their behaviour to achieve positive benefits. This is consistent with the use of the self-report measures discussed earlier in this chapter.

THE IMPORTANCE OF SELF-REGULATION CONCEPT IN THE MANAGEMENT OF ASTHMA

Self-regulation is a very important construct from Social Cognitive Theory that plays a crucial role in developing interventions that control asthma. Based on the definition described earlier, self-regulation simply means the act of being observant in order to make personal judgement based on observations against other factors such as traditions, fear or habit. The processes of self-regulation therefore may describe reacting appropriately making personal efforts in order to foster change. The model described in figure 3 revolves around the notion that self-regulation is a continuous and reciprocal process. As a key concept of Social Cognitive Theory, this concept observes that individuals are motivated to become self-regulating through their own goals or simple end-points. This implies that the more salient the individual goal, the more self-regulating one becomes, and hence the power held by the desired goal is dependent on its value as perceived by the individual.

Intrapersonal and external factors drive a person to follow disease management strategies in order to attain a desired goal. In the course of the entire process, to determine whether the

action selected produced the desired outcome is combined with another reaction to determine whether there is need for continuation (self-efficacy) please sees the figure 3.

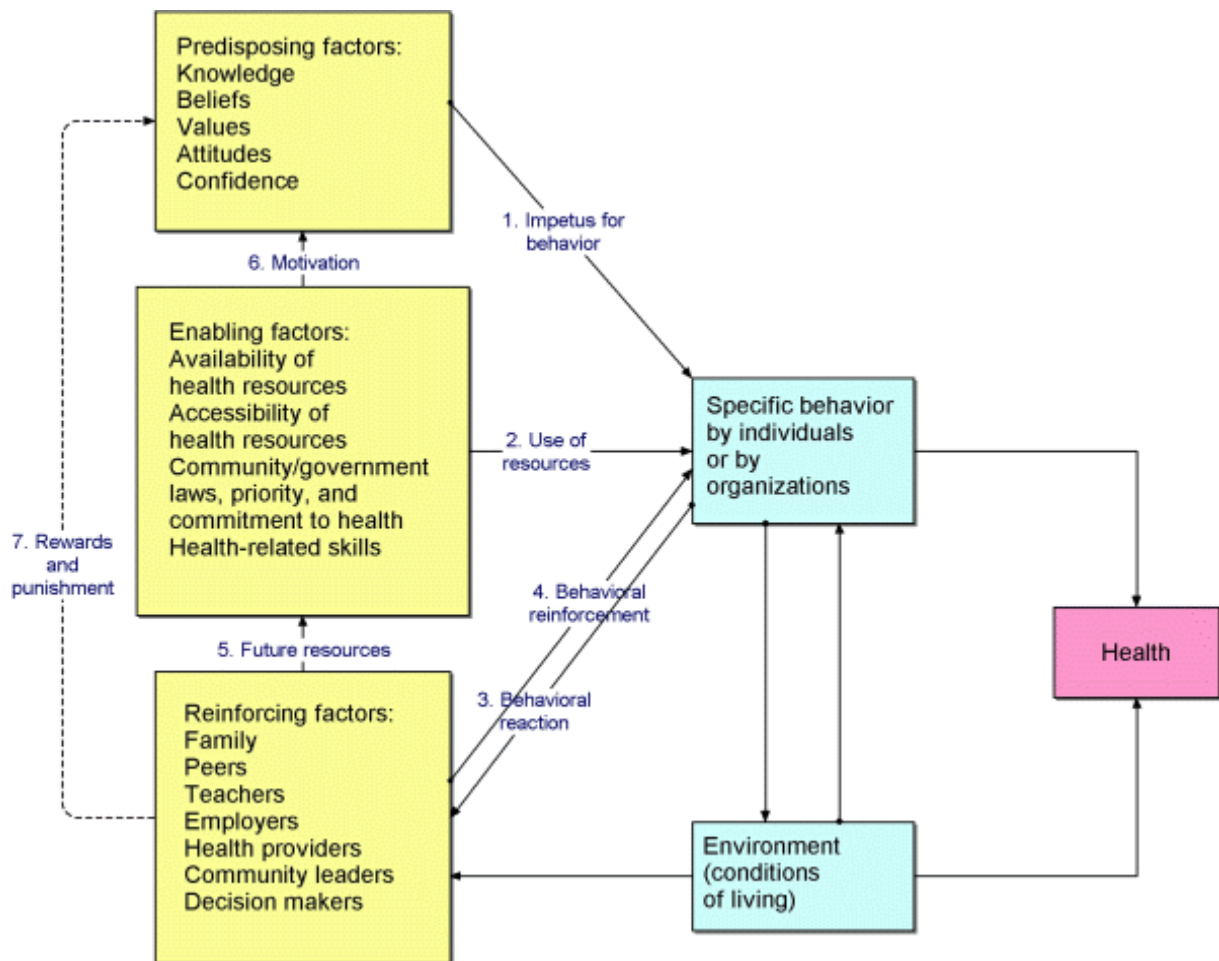


Figure 3: The model of Social Cognitive Theory. (Adapted from Simon et al (1995))

THE ASTHMA EDUCATION PROGRAMME

There are many specific educational programmes aimed at children diagnosed with asthma. While many programmes have included information about allergens, how to avoid these, and the importance of taking preventive medications as prescribed (Cicutto et al, 2005), other components include a focus on increasing relevant knowledge (McGhan et al, 2003) and promoting positive attitudes thought to increase self-management behaviours (Gibson et al., 2004). Other asthma education programmes include strategies aimed at reducing the number

and severity of asthmatic attacks (Williams et al., 2004; GINA, 2002; Rabe et al., 2000). However, some asthma education programmes have been criticised for failing to look beyond factors such as knowledge and attitudes to consideration of the impact of coping skills, social support and self-efficacy on outcomes for school children. This is an important omission as the theoretical association between these factors and children's learning offers better insight into what works, for whom and why.

The intervention in this study has been designed to take account of the key concepts in Social Cognitive Theory to ensure that the children and young people that attended had the best possible chance of achieving the best possible outcome. The sessions were designed to maximise the children's learning not only in relation to knowledge but also in relation to observations of their symptoms and responses to medication, personal judgments and reacting to change. A 3 day programme consisting of 2 hour daily sessions was designed. The sessions were based on evidence based recommendations provided by the British Thoracic Society and Saudi Initiative for Asthma (see appendix 19) but it also took account of Social Cognitive Theory and the three domains of learning (Gilbert et al., 2011).

Goal of Asthma Education Programme

The aim of the asthma education programme was to increase the ability of children with asthma to independently self-assess and self-manage their asthmatic symptoms appropriately. Although this goal statement reflects the general purpose of the asthma education programme, it is not sufficient to provide sufficient guidance for the educator or measurable outcomes as it is too general and non-specific (Gilbert et al., 2011). Therefore, learning objectives were developed to determine and specific, measurable, attainable, and time related outcomes (Gilbert et al., 2011).

Objectives and implementation of Asthma Education Programme

- A) To improve children's knowledge of the causes, symptoms and medications used for the management of asthma (Cognitive domain)
- B) To improve children's effective use of prescribed medications using appropriate devices effectively (Psychomotor/Cognitive domain)
- C) To help children to identify their common asthma triggers and the possible strategies to avoid these whenever possible: (Cognitive domain/psychomotor domain)
- D) To help children to control environmental factors that aggravates their asthmatic symptoms: (Cognitive domain/affective domain)

- E) To help the children detect early warning signs as well as related symptoms of asthma, such as shortness of breath, and paroxysmal nocturnal dyspnoea: (Cognitive domain/affective domain)
- F) To enhance adherence to the therapeutic regime and increase knowledge related to the importance of medical therapy: (Affective domain/Cognitive domain)
- G) To increase self-confidence in those affected children and decrease social alienation: (Affective domain).

These first two objectives (A and B) were used to develop the content for the first day of the programme. The teaching and learning strategies for these sessions included a parachute team-building game to help the children ‘get-to-know’ each other. A demonstration of the physical characteristics of asthma was given using models, pictures. The materials for this session were taken from Saudi Initiative for Asthma (SINA, 2012). In addition, the children were provided with an explanation about inhaler therapy, and information about when and how to use their inhalers. A direct demonstration and re-demonstration of different types of inhalers, showing how they worked was included in this. All children had the opportunity to practice use of the inhalers using a virtual inhaler. The strategies used to deliver this session took account of the concepts of Social cognitive Theory discussed earlier and the strategies identified by Bandura (1986) to help children to learn; including observation; verbal, written or audio and video demonstrations. In addition all took account of the need for the children to be actively engaged and have some fun such that their attention was maintained.

Teaching and learning relating to objectives (C and D) were delivered on the second day of the programme. This included an explanation of the importance of understanding the impact of asthma on daily living activities. In addition, the identification of asthma triggers was delivered using a model toy kit and accompanying worksheet. Information on trigger-avoidance and prophylactic treatment were also included as advised by SINA (2012) and the British Thoracic Society, (2012) and their materials were used. According to Social Cognitive Theory, assessing the extent that learned behaviours are integrated into daily living activities is more important than assessing how skilfully the learner performs the specific task. Learning can be preceded using a combination of education methods to compensate for any gap inherent in the learning capabilities of children. For that reason, written materials were used along with simulation techniques (e.g. illustrations) and case scenarios.

Objective (E) was used to plan and deliver the session on the third day of the programme and included a session on of how to recognise and prevent asthma complications, how to anticipate serious exacerbation of asthma and ways of managing asthma attacks. Figures and illustrations provided by the SINA (2012) and the BTS (2012) were used. Similar to the previous education methods, case scenarios were used by the means of written simulation as suggested by Gilbert et al, (2011). The application of Social Cognitive Theory supports the use of educational materials such as illustrations to enhance cognitive awareness of the exacerbations of asthma which is particularly grounded in the concept of ‘positive reinforcement’ as noted by McGhan et al (2003).

The final two objectives (F and G) were also used to plan and deliver the final and third session on the programme. A supportive session including the importance of adherence to the medical therapy and how this would increase self-independence was developed. Role-playing was established using a tailor made story poster. This was used to increase the children’s knowledge of asthma but was also used to promote positive attitudes and beliefs and to enhance the children’s self-regulatory mechanisms (Gibson et al., 2004). Bandura (1986) acknowledged the role of self-efficacy in formulating individual's attitudes towards certain stimulation. Thus, the attempt to change children’s attitude towards asthma in this study was rooted in Social Cognitive Theory. Full details of the programme can be found in Appendix 19.

Linked to Social Cognitive Theory, asthma education programme had been classified the leaning objectives into behavioural classes as shown in Table 9. The theory has been the basis for establishing elements of each objective. For instance, observational learning modelling supposes that children learn from their observations using personal attention. In our programme, pictures and building games for instance were the educational materials aimed to arouse children attention towards information about asthma definition. According to the theory, a positive reinforcement may occur through which children may integrate this observed task practically into their thinking process. Although at this primary cognitive level children may only recall this new information into a similar situation when needed in the future, these learned information are subject to be transformed into higher cognitive level where origination and synthesis might be developed. The rest of educational materials shown in Table 9 hold the same consequences of learning process although they differ in their nature (i.e. cognitive vs. affective vs. psychomotor).

Table 9: A summary of asthma education sessions

What is asthma? (Cognitive domain)	Delivered on the 1st day including demonstration of asthma characteristics using models, pictures & a parachute team-building game. Materials were gathered from SINA & other illustrative images available from other online resources.
What is your inhaler? (Cognitive and psychomotor domain)	Delivered on the 1st day including explanation about inhaler therapy, and indication & time of use. Then, demonstration and re-demonstration of different types of inhalers, showing how they work. Each student had the opportunity to perform the use of inhaler using a virtual inhaler.
What makes your asthma worse? (Cognitive and affective domain)	Delivered on the 2nd day including an explanation of the importance of understanding the impact of asthma on daily living activities. In addition, identification of asthma triggers using model toy kit and accompanying worksheet. Trigger-avoidance and prophylactic treatment were also applied. SINA and British Thoracic Society materials were used.
Managing an asthma attack (Cognitive and affective domain)	Delivered on the 3rd day including sessions of how to recognise and prevent asthma complications. Education of how to anticipate serious exacerbation of asthma and ways of managing asthma attacks. Children were also provided with supportive sessions aimed to promote children psychological status and installing hops and help them to accommodate with their daily living activities. Role- playing was established using tailor made story poster.

DATA COLLECTION

As mentioned earlier, the children attending the five schools from the Northern part of Ha'il were allocated to the intervention group and their counterparts from the Southern region were allocated to the control group. Data collection was carried out in three stages; once before starting asthma education programme, one month after delivering asthma education programme, and three months after completion of the asthma education programme. The reasons for selecting these intervals is based on the systematic review conducted in this study and Social Cognitive Theory which confirmed that observing children's behavioural change should occur after a short period of time (one month) to assess the point of maximum benefits where learning by observation is intensified. Over this first month, children were assumed to follow the process of learning by observation (attention, retention, and motivation). However, the second assessment post intervention (three months later) aimed to assess children's ability to retain the acquired learning over a short period of time. However, assessing the impact of asthma education further and beyond this time span would be beneficial but not introduced into this study.

The 4 instruments discussed earlier (Paediatric Asthma Quality of Life Questionnaire; Spence Children's Anxiety Scale; Newcastle Asthma Knowledge Questionnaire; and Asthma Attitudes Questionnaire) administered by the research assistants to both the control and intervention groups, maintained the consistency of the data collection process. Questionnaires were completed on an individual basis without the children sharing ideas in the classroom. A brief introduction about the questionnaire was given by the research assistant to help the children understand how to complete them. It was assumed that as all instruments which had been translated into Arabic and had been cognitively tested as suitable for children of the sample age, that no children would need assistance in completing the questionnaires. However, there was no guarantee that this would be the case. The research assistants reported that some children (although few in number) had sought help with some of the questions. However, the research assistants had been told that while they could offer support to the children they could not assist the children with answering the questions. Over the course of the study requests from children declined and this is thought to relate to them becoming increasingly at ease at answering the questionnaires. It is worthy of note that there were fewer requests for help in the intervention group and this is thought to relate to increased knowledge and awareness gained from the educational programme.

Although some parents accepted the invitation to attend the programme, they were allowed only to attend the programme with their children but without any gesture to help children in selecting their responses while completing the questionnaire. The role of the class teacher was confined to distributing and collecting the study forms from students when start and end self-evaluation.

On completion of the data collecting activities the research assistants delivered the same health education programme to children in the control group. Figure 4 shows a pictorial representation of the study design.

DATA ANALYSIS

Data analysis is a crucial step in any study. These processes were completed under the guidance of the supervisory team. Quantitative data analysis aims to summarise the large number of numerical data into statistical inferences that can be translated and interpreted for use in practice. Statistical analysis was conducted on the basis of eliminating the risk for type I and type II errors as mentioned before (Polit and Beck, 2008).

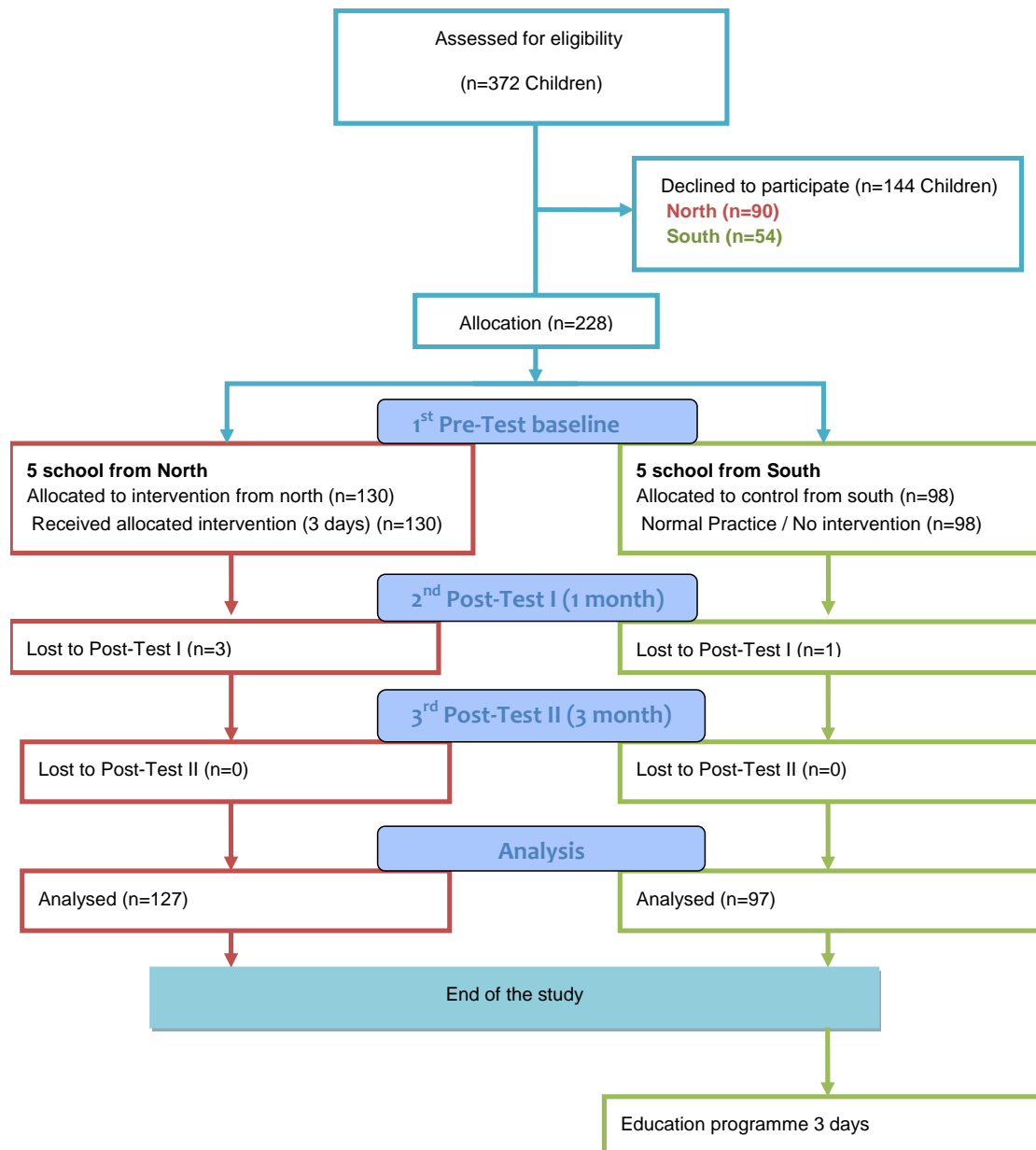
Preparation and processing of the quantitative data included transfer of questionnaire responses into a spread sheet where each response was given a numerical value. Then, the survey data were managed using the Statistical Package of Social Sciences (SPSS version 20). After the completion of data entry, missing data were detected in each variable. As a general rule, missing data which does not exceed 3% of the total data such variables can be replaced with the mean value of the same variable as a neutral action that does not influence the actual mean (Burns and Grove, 2010). Outliers were also investigated in this stage and appeared absent due to the narrowing range of scores especially in the continuous variables.

The logical sequence of statistical analysis is to start with the descriptive statistics moving towards inferential statistics. The descriptive statistics of all items were examined in order to establish their normality. Means, percentages, and standard deviations (SD) were used to describe the distribution of demographics over the study groups (control Vs. intervention) and over study stages (pre-test, post-test I, and post-test II). Before describing the results gained from study instruments, it was important to examine the homogeneity of the sample prior to starting the programme, assuming that there were no significant differences between control and intervention groups in relation to the variables under investigation. The ANOVA statistic was used for this purpose, which revealed that both groups were homogenous in relation to all

demographical variables except their age distribution. The test of internal consistency was also measured using Cronbach's alpha statistic for all variables in each group (control vs. intervention) before and after applying the programme.

Thereafter, a number of statistical steps were done to show that changes occurred in variable scores over the study stages. Means, standard deviation (SD), Degree of Freedom (DF), and significant level which was set at 0.05, were included as the nature of the variables held the continuous level of measurement. Since the instruments produced continuous data which met the assumptions of the parametric statistics, such as normality, parametric statistics were conducted to show the comparisons between groups using one way ANOVA test. Normality was assessed in each individual variable based on the value of skewness which was as follows: knowledge 0.176; attitude 0.345; anxiety 0.202; quality of life 0.198. Various references supported the normality where skewness was lower than 0.2 (Daniel, 2009; Polit and Beck, 2008). Other tests such as the T test were also used in some comparisons, showing all the elements in addition to the value of the Confidence Interval (CI). Finally, demographic variables were compared with the changes found in each of the study variables over the study duration using the same statistical procedures.

Figure 4: Overall study process



CHAPTER SUMMARY

This chapter has outlined the methods used in this study. It has presented a detailed description of each phase of the study design including ethical approval to conduct the study, sampling techniques, choice and translation of instruments, data collection and methods of analysis. The next chapter presents the results of data analysis.

CHAPTER FIVE: RESULTS

INTRODUCTION

This chapter provides the results obtained from data analysis, structured according to the research questions. It begins with the demographic detail of the study sample, considering the distribution of participants in the control and intervention groups. Thereafter, a comparison between control and intervention groups in relation to the study variables at the pre-test is provided to determine the extent of homogeneity between groups before starting the education programme. Results gained from scores will be compared between groups (control vs. intervention) and over time (pre-test, post-test I, and post-test II). Then, these results will also be compared with regard to the demographic data including age, gender, and income levels to examine whether there is significant difference between these subgroups in relation to any study variables. A summary at the end of this chapter highlights the main findings from the study.

RESEARCH QUESTIONS

1. Is there a significant difference in the pre-test measurements of asthma-related in knowledge, attitude, quality of life, anxiety, and school attendance between children in the control and intervention groups?
2. Is there a significant difference in the post-test I measurements of asthma-related in knowledge, attitude, quality of life, anxiety, and school attendance between children in the control and intervention groups?
3. Is there a significant difference in the post-test II measurements of asthma-related in knowledge, attitude, quality of life, anxiety, and school attendance between children in the control and intervention groups?
4. Is there a significant difference between the measurements of the three phases (pre-test, post-test I, post-test II) in both groups in relation to the study variables?
5. Is there a significant difference between demographic categories (gender, age, income levels) in relation to the study variables (knowledge, attitude, quality of life, anxiety, and school attendance) before and after implementing the education programme?

PARTICIPANT DEMOGRAPHICS

Two hundred and twenty-eight participants joined the study distributed into control group (n=98 accounting for 43%) and intervention group (n=130 accounting for 57%). Table 10 shows the distribution of the study participants in regard to their demographic details; gender, age, and income level. The control group had a slight female bias (males 48%), while the intervention group had a more noticeable male bias (males 58%). However, the Chi-square test for independence (with Yates' continuity correction for 2x2 table), indicated that this difference in gender balance was not significant (Chi-square: 2.128, df 1, p=0.145). Regarding ages, the majority of participants were over 9 years old. However, there was a significant difference between control and intervention groups regarding ages, with the majority of students in the intervention group being older than those in the control group (Chi-square: 6.463, df 2 p=0.040). As explained previously in the methodology chapter, this issue may add some threats to the validity of results as the two groups under comparisons were heterogeneous in regard to age assuming that age may impact on children ability to acquire knowledge and their ability to modify the quality of life. Finally, control group and intervention group did not differ in term of income levels (Chi-square: 8.189, df 3, p=0.085). However, the majority of participants had income above than 5000 SR as shown in the Table 10.

Table 10: Participant demographic detail

	Control Number (%)	Intervention Number (%)	Total Number (%)	Chi- square	Significance
Gender					
Male	47 (48%)	75 (57.7%)	122 (53.5%)	2.1279	0.145
Female	51 (52%)	55 (42.3%)	106 (46.5%)		
Total	98 (100%)	130 (100%)	228 (100%)		
Age (years)					
7-8	35 (35.7%)	28 (21.5%)	63 (26.6%)	6.4632	0.040
9-10	35 (35.7%)	49 (37.7%)	84 (36.8%)		
11-12	28 (28.6%)	53 (40.8%)	81 (36.6%)		
Total	98 (100%)	130 (100%)	228 (100%)		
Income in SR (Saudi Rial)					
<3000	20 (20.4%)	13 (1.0%)	33 (14.5%)	8.1886	0.0849
3000-4999	18 (18.4%)	23 (17.7%)	41 (18.0%)		
5000-6999	16 (16.3%)	32 (24.6%)	48 (21.1%)		
7000-8999	20 (20.4%)	37 (28.4%)	57 (25.0%)		
≥9000	24 (24.5%)	25 (28.3%)	49 (21.4%)		
Total	98 (100%)	130 (100%)	228 (100%)		

PRE-ASSESSMENT OF THE SAMPLE (PRE-TEST)

It was essential to assess the homogeneity of the sample prior starting the educational programme as it was assumed that the sample was homogenous in terms of asthma Knowledge, Attitude, Anxiety level, and Quality of Life. Table 11 shows the differences between the intervention and control groups in term of these variables.

RESEARCH QUESTION:

1. Is there a significant difference in the pre-test measurements of asthma-related in knowledge, attitude, quality of life, anxiety, and school attendance between children in the control and intervention groups?

Table 11: Comparison between groups in the pre-test

Variable	Intervention group				Control group				P value
	Obs	Mean	SD	Cronbach's Alpha	Obs	mean	SD	Cronbach's Alpha	
Knowledge	130	13.6	2.5	0.74	98	11.5	2.9	0.50	<0.001
Attitude	130	47.5	13	0.72	98	49.5	12	0.77	0.22
Anxiety	130	42.4	18.5	0.92	98	50.0	13.3	0.79	<0.001
Quality of life	130	90.4	32.1	0.96	98	75.9	19.8	0.89	<0.001

According to the previous table, it is evident that there were some significant differences between the intervention and control groups. Students assigned to the intervention group scored higher in having knowledge about asthma than students assigned to the control group. Students in the intervention group had higher quality of life compared to students in the control group. Likewise, students in the intervention group showed less anxiety than students in the control group. However, no significant difference appeared between the intervention and control groups in relation to attitudes toward asthma. Internal consistency of the study instruments was assessed by measuring reliability using Cronbach's alpha statistic. Most results revealed acceptable or high internal consistency in all values for both groups except for knowledge in the control group (0.50).

In respect to these findings, it was noted that children in the intervention group were significantly older than children in the control group. There might be a theoretical foundation explaining this phenomenon. For example children who are considerably older may exhibit much understanding of the disease severity and management compared to younger children as explained by differences in knowledge level. Similarly, older children may show less anxiety and higher perceived quality of life due to longer exposure to the disease possibly resulting in enhanced adaptation and coping with the disease in contrast with their counterparts who had been exposed to the illness for a shorter time so they might not be fully adapted with the disease processes.

POST-EDUCATION PROGRAMME MEASUREMENTS

The attrition rate in both groups over the study phases did not exceed 1-2% (3 participants from the intervention group and 1 participant in the control group). Results were based on the parametric statistic one way ANOVA to compare the group's means. As shown in Table 12, 130 participants in the intervention group were compared to 98 participants in the control group.

RESEARCH QUESTIONS

1. Is there a significant difference in the post-test I measurements of asthma-related in knowledge, attitude, quality of life, anxiety, and school attendance between children in the control and intervention groups?
2. Is there a significant difference in the post-test II measurements of asthma-related in knowledge, attitude, quality of life, anxiety, and school attendance between children in the control and intervention groups?
3. Is there a significant difference between the measurements of the three phases (pre-test, post-test I, post-test II) in both groups in relation to the study variables?

Change in Knowledge in Intervention and Control Groups

The results showed that the level of participants' knowledge did not differ significantly in the control group over the three phases, whereas the level of asthma knowledge was increased significantly after delivering the programme (F 26.5746, df 2, $p < 0.001$) (Table 12). A post hoc test was conducted using Tukey HSD test to identify differences in means. The test showed that there was a statistically significant difference in means between pre-test and post-test I, and between pre-test and post-test II (mean differences, 2.54 and 1.81, $p < 0.001$ and < 0.001 , respectively). However, although there was a decline in knowledge at post-test II from post-test I, this reduction was not statistically significant ($p = 0.107$). This result confirms that the asthma educational programme had a significant impact on child knowledge leading to sustained, increased awareness and knowledge of the asthma.

Change in Attitude in Intervention and Control Groups

Neither the intervention group nor the control group showed any significant change in attitude toward asthma over the three phases of assessment ($p > 0.05$). Scores from both groups showed little difference (Table 13). No significant change means that the educational programme could not be said to have impacted on students' attitudes toward their illness.

Table 12: Change in Knowledge among Intervention and Control Groups across Pre-test and Post-Tests

	Intervention Group						Control Group					
	Obs	Mean	Std Dev	ANOVA			Obs	Mean	Std Dev	ANOVA		
				F statistic	Df	P-value				F statistic	Df	P-value
Pre-Test	130	13.5615	2.5089	26.5746	2	<0.001	98	11.5306	2.8546	0.3936	2	0.6750
Post-Test I	127	16.1024	3.0468				97	11.5773	2.8425			
Post-Test II	127	15.3701	3.0571				97	11.2474	2.7120			

Table 13: Change in Attitude among Intervention and Control Groups across Pre-test and Post-Tests

	Intervention Group						Control Group					
	Obs	Mean	Std Dev	ANOVA			Obs	Mean	Std Dev	ANOVA		
				F statistic	Df	P-value				F statistic	Df	P-value
Pre-Test	130	47.4692	12.9550	0.0490	2	0.9522	98	49.5204	11.9036	2.0789	2	0.1269
Post-Test I	127	47.7165	7.9780				97	46.3402	11.1532			
Post-Test II	127	47.8504	7.8650				97	47.2990	10.4205			

Change in Anxiety among Intervention and Control Groups

As mentioned in the methodology chapter, Spence's anxiety scale was used to measure the overall anxiety level and separately in six sub-domains: Generalized, Social, Panic, Physical, Separation, Obsessive Compulsive. In the accumulative score, there was a statistically significant difference in the anxiety score between the three phases of intervention group as shown in Table 14. Tukey HSD test revealed that there was a significant difference in means between post-test I and post-test II (mean difference: 5.69, $p=0.028$), with no statistically significant difference between pre-test and either post-test ($p>0.05$). Despite this backing down effect in the intervention group, the control group showed no significant change over the three phases. The accumulative Spence's scores indicated that the education programme had a no direct impact on lowering overall anxiety subsequent to delivery of the programme, and the lowest anxiety scores did sustain for an extended period of time.

There were mixed results from the sub-domains scores. It was evident that the educational programme was associated with statistically significant changes in the Panic, Physical, Separation, and Social sub-domains, while no significant changes occurred in the Generalized and Obsessive Compulsive sub-domains (Table 15). In contrast, the control group had no statistically significant changes in any sub-domains (Table 16). Further research is needed to investigate these elements and overall anxiety.

Table 14: Change in Anxiety Score among Intervention and Control Groups across Pre-test and Post-tests

	Intervention Group						Control Group					
	Obs	Mean	Std Dev	ANOVA			Obs	Mean	Std Dev	ANOVA		
				F statistic	Df	P-value				F statistic	Df	P-value
Pre-Test	130	42.4154	18.4529	3.7599	2	0.0242	98	49.9184	13.3097	0.5305	2	0.5889
Post-Test I	127	37.7638	17.6336				97	51.8763	12.9946			
Post-Test II	127	43.4567	16.7530				97	51.1443	13.9306			

Table 15: Change in Anxiety Score Domains among Intervention Group across Pre-test and Post-tests

	Pre-test			Post-test I			Post-test II			ANOVA		
	Obs	Means	SD	Obs	Means	SD	Obs	Means	SD	F statistic	df	P-value
Generalized	130	6.5615	3.8640	127	6.3622	3.3230	127	6.8268	3.0553	0.5850	2	0.5576
Obsessive Compulsive	130	7.2462	3.9258	127	6.6142	3.4366	127	7.2913	3.4159	1.4065	2	0.2463
Panic	130	9.2231	5.0074	127	8.3386	4.6738	127	10.0157	4.7191	3.8737	2	0.0216
Physical	130	5.9154	3.1501	127	5.0000	2.8922	127	5.6535	2.4507	3.5079	2	0.0309
Separation	130	7.2692	4.0073	127	5.9055	3.3910	127	7.0630	3.2629	5.4095	2	0.0048
Social	130	6.2000	3.8265	127	5.5433	3.1767	127	6.6063	3.2223	3.1163	2	0.0455
Cumulative Anxiety	130	42.4154	18.4529	127	37.7638	17.6336	127	43.4567	16.7530	3.7599	2	0.0242

Table 16: Change in Anxiety Sub-domains among Control Group across Pre-test and Post-tests

	Pre- test			Post- test I			Post- test II			ANOVA		
	Obs	Means	SD	Obs	Means	SD	Obs	Means	SD	F statistic	Df	P-value
Generalized	98	7.5000	3.3406	97	8.2680	3.0670	97	7.6701	2.9181	1.6325	2	0.1972
Obsessive Compulsive	98	8.0918	3.2684	97	7.8247	3.5238	97	7.9588	3.2175	0.1560	2	0.8557
Panic	98	12.3571	4.3701	97	12.1649	4.4527	97	12.3711	4.5445	0.0649	2	0.9371
Physical	98	6.5714	2.6360	97	6.8763	2.5991	97	6.7423	2.6152	0.3325	2	0.7174
Separation	98	7.9388	3.1779	97	8.9072	2.9229	97	8.4021	2.8963	2.5372	2	0.0808
Social	98	7.4592	3.4497	97	7.8351	3.1744	97	8.0000	3.1491	0.7051	2	0.4949
Cumulative Anxiety	98	49.9184	13.3097	97	51.8763	12.9946	97	51.1443	13.9306	0.5305	2	0.5889

Change in Quality of Life among Intervention and Control Groups

As shown in Table 17, there was a statistically significant increase in Quality of Life after receiving the educational programme ($p < 0.001$). There was no significant change in the Quality of Life scores among participants in the control group ($p = 0.30$), while the total quality of life scores changed significantly between the three phases among the intervention group showing a statistical significant differences ($F: 87.6534$, $df: 2$, $p < 0.001$). When using Tukey HSD post hoc tests to identify differences in means between phases, a statistically significant difference appeared between pre-test and both post-test I & post-test II (mean differences: 29.88 & 31.40, $p < 0.001$ & < 0.001 , respectively). However, there was no statistical difference found between post-test I and post-test II ($p = 0.839$). The increase in quality of life did not change significantly between the post-tests, but the significant improvement was sustained following the intervention.

When examining the quality of life sub-domains, results confirmed that the control group showed no changes in any domain scores over the study duration (Table 18). Scores in the intervention group within all domains were higher than scores in the control group. There were significant differences between pre-test and post-test I in all quality of life sub-domains among participants in the intervention group (Table 19). Scores increased from pre-test to post-test I in sub-domains of Symptoms, activity limitation, and emotional affection. No significant changes occurred in these sub-domains between post-test I and post-test II, indicating the stability of quality of life after delivering the programme.

Table 17: Change in Quality of Life Score among Intervention and Control Groups across Pre-test and Post-tests

	Intervention Group						Control Group					
	Obs	Mean	Std Dev	ANOVA			Obs	Mean	Std Dev	ANOVA		
				F statistic	Df	P-value				F statistic	Df	P-value
Pre-Test	130	90.3923	32.0570	87.6534	2	<0.001	98	75.8980	19.7920	1.1979	2	0.3033
Post-Test I	127	120.2756	12.5310				97	72.9381	19.2926			
Post-Test II	127	121.7953	13.6425				97	71.5567	20.9419			

Table 18: Change in Quality of Life Domains among Control Group across Pre-test and Post-tests

	Pre- test			Post- test I			Post- test II			ANOVA	
	Obs	Means	SD	Obs	Means	SD	Obs	Means	SD	F statistic	P-value
Symptoms	98	32.7	10.4	95	30.4	9.0	97	29.9	9.6	2.225	0.110
Activity limitation	98	14.8	4.7	96	14.8	4.6	96	14.8	5.4	0.001	0.999
Emotional Affection	98	28.5	8.2	97	27.8	8.8	97	27.0	9.1	0.722	0.487

Table 19: Change in Quality of Life Domains among Intervention Group across Pre-test and Post-tests

	Pre- test			Post- test I			Post- test II			ANOVA	
	Obs	Means	SD	Obs	Means	SD	Obs	Means	SD	F statistic	P-value
Symptoms	130	39.6	14.5	127	52.3	6.0	127	53.3	6.0	78.834	<0.001
Activity limitation	129	19.0	7.3	125	26.0	3.7	127	26.4	3.7	83.197	<0.001
Emotional Affection	130	31.8	12.1	127	42.1	5.2	127	42.1	5.5	66.412	<0.001

DIFFERENCES BETWEEN DEMOGRAPHIC CATEGORIES IN RELATION TO STUDY VARIABLES

This section represents the results gained from comparisons between the each demographic category of gender, age, and income in regard to the study variables of knowledge, attitude, anxiety, quality of life and school attendance. The findings were based solely on the intervention group of 130 participants in the pre-test phase and 127 participants in both post-test phases. Comparisons were made using the one way ANOVA test.

RESEARCH QUESTION:

5. Is there a significant difference between demographic categories (gender, age, and income level) in relation to the study variables (knowledge, attitude, quality of life, anxiety, and school attendance) before and after implementing the educational programme?

Comparisons between male and female participants

Regarding the level of knowledge of asthma, male and female participants revealed roughly equal knowledge levels in the pre-test phase showing no significant difference in means at this stage. At post-test I and post-test II, both male and female participants showed an improvement in knowledge. However, female participants scored higher than male participants, leading to a statistically significant difference in both post-test I and post-test II measurements (Table 20). In addition, female participants sustained the increase in knowledge to post-test II in contrast to male participants whose knowledge fell back to near the pre-test measure at post-test II (Table 20).

In the measurement of attitude scores, male and female participants were different in the pre-test. Female students scored significantly higher compared to male participants ($t=2.359$, $p=0.0198$). Despite that difference in the pre-test, male and female participants revealed no significant differences in the subsequent phases (Table 20).

Students' anxiety level was similar for male and female participants at pre-test. After experiencing the programme, male students showed a statistically significant increase in anxiety over the study phases. On the contrary, female students had a significant decline in anxiety over the study phases. There was a statistically significant difference between male and female in regard to anxiety in both post-test I and post-test II (Table 20), with females showing reduced anxiety and males an increase in anxiety.

Although there were no statistically significant differences between male and female participants in relation to quality of life measurement, it was evident that both gender had improvement in quality of life as displayed in Table 20. The educational programme exerted a significant impact on improving the quality of life for both male and female students suffering from asthma.

Table 20: Comparisons between male and female participants within the intervention group in relation to the study variables

	Male			Female			ANOVA	
	Obs	Mean	Std Dev	Obs	Mean	Std Dev	T statistic	P-value
Knowledge								
Pre-Test	75	13.24	2.46	55	14.0	2.53	1.719	0.088
Post-Test I	73	14.4	2.13	54	18.4	2.54	9.646	<0.001
Post-Test II	72	13.4	1.73	55	18.0	2.33	12.867	<0.001
Attitude								
Pre-Test	75	45.2	13.9	55	50.5	10.9	2.359	0.019
Post-Test I	73	47.4	6.7	54	48.2	9.5	0.545	0.587
Post-Test II	72	46.6	3.67	55	49.5	11.1	2.034	0.044
Anxiety								
Pre-Test	75	40.71	18.5	55	44.75	18.3	1.235	0.219
Post-Test I	73	44.7	15.7	54	28.4	15.7	5.806	<0.001
Post-Test II	72	53.3	5.7	55	30.6	17.7	10.210	<0.001
Quality of life								
Pre-Test	75	93.5	34.4	55	86.1	28.4	1.308	0.193
Post-Test I	73	120.4	10.3	54	120.1	15.2	0.126	0.899
Post-Test II	72	123.3	13.7	55	119.9	13.4	1.406	0.162

Comparison between age categories

There was no statistically significant difference between participants from different age categories in knowledge of asthma in pre-test or post-test phases. However, participants from all age categories exhibited a remarkable increase in knowledge after implementing the programme, although scores declined slightly at post-test II (Table 21).

Similarly, age categories did not differ in regard to attitude toward asthma over the study phases (Table 21). It was noted that attitudes scores were inconsistent with an unstable association between different age groups and attitude toward asthma.

Younger children (7-8 years old) scored higher for overall anxiety compared to older children (Table 21). Although there was a statistically significant difference at pre-test between participants from different age groups, no statistically significant differences were found between age categories at post-test I and post-test II. However, the results suggest that the educational programme had a significant impact on reducing the level of anxiety in all age groups.

Quality of life was also assessed in respect to the age classifications. It was clear that older child (11-12 years old) had notably higher quality of life scores compared to younger child. There was a statistically significant difference between age groups at pre-test. Indeed, quality of life was improved in all categories after delivering the educational programme although no statistically significant differences between these groups in post-test I. This result indicates that asthma educational programme had improved participants' views about quality of life.

Table 21: Comparison between age categories within the intervention groups in relation to the study variables

	Age categories									ANOVA Test	
	7-8 years			9-10 years			11-12 years				
	Obs	Means	SD	Obs	Means	SD	Obs	Means	SD	F statistic	P-value
Knowledge Pre-Test	28	13.9	2.5	49	13.2	2.6	53	13.8	2.4	1.018	0.363
Post-Test I	27	15.5	3.4	47	15.7	2.7	53	15.7	3.1	2.064	0.131
Post-Test II	28	14.9	2.1	47	15.6	2.7	52	15.4	3.7	0.419	0.658
Attitude Pre-Test	28	45.9	8.4	49	47.1	13.4	53	48.6	14.5	0.443	0.643
Post-Test I	27	47.4	5.5	47	48.9	9.0	53	46.9	8.1	0.816	0.445
Post-Test II	28	46.5	8.5	47	47.7	8.0	52	48.7	7.4	0.727	0.485
Anxiety Pre-Test	28	51.4	13.8	49	45.3	20.2	53	35.0	16.2	9.343	<0.001
Post-Test I	27	42.2	17.7	47	38.8	18.1	53	34.5	16.8	1.858	0.160
Post-Test II	28	45.0	18.5	47	43.1	16.7	52	34.0	16.1	0.151	0.860
Quality of life Pre-Test	28	76.4	27.1	49	86.6	31.4	53	101.3	31.9	6.607	0.002
Post-Test I	27	117.8	10.2	47	118.8	13.0	53	122.9	13.0	2.034	0.135
Post-Test II	28	116.3	12.2	47	121.3	13.1	52	125.3	14.0	4.243	0.016

Comparison between income levels

Five income levels were introduced ranging from <3000 SR to >9000 SR. As was expected from the pattern of salaries in KSA, the majority of participants fell within the middle range of income. Participants whose income was below 3000 SR had the highest knowledge level compared to other income levels. This was found in pre-test, post-test I, and post-test II. There were statistically significant differences in the level of knowledge between all these categories in the three study phases as shown in Table 22. Although there were statistical differences, it was not clear how knowledge score alters between different income groups. Meaning, it was not possible to decide whether low-income children or high-income children was affected more by the programme.

There was little change overall across all income groups with regard to attitude toward asthma, and no statistically significant differences between income groups (Table 22).

Anxiety scores across income groups did not show statistically significant difference at pre-test. Following the educational programme, a statistically significant reduction subsided in anxiety was found among participants whose income was below 3000 SR ($F=2.870$, $p=0.026$). In general, anxiety scores for most participants reduced after the programme. Participants in the middle categories (5000-9000 SR) had the highest anxiety scores after the educational programme.

Finally, income groups were compared according to their quality of life analysis. There were no any statistically significant difference between income groups regarding the quality of life scores in all study phases including pre-test, post-test I, post-test II. However, it was clear that all income groups had improved after receiving the educational programme. This result indicates that income did not influence the change in the quality of life after experiencing the educational programme.

Table 22: Comparison between income levels within the intervention group in relation to the study variables

	Income levels															ANOVA	
	<3000 SR			3000-4999 SR			5000-6999 SR			7000-8999 SR			9000+ SR				
	Obs	Means	SD	Obs	Means	SD	Obs	Means	SD	Obs	Means	SD	Obs	Means	SD	F statistic	P value
Knowledge Pre-Test	13	14.8	2.7	23	14.2	2.8	32	12.3	2.1	37	13.9	2.0	25	13.6	2.8	3.705	0.0069
Post-Test I	19	18.2	2.7	24	16.5	3.2	25	14.4	1.7	38	15.9	3.2	21	16.2	3.1	4.843	0.0012
Post-Test II	14	18.1	3.2	24	16.2	2.9	29	14.2	1.6	38	14.7	3.0	22	15.0	3.4	6.269	<0.001
Attitude Pre-Test	13	46.3	10	23	45.7	6.6	32	48.3	16.6	37	47.9	12.8	25	47.9	14.2	0.184	0.946
Post-Test I	19	49.4	9.7	24	48.5	6.5	25	47.8	7.0	38	47.8	7.3	21	44.9	9.9	0.934	0.446
Post-Test II	14	47.4	10.7	24	48.1	6.4	29	48.5	5.4	38	47.7	8.0	22	47.2	10.1	0.095	0.983
Anxiety Pre-Test	13	47.1	17.5	23	46.2	10.8	32	43.9	23.6	37	41.0	17.2	25	36.6	18.4	1.174	0.325
Post-Test I	19	27.3	15.2	24	40	19.0	25	44.3	17.0	38	38.3	15.3	21	35.8	19.7	2.870	0.026
Post-Test II	14	26.4	14.4	24	41.3	17.2	29	49.8	10.9	38	47.6	16.1	22	41.1	17.9	6.369	<0.001
Quality of life Pre-Test	13	73.7	22.8	23	92.3	28.3	32	92.9	35.1	37	88.2	35.0	25	97.3	29.5	1.293	0.276
Post-Test I	19	117.0	15.8	24	120.6	14.7	25	121.9	10.8	38	120.5	12.0	21	120.5	9.8	0.429	0.787
Post-Test II	14	118.4	15.4	24	117.6	13.3	29	126.1	14.6	38	121.3	11.1	22	123.7	14.7	1.663	0.163

Change in the absenteeism rate before and after the education programme

As shown in Table 23, paired samples t-test showed that male participants in the control group had no significant change in means for absenteeism before and after the programme. On the contrary, male participants in the intervention group had significantly reduced rate of absenteeism from 3.6 to 2.8 ($t=2.98$, $p=0.003$). There was no significant difference between females assigned to the control group before and after the programme (Table 23). However, female participants assigned to the intervention groups showed a significant reduction in absenteeism after the programme (mean difference: 4.2 to 2.7 days, $t=2.82$, $p=0.007$). These results confirm that the educational programme had a significant impact on school attendance in both male and female asthmatic children.

Table 23: Changes in absenteeism rate between males and females over study period

	Control groups				Intervention groups			
	Pre-Test Mean (SD)	Post-Test II Mean (SD)	T	P value	Pre-Test Mean (SD)	Post-Test II Mean (SD)	T	P value
Male	3.9 (1.6)	4.2 (1.1)	1.031	0.306	3.6 (1.8)	2.8 (1.5)	2.98	0.003
							CI: 0.94-1.473	
Female	4.6 (1.8)	4.6 (1.7)	0.130	0.897	4.2 (2.2)	2.7 (1.8)	2.82	0.007
							CI: 0.414-2.512	

SUMMARY

It was evident that the participants assigned to the control and intervention groups were homogenous in term of study demographic variables (age, gender, and income levels). However, there were some statistical differences between groups in relation to study variables. A number of dimensions had been changed as a result of the intervention. Knowledge and quality of life scores had been improved after the programme. Regarding anxiety in the accumulative score, there was a statistically significant difference in the anxiety score between the three phases of intervention group ($F=3.7599$, $DF\ 2$, $p=0.0242$) but no statistically significant difference between pre-test and either post-test ($p>0.05$). Anxiety scores had reverted to those at pre-test

at post-test II. However, findings did not report significant change in the attitude scores in the intervention groups. Control groups had no significant changes in all these variables over the study duration.

Female students showed more stability on their knowledge levels after receiving the programme compared with male students. In addition, females showed reduced anxiety compared with males after the education programme. Younger students were affected more by the intervention. Low financial income students were less anxious after the programme compared with student who had higher income. Finally, both male and female participants had a significant reduction in the absenteeism after delivering the educational programme.

CHAPTER SIX: DISCUSSION

INTRODUCTION

This chapter provides discussion of the study findings in the context of the KSA and existing literature. The chapter is organised according to the study variables; the impact of asthma education on children's level of knowledge, attitudes, quality of life, anxiety, and school absenteeism in the context of Social Cognitive Theory. The evidence obtained from this study is compared with what is already known in the literature.

Asthma education and the level of knowledge

Children's knowledge regarding asthma is known to influence the effectiveness of their asthma treatment (Gerald et al., 2006; Partridge et al., 2006; Anarella et al., 2004; Green et al., 2002). There is a general consensus that asthma education programmes can be an effective means to help children learn and acquire the knowledge they need to help them manage asthma (Dashash & Mukhtar, 2003). In the KSA, it has been agreed that asthma education programmes should be delivered to children in a structured format in terms of content, delivery, and follow up to attain higher levels of knowledge among children with asthma (Faisal, 2004; Gawward & El-Herishi, 2007). However, as noted in chapter 3, educating children about their asthma has yet to be integrated into the care package offered to children living with asthma in KSA (Alnaif & Alghanim, 2009). A consequence of this is that the management of children's asthma remains less effective than should be the case.

However, it is acknowledged that one study conducted in Chicago reported no significant improvement in the level of knowledge after implementing the Open Airway for School (OAS) programme to children aged 8-13 (Velsor-Friedrich et al., 2004). However, it was not clear whether the findings of this study were sufficiently rigorous as no randomisation, concealment, sample size or power calculations were reported. In addition, the evidence obtained was at a moderate (fair) level due to the limitations of the study design. In contrast, the majority of studies reviewed in chapter 3 confirmed the positive impact of asthma education programmes on the level of children's knowledge. Four of the reviewed studies were evaluated as good (strong) positive evidence to support this relationship (Bowen, 2013, Cicutto et al., 2005;

Kintner 2009, Patterson et al., 2005,). Another three studies were judged to be moderate (fair) level to support the relationship (Velsor-Friedrich. 2005; Bartholomew. 2006; Levy et al., 2006). For instance, a clustered RCT conducted to evaluate the implementation of a case management programme which consisted of an asthma education course, weekly monitoring of student health status, and co-ordination of care (Levy et al., 2006) with a sample of 243 children (115 intervention and 128 control), reported a significant improvement in the knowledge score in the intervention group. Further, Gerald et al. (2006) evaluated the effectiveness of the (OAS) programme on outcomes for children living with asthma in the USA and reported improved knowledge scores from baseline in the immediate intervention group.

The findings reported here concur with these results as they show a significant improvement in the intervention group knowledge scores compared to the control groups. This includes general knowledge related to asthma triggers, symptoms, asthma treatment, and asthma management. Moreover, the improvement in children's knowledge was sustained over the study duration at post-test II. However, although both male and female children had increased their knowledge, females scored higher than males in the knowledge and sustained their increase in knowledge to post-test II in contrast to male children who drew back to near the baseline measure at post-test II. This result is in keeping with the findings from other studies that reported increased knowledge of asthma symptoms, medication, and effectiveness of use of inhalers following asthma education programmes (Kintner and Sikorskii, 2009; Bowen, 2013). The study findings reported here add that such programmes can be designed and delivered in the cultural context of the KSA. Moreover, these findings are important as there is a general consensus that knowledge improvement is related to the control of asthma symptoms and a reduction in asthma intensity (Bowen, 2013, Gerald et al., 2006) a strategic aim of the KSA MoH (Faisal, 2004; Gawward & El-Herishi, 2007).

The success of any education programme relies heavily on the sustained learning that leads to improved adherence to the learned principles. The outcomes related to knowledge improvement reported in this study demonstrate sustained knowledge gain over a three month period evidenced by a very minimal and non-significant decline in knowledge scores at post-test II. This is compatible with other researchers that

reported significant improvements in children's knowledge and daily self management over a prolonged period of time, some exceeding three years (Bartholomew et al, 2006). Although sustained knowledge is important, some studies have reported that children with higher knowledge scores exhibited better concordance with prescribed treatment (Put et al. 2008; Bartholomew et al., 2006; Butz et al., 2005; Henry et al., 2004). In addition, knowledge is also associated with fewer complications and less bothersome day and night symptoms (Douglas & Elward, 2010; Butz et al., 2005; Clark et al., 2005; Velsor-Friedrich et al., 2004). It is apparent that asthma education has contributed to a better level of knowledge in children with asthma. Whether delivered through secondary or tertiary services, health education has been shown to promote better understanding of the illness and to facilitate the capability needed for self-assessment and management of symptoms.

Social Cognitive Theory helps to explain why this is so. According to Social Cognitive Theory, personal knowledge or "personal determinants" is the means by which all self-regulatory mechanisms such as self-observation, self-judgement and self-reaction, are integrated with basic knowledge. Personal knowledge is also enhanced through a personal capacity to undertake actions to prevent complications and improve health status (Bandura & Ross, 1969). Bandura emphasised the influence of personal factors represented by these self-regulatory sub-processes as manifest in determining the efficiency of the learning process by which each process plays an integral part in formulating the perception towards the retained knowledge. Thus, when applied to this programme, it suggests that the programme may facilitate self-regulation in children according to their learning capabilities to enhance better learning outcomes.

As noted in chapter 2, there is a consensus in the international guidelines for the need to provide effective health education as an integral part of asthma management (National Asthma Education and Prevention Programme, 2007; The British Thoracic Society, 2012; SINA, 2012). Failure to do so leads to a lack of knowledge about the disease and thus poor adherence to the therapeutic regimes and poor self-management (Partridge et al., 2006; Green et al., 2002). Without a national strategy driven by the MoH in the KSA it is unlikely that the SINA (2012) guidance will be implemented. Yet, Henry et al (2004) demonstrated that children can benefit from national programmes. Even those provided with a short asthma intervention (one day

programme) showed a significant improvement from baseline scores relating to knowledge and adherence to therapeutic regimes (Henry et al 2004).

The results presented here add evidence that a national education programme aimed at children living with asthma in the KSA could help them to acquire sufficient knowledge to help improve their quality of life and well-being.

Asthma education, attitudes and self-efficacy

Attitudes towards asthma were another major concept that was measured. According to Social Cognitive Theory, attitudes depend heavily on self-observation and reinforcement which act as motivators to change and manipulate individual values and behaviour (Bandura, 1989; Bandura, & Ross, 1969). Bandura postulated that children that had greater self-efficacy had more confidence in their ability to perform well and succeed compared to those with lower self-efficacy. Social Cognitive Theory added additional illustration to this concept by providing descriptions about behavioural determinants in the social context. People who hold certain characterisations which enhance their attitudes are considered more able to sustain, change, or improve their self-expectations based on their internal values through self-empowerment (Clark & Zimmerman, 1990). Psychologists argue that self-efficacy impacts on all areas of an individual's endeavours by shaping beliefs related to their intentions. Therefore, self-efficacy is a concept that is thought to enhance an individual's capacity to face challenges effectively and select the best choice from available alternatives (Ormrod, 2006; Luszczynska & Schwarzer, 2005). While self-efficacy was the prominent term used in the literature to assess the impact of asthma education programme on outcomes for children, the findings of their attitude towards asthma is related to the concept of self-efficacy.

As noted in chapter 4, self-efficacy is related to the individual's ability to assess their capability to perform certain behaviours through performance attainment, self-observation, and control of anxiety and physical limitations. The impact of an asthma education programme can be measured in part through the children's adherence to their therapeutic regimes and their ways of recognising and prioritising their therapeutic plans (Butz et al., 2005; Velsor-Friedrich et al., 2004; Rosenstock et al., 1988; Bartlett, 1983). Hence, adherence to asthma treatment can also be explained through the concept of self-efficacy (Schmitt diel et al., 2004; Boulet, 1999).

The children's attitudes towards asthma were examined using a number of domains included in the Asthma Attitude Questionnaire including tolerance towards asthma, internal control, powerful other and the result of chance (Gibson et al., 1995; Friedman & Litt, 1987). As reported in the previous chapter the results indicated that none were significantly altered by the asthma education programme. One explanation for this is that attitudes towards asthma cannot be changed over a short period of time (Winnick et al., 2005; Schmittiel et al., 2004; Boulet, 1999). As noted in chapter 3 there were some variations in the research results reported that related to change in attitude towards asthma, but there were also variations in the time-frame used to measure this outcome post intervention. It is contended here that these differences may explain the different results reported.

The study reported here assessed attitude at one and three months after the asthma education programme. Butz et al. (2005) assessed self-efficacy of children after ten months of the educational programme. Their results showed a significant increase in children's self-efficacy and mitigation of asthma symptoms. Likewise, Velsor-Friedrich et al. (2004) reported a significant improvement in participants' self efficacy after five months of the asthma education programme. Contrary to these results, a study by Velsor-Friedrich, Pigott, and Srof (2005) who used the RAP asthma education programme with school children aged 8-16 years, reported higher self-efficacy after two months of the programme. The different programme used in this study may be implicated in this. Therefore, the relationship between asthma education programmes and attitudes towards asthma remains uncertain. More research is needed to explain the many extraneous factors that may impact on the accurate measuring of children's attitudes towards asthma.

However, although the results reported here do not show any significant change in children's attitudes towards asthma, it is important to remember that asthma education programmes are thought to impact on basic knowledge and the integration of acquired skills into daily living activities such as controlling symptoms and promoting self-management (Douglas & Elward, 2010; Butz et al., 2005; Velsor-Friedrich et al., 2004). It seems likely that without the modification of patient-related determinants, of which self-efficacy is one, impact on attitude is less likely (Rabe et al., 2004; Sekerel et al., 2006; Humbert et al., 2007). Previous research confirmed this association and reported that in the presence of effective asthma education

programmes there is a strengthening of children's self-efficacy (Bartholomew et al., 2006, Butz et al., 2005, Velsor-Friedrich et al., 2005). For instance, Velsor-Friedrich et al., (2004) reported that children in the intervention group who attended an asthma education programme showed a significant improvement in self-efficacy measured by the Asthma Belief Survey. McGhan et al (2003) and Bartholomew et al. (2006) reported significant improvement in self-efficacy among children who received asthma education. In addition, self-management practice and behaviours such as recognising triggers, adhering to medications, and identifying asthma symptoms were significantly improved by the education programme. Further, fewer symptoms and fewer asthmatic attacks were reported in children who have received asthma education (Bowen, 2013, McGhan et al., 2010, Bartholomew et al., 2006, Walker et al., 2008).

In summary, although there was no significant change in the children's attitudes towards asthma between the intervention and control group, it is possible that this change may occur at a later point in time, when the children had more experience of their expectations being reinforced by success in managing their asthma. However, it is also acknowledged that children's attitudes towards asthma and their self-efficacy may be influenced by their psychological response to the disease (Clark & Zimmerman, 1990). Consequently, measuring children's attitudes towards asthma becomes a complex task. In addition, other factors such as low moods or fluctuating moods, transitions in social roles, and hyperactivity may also alter the outcomes (Laforest et al., 2006; Sekerel et al., 2006; Bousquet et al., 2005).

Asthma education and Quality of Life

There is a consensus that living with asthma impacts on the QoL of children especially when there is poor control. As noted in chapter 3 for the purpose of this study, QoL is defined as a human's insights of their position in life and their value system which is related to their goals, expectations, standards, and concerns (Phillips, 2006). Generally, QoL consist of six domains; 'physical health', 'psychological status', 'level of independence', 'social relationships', 'environmental features', and 'spiritual concerns and beliefs' (WHO, 1993, p1). According to Horner, Kieckhefer, & Fouladi, (2006) Mohangoo et al., (2007) Sawyer et al., (2000) and Van De Ven et al., (2007) many health practitioners acknowledge QoL as an indicator of the state of an individual's well-being. Moreover, as discussed in chapter 3, McGhan et al. (2010)

and Cicutto et al. (2005) had developed a robust instrument to measure the relationship between a child's QoL and the management of their asthma. However, the study by Cicutto et al. (2005) had only examined the impact of asthma education programme on the QoL regardless the severity of intensity of disease in those children.

As reported in the previous chapter, analysis of the results from the use of this measure in this study showed a positive impact of the asthma education programme on the overall quality of life scores for children in the intervention group compared to those in the control group. Alongside this there was a statistical significant difference in the all sub-domains of the QoL scores including severity of symptoms, activity limitation, and emotional distress. Of particular note was that those in the intervention group sustained the initial improvement in QoL scores shown at post-test I (1 month after intervention) when this measured again at Post-test II (3 months after intervention).

It is well-known that asthma can lead to feelings of anxiety and depression (Osman 2002; Rand & Butz, 2000). For instance, those with severe symptoms of asthma (i.e. shortness of breath) were found to be more likely to suffer from major depression than those without severe symptoms (Goldney et al., 2003). In addition, children with asthma may experience sleep disturbances and often complain of feeling tired and frustrated (Ford et al., 2003; Sawyer & Fardy, 2003). Furthermore, Juniper et al, (2001) reported that children with asthma may feel angry and socially isolated. Other researchers (Bowen, 2013, Patterson et al., 2005, Butz et al., 2005) have reported that physical health, mental health, and social functioning are significantly worse among children living asthma than those without asthma. In addition, children with asthma show less engagement in school activities, low self-esteem, disturbed behaviours, and maybe less organised compared with those healthy children (Sawyer & Fardy 2003; Sawyer et al., 2001). All factors relate to the 6 domains of QoL.

The findings reported here are compatible with those reported by other researchers which confirmed the significance of asthma education on improving QoL scores (Cicutto et al., 2013, McGhan et al., 2010, McCann et al., 2006, Cicutto et al., 2005). In the RCT by Cicutto et al. (2013), students reported a significant improvement in

their QoL scores after receiving education about asthma, and this was sustained at the one year follow up. Another RCT with two follow up points (at 6 and 12 months) using the RAP programme reported similar findings (McGhan et al., 2010). Further, Clark et al. (2005) and McCann et al., (2006) tested the effects of a school-based asthma education programme using the OAS programme on children with asthma aged between 7-11 years old. The quality of life in both studies, which was measured at baseline and one year after the intervention, showed a significant improvement in the children's QoL.

However, although researchers have established an association between asthma and QoL some research reports conflicting findings for children with mild to moderate asthmatic symptoms (Erickson et al., 2002; Goldbeck et al., 2007; Montalto et al., 2004; Vila et al., 2003). For example, a study was conducted to measure asthma symptoms and disease-specific QoL in 339 children aged between 5-12 years old by Annett, (2001). The study found that mild-to-moderate asthma did not significantly affect the children's QoL, whereas severe asthma did (Annett, 2001). Another study conducted in 238 school children aged between 8-16 years old found that QoL was not associated with low asthma severity (Montalto et al., 2004). In this context, future research works in the KSA are encouraged to examine the relationship between severity of asthma and QoL in the light of asthma education.

Likewise, other studies did not establish an association between asthma education for children and QoL (Bowen, 2013, Walker et al., 2008, Patterson et al., 2005, Butz et al., 2005). In a study by Walker et al. (2008), QoL did not significantly change after ten months of delivering a short workshop and asthma devices training for children with asthma. Also, Patterson et al. (2005) found no significance difference in the quality of life scores between the intervention and control group after the completion of eight weeks educational sessions. Ward et al., (2010) and Young et al., (2001) found no significant improvement in the QoL which was assessed by Paediatric Asthma Quality of Life Questionnaire (PAQLQ) after conducting a school-based asthma education programme for children aged between 7-17 years when it was reassessed one month after the interventions.

As noted earlier, QoL is a complex and multi factorial construct that rests on the

interplay between 6 domains ('physical health', 'psychological status', 'level of independence', 'social relationships', 'environmental features', and 'spiritual concerns and beliefs'). Application of Social Cognitive Theory (Bandura, 2001) suggests that QoL is related to self-regulation, the process by which people try to control environmental, personal, and behavioural factors in order to achieve a better life (Clark & Zimmerman, 1990). This suggests that asthma education programmes may impact on children's self-regulatory mechanisms. However, environmental support is given a high priority in Social Cognitive Theory and Graham and Logan (2006) assert that a change in behaviour is not possible without control of environmental obstacles. Some stimulus associated with the surrounding environment such as peers, family, and health care providers may negatively influence the learning process (Stewart et al, 2011). This suggests that factors beyond the influence of the education programme may result in negative stimulus and that children may be prepared to understand the impact of this to reduce the risk of learning inadequacy (Graham & Logan, 2006; Stewart et al, 2011). assessing the influence of these factors would need to be considered more fully in any future programme development Secondly, psychosocial reactions which are determined by children's responses to peers' behaviours may induce feelings of embarrassment and lead to negative impacts or conversely positively enhance adherence to what has been learned on the programme.

Finally, the physical environment in the children's school and the children's home may lead to exposure to triggers that exacerbate asthmatic symptoms. For example, when there are adequate instructions about the use of inhaler devices in their home, the likelihood of asthmatic episodes will be minimised as adherence to medication and treatment regimes is more likely to be maintained. Another example is the exposure to animals' fur, painting substances, and smoking, common triggers for those with asthma (Arbex et al., 2007; Sarnat & Holguin, 2007). It is known that Social Cognitive Theory links aspects related to individual behaviours to the predisposing factors, enabling factors, and reinforcing factors along with the environmental conditions (Simon et al, 1995). The relationship between these factors illustrates the multi-factorial complexity of behavioural change in children and may go some to explaining the variations in results across studies.

It is evident from this study that the asthma education programme resulted in positive outcomes for those children in the intervention group. While this intervention was delivered in the context of the Ha'il region in the KSA, it supports the premise that culturally accepted asthma education may help to improve the health and well-being for children in other KSA regions and other cultural contexts. However, to confirm this asthma education programmes would benefit from national public health campaigns aimed at increasing the knowledge of others' in the child's environment to avoid unintended negative impact on children's learning. The value of this requires further research.

Asthma education and children's anxiety

Although levels of anxiety is one of the sub-aspects of children's QoL, remarkably little is known about the contribution of asthma education programmes on levels of anxiety for those children living with asthma. Anxiety, an indication of psychological distress, can be exacerbated by asthmatic symptoms such as shortness of breath (Kang & Weaver, 2010). Anxiety is also aggravated in the presence of day and night-time symptoms (Butz et al., 2005; Gawward & El-Herishi, 2007; Velsor-Friedrich et al., 2004). While relieving day and night symptoms is associated with better self-efficacy and QoL (Bartholomew et al., 2006; Butz et al., 2005; Velsor-Friedrich et al., 2005), asthma education was also key in managing these symptoms efficiently using self-management strategies (Bartholomew et al., 2006; Patterson et al., 2005; Velsor-Friedrich et al., 2005). It followed that a reduction in levels of anxiety may follow. Studies which examined the outcomes for anxiety levels following an asthma education programme emphasised a significant reduction following the intervention (Newacheck & Halfon, 2000; Rand et al., 2000). Newacheck & Halfon (2000), and Rand et al., (2000) investigated anxiety levels in children with asthma to further explain the association between asthma education programmes and a reduction in anxiety and reported that anxiety was significantly reduced after receiving asthma education.

Spence's (1998) anxiety scale was used in this study to measure the anxiety levels of children living with asthma and to compare the results between the intervention and control groups. Spence's (1998) anxiety scale comprises the following domains generalised, obsessive compulsive, social, panic, physical, separation. A significant

difference in anxiety scores was found in the intervention group at post-test II (three month after the asthma education programme) compared to the post-test I (one month after the programme) in which anxiety in post-test I was significantly less than anxiety in post-test II. Although the difference in the anxiety scores between pre-test and post-test I was not statistically significant, there was a mild reduction in the anxiety scores between these two consecutive phases (mean change 42 to 37). On the whole, the asthma education programme yielded uncertain findings regarding the anxiety levels in which anxiety scores reverted to the (pre-test) after three months of the programme (post-test II).

Anxiety is similar to attitudes and self-efficacy in that persistent alteration over time maybe noted in an individual with chronic illness (Schmittiel et al., 2004; Kang and Weaver, 2010). It is acknowledged that a concrete improvement in an individual's health status is required to enhance a feeling of difference between the present and the past regarding an individual's feelings and attitudes towards their current illness (Henry et al., 2004; McCann et al., 2006). While the initial post intervention results indicate that asthma education had improved the knowledge and QoL of children, it seems it did not sufficiently influence personal interpretation about the nature of the disease over time as evidenced by anxiety scores reverting to those reported at pre-test.

However, it is known that children with higher self-regulatory capabilities are less likely to suffer from persistent anxiety and stress due to their illness. This is thought to relate to self-regulation as this is the way by which children with asthma are able to examine their condition and take action for change (Clark & Zimmerman, 1990). Anxiety levels are reduced accordingly when self-regulation mechanisms are successfully implemented. However, reduction in anxiety levels is difficult to sustain without the existence of positive reinforcement which is the incentive to improve the internal motivation to achieve the desired goal (Bandura, 1989). Negative reinforcement is one of the factors that induce feelings of anxiety and stress when past experiences are less likely to be beneficial for the future experiences. Social Cognitive Theory suggests that self-regulation is a continuous and reciprocal process. This concept indicates that an individual is motivated to become self-regulatory using their own mechanisms of action. The more self-regulation the more powerful response to

the stimuli that holds meanings of the desired goal. Therefore, Social Cognitive Theory illustrated how such environmental factors may act as a habitual catalyst in an individual's ability to deal with stress and its consequences effectively over the long-term.

According to the above discussion, asthma education programmes hold unclear influence on the children anxiety. Despite supporting evidence in the literature, asthma education in the KSA might be affected by other factors that impede the reduction in children's anxiety. This manifest high anxiety in the pre-test among children in this study meant that those children had been in a stressful condition and reasons beyond that behaviour may be embedded in psychological stressors. Further psychological arguments supported by physical examination would be required to identify these hidden factors associated with anxiety in children which may also impact of their physical features such as frequent shortness of breath and exaggerated asthma symptoms (Schmittiel et al., 2004).

Asthma education and school absenteeism

School attendance is another important aspect measured in research which has assessed the outcomes of asthma education programmes for children living with asthma. This study found that both male and female students in the intervention group had a significant reduction in school absenteeism compared to those in the control group. This supports the contention that effective asthma education may improve children's attendance at school. These findings are in keeping with other studies that have reported a reduction in school absenteeism for those that have attended asthma education programmes when compared to children living with asthma that have not (Cicutto et al., 2013, Walker et al., 2008, Levy et al., 2006, Clark et al., 2005, Cicutto et al., 2005, McGhan et al., 2003).

Some cross-sectional studies in the KSA have examined the relationship between children living with asthma and school absenteeism (Al-Dawood, 2002; Bener et al., 2007). In the first, a cross-sectional study, school health registry was used to obtain information about school attendance. The study found that children living with asthma were more likely to report missed school days compared to non-asthmatic students (Bener et al., 2007). In the second study, the number of days missed in asthmatic students aged between 6 -15 years was significantly higher than those without asthma

(Al-Dawood, 2002). While both studies provide useful data, they did not investigate the reasons behind school absenteeism. However, a study undertaken in Oman by Huda et al. (2008) reported that 66% of school students may miss their school due to asthmatic attacks which suggests that the problem is not specific to the KSA.

While the majority of studies confirmed the association between asthma education and reduced school absenteeism, many other studies found no significant differences between students who received asthma education and students who did not in regard to school attendance (McGhan et al., 2010, Walker et al., 2008, Gerald et al., 2006, Bartholomew et al., 2006, Velsor-Friedrich et al., 2005, Horner, 2004, Clark et al., 2004, Velsor-Friedrich et al., 2004). For instance, a study to evaluate the impact of an education intervention programme on school attendance (n=736, age=7-11 years old) reported no significant difference between the intervention and control group in regard to school absenteeism and the level of academic achievement (Gerald et al., 2006). Likewise, an RCT was conducted in the USA to assess the effects of a comprehensive school-based education programme for children with asthma on school absence and academic performance (Clark et al., 2004). The OAS education programme was introduced to 835 children. The researchers reported that education did not seem to reduce the number of missed school days. However, some researchers have pointed out that some reasons for absence from school include attendance at doctor appointments and environmental factors (Coffman, Cabana, & Yelin, 2009; Findley et al., 2003; Gorelick et al., 2003; McGhan et al., 2003; Newacheck & Halfon, 2000; Warsi et al., 2004; Yeatts, et al., 2003).

One explanation for differences reported may be due to the use of different methods of measurement to evaluate school attendance. In addition, there is no consensus on a definition for school absenteeism to compare asthmatic children's attendance with that of their counterparts. Another problem is that researchers relied on different sources of data. For instance, some used school records (McGhan et al., 2003; Silverstein et al., 2001), while others derived results from students' self-reports (Yeatts & Shy, 2001), and others relied on parents' reporting (Al-Dawood, 2002; McGhan et al., 2003). Another difference was the duration of observation of school absenteeism which ranged from days to months, something that distorts the reliability of the findings due to a lack of observational consistency. The study reported here used school records to measure for absenteeism; however, they were insufficient to

examine the reasons behind absenteeism. This matters as students may not attend school for reasons unrelated to asthma problems and emphasises the need for reasons for absenteeism to be investigated thoroughly. In fact, the impact of asthma on school attendance is still uncertain and needs to be verified by longitudinal monitoring and follow-up to embrace all issues surrounding poor school attendance such as severity of illness and economic status.

A number of previous studies found that asthma impacted negatively on the academic grading (Taras & Datema, 2005). A cross-sectional study found that children with asthma had a significantly lower reading ability compared with non-asthmatic children (Halterman et al., 2001). Another study revealed that asthmatic students were not as good as their healthy peers in reading, mathematics, or physical education units (Gawward & El-Herishi, 2007). A longitudinal study of 12 months was conducted to predict the achievements of children with asthma in 298 children aged between 6-7 years old. The study discovered that children with asthma were poor in reading compared to their healthy peers (Yawn et al., 2000). However, other research studies refuted this claim and reported that the performance of children with asthma was similar to their peers (Annett et al., 2000; Halterman et al., 2001). Another study found those children in the intervention group achieved higher grades in science subjects compared to children in the control group (Silverstein et al., 2001). Although the impact of asthma education on students' academic achievements was not investigated in the study reported here, it seems there may be a relationship between school attendance and school performance but this warrants further investigation to examine the impact of asthma on educational outcomes and how effective education programmes may mitigate this impact.

The influence of demographic variables on the reported outcomes

As noted in the previous chapter, there were many significant changes in outcomes for the children following the asthma education programme. However, the analysis showed some differences between children that related to different demographic variables. For instance, gender was implicated in this. Female students in the intervention group scored higher in knowledge about asthma after receiving asthma education compared to their male counterparts. In addition, they sustained their higher levels of knowledge over the three months between post-test I and II whereas male participants regressed to the pre-test score at post-test II. Another difference was that

anxiety levels in female participants declined while the study was progressing compared to males who exhibited an increase in anxiety levels over the study period. While a number of studies from different backgrounds investigated the effect of gender on asthma education outcomes (Al Frayh et al., 2001; Bartholomew et al., 2006; Butz et al., 2005; Velsor-Friedrich et al., 2005), there was no consensus regarding the reasons for this. It is important to note that the studies cited here did not attempt to discover factors that influence learning in the context of Saudi culture. Gender differences in relation to learning capability in the chronically ill are still uncertain. In general, it appears that asthma education resulted in more positive outcomes in females than male despite the consistency in delivering the programme for both genders. Another interpretation may support the premise that females might have preferred the format of the learning materials used in the intervention more than males did. However, further investigation is required to gain greater understanding of the influence of gender on asthma education in the KSA.

Regarding age, the asthma education programme was mildly associated with significantly lower anxiety levels for all students especially those aged 7-8 years who scored higher anxiety level in the pre-test compared with older children. Moreover younger children had been more anxious than older students at the beginning of the study. Likewise, asthma education had significantly improved the QoL of all students in different age groups. Younger students had proportionally higher scores in the QoL than older students after receiving asthma education. It was noted the both groups were not homogenous in relation to the age variable. This may have occurred due to not randomising the study sample, which was a main criticism to the validity of the study findings in which the range of age distributions may affect children's response to the intervention.

However, as noted in chapter 4, Social Cognitive Theory explains the role of observational learning in the acquisition of new strategies for adaptation. Bandura (1986) explained that the most effective direct/indirect learning strategy is observation. These processes are more attainable in younger children than older children due to the nature of mental predisposition to comprehend the surrounding environment. In particular, younger children are able to adapt effectively and change their life according to the learned principles much better than older children who show

more resistance to change (Clark & Zimmerman, 1990). This is worthy of further exploration in future research.

In respect of the income levels, children from families with low incomes (<3000 SR) demonstrated higher levels of knowledge in all the study phases compared to those students from families with moderate to high incomes. Similarly, those students from low income families had reduced anxiety scores over the study phases compared to those with from families with higher incomes whose anxiety levels fluctuated across the study duration. However, it is acknowledged that those from higher socioeconomic classes have better adherence to healthy behaviours. Students from families of low socioeconomic class are twice as likely to have asthmatic complications compared with the students from families in higher socio-economic class (Gawward & El-Herishi, 2007; Gerald et al., 2006; Horner, 2004; Velsor-Friedrich et al., 2004). In light of this contradiction, and in keeping with Social Cognitive Theory which explains the complex interplay between personal determinants, environmental determinants, and behavioural determinants (Bandura, 1986), it is thought that children from lower socioeconomic classes generate greater impetus to accommodate the illness through self-regulatory mechanisms to advance towards different behavioural outcomes due to their limited opportunities to receive best medical treatment and follow-ups. This is worthy of further investigation through robust research to examine the association between socioeconomic status and uptake of asthma education. This research query is important to find the influence of social and economic class on asthma severity. Larger trials in the KSA could include children from different geographical locations, considering the variations in health care facilities, educational facilities, and the average of wages in these regions. Although there is much known about the relationship between socioeconomic status and wellbeing, this relationship among children with asthma in the KSA is still unclear.

SUMMARY

Considering that health education is a well established method to increase self-awareness about a particular disease, asthma is one of the chronic disorders that sometimes go beyond the capacity of children to embrace the complexity of the situation. Asthma education has been demonstrated as an effective and accessible

method to attain help children the goal of asthma control and enhance self-management.

Children living with asthma are the beneficiaries of asthma education. The evidence gained from this study, which were also congruent with previous research work, has confirmed the usefulness of asthma education in improving the level of knowledge, QoL, and a reduction in school absenteeism. Other research findings have emphasised the role of asthma education on enhancing self-regulation, self-efficacy, and self-management. It seems that asthma education programmes may improve outcomes for children in their physical sphere but not necessarily their psychological sphere.

The discrepancies reported in the findings from this study compared to those reported in the literature including age, gender, and socioeconomic class may be related to distinctive factors for Saudi culture. Cultural variation is a major concept to be investigated in this field. This affirms that universal asthma education must be designed to take account of cultural variations in any society.

CHAPTER SEVEN: CONCLUSION AND RECOMMENDATIONS

INTRODUCTION

This chapter considers the implications of these findings for clinical practice, nursing research and health and education policy in the context of the KSA. Limitations of the study are also addressed and a number of recommendations are also provided. Finally, the chapter concludes with a brief outline of the dissemination strategy that will be used to ensure that the findings from the study are promulgated.

This quasi-experimental study aimed to assess the impact of a school-based asthma health education programme on outcomes for children living with asthma who reside in the northern part of the KSA. Study outcomes were associated with different variables such as quality of life, school absenteeism, anxiety levels, knowledge of asthma, and attitudes to asthma. The study found that the level of asthma knowledge increased significantly in those children who received asthma education. There was also a significant reduction in the anxiety level in this group compared to the control group. In respect to the QoL, children who received the asthma education programme scored higher in the total QoL measure compared to those who did not. The asthma education programme has also significantly reduced the school absenteeism in the intervention group. However, the asthma education programme was found to be ineffective in the changing of attitudes towards asthma of children after receiving the programme. Testing the effectiveness of asthma education in the Saudi culture was extremely important because research evidence found that being a Saudi citizen carries a high risk factor for asthma (Al-Ghamdi, et al., 2008; Hijazi, et al., 1998).

The study findings support the claim that the asthma education programme yielded beneficial outcomes for children with asthma in the context of Saudi culture. This leads to the assumption that the asthma education programme would impact on the children's ability to perform their daily living activities in an effortless manner as argued by Gibson et al., (2004).

The introduction of an asthma education programme in elementary schools, where students are age between 7 and 12 years old, was another impetus. There is paucity in research conducted in Saudi Arabia in the area of asthma control and prevention for this age category. While a number of asthma guidelines are implemented in the KSA

(National Asthma Education and Prevention Programme, 2007), this study unveiled a deficiency in the diagnosing, treating, and follow-up of these children with higher ecological and genetic predisposition for asthma. The evidence taken from this study affirms that the success of any asthma prevention programme is unlikely to occur without tangible health education instruction that aims to help children living with asthma move towards self-efficacy and self-management.

In fact, the childrens attitude and was found irresponsive to asthma education programme. Despite this, it seems that an effective multidisciplinary approach may provide the best means of ensuring success of such programmes should they be rolled out across the KSA.

IMPLICATION FOR POLICY AND CLINICAL PRACTICE

This study is the first study in KSA to measure outcomes of an asthma education programme from the perspective of children. It is also one of few studies globally to use multiple measures of important outcomes. Although the study matches with other research in its findings, this study has unique features that enabled identification of significant improvements gained from an asthma education programme related to QoL, knowledge of asthma, and school absenteeism in the KSA. Likewise, it is the first study in KSA to acknowledge that more needs to be done in consideration of children's attitudes to living with asthma.

Findings from this study support the contention that the health care leaders in the KSA consider the need to implement asthma education programmes nationwide. However, the Saudi government has already identified that asthma is a major health concern in their strategic health plan and they have encouraged researchers to focus on this area of research (Ministry of Health, 2010). Congruent with this, it is recommended here that asthma education programmes go beyond school-based programmes to include the education of others that impact on children's learning. It is also suggested that health care providers make every health contact with children living with asthma count by providing and reinforcing evidence-based information during visits to medical facilities for help or follow-up visits.

Multimedia national health promotion programmes could also be used to disseminate the findings of this study to the wider health community in the KSA. Although the

SINA initiative exists already, further explication about asthma education and its impact on children, as addressed in this study could be integrated within the existing guidance to strengthen the evidence base and provide emphasis. Furthermore, increasing the awareness of children about risk factors such as smoking, infection, diet, and obesity may also contribute to decrease in the likelihood of asthmatic episodes.

IMPLICATIONS FOR NURSING RESEARCH

This work has provided a robust translation of the (NAKQ, AAQ) that may now be used by other researchers wishing to evaluate the impact of asthma education programmes for children in the KSA and elsewhere in the Arabic world. As mentioned earlier, this is the first study that has integrated a range of outcome measures in the sphere of asthma education. The questions raised by this study that remain unanswered provide the basis for future research to discover, explore and examine other factors related to children living with asthma in the KSA, such as local environmental factors. The national research programme is the most important source of funding that should now embark on financial support for larger trials that focus on the effectiveness of asthma education programmes in different regions of the KSA taking into account regional, social-economic and other distinct factors including age and gender in the context of Saudi culture.

LIMITATIONS

Using a quasi-experiment design aims to evaluate the association between an intervention and an outcome (Reichardt, 2009). This study employed the quasi-experimental design using a control group and pre-test. However, the use of a convenience, rather than randomly selecting sample limits evidence derived to that below a RCT (Facchiano and Snyder, 2012b). Using a non-randomized sample has entailed non-homogenous sample in regard to age variable. It is assumed that most of changes between intervention and control groups were influenced by age variation and thus future researchers are encouraged to employ randomised-controlled trials to avoid heterogeneity in demographics between the two discrete groups.

In addition, choosing to undertake the study in some schools in one region (Ha'il) may be interpreted by some as selection bias (Polit and Beck, 2008). Although there was clear justification for undertaking the study in this region it is possible that other geographical locations may hold different characteristics which may lead to different results.

It is recommended that longitudinal studies are carried out in multiple steps over a longer period of time. This study was confined to three months of assessment. Providing a greater duration of time between the post-test I and post-test II may have elicited different results in changes in children's behaviours over longer period of time. However, this was mitigated in part by the recruitment of a larger sample and the low attrition rate may have been adversely affected had the study run over a longer time period.

The included schools in this study were entirely government funded. Including other educational sectors such as private or military schools may also have yielded different findings. In fact including students from private schools may have provided additional insight into the impact of socioeconomic status on the asthma education outcomes. It is also noted that this study was limited to children of Saudi nationality and consideration of outcomes non-Saudi children with asthma will be an important consideration in future work.

RECOMMENDATIONS

According to the study findings, the following points summarise the recommendations from the study which relate in particular to work to improve the effectiveness of asthma education programmes in children with asthma in the KSA, the Arabic world and elsewhere.

Recommendations for policy

1. That the Ministry of Health and Ministry of Education consider the findings reported here and ensure that asthma education be integrated into all national asthma management and prevention guidelines to enhance children's capacity for self-efficacy and self-management. The outcomes of doing so should be subject to robust evaluation using similar outcome measures to those used in this study.

2. Health care services should use national evidence based guidance to eliminate the potential risk for discrepancies in care and ensure that children with asthma receive optimum care, education and management of their condition.

Recommendations for practice

1. That the role of the school must be acknowledged in the control and management of children's asthma through participating in asthma education.
2. That Asthma surveillance should be maintained regularly by qualified health practitioners especially for children living in the rural and countryside regions.
3. That children's agency, capacity and readiness to learn about their asthma and benefit from that learning is acknowledged in health and education practice.
4. That an introductory course regarding asthma is offered to all students affected by asthma to increase the level of awareness towards the disease by the means of primary management and prevention.

Recommendations for further research

1. That future researchers are encouraged to undertake further investigation on the possible risk factors associated with successful asthma education programmes considering those factors related to children living in Saudi culture.
2. That further research into the benefits of counselling and follow-ups is undertaken in the context of Saudi culture.
3. That additional investigation for children with asthma should be conducted considering different geographical locations in the kingdom to attain comprehensive figures about highly susceptible populations.
4. That gender and age variations in addition to socioeconomic class need to be examined to enhance in-depth exploration for their influence.
5. That anxiety more work is needed to understand the interaction between asthma education programme, Saudi culture and children's.

DISSEMINATION PLAN:

The study findings are expected to be disseminated in the following ways:

Local

1. A copy of the study findings will be sent to the authorities of all participating schools and the Ministry of Education and the Ministry of Health.
2. Brief seminars will be organised at the participating schools to provide an overview of the main findings of the study to the students, their parents and their teachers.
3. The results will be available in written format suitable for children, parents and the lay community.

National

1. The results of the study have been presented at national conferences and received well. (See appendix 20)
2. The results of the study will be disseminated to the local scientific committees concerned with children with asthma in the KSA (e.g. Ministry of Education, and Gulf Thoracic Congress).
3. The results of the study will also be submitted to the SINA so that they may appraise and include the evidence provided in future update of the SINA guidelines.

International

1. Study findings will be available on the University of Salford repository web site.
2. Publication in professionally peer reviewed national and international journals in children and asthma education.

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APPENDICE

Appendix 1

Hawker's Assessment Tool

Author and title:					
Date:					
	Good 4	Fair 3	Poor 2	Very poor 1	Comment
1. Abstract and title					
2. Introduction and aims					
3. Method and data					
4. Sampling					
5. Data analysis					
6. Ethics and bias					
7. Findings/results					
8. Transferability/generalizability					
9. Implications and usefulness					
Total					

1. Abstract and title: Did they provide a clear description of the study?	
Good	Structured abstract with full information and clear title.
Fair	Abstract with most of the information.
Poor	Inadequate abstract
Very Poor	No abstract
2. Introduction and aims: Was there a good background and clear statement of the aims of the research?	
Good	Full but concise background to discussion/study containing up-to date literature review and highlighting gaps in knowledge.
	Clear statement of aim AND objectives including research questions

Fair	Some background and literature review. Research questions outlined.
Poor	Some background but no aim/objectives/questions, OR Aims/objectives but inadequate background
Very Poor	No mention of aims/objectives No background or literature review.
3. Method and data: Is the method appropriate and clearly explained?	
Good	Method is appropriate and described clearly. Clear details of the data collection and recording
Fair	Method appropriate, description could be better. Data described.
Poor	Questionable whether method is appropriate Method described inadequately. Little description of data
Very Poor	No mention of method, AND/OR Method inappropriate, AND/OR No details of data.
4. Sampling: Was the sampling strategy appropriate to address the aims?	
Good	Details (age/gender/race/context) of who was studied and how they were recruited. Why this group was targeted. The sample size was justified for the study. Response rates shown and explained
Fair	Sample size justified. Most information given, but some missing
Poor	Sampling mentioned but few descriptive details.
Very Poor	No details of sample
5. Data analysis: Was the description of the data analysis sufficiently rigorous?	
Good	Clear description of how analysis was done. Qualitative studies: Description of how themes derived/respondent validation or triangulation.

	Quantitative studies: Reasons for tests selected hypothesis driven/ numbers add up/statistical significance discussed.
Fair	Qualitative: Descriptive discussion of analysis.
	Quantitative
Poor	Minimal details about analysis
Very Poor	No discussion of analysis

6. Ethics and bias: Have ethical issues been addressed, and what has necessary ethical approval gained? Has the relationship between researchers and participants been adequately considered?

Good	Ethics: Where necessary issues of confidentiality, sensitivity, and consent were addressed.
	Bias: Researcher was reflexive and/or aware of own bias.
Fair	Lip service was paid to above
Poor	Brief mention of issues
Very Poor	No mention of issues

7. Results: Is there a clear statement of the findings?




Good	Findings explicit, easy to understand, and in logical progression.
	Tables, if present, are explained in text.
	Results relate directly to aims.
	Sufficient data are presented to support findings.
Fair	Findings mentioned but more explanation could be given.
	Data presented relate directly to results.
Poor	Findings presented haphazardly, not explained, and do not progress logically from results.
Very Poor	Findings not mentioned or do not relate to aims.

8. Transferability or generalizability: Are the findings of this study transferable to a wider population?

Good	Context and setting of the study is described sufficiently to allow comparison with other contexts and settings, plus high score in Question 4 (sampling).
------	------------------------------------------------------------------------------------------------------------------------------------------------------------

Fair	Some context and setting described, but more needed to replicate or compare the study with others, PLUS fair score or higher in Question 4.
Poor	Minimal description of context/setting
Very Poor	No description of context/setting
9. Implications and usefulness: How important are these findings to policy and practice?	
Good	Contributes something new and/or different in terms of understanding/insight or perspective.
	Suggests ideas for further research
	Suggests implications for policy and/or practice
Fair	Two of the above (state what is missing in comments).
Poor	Only one of the above
Very Poor	None of the above

Appendix 2: Permission from Ha'il

MASAI OFFICE FOR TRANSLATION		
<hr/>		
NO. :	الرقم :	
Date : 24/3/2013	التاريخ : ٢٤/٥/١٤٣٤	
 Kingdom of Saudi Arabia Ministry of Education Code (280) Gen. Admin. of Education in Hail Region planning & developing Department Researchs and Studies		No. :34428797 Date : 02/03/1434 H 14/01/2013 G
Subject : To facilitate the mission of the researcher / Nashi Masnad Al-Reshidi Circular for all the primary schools in the region (boys –girls)		
Greetings		
<p>In reference to the letter of his excellency the Saudi Cultural Attaché in London , dated 10/12/2012 , concerning Study instrument application entitled (the impact of school based asthma health education program on quality of life, knowledge and attitudes of Saudi children with asthma) for the student : Nashi Masnad Nashi Al-Reshidi , and this is for the complement the requirements of obtaining the PHD degree in Nursing from Salford Univirsity at U.K.</p> <p>Pleading with you to kind cooperate with the researcher and to facilitate his mission of implementing the instrument of his study and provide him with all necessary data needed for the success of the study.</p>		
<p>Yours faithfully General director of education at Hail Region Hamad Mansour Alomran</p>		
		
<hr/>		
<p>المملكة العربية السعودية - حائل - ص.ب. ١٤٣٣ - رمز : ٨١٤١١ - ت. : ٣٣٥٠٠٠٧٤٥٤ - فاكس : ٥٤٣١١١٦ - رقم العضوية : ٦٠٨٩ Kingdom of Saudi Arabia - Hail - P.O.Box:1433 - Pen : 81411 - C.R. : 3350007454 - Tel. : 5436116 - Fax : 5434074 - Camber Of Cmo.6089</p>		

Appendix 3: Permission from Salford



Research, Innovation and Academic
Engagement Ethical Approval Panel

College of Health & Social Care
AD 101 Allerton Building
University of Salford
M6 6PU

T +44(0)161 295 7016
r.shuttleworth@salford.ac.uk

www.salford.ac.uk/

10 April 2013

Dear Nashi,

RE: ETHICS APPLICATION HSCR12/85 – The impact of a school-based asthma health education program on quality of life of Saudi children with asthma

Following your responses to the Panel's queries, based on the information you provided, I am pleased to inform you that application HSCR12/85 has now been approved.

If there are any changes to the project and/ or its methodology, please inform the Panel as soon as possible.

Yours sincerely,

Rachel Shuttleworth

Rachel Shuttleworth
College Support Officer (R&I)

Appendix 4: Announcement to recruit research assistants

الى جميع التمريض بمستشفى الملك خالد بجايل

انا الباحث /ناشي مسند ناشي الرشيدى طالب دكتوراه بجامعة سالفورد ببريطانيا في كلية التمريض لدي بحث
بعنوان

((أثر برنامج التشيف الصحي المدرسي الربو على نوعية حياة الأطفال السعوديين الذين يعانون من الربو))

وارغب في تجنيد ممرض وممرضه ممن تنطبق عليهم الشروط

-ان يكون سعودي الجنسية

-ان يكون لديه خبره سنتان ع الاقل

-ان يكون من حملة البكالوريوس

-ان يكون ممن يعملون بقسم الاطفال ويتعاملون مع مرضي الربو

الافضليه لمن تنطبق عليه الشروط اولا

للاتصال بالباحث شخصيا او الايميل

0548183321

n.m.alreshidi@edu.salford.ac.uk

Appendix 5: Permission for using the PAQLQ Arabic version

From: Penny Freeman <penny@qoltech.co.uk>

Sent: 05 November 2012 09:10

To: Alreshidi, Nashi Masnad (PG)

Cc: Jilly Styles

Subject: Re: PAQLQ Package ordering

Dear Nashi

Thank you for your e mail. I will now prepare the PAQLQ Arabic for UAE and North American English translations and post them off to you this week by first class mail. I hope the package arrives with you safely and swiftly. I am sending you the N Am Eng translation and not UK English as your study will be in Saudi Arabia.

With all good wishes for your study. Please do not hesitate to contact us again should you require any further information or assistance.

Penny Freeman

Assistant to Jilly Styles

QOL Technologies Ltd

20 Marcuse Fields

Bosham

West Sussex

PO18 8NA. UK

Telephone: + 44 (0) 1243 572124

Facsimile: + 44 (0) 1243 573680

e:mail: penny@qoltech.co.uk

Appendix 6: The Arabic version of the Spence Children's Anxiety Scale

بدائل الإجابة				
دائما	غالبا	أحيانا	لا	
				1. أصاب بالقلق على الأشياء الخاص بي وبأسرتي
				2. اشعر بالخوف من العتمة (الظلام)
				3. عندما اكو نفس مشكله يصيبني شعور بالغثيان وألم في معدتي
				4. اشعر بالخوف
				5. اشعر بالخوف عندما أكون وحدي في البيت
				6. اشعر بالخوف عندما يكون لدى امتحان
				7. اشعر بالخوف عند استخدام الحمام خارج البيت
				8. اشعر بالانزعاج عندما أكون بعيدا عن والدي
				9. اشعر بالقلق من أن تبدو أفعالي وأقوالي سخيفة أمام الآخرين
				10. اقلق من أنني لن أقوم بواجبي المدرسي بشكل جيد
				11. أنا محبوب بين زملائي من نفس عمري
				12. اقلق بأن شيئا سيئ يحدث لأحد أفراد أسرتي
				13. اشعر فجاء بنوبات من ضيق التنفس بدون سبب واضح
				14. استمر في تفقد الأشياء التي قمت بها عدة مرات مثل (التأكد من أن الضوء مطفي، باب البيت مقفول، الحنفية مكسورة)
				15. اشعر بالخوف عندما أنام وحدي
				16. اشعر بالتوتر والخوف عند ذهابي للمدرسة صباحا
				17. أمارس الرياضة بشكل جيد
				18. أخاف من الكلاب أو القطط
				19. لا استطيع التغلب على بعض الأفكار والصور السخيفة أو السيئة المزعجة وطردها من ذهني.
				20. عندما اقع في مشكله يدق قلبي بشده
				21. يرتجف جسمي فجأة دون سبب واضح
				22. اقلق بأن شيئا سيئا سيحدث لي
				23. أخاف من الذهاب للأطباء كطبيب الأسنان أو الطبيب العام
				24. اشعر بالارتجاف عندما أقع في مشكله
				25. أخاف من الأماكن العالية أو من ركوب المصاعد
				26. أنا شخص جيد
				27. اكرر التفكير بكلمات أو عبارات أو أرقام محدد له لأمنع الأشياء السيئة من الحدوث
				28. أخاف من السفر بالسيارة أو الباص أو القطار

				29. تقلقني طريقه تفكير الآخرين بي
				30. أخاف من وجودي في الأماكن المزدحمة (السوق، مواقف الباصات، الملاعب)
				31. اشعر بالسعادة
				32. ينتابني شعور و الخوف الشديد دون وجود شيء أخاف منه.
				33. أخاف من الحشرات (كالعناكب ، الصراصير الخ)
				34. أصاب فجاءه بالدوار أو الدوخة دون وجود سبب واضح
				35. أخاف عندما يطلب منى المعلم الإجابة أمام زملائي في الصف
				36. يبدأ قلبي فجاء بالدق بسرعة بدون سبب واضح
				37. ينتابني شعور بالقلق والخوف الشديد دون وجود شيء أخاف منه
				38. تعجبني شخصيتي
				39. أخاف من الأماكن الضيقة والمغلقة (كالأنفاق أو الغرف الصغيرة)
				40. اكرر القيام ببعض الأعمال عدة مرات يوميا (كغسل يدي، التنظيف، وضع الأشياء في ترتيب معين)
				41. أحاول طرد الكثير من الأفكار والصور السخيف هاو السيئة المزعجة من ذهني
				42. افعل بعض الأشياء فقط بطريقتها الصحيحة لكي أتجنب أشياء سيئة من أن تحدث
				43. أنا فخور بعملتي المدرسي
				44. اشعر بالخوف إذا كان على البقاء خارج البيت لوقت متأخر يحل فيه الظلام
				45. هل هناك أشياء أخرى تخاف منها ؟ اذكر ما هي؟

Appendix 7: Asthma Knowledge Questionnaire

	Items	Yes	NO
.1	Lots of children have asthma		
.2	People with asthma worry a lot		
.3	People with asthma can drink milk and eat yogurt		
.4	Having the flu can cause an asthma attack		
.5	Smoking is OK for people with asthma		
.6	People with asthma become hooked on their asthma drugs (cannot get off them)		
.7	If you do not have asthma now, you will never get it		
.8	An asthma attack is caused by redness and swelling in the airways of the lung		
.9	Most children with asthma are smaller than other children		
.10	Asthma can be spread from person to person		
.11	If one child in a family has asthma, then their brothers and sisters will have asthma too		
.12	People with asthma can die if not treated well		
.13	Medicines that keep asthma from happening should be taken every day		
.14	A puffer (inhaler) should be used when a person has an asthma attack		
.15	Having pet birds is OK for people with asthma		
.16	Asthma happens more at night		
.17	It is OK for people with asthma to swim		
.18	Some asthma medicines can hurt the heart		
.19	Rest is needed to stop an asthma attack		
.20	An asthma attack can happen suddenly without warning		
.21	When asthma is OK, all medicines can be stopped		
.22	With the right treatment, a child with asthma can live a normal life		
.23	Children with asthma can play sport		
.24	Can you list three signs of asthma 1- 2- 3-		

Appendix 8: Permission for using asthma knowledge scale

From: MohammadA_M@hu.edu.jo
To: namn2006@hotmail.com
Date: Mon, 5 Nov 2012 09:20:33 +0200
Subject: Re: FW: Permission For Questionnaire

Dear Nashi

Of course you can use the questionnaire, that's why we did it. But I will be gladful if you send me any publication later on that has cited this questionnaire.

All the best with your PhD

Mohammad

Dr. Mohammad Al-Motlaq Shutnawi
Assistant Professor, RN, BSN, MBS, PhD
School of Nursing
Hashemite University
Zarqa-JORDAN

Appendix 9: ASTHMA ATTITUDES QUESTIONNAIRE

Below are some statements made by people about their asthma. For each statement please show how strongly you agree or disagree. Do this by placing in the box the number that best describes your feelings. Please answer all questions (Gibson et al., 1995).

		1	2	3	4	5	6
		Strongly Agree	Agree	Tend to agree	Tend to disagree	Disagree	Strongly disagree
1.	If someone with asthma takes care of him/herself, he/she can avoid most asthma symptoms.						
2.	When someone has an attack of asthma symptoms at school, it is usually because he/she has been careless.						
3.	How soon someone recovers from an attack of asthma at school depends mainly on how well the teacher takes care of him/her.						
4.	When someone has an attack of asthma during sport, it is because the teacher hasn't checked up on whether the student has taken his/her medication.						
5.	If someone is going to have an attack of asthma, it will happen no matter what anyone does.						
6.	How soon someone recovers from an attack of asthma						

	symptoms is mostly a matter of luck.						
7.	Most people can control their asthma well without seeing a doctor regularly.						
8.	Someone with asthma should not use his/her puffer in class.						
9.	Students are embarrassed about using their inhalers in class.						
10.	Students without asthma have a negative attitude to students with asthma.						
11.	Students play on their asthma.						
12.	There would be few problems with asthma at school if students could carry their puffers around with them.						
13.	Teachers are worried about taking someone with asthma on a school camp or excursion.						
14.	Students with asthma are just as fit as students without asthma.						
15.	School teachers have a negative attitude to students with asthma.						

Appendix 10: Permission for using Asthma knowledge, attitudes, and quality of life in adolescents questionnaire

Date: Thu, 8 Nov 2012 13:34:54 +1100

From: Peter.Gibson@newcastle.edu.au

Subject: Re: FW: Permission For Questionnaire

To: namn2006@hotmail.com

hi,

you have my permission to use the questionnaire,

I am not able to help further with copies etc

peter

Appendix 11: The World Health Organization's (WHO) steps of translation and adaptation of instruments

Process of translation and adaptation of instruments

The aim of this process aimed to reach to different language versions of the English written instrument so that what results is conceptually equivalent in each of the target countries/cultures. That is, the instrument should be equally natural and acceptable and should perform practically in the same way. The focus is on the cross-cultural and conceptual understanding, rather than on linguistic and literal equivalence. A well-established method to achieve this goal is to use forward-translations and back-translations. This method has been refined in the course of several WHO studies to result in the following guidelines.

Implementation of this method includes the following steps:

- Forward translation
- Expert panel Back-translation
- Pre-testing and cognitive interviewing
- Final version

1. Forward translation

One translator, preferably a health professional, familiar with terminology of the area covered by the instrument and with interview skills should be given this task. The translator should be knowledgeable of the English-speaking culture but his/her mother tongue should be the primary language of the target culture.

Instructions should be given in the approach to translating, emphasizing conceptual rather than literal translations, as well as the need to use natural and acceptable language for the broadest audience. The following general guidelines should be considered in this process:

- Translators should always aim at the conceptual equivalent of a word or phrase, not a word-for-word translation, i.e. not a literal translation. They should consider the definition of the original term and attempt to translate it in the most relevant way.

- Translators should strive to be simple, clear and concise in formulating a question. Fewer words are better. Long sentences with many clauses should be avoided.
- The target language should aim for the most common audience. Translators should avoid addressing professional audiences such as those in medicine or any other professional group. They should consider the typical respondent for the instrument being translated and what the respondent will understand when s/he hears the question.
- Translators should avoid the use of any jargon. For example, they should not use:
 - technical terms that cannot be understood clearly; and
 - colloquialism, idioms or vernacular terms that cannot be understood by common people in everyday life.
- Translators should consider issues of gender and age applicability and avoid any terms that might be considered offensive to the target population.

2. Expert panel

A bilingual (in English and the target language for translation) expert panel should be convened by a designated editor-in-chief. The goal in this step is to identify and resolve the inadequate expressions/concepts of the translation, as well as any discrepancies between the forward translation and the existing or comparable previous versions of the questions if any. The expert panel may question some words or expressions and suggest alternatives. Experts should be given any materials that can help them to be consistent with previous translations. Principal investigators and/or project collaborators will be responsible for providing such materials. The number of experts in the panel may vary. In general, the panel should include the original translator, experts in health, as well as experts with experience in instrument development and translation.

The result of this process will produce a complete translated version of the questionnaire.

3. Back-translation

Using the same approach as that outlined in the first step, the instrument will then be translated back to English by an independent translator, whose mother tongue is English and who has no knowledge of the questionnaire. Back-translation will be limited to selected items that will be identified in two ways. The first will be items selected by the WHO based on those terms / concepts that are key to the instrument or those that are suspected to be particularly sensitive to translation problems across cultures. These items will be distributed when the English version of the instrument is distributed. The second will consist of other items that are added on as participating countries identify words or phrases that are problematic. These additional items must be submitted to WHO for review and approval.

As in the initial translation, emphasis in the back-translation should be on conceptual and cultural equivalence and not linguistic equivalence. Discrepancies should be discussed with the editor-in-chief and further work (forward translations, discussion by the bilingual expert panel, etc.) should be iterated as many times as needed until a satisfactory version is reached.

Particularly problematic words or phrases that do not completely capture the concept addressed by the original item should be brought to the attention of the WHO.

4. Pre-testing and cognitive interviewing

It is necessary to pre-test the instrument on the target population. Each module or section will be fully tested using the methodologies outlined below.

- Pre-test respondents should include individuals representative of those who will be administered the questionnaire. For this study, dependent opioid users should be used to test the translated instruments, although such users could be drawn from sources other than those used to recruit study participants – preferably persons who would not otherwise be eligible for the main study.
- Pre-test respondents should number 10 minimum for each section. They should represent males and females from all age groups (18 years of age and older) and different socioeconomic groups.

- Pre-test respondents should be administered the instrument and be systematically debriefed. This debriefing should ask respondents what they thought the question was asking, whether they could repeat the question in their own words, what came to their mind when they heard a particular phrase or term. It should also ask them to explain how they choose their answer. These questions should be repeated for each item.
- The answers to these questions should be compared to the respondent's actual responses to the instrument for consistency. • Respondents should also be asked about any word they did not understand as well as any word or expression that they found unacceptable or offensive.
- Finally, when alternative words or expressions exist for one item or expression, the pre-test respondent should be asked to choose which of the alternatives conforms better to their usual language.
- This information is best accomplished by in-depth personal interviews although the organization of a focus group may be an alternative.
- It is very important that these interviews be conducted by an experienced interviewer.

A written report of the pre-testing exercise, together with selected information regarding the participating individuals should also be provided.

5. Final version

The final version of the instrument in the target language should be the result of all the iterations described above. It is important that a serial number (e.g. 1.0) be given to each version. Instructions for providing the electronic version of the final translated instrument to WHO will be provided.

6. Documentation

All the cultural adaptation procedures should be traceable through the appropriate documents. These include, at the least:

- Initial forward version;
- A summary of recommendations by the expert panel;

- The back-translation;
- A summary of problems found during the pre-testing of the instrument and
- The modifications proposed; and
- The final version.

It is also necessary to describe the samples used in this process (i.e. the composition of the expert panel and the pre-test respondent samples). For the latter, the number of individuals as well as their basic characteristics should be described, as appropriate.

مقدار المعرفة اتجاه مرض الربو: Appendix 12

(The Arabic version of the Asthma Knowledge Questionnaire)

(First version)

لا	نعم		
		العديد من الأطفال مصابين بالأزمة	1.
		المصابين بالأزمة يقلقون كثيرا	2.
		المصابين بالأزمة يستطيعون شرب الحليب و أكل اللبن	3.
		إصابتي بالرشحة تؤدي إلى نوبة أزمة	4.
		التدخين مسموح به لمرضى الأزمة	5.
		المصابين بالأزمة يصبحون مدمنين على أدويتهم ولا يستطيعون الإقلاع عنها	6.
		إذا لم تكن مصاب بالأزمة حاليا لن تصاب بها ابدا	7.
		أن السبب في نوبة الأزمة هو الاحمرار والانتفاخ في المجاري التنفسية للرئة	8.
		غالبا ما يكون الطفل المصاب بالأزمة أصغر حجما من الطفل غير المصاب	9.
		مرض الأزمة يمكن أن ينتقل بالعدوى من شخص إلى آخر	10.
		فإن أخوته وأخواته سوف يكونون مصابين إذا كان أحد الأطفال في العائلة مصاب بالأزمة بالأزمة	11.
		يمكن لمرضى الأزمة أن يموت إذا لم يعالج بالشكل الصحيح	12.
		الأدوية التي تقي من مرض الأزمة يجب أن تأخذ يوميا	13.
		يجب استعمال البخاخ عندما يصاب الطفل بنوبة الأزمة	14.
		تربية الطيور مسموح به لمرضى الأزمة	15.
		تزيد حدة الأزمة في ساعات الليل	16.
		يسمح للمصابين بالأزمة بالسباحة	17.
		بعض من أدوية الأزمة تؤثر على القلب	18.
		الراحة ضرورية لوقف نوبة الأزمة	19.
		تحدث نوبة الأزمة بشكل مفاجئ بدون سابق إنذار	20.
		إذا شعرت بتحسن استطيع إيقاف أدوية الأزمة	21.
		استخدام العلاج الصحيح للطفل المصاب بالأزمة يستطيع أن يعيش حياة طبيعية	22.
		يستطيع مريض الأزمة ممارسة الرياضة	23.
		هل تستطيع أن تعدد ثلاث أعراض للأزمة	24.
		-1	
		-2	
		-3	

Appendix 13: اتجاهات مرضى الربو للمرض

(The Arabic version of asthma attitudes questionnaire)

(First version)

لا أوافق بشده	لا أوافق	أميل إلى عدم الموافقة	أميل إلى الموافقة	أوافق	أوافق بشده		
						1. إذا اعتنى مريض الأزمة بنفسه جيدا قد يستطيع الابتعاد عن معظم أعراض الأزمة	
						2. إذا أصيب الطفل بأعراض الأزمة في المدرسة بالعادة تكون بسبب قلة الاهتمام	
						3. سرعة التعافي من نوبة الأزمة يعتمد رئيسيا على مدى مساعدة المعلمين للطفل	
						4. عندما يصاب الطفل بنوبة الأزمة خلال لعب الرياضة بسبب أن المعلم لم يتأكد أن الطفل تناول دواءه أم لا	
						5. إذا قدر لك الإصابة بنوبة الأزمة فإنها ستحدث بغض النظر عن التحضيرات السابقة أو تدخل أي أحد	
						6. التعافي السريع من أعراض نوبة الأزمة تعتمد على الحظ	
						7. معظم المصابين بالأزمة يستطيعون السيطرة على أعراض الأزمة بدون مراجعة الطبيب بشكل دوري	
						8. الطفل المصاب بالأزمة لا يجب أن يستعمل البخاخ في الصف	
						9. الطفل المصاب يخجل من استخدام البخاخ في الصف	
						10. الأطفال الغير مصابين بالأزمة لديهم مواقف سلبية تجاه الأطفال المصابين بالأزمة	
						11. الطفل المصاب يستخف بالمرض	
						12. سيكون هنالك مشاكل أقل في المدرسة إذا كان الأطفال المصابين بالأزمة يحمل معهم البخاخ	

						يصيب المعلمين القلق حيال أخذ طفل مصاب بالأزمة إلى التخييم أو الأعمال التي بحاجة إلى جهد عالي	13.
						الأطفال المصابين بالأزمة لانقين كالأطفال غير المصابين بالمرض	14.
						المعلمين في المدرسة يتبنون اتجاهات سلبية اتجاه الأطفال المصابين بالمرض	15.

Appendix 14: (The Arabic version of the Asthma Knowledge Questionnaire)
(Second version)

لا	نعم		
		العديد من الأطفال مصابين بالآزمة (الربو)	1.
		المصابين بالآزمة (الربو) يقلقون كثيرا	2.
		المصابين بالآزمة (الربو) يستطيعون شرب الحليب و أكل اللبن	3.
		إصابتي بالرشحة تؤدي إلى نوبة أزمة(الربو)	4.
		التدخين مسموح به لمرضى الآزمة (الربو)	5.
		المصابين بالآزمة (الربو) يصبحون مدمنين على أدويتهم ولا يستطيعون الإقلاع عنها	6.
		إذا لم تكن مصاب بالآزمة (الربو) حاليا لن تصاب بها ابدًا	7.
		أن السبب في نوبة الآزمة (الربو) هو الاحمرار والانتفاخ في المجاري التنفسية للرئة	8.
		غالبًا ما يكون الطفل المصاب بالآزمة (الربو) أصغر حجما من الطفل غير المصاب	9.
		مرض الآزمة (الربو) يمكن أن ينتقل بالعدوى من شخص إلى آخر	10.
		إذا كان أحد الأطفال في العائلة مصاب بالآزمة (الربو) فإن أخوته وأخواته سوف يكونون مصابين بالآزمة(الربو)	11.
		يمكن لمرضى الآزمة (الربو) أن يموت إذا لم يعالج بالشكل الصحيح	12.
		الأدوية التي تقي من مرض الآزمة (الربو) يجب أن تأخذ يوميا	13.
		يجب استعمال البخاخ عندما يصاب الطفل بنوبة الآزمة (الربو)	14.
		تربية الطيور مسموح به لمرضى الآزمة (الربو)	15.
		تزيد حدة الآزمة (الربو) في ساعات الليل	16.
		يسمح للمصابين بالآزمة (الربو) بالسباحة	17.
		بعض من أدوية الآزمة (الربو) تؤثر على القلب	18.
		الراحة ضرورية لوقف نوبة الآزمة (الربو)	19.
		تحدث نوبة الآزمة (الربو) بشكل مفاجئ بدون سابق إنذار	20.
		إذا شعرت بتحسن استطيع إيقاف أدوية الآزمة (الربو)	21.
		استخدام العلاج الصحيح للطفل المصاب بالآزمة (الربو) يستطيع أن يعيش حياة طبيعية	22.
		يستطيع مريض الآزمة (الربو) ممارسة الرياضة	23.
		هل تستطيع أن تعدد ثلاث أعراض للآزمة (الربو) -1 -2 -3	24.

Appendix 15: (The Arabic version of asthma attitudes questionnaire)

(Second version)

لا أوافق بشده	لا أوافق	أميل إلى عدم الموافقة	أميل إلى الموافقة	أوافق	أوافق بشده		
						1. إذا اعتنى مريض الأزمة (الربو) بنفسه جيدا قد يستطيع الابتعاد تجنب معظم أعراض الأزمة (الربو)	
						2. إذا أصيب الطفل بأعراض الأزمة (الربو) في المدرسة بالعادة تكون بسبب قلة الاهتمام	
						3. سرعة التعافي من نوبة الأزمة (الربو) يعتمد رئيسيا على مدى مساعدة المعلمين للطفل	
						4. عندما يصاب الطفل بنوبة الأزمة (الربو) خلال لعب الرياضة بسبب أن المعلم لم يتأكد أن الطفل تناول دواءه أم لا	
						5. إذا قدر لك الإصابة بنوبة الأزمة (الربو) فإنها ستحدث بغض النظر عن التحضيرات السابقة أو تدخل أي أحد	
						6. التعافي السريع من أعراض نوبة الأزمة (الربو) تعتمد على الحظ	
						7. معظم المصابين بالأزمة (الربو) يستطيعون السيطرة على أعراض الأزمة (الربو) بدون مراجعة الطبيب بشكل دوري	
						8. الطفل المصاب بالأزمة (الربو) لا يجب أن يستعمل البخاخ في الصف	
						9. الطفل المصاب يخجل من استخدام البخاخ في الصف	
						10. الأطفال الغير مصابين بالأزمة (الربو) لديهم مواقف سلبية تجاه الأطفال المصابين بالأزمة (الربو)	
						11. الطفل المصاب يستخف بالمرض	

						سيكون هنالك مشاكل أقل في المدرسة إذا كان الأطفال المصابين بالآزمة (الربو) يحمل معهم البخاخ	12.
						يصيب المعلمين القلق حيال أخذ طفل مصاب بالآزمة (الربو) إلى التخييم أو الأعمال التي بحاجة إلى جهد عالي	13.
						الأطفال المصابين بالآزمة لائقين كالأطفال غير المصابين بالمرض	14.
						المعلمين في المدرسة يتبنون اتجاهات سلبية اتجاه الأطفال المصابين بالمرض	15.

مقدار المعرفة اتجاه مرض الربو: Appendix 16

(The Arabic version of the Asthma Knowledge Questionnaire)

(Third version)

لا	نعم		
		العديد من الأطفال مصابين بالأزمة (الربو)	
		المصابين بالأزمة (الربو) يقلقون كثيرا	
		المصابين بالأزمة (الربو) يستطيعون شرب الحليب و أكل اللبن	
		إصابتي بالرشحة تؤدي إلى نوبة أزمة (الربو)	
		التدخين مسموح به لمرضى الأزمة (الربو)	
		المصابين بالأزمة (الربو) يصبحون مدمنين على أدويتهم ولا يستطيعون الإقلاع عنها	
		إذا لم تكن مصاب بالأزمة (الربو) حاليا لن تصاب بها ابدا	
		ان السبب في نوبة الأزمة (الربو) هو الاحمرار والانتفاخ في المجاري التنفسية للرئة	
		غالبا ما يكون الطفل المصاب بالأزمة (الربو) أصغر حجما من الطفل غير المصاب	
		مرض الأزمة (الربو) يمكن أن ينتقل بالعدوى من شخص إلى آخر	
		إذا كان أحد الأطفال في العائلة مصاب بالأزمة (الربو) فان أخوته وأخواته سوف يكونون	
		يمكن لمريض الأزمة (الربو) أن يموت إذا لم يعالج بالشكل الصحيح	
		الأدوية التي تقي من مرض الأزمة (الربو) يجب أن تؤخذ يوميا	
		يجب استعمال البخاخ عندما يصاب الطفل بنوبة الأزمة (الربو)	
		تربية الطيور مسموح بها لمرضى الأزمة (الربو)	
		تزيد حدة الأزمة (الربو) في ساعات الليل	
		يسمح للمصابين بالأزمة (الربو) بالسباحة	
		بعض من أدوية الأزمة (الربو) تؤثر على القلب	
		الراحة ضرورية لوقف نوبة الأزمة (الربو)	
		تحدث نوبة الأزمة (الربو) بشكل مفاجئ بدون سابق إنذار	
		إذا شعرت بتحسن استطيع إيقاف أدوية الأزمة (الربو)	
		استخدام العلاج الصحيح للطفل المصاب بالأزمة (الربو) يساعد على أن يعيش حياة	
		يستطيع مريض الأزمة (الربو) ممارسة الرياضة	
		هل تستطيع أن تعدد ثلاث أعراض للأزمة (الربو)	

اتجاهات مرضى الربو للمرض: Appendix 17

(The Arabic version of asthma attitudes questionnaire)

(Third version)

لا أوافق بشده	لا أوافق	أميل إلى عدم الموافقة	أميل إلى الموافقة	أوافق	أوافق بشده		
						إذا اعتنى مريض الأزمة (الربو) بنفسه جيدا قد يستطيع تجنب معظم أعراض الأزمة (الربو)	1
						إذا أصيب الطفل بأعراض الأزمة (الربو) في المدرسة بالعادة تكون بسبب قلة الاهتمام	2
						سرعة التعافي من نوبة الأزمة (الربو) يعتمد رئيسيا على مدى مساعدة المعلمين للطفل	3
						عندما يصاب الطفل بنوبة الأزمة (الربو) خلال لعب الرياضة قد يكون ذلك بسبب أن المعلم لم يتأكد أن الطفل تناول دواءه أم لا	4
						إذا قدر لك الإصابة بنوبة الأزمة (الربو) فإنها ستحدث بغض النظر عن التحضيرات السابقة أو تدخل أي أحد	5
						التعافي السريع من أعراض نوبة الأزمة (الربو) تعتمد على الحظ	6

					معظم المصابين بالأزمة (الربو) يستطيعون السيطرة على أعراض الأزمة (الربو) بدون مراجعة الطبيب بشكل دوري	7
					الطفل المصاب بالأزمة (الربو) لا يجب أن يستعمل البخاخ في الصف	8
					الطفل المصاب بالأزمة (الربو) يخجل من استخدام البخاخ في الصف	9
					الأطفال الغير مصابين بالأزمة (الربو) لديهم مواقف سلبية تجاه الأطفال المصابين بالأزمة (الربو)	10
					الطفل المصاب يستخف بالمرض	11
					سيكون هنالك مشاكل أقل في المدرسة إذا كان الأطفال المصابين بالأزمة (الربو) يحملون معهم البخاخ	12
					يصيب المعلمين القلق حيال أخذ طفل مصاب بالأزمة (الربو) إلى التخييم أو الأعمال التي بحاجة إلى جهد عالي	13
					الأطفال المصابين بالأزمة لائقين كالأطفال غير المصابين بالمرض	14

						المعلمين في المدرسة يتبنون اتجاهات سلبية تجاه الأطفال المصابين بالمرض	15
--	--	--	--	--	--	-----------------------------------------------------------------------	----

Dear [insert parent's name]

My name is Nashi Alreshidi. I have been given the permission by the Ministry of Education to contact you. I am a PhD candidate at the University of Salford in England. I am undertaking research to measure the impact of a health education programme about asthma on Saudi children's knowledge of asthma, their quality of life, anxiety and attitudes.

Please read the enclosed parent information leaflet, and if you consent for your child to participate, pass the children's information leaflet to them to read, or read it with them.

Should you have any further questions relating to the study please do not hesitate to contact me on

Home Phone: +966548183321

Email: n.m.alreshidi@edu.salford.ac.uk

Regards

Appendix B

Letter to ethics committee at Saudi schools (Ha'il region)

Re: permission to conduct research in yours schools

Dear Sir,

My name is Nashi Alreshidi. I am a PhD candidate at the University of Salford in England. The aim of my study is to measure the impact of an asthma health education programme on 7-12 year old children's knowledge of asthma, their quality of life, their levels of anxiety and their attitudes to asthma over a 4 month period.

For children attending schools randomised to the intervention group, the health education programme will be delivered over 3 days (each session lasting for about 2 hours). The delivery of the sessions will be organised so that no more than 12 children will attend at any one time. This will ensure that those delivering the session achieve interaction and benefit for each child.

Data collection will involve the use of 4 validated questionnaires on 3 occasions; immediately before the health education programme and repeated on two further occasions, 1 and 3 months after the education programme. Completion of the questionnaires should take the children no more than 45 minutes. Research assistants will be available to help the children to complete these as necessary.

Permission to approach the children will be sought from their parents. Parents' will also be asked to sign a consent form giving permission for their children to take part prior to commencement of the education programme. The children will also be asked to consent to their involvement in the study.

Information from the participants will be handled confidentially. No names will appear in any place in the study. Participants will be assured that the information that they provide will be kept confidential. Participants will be assured that their identities will be known only to the researcher and research assistants.

In Saudi Arabia, personal details will be stored separately from the data in a locked, secure filing cabinet, and data will be stored in a password-protected computer at the researcher's home. In the United Kingdom, personal details will be stored separately

from the data in a secure, locked filing cabinet at the researcher's office at the University of Salford for five years and then destroyed. During the study, data will be stored in a password-protected computer for the student's use, with materials archived to non-rewritable CD each week and stored by the supervisor in case of technical failure.

No identifiable details will be included in reports, publications or presentations. The data will be kept for a period of five years from the date of publication of the study results, following which the data will be destroyed. All computer files will be erased and all paper copies will be shredded.

If there are any further questions regarding this study, please contact me on +966548183321 or at n.m.alreshidi@edu.salford.ac.uk, alternatively, you can contact my supervisors Dr Joan Livesley and Professor Tony Long at j.livesley@salford.ac.uk , t.long@salford.ac.uk respectively.

Regards.

Nashi Alreshidi

PhD candidate

School of Nursing, Midwifery & Social Work

University of Salford

Research title: The impact of a school-based asthma health education programme on quality of life of Saudi children with asthma

I. Who are you?

My name is Nashi Alreshidi and I am currently completing a research study for my PhD at the University of Salford. I will be working with [research assistant name]. [Research assistant] will support the managerial and logistic issue. That is, [he/she] will organise a space for our meeting, provide teaching aids, help me in identifying students with asthma, and ensure the safety of you and your child.

II. How do you know my child?

The school administrators have provided me with your child's name and your contact details. I have been given the permission to contact you by the Ministry of Education.

III. What do you hope to find out?

The aim of my study is to find out if an asthma health education programme impacts on children's knowledge of asthma, their attitudes towards asthma, their anxiety about asthma, or their quality of life.

IV. Who has reviewed this study?

This research has been judged as safe and acceptable for you and your children by their school (approval number...) and the University of Salford Research Ethics Committee (Approval number).

V. Why do you want to speak to my child?

I am seeking the help of your child in order to test the effectiveness of introducing a new asthma education programme on the quality of life for children with asthma.

VI. Do I have to say yes to my child being involved?

No, you do not have to give permission for your child to be involved. Please read this information sheet and take your time to decide. If you decline permission for your

child to participate, their healthcare treatment and status at school will not be affected in any way. Should you give permission for your child to participate, you will have the right to withdraw this permission at any time. Your child will also have the right to decline to participate or to withdraw at any time without any consequence to their schooling or health care.

You may wish to discuss the project with a member of your family or your doctor. Please contact me or one of my supervisors if you wish to discuss any aspect of this invitation.

VII. What would my child's involvement be and how long would they be involved?

If you agree that your child can participate, you will be allocated to one of two groups, Group A or Group B.

If you are allocated to Group A, you and your child will be invited to attend 3 education sessions, each one lasting for no more than 2 hours. The education sessions will be held at your children's school. You would be expected to attend the sessions with your child, and you would both be asked to attend all three. Your child will be asked to complete 4 questionnaires before the first session. They will be asked to complete these questionnaires on 2 further occasions: one month and 3 months following completion of the programme.

If your child is allocated to Group B, they will be asked to complete the questionnaires on the same 3 occasions. You and your child would be invited to attend 3 education sessions after the third set of questionnaires.

The questionnaires should take no longer than 45 minutes to complete. The two health education teachers will be available to help your children complete the questionnaires if needed.

VIII. When and where would we meet?

If you and your son/daughter agree to participate in this study, you will be invited to attend with your child in a room prepared specially for this study. You will be given at least 1 week's notice of the time and days of the week that you will be expected to attend. The sessions will all take place during the normal school day.

IX. Can I stay with my child?

You must be able to attend the education sessions with your child as it is important for you both to learn together and maximise any benefits from the programme.

X. Will you tell anyone what the children says?

Yes, I will be preparing a report for children and parents that participate. I will also be writing formal reports and making these available to the Ministry of Education. I will also be preparing papers for academic journals, and will presenting the findings at international research conferences. I will be using the findings to teach other researchers from time to time. However, I will never divulge the individual identities of you or your child nor make available any information or data that may lead to you or your child being identified. Although the teachers at the school will know that your child has participated in the study, other than being able to read the reports and papers made available to others they will not know what individual children have said. They will not know anything about individual children's scores.

XI. Will anyone reading your report or research findings be able to identify me or my child?

No. The information that you provide will be confidential. No names will appear in the study. Your daughter's/son's identity and personal contact details will be known only to the researcher, the research assistants and the research supervisors at the University of Salford. The researcher will not use your daughter's/son's name or any information that could reveal their identity in this or any future research study, publication, conference presentation or teaching session. To guarantee confidentiality, all data will be stored in a secure, locked cupboard or on a computer protected by password at the researcher's office during the study and for a period of five years following the date of publication in a locked secure filing cabinet in the research supervisor's office. Personal data, such as names and addresses and consent forms will be stored separately from other data. After five years the signed consent forms and all data will be destroyed. All data stored on the computer will be erased and all paper material will be shredded.

XII. What will you do with the findings from the study?

The findings will be used to inform future health education programmes for children with asthma in Saudi Arabia and to help health care providers in other countries to understand the impact of school-based asthma education programmes on the quality of life of children aged 7-12 years.

XIII. What if I want to make a complaint?

You may do this in one of the following methods. You can do this through the research assistant, directly via me as the principle investigator, or through my supervisors. My contact detail and my supervisors' contact detail are provided at the end of this information sheet.

XIV. What happens next?

I will contact you over the next 2 days so that you can ask any questions that you or your child have regarding this study. If after this you agree that your child can participate in this study, please pass the children's information to them to read, or read it with them. If they wish to participate, please sign the enclosed consent form, and ask your child to sign or mark the consent form to signal their wish to be involved. Please do not put any pressure on your child to participate. If they would rather not take part, they do not have to take part.

When you have signed the consent form please place it in the envelope provided, seal this and return it to the school. I will collect the signed consent forms from school in the next few days.

If there are any further questions regarding this study, you can contact me (by phone or email) or my supervisors (by email) as follows. If you prefer, we can arrange to discuss this invitation, face to face, at a mutually convenient place and time.

Thank you for taking the time to read this leaflet.

XV. Contact Details

Researcher

Nashi Alreshidi

+966548183321 or at n.m.alreshidi@edu.salford.ac.uk.

Supervisors

Dr Joan Livesley, j.livesley@salford.ac.uk ,

Professor Tony Long t.long@salford.ac.uk

Thank you for giving your valuable time in reading this letter.

Regards.

Nashi Alreshidi

PhD Candidate

School of Nursing, Midwifery and Social Care

University of Salford

England

Information for children and young people

Research title: The impact of a school-based asthma health education programme on quality of life of Saudi children with asthma

I. Who are you?

My name is Nashi Alreshidi and I am currently completing a research study for a higher degree at the University of Salford in England.

II. How you know me?

The school administrators have provide me with your name and contact details. I have been given the permission to contact you by the Ministry of Education.

III. What is the purpose of the study?

I am trying to find out if teaching you about your asthma will help you.

IV. Why have I been asked if I want to be involved?

I have asked if you want to be involved because you have asthma and are aged between 7 and 12 years. You are not alone. Many children in Saudi Arabia have asthma, and we are trying to find out how to make things better for you.

V. Do I have to take part?

No, you do not have to take part. Even if your parents say that you can, it is alright for you to say no. It is up to you.

VI. What will happen to me if I take part?

You will be invited to attend 3 classes at school to learn about your asthma. Your mother or father will be with you and there will be other children from your school there at the same time. The classes will take about 2 hours. Each class will take place on a different day. The classes will be fun with lots of activities to help you to learn about your asthma.

I also want to ask you some questions about your asthma. These are not a test. There are no right or wrong answers. I want to know what you think about your asthma and

how your asthma makes you feel. The questions will be written down on paper, and most of them will have the answers ready for you to choose. I will ask you to tick a box to tell me what you think. I may also ask you to write down what you think, but there will be people there to help you to do this.

VII. What will happen to me if I do not take part?

Nothing will happen to you. If you do not want to take part, just let me know.

VIII. What might be good about taking part?

Learning about your asthma may help you to feel better.

IX. Will anyone know who I am or what I have said?

Your teachers will know if you take part, but they will not know what you have said. I will tell other people what you have said, but I will not use your name, so they will not know who you are. I will never tell anyone your name and I will never identify you by your name in anything I write. Everything you tell me will be stored securely. I have to keep the information you give to me for five years, but after this time the information will be destroyed.

X. What if I'm not sure?

Take your time, talk to your parents about it. If you want to, you can talk to me. My telephone number is here, but if you want to you can email me. If you want to meet me, just get your parents to let me know. I will contact your parents in a couple of days to ask if you want to be involved.

XI. What if I want to make a complaint?

You may do this in one of the following methods. Either you can do this through the research assistant, directly via me as the principle investigator, or through my supervisors. My contact detail and my supervisors' contact detail are provided at the end of this information sheet.

XII. What happens next?

If you want to participate in this study, and your parents agree that you can, please write your name, or draw a picture next to your name on the sheet that I have given to

your parents. They will send this back to school so that I know that you want to take part.

XIII. Contact Details

Nashi Alreshidi

+966548183321 or at n.m.alreshidi@edu.salford.ac.uk.

Joan and Tony work in England and they are helping me to do my work in Saudi Arabia. You can email them if you want to.

Joan j.livesley@salford.ac.uk (Dr. Joan Livesley)

Tony t.long@salford.ac.uk (Professor Tony Long)

Thank you for giving your valuable time in reading this letter.

Regards.

Nashi Alreshidi

PhD Candidate

School of Nursing, Midwifery and Social Care

University of Salford

CONSENT FORM

(Version 1, December 2012)

TO BE COMPLETED BY PARENT/GUARDIAN AND YOUNG PERSON

PART A TO BE COMPLETED BY THE PARENT/GUARDIAN

<input type="checkbox"/>	I have read and understood the accompanying letter and information sheet and give permission for my child to be included.
<input type="checkbox"/>	I know what the study is about and the part I will be involved in.
<input type="checkbox"/>	I know that I can change my mind about my child taking part at any time.

Name _____

Relationship to child _____

Signature _____

PART B TO BE COMPLETED BY THE YOUNG PERSON.

I agree to take part in the study that entitled " The impact of a school-based asthma health education programme on quality of life of Saudi children with asthma" and would like to take part in (please tick one or more of the following)

<input type="checkbox"/>	Fill questionnaires
<input type="checkbox"/>	Educational class sessions

<input type="checkbox"/>	I have read and understood the accompanying letter
<input type="checkbox"/>	I have read the information sheet.
<input type="checkbox"/>	I know what the study is about and the part I will be involved in.
<input type="checkbox"/>	I know that I do not have to answer all of the questions
<input type="checkbox"/>	I know that I can change my mind about taking part at any time.

Please write you name here

Or draw a picture here

How old are you? Age_____

This form must be completed and returned in a sealed envelope to the school for the named young person to be included in this study.

Further information about the study is contained in the enclosed letters and information sheet for young people and parents/guardians.

Appendix 19

اثر برنامج التنقيف الصحي المدرسي للربو على نوعية حياة الاطفال السعوديين الذين يعانون من الربو

البرنامج التنقيفي للربو

الغاية:

الغاية من هذا البرنامج هو تنقيف الأطفال وأولياء أمورهم بالمعلومات الأساسية للربو التي تساعد على التغلب ومنع نوبة الربو من أجل تحسين نوعية حياتهم.

الأهداف :

- سوف يكون الأطفال وآبائهم قادرون على تحديد الخصائص الأساسية للربو.
- سوف يكون الأطفال وآبائهم قادرون على تحديد كيفية استخدام أجهزة الاستنشاق ووقت استخدامها.
- سوف يكون الأطفال وآبائهم قادرون على إثبات قدرتهم على استخدام أجهزة الاستنشاق الخاصة بهم.
- سوف يكون الأطفال وآبائهم قادرون على تحديد محفزات الربو وكيفية تجنب هذه المحفزات.
- سوف يكون الأطفال وآبائهم قادرون على فهم بعض أدوية الربو.
- سوف يكون الأطفال وآبائهم قادرون على الإجابة على بعض الاسئلة المتكررة حول الربو.

1: لمحة عامة عن الربو :

1. ما هو الربو؟

الربو هو مرض يصيب الشعب الهوائية أو أنابيب التنفس في الرئتين. هذه المجاري الهوائية تحمل الهواء إلى الرئتين. المجاري الهوائية تصبح أصغر وأصغر مثل فروع شجرة. عندما يكون الربو تحت السيطرة فإن الشعب الهوائية تكون سلسلة ويكون تدفق الهواء بسهولة داخل وخارج الرئتين.

تكون العلامات والأعراض الأكثر شيوعاً في الطفل المصاب بالربو هي الأزيز في الصدر و السعال المستمر، أو ضيق في الصدر. قد يعاني الانسان من الربو في أي سن. لا ينتقل الربو للشخص من غيره من الناس. ولكن ظهوره في الأسرة قد يؤدي الى اصابة أكثر من شخص واحد في نفس العائلة. يهاجم الربو الاطفال بسرعة عندما يتعرضون لأبخرة من السيارات أو دخان السجائر. يهاجم الربو الاطفال بسرعة عندما يتعرضون إلى الأشياء التي لديهم حساسية منها و عندما يكونو مرضى بنزلات البرد أو التهابات أخرى. وقد يصابو بالربو دون سابق إنذار على الإطلاق. وقد تكون الاصابة خفيفة أو خطيرة للغاية. يسبب السعال وصعوبة في التنفس في الليل اضرابات بالنوم. بعض الناس قد يموتون من نوبة الربو السيئة يمكن استشارة الطبيب لشرح كيفية السيطرة على الربو وكيفية منع وقوع انتكاسات.

1.2: ما الذي يسبب نوبة الربو؟

عندما يكون الربو ليس تحت السيطرة، فإن الحواف في الشعب الهوائية في الرئتين تبقى ملتهبة، متقرحة، سميقة، ومتورمة. عندما تكون الشعب الهوائية بهذا الشكل، فإنه حتى لو كان الإنسان يشعر بالتنفس الطبيعي، فمن السهل لنوبة ربو جديدة الحدوث. ومن ثم الشعب الهوائية تصبح ضيقة جداً، وبالتالي فإن كمية الهواء الداخل والخارج للرئتين تصبح أقل. يبدأ الطفل بالسعال والازيزويشعر بضيق بالصدر. أشياء كثيرة يمكن أن تبدأ نوبة الربو. وتسمى هذه الأشياء التي تساعد بالبداً بنوبة الربو "المحفزات". وإليك بعض الأمثلة من المحفزات لمرض الربو:

- دخان السجائر - السيجار أيضاً، أو دخان البيب أو المدواخ أو الشيثة
- الحساسية لفراء الحيوانات (مثل القطط والكلاب)
- الصراصير
- الغبار في السجاد والأسرة والوسائد، والحيوانات التي على شكل ألعاب
- الأبخرة القوية والبخاخات مثل عوادم السيارات والعطور القوية، أو روائح منتجات التنظيف
- حبوب اللقاح من الأشجار والزهور والحشائش والأعشاب الضارة
- الهواء البارد في المواسم الباردة أو الحارة أحياناً، الأيام الممطرة
- نزلات البرد أو التهابات أخرى
- ممارسة الألعاب المجهدة، والعمل الشاق.

1.3: ما هي أعراض الربو؟

الصفير : سماع مثل صوت صفير عند التنفس.

- السعال
- الشعور كما لو أنه من الصعب أن تتنفس
- الشعور بضيق في الحلق
- الشعور بنقص بكمية الهواء.
- وجود ضيق بالصوت .
- ضيق في الصدر.
- ضيق في التنفس.
- الشعور بالتعب أو الشعور بعدم وجود أي الطاقة.
- الكره للتنفس.
- الشعور بضيق في التنفس عند ممارسة الرياضة، أو أي نشاط آخر .

1.4: كيف يتم تشخيص الربو؟

يمكن لطبيبك معرفة ما إذا كان لديك الربو من خلال التحدث إليكم واخضاعكم لاختبار بدني. هناك العديد من الاختبارات التي تساعد في تشخيص الربو وتساعد في معرفة كيفية تطوره. هذه الاختبارات تقيس مدى تدفق الهواء من وإلى المجاري الهوائية. وتسمى هذه الاختبارات اختبارات وظائف الرئة واختبارات تدفق الذروة.

2: خطة التحكم بمحفزات الربو :

2.1: ما هي المحفزات؟

لأن لديك الربو، فإن المجاري الهوائية الخاصة بك حساسة للغاية. وقد تتفاعل مع أشياء تسمى محفزات (الأشياء التي يمكن أن تسبب نوبات الربو). عندما تكون قريباً من هذه المحفزات تصبح أنابيب التنفس متورمة، مشدودة وتقرز الكثير من المخاط. وهذا سيجعل من الصعب بالنسبة لك التنفس بسهولة. لذلك فإنه من المهم معرفة ما هي مسببات الربو لديك وتعلم طرق تفاديها. إذا كنت تشكو من حساسية، تجنب المواد المثيرة للحساسية.

2.2: مسببات الحساسية في الهواء الطلق

2.2.1: الطلع وجراثيم الفطر:

كيفية تجنبها

- حاول البقاء في المنزل خلال منتصف النهار وبعد الظهر عندما تنتشر حبوب اللقاح بكثرة.
- استخدام تكييف الهواء إذا كان ذلك ممكناً.
- ابق النوافذ مغلقة خلال مواسم حبوب اللقاح والفطر.
- تجنب مصادر الفطر (أوراق الأشجار الرطبة، وبقايا الحقائق ، السماد).

2.2.2: مسببات الحساسية في الأماكن المغلقة

عث غبار المنزل، جراثيم العفن، وبر الحيوانات، الصراصير
عث غبار المنزل (الحشرات مثل العنكبوت الصغير)

كيفية تجنبها

- تغطية المراتب الخاصة بك بغطاء من البلاستيك بإحكام.
- تغطية وسادتك بغطاء محكم.
- مسح أغطية البلاستيك مرة واحدة في الأسبوع بقطعة قماش مبللة والصابون.
- اغسل الستائر في غرفة النوم الخاصة بك مرة واحدة في الأسبوع.
- لا تقم بتخزين الملابس القديمة أو الأحذية في خزانة غرفة النوم.
- أزل الغبار في غرفة النوم كل يوم بقطعة قماش مبللة. استخدام ممسحة رطبة مرة واحدة في الأسبوع للوصول

- إلى أماكن مثل قمم الأبواب وإطارات النوافذ، قمم الأباجورات، ورفوف الخزانات.
- الارضيات العارية هي الأفضل، ولكن يمكن استخدام السجاد اذا كان قابل للغسل و غسلها كل أسبوع.
- اغسل الفراش الخاص بك واللعب المحشوة مرة واحدة في الأسبوع في ماء ساخن (130 درجة فهرنهايت).
- تأكد من تقليل درجة حرارة الماء إلى 120 درجة فهرنهايت اذا خفت من حرقها .
- يمكن وضع الحيوانات المحنطة في الثلاجة ليلة وضحاها مرة واحدة في الأسبوع لقتل العث.
- تقليل الرطوبة في الأماكن المغلقة إلى أقل من 70٪. استخدام مزيل الرطوبة إذا لزم الأمر.
- حافظ على نظافة فلاتر الفرن ، انسداد الفلاتر الغبار قد يؤدي لدخول الغبار والاوزاخ الى داخل المنزل.

فطريات المنازل

كيفية تجنبها

- حافظ على تهوية الحمامات والمطابخ.
- حافظ على نظافة الحمامات والمطابخ بانتظام.
- لا تستخدم جهاز زيادة الرطوبة.
- تقليل الرطوبة في الأماكن المغلقة إلى أقل من 70٪، واستخدام مزيل الرطوبة إذا لزم الأمر.

2.2.3: وبر الحيوانات

الوبر هو رقائق من الجلد. جميع الحيوانات لها جلود لذلك ليس هناك شيء اسمه كلب أو قطة غير مسبب الحساسية. طول الشعر الحيوانات الأليفة لا يهم. الحساسية موجودة في لعاب (القطط) والبول (الفئران)، ووبر (القطط والكلاب).

كيفية تجنبها

- إزالة الحيوان من البيت أو المدرسة أو الفصل الدراسي .
- إذا كان يجب أن لا بد من وجود حيوان أليف ينبغي إخراج الحيوانات الأليفة من غرفة نوم الطفل بالربو في جميع الأوقات.
- إذا كان هناك فتحات التهوية في المنزل الذي به الحيوانات الأليفة ينبغي إغلاق مجاري الهواء إلى غرفة نوم الطفل بالربو في جميع الاوقات.
- ينبغي غسل الحيوانات الأليفة اسبوعيا حتى القطط منها.
- تجنب زيارة الأصدقاء أو الأقارب الذين لديهم حيوانات أليفة.
- اختيار حيوان أليف دون فراء أو ريش (الأسماك).
- تجنب المنتجات المصنوعة من الريش (الوسائد، الأغطية).

- تجنب الوسائد المحشوة بكثرة.

2.2.4: حساسية الصراصير

كيفية تجنبها

- يمكنك استخدام بخاخ الحشرات، ولكن تأكد من إخراج الطفل المصاب بالربو من المنزل في ذلك الوقت.
- تهوية المنزل لبضع ساعات بعد الرش.
- استخدام مصائد الصراصير.
- استخدم بخاخ عديم الرائحة.
- إزالة مصادر غذاء الصراصير.

2.2.5: المهيجات

2.2.5.1: دخان التبغ

كيفية تجنبها

- لا تدخن.
- لا تسمح بالتدخين في المنزل أو السيارة.
- التدخين خارج المنزل إذا كان يجب ان يتم التدخين.
- يجب ارتداء سترة التدخين للمدخنين (الارتداء خارج المنزل) وخلعها بداخل المنزل.

2.2.5.2: دخان الحطب

كيفية تجنبها

- تجنب استخدام موقد حرق الخشب للتدفئة للطهي.
- تجنب استخدام سخانات الكيروسين.

2.2.5.3: الروائح القوية والمرشات

كيفية تجنبها

- لا يجب البقاء بالمنزل في حالة طلاء المنزل.
- تجنب العطور ومستحضرات التجميل المعطرة مثل البودرة ورذاذ الشعر.
- لا تستخدم مزيلات الروائح للغرف و استخدام منتجات غير معطرة للتنظيف المنزلي.
- تقليل الروائح القوية أثناء الطبخ باستخدام مروحة وفتح النوافذ.

2.2.6: ملوثات الهواء

كيفية تجنبها

- تجنب تلوث الهواء بالبقاء داخل المنازل عندما تكون معدلات التلوث مرتفعة.

2.2.7: أشياء أخرى يجب القيام بها

- تجنب الناس الذين يعانون من نزلات البرد أو الانفلونزا.
- الحصول على قسط وفير من الراحة.
- الحصول على لقاح ضد الانفلونزا كل عام.
- اتباع نظام غذائي متوازن.
- وضع خطة تمارين رياضية مناسبة بالاشتراك مع الطبيب.

2.2.8: التمرين

العديد من الأطفال لديهم أعراض الربو أثناء الجري واللعب. لذلك قد يبدأ بالسعال أو الأزيز (صوت صغير أثناء التنفس). وقد يشعرون بضيق في التنفس أثناء أو بعد ممارسة الرياضة. لذلك قد فهم يتعبون بسرعة ويجدون صعوبة في مواكبة أصدقائهم وتسمى هذه العملية (الربو المصاحب للنشاط). الأطفال الذين يعانون من (الربو المصاحب للنشاط) يجب أن يبقوا محافظين على نشاطهم. لان التمارين الرياضية تساعد على النمو وتدعم الصحة.

الأطفال الذين يعانون من (الربو المصاحب للنشاط) لديهم فرصة الاستمتاع بالعديد من الألعاب الرياضية مثل السباحة وكرة السلة وركوب الدراجات. وقد نمت بعض مواهب الأطفال الذين يعانون من (الربو المصاحب للنشاط) حتى أصبحوا من الرياضيين الأولمبيين. يمكن لطفلك أيضا ان يصبح كذلك!

إذا كان طفلك يعاني من الربو المصاحب للنشاط ، يجب التحدث مع الطبيب حول ما يجب القيام به. هناك بعض الأدوية التي تحد من الربو المصاحب للنشاط.

يجب تعليم الطفل كيفية مراقبة أعراض الربو أثناء ممارسة الرياضة. عندما يكون الطفل يعاني من أعراض الربو يجب ان يأخذ قسطا من الراحة.

التحدث مع المعلمين والمدربين حول الربو المصاحب للنشاط لدى الطفل . بهذه الطريقة سوف تدعم الجهود التي تبذل للسيطرة علي الربو.

2.2.9: المرض

موسم البرد والانفلونزا من اكثر الاوقات صعوبة على الأطفال الذين يعانون من الربو. ويمكن لنزلات البرد، انفلونزا، أو فيروس ان يساعد في ظهور أعراض الربو. إذا كان طفلك يمرض كثير بالتالي قد يعاني من الربو كثيرا. للسيطرة على الربو يجب الحرص على إبقاء الطفل بصحة جيدة.

غسل اليدين جيدا هو أفضل وسيلة لوقف انتشار الجراثيم. غسل اليدين مهم في البيت والمدرسة والنادي.

يجب التحدث مع الطبيب حول لقاح الانفلونزا للطفل. واللقاح هو التحصين التي يمكن أن يمنع المرض. يتم إعطاء لقاح الانفلونزا مرة واحدة في السنة في الخريف.

2.2.10: التهاب الجيوب الأنفية

الجيوب الأنفية هي جيوب الهواء داخل الرأس. في بعض الأحيان هذه الجيوب الهوائية تنتفخ وتتهب. ثم يتراكم المخاط بها و لا يمكنه المرور من الفتحات الصغيرة التي تقود نحو الأنف. وبهذا يتراكم السائل في الجيوب وهذا ما يسمى التهاب الجيوب الأنفية.

التهاب الجيوب الأنفية يمكن أن يؤدي لظهور أعراض الربو وخصوصا في الليل. ويمكن لالتهاب الجيوب الأنفية الشديدة أن تؤدي إلى العدوى. لذلك فقد يحتاج المريض بالتهاب الجيوب الأنفية الى المضادات الحيوية.

من المهم للحفاظ على الجيوب الأنفية صحية حيث ان الرعاية الجيدة بالجيوب الأنفية يعني الحفاظ على خروج المخاط من الجيوب الأنفية وتقليل التورم.

يجب التحدث مع الطبيب حول طريقة غسل الأنف. غسيل الأنف يساعد على اخراج المخاط والبكتيريا من الأنف والجيوب الأنفية. يمكن للطبيب ان يوضح لك ولطفلك أفضل طريقة لغسيل الأنف.

يجب التحدث مع الطبيب حول الأدوية التي تلزم في حالة الجيوب المنتفخة. ويمكن لرذاذ الأنف مساعدة في وقف تورم الأنف والجيوب الأنفية.

إذا كان طفلك يعاني في أي وقت مضى من التهاب الجيوب الأنفية راجع طبيبك. المخاط السميك (الأصفر والأخضر أو البني) هو علامة على وجود التهاب الجيوب الأنفية.

2.2.11: الطقس

أنواع معينة من الطقس الطفل المصاب بالربو مثل:

- الرياح
- المطر والطقس الرطب
- الهواء الباردة في فصل الشتاء
- الطقس الحار الجاف
- الأيام قبل وبعد العواصف

كل طفل مختلف عن الآخر. لا يوجد نوع محدد من المناخ جيد أو سيء لجميع الأطفال الذين يعانون من الربو. الشيء المهم هو تحديد نوع الطقس التي تجعل نوبة الربو سيئة. وعندما يأتي ذلك الطقس يجب مراقبة ظهور أعراض الربو عند الطفل و اتباع تعليمات الطبيب لمنع حدوث نوبة الربو.

2.2.12: هل يجب الرحيل أو الانتقال ؟

كثير من الآباء يتسألون عما إذا كان طفلهم المصاب بالربو سيكون أفضل إذا انتقلوا إلى مكان آخر. الجواب على هذا السؤال هو عادة "لا". ليس هناك مكان مفضل دائما للعيش للأطفال الذين يعانون من الربو.

قد تتحسن حالة الربو للطفل عند زيارة مكان جديد، هذا التغيير هو عادة قصير الأجل، عاجلاً أم آجلاً سوف يتأثر الطفل المصاب بالربو من الطقس في هذا المكان الجديد.

3: كيف يتم معالجة الربو؟

قد يساعد الطبيب أو الممرضة على فهم مدى سوء حالة الربو للطفل وكيفية منع حدوث نوبات الربو. يجب أن يكون هناك خطة عمل لمتابعة الربو لتحديد متى يكون الوضع مطمئناً وعندما يكون هناك نوبات ربو. خطة العمل تساعد على تذكر كيفية التعامل مع الربو و ترشدك الى نوع من الادوية التى بإمكانك تناولها اعتمادا على مدى سوء أعراض الربو لديك.

3.1: الإغاثة السريعة - تخفيف (توقيف) الأعراض

- إذا كان لديك أعراض ربو أقل من مرة أو مرتين في الأسبوع قد تكون ادوية الإغاثة السريعة هي الادوية المناسبة للسيطرة على الربو لديك.
- إذا كانت الرياضة هي واحدة من المحفزات للربو لديك ، قد يصف الطبيب دواء الإغاثة السريعة قبل ممارسة الرياضة.

3.2: السيطرة على المدى الطويل - منع التورم / التهاب

- إذا كان لديك أعراض أكثر من مرتين في الأسبوع، قد تكون حالة الربو لديك خارجة عن نطاق السيطرة والتي قد تحتاج لضبط العلاج على المدى الطويل.
- يجب أن يؤخذ الدواء كل يوم ليكون فعال.

تذكر: خطة العمل الخاصة بك للتعامل مع الربو قد لا تتجح إذا كانت الأعراض لا تزال مستمرة أثناء الرياضة ، في الراحة ، في الليل، أو في الصباح الباكر. قد يلجأ الطبيب إلى تغيير جرعة أو نوع من الدواء. إذا إستمرت الأعراض أكثر من أسبوعين يجب مراجعة الطبيب.

3.3: ما هي الأدوية التى تستخدم لعلاج الربو؟

خطة العمل ترشدك الى وقت اخذ الأدوية الخاصة بك عادة، هناك نوعان من الأدوية المستخدمة لعلاج الربو:

3.3.1: ادوية الإغاثة السريعة

الأدوية التي تعمل على استرخاء الشعب الهوائية لجعل التنفس أسهل وأسرع مثل الألبوتيرول.

3.3.2: أدوية السيطرة على المدى الطويل

هي الأدوية التي تقلل من تورم أو التهاب في الشعب الهوائية، كما أنها تمنع التورم من البداية وتساعد على منع وقوع نوبات الربو. هذه الأدوية ليس لها أي تأثير سريع وتستغرق وقتاً أطول في العمل مثال هو الستيرويد المستنشق.

3.3.3: كيف يتم وصف أدوية الربو؟

- كل مريض ربو يختلف عن الآخر.
- الشعب الهوائية عند كل مريض تستجيب لمحفزات مختلفة بأوقات مختلفة وبأعراض مختلفة.
- يجب أن توصف الأدوية للربو فيما يتوافق مع الاحتياجات الخاصة لكل شخص.
- قد نحتاج لبعض الوقت لمعرفة أفضل الأدوية المناسبة لك .

3.3.4: أدوية التحكم

وجود الربو يعني وجود تاريخ طويل من التهاب الشعب الهوائية. إن تجنب العوامل التي تسبب الربو لديك عن طريق تعديل البيئة أو الوسط لديك هو أفضل وسيلة للمساعدة في تقليل الالتهاب والتورم ، لكن ذلك غالباً ما يكون غير كاف لتحقيق التحكم الجيد في الربو. لذا فإن الاستخدام المنتظم لأدوية التحكم يودي الى علاج التهاب الشعب الهوائية المزمن.

3.3.5: أدوية التحكم: استنشاق الكورتيكوستيرويدات

الستيرويدات القشرية المستنشقة يكون لها تأثير مضاد للالتهابات على الشعب الهوائية ويشار إلى أنها الأدوية "المتحكممة" أو الأدوية "المانعة".

عندما تستخدم بانتظام فإن الستيرويدات القشرية المستنشقة تقلل الالتهاب والمخاط في الشعب الهوائية، مما يجعل من الرئتين أقل حساسية للمحفزات.

جميع من يعانون من الربو بما في ذلك الربو الخفيف سوف يستفيدون من استخدام الستيرويدات القشرية المستنشقة العادية لأنها أفضل دفاع ضد حدوث الأضرار في الرئة على المدى الطويل.

عندما تكون نوبة الربو سيئة قد يلجأ الطبيب لوصف استنشاق الكورتيكوستيرويد. يمكن أن يستغرق الكورتيكوستيرويد عدة أيام أو أسابيع للحد من التهاب الشعب الهوائية لذا ينبغي الصبر في مثل هذه الحالات. كلما استخدمت الكورتيكوستيرويد لمدة أطول كلما قل استخدامك للأدوية الأخرى المساعدة. ولكن تذكر الستيرويدات القشرية المستنشقة ليست للتخفيف من أعراض الربو المفاجئة.

عندما تشعر أنك أفضل، لا تتوقف عن تناول الستيرويدات القشرية المستنشقة. بدلاً من ذلك يجب التحدث مع الطبيب حول ضبط الجرعة لأن الهدف من استنشاق الكورتيكوستيرويد هو للحفاظ على الربو تحت السيطرة لذا إذا توقفت عن تناول الكورتيكوستيرويد فإن الالتهاب قد يرجع.

الآثار الجانبية شائعة للستيرويدات القشرية المستنشقة هي أنها تجعل الصوت أجش، احتقان الحلق والتهاب الحلق

الخفيف الذي يسمى مرض القلاع (عدوى الخميرة). احتقان الحلق والتهاب الحلق والقلاع تسببهم بالغالب أجهزة الاستنشاق الرخيصة. ينبغي سؤال الطبيب أو الصيدلي عن كيفية استخدام جهاز الاستنشاق. قد تحتاج إلى أداة التبادل إذا كنت تستخدم أجهزة الاستنشاق بالجرعات المقننة (البخاخ). وينبغي شطف فمك بالماء بعد كل جرعة من الكورتيكوزون المستنشقة مما يساعد في الحد من هذه الآثار الجانبية. الستيرويدات القشرية المستنشقة هي الخيار الأفضل لعلاج الربو ويجب استخدامها على أساس منتظم

3.3.6: أدوية التحكم الأخرى

3.3.6.1: مضادات مستقبلات الليكوترين

تعمل مضادات مستقبلات الليكوترين من خلال منع التفاعل الكيميائي الذي يمكن أن يؤدي إلى التهاب الشعب الهوائية. وإن لم تكن مضادات مستقبلات الليكوترين الخيار المفضل الأول للعلاج ولكن يمكن أن تستخدم عندما لا يمكن استخدام أو استنشاق الكورتيكوستيرويد أو إذا لم يكن بالامكان زيادة الجرعة. مضادات مستقبلات الليكوترين لا تحتوي على المنشطات وتأتي في شكل أقراص و آثارها الجانبية قليلة. إذا لم يتم الربو السيطرة على الربو باستخدام دواء واحد بالامكان اضافة دواء اخر للمساعدة في التحكم بالربو. بالامكان مواصلة اخذ الكورتيكوستيرويد المستنشقة و اخذ أدوية اضافية حيث يعملان معا. قد تكون هناك حاجة لاستخدام علاج اخر مع الكورتيكوستيرويد بهدف السيطرة على الربو .

3.3.6.2: LABAs (beta2-agonists): المستنشق الطويل المفعول

المستنشق الطويل المفعول يمدد الشعب الهوائية لمدة تصل إلى 12 ساعة، ويستخدم مع الستيرويدات القشرية المستنشقة. قد تستخدم الكورتيكوستيرويد و المستنشق الطويل المفعول من خلال اثنين من أجهزة الاستنشاق كل على حدة إذا كان الامر كذلك تأكد من استخدام كليهما. قامت بعض المصانع بدمج كلا الدوائين بواحد ويشار إلى هذا الدواء ب "الجمع بين الأدوية" وهي أدوية تحتوي على مزيج كل المستنشق الطويل المفعول والكورتيكوستيرويد. المستنشق الطويل المفعول يمدد الشعب الهوائية الخاصة بك، مما يجعل من الأسهل بالنسبة لك للتنفس. واستنشاق كورتيكوستيرويد يقلل من التهاب الشعب الهوائية في الخاص بك. بعض الآثار الجانبية للأدوية المدموجة تشمل بحة في الصوت، وتهيج الحلق، سرعة ضربات القلب.

3.3.6.3: الدواء المنجدة

وتسمى موسعات القصبات قصيرة المفعول "مسكنات" أو "أدوية الانقاذ". موسعات القصبات لا تفعل شيئاً للحد من التهاب في الشعب الهوائية أنها فقط توفر راحة مؤقتة من تشنج القصبة الهوائية عن طريق التخفيف من تشنج العضلات التي حول أنابيب القصبة. معظم موسعات القصبات الهوائية تؤدي الى استعادة التنفس الطبيعي خلال 10 إلى 15 دقيقة.

ولها تأثير يستمر لمدة 4 ساعات تقريبا.

تستخدم هذه الادوية عندما يكون هناك أعراض للربو لذا يجب حملها في جميع الأوقات واستخدامها عند الضرورة يجب ملاحظة عدد المرات التي تلجأ بها إلى استخدام الدواء. إذا كنت تستخدمها 4 مرات أو أكثر في الأسبوع لتخفيف حالة الربو لديك معنى ذلك أنك لا تسيطر على الربو بشكل جيد.

تحدث مع الطبيب حول عدد المرات التي تستخدم بها أجهزة الاستنشاق المنجدة. قد يصف الطبيب واحد من أدوية التحكم أو أكثر أو قد يغير جرعة الدواء الذي تستخدمه حاليا لجعل الربو تحت السيطرة.

الادوية المنجدة تقديم الإغاثة الفورية من أعراض الربو. أخبر طبيبك إذا كنت بحاجة للدواء 4 مرات أو أكثر في الأسبوع.

ويمكن استخدام الادوية المنجدة لمدة قصيرة الأجل بهدف منع الربو المصاحب للنشاط وذلك بالطبع مقبول حيث تؤخذ الجرعة 10 إلى 15 دقيقة قبل ممارسة الرياضة.

بعض الآثار الجانبية لموسعات القصبات قصيرة المفعول هي الصداع وان تصبح اليدين هشة (الرعدة)، والعصبية وسرعة ضربات القلب. كانت هناك بعض التقارير تشير الى حدوث " النشاط المفرط " عند اخذ هذا الأدوية.

4: الأدوية: أسئلة وأجوبة

4.1: ما هو الفرق بين الستيرويدات القشرية والمنشطات؟

بعض الرياضيين إساء استخدام المنشطات القشرية لبناء العضلات. الستيرويدات القشرية هي المنشطات المستخدمة لعلاج الربو. الستيرويدات القشرية ليس لبناء العضلات أو تحسين الأداء. الستيرويدات القشرية هي الهرمونات التي تنتج بالجسم بشكل طبيعي. عندما يصف الطبيب الكورتيكوستيرويد فإنه يعطي كمية صغيرة جدا من هذا الهرمون وذلك لتقليل كمية الالتهاب في الشعب الهوائية.

4.2: هل أدوية الربو تقود الى الادمان؟

لا , يخشى بعض الناس أن استخدام ادوية الربو بكثرة او لمدة طويلة يؤدي الى عدم القدرة عن الاستغناء عنها . هذا ليس صحيحا حيث ان أدوية الربو لا تسبب الادمان.

4.3: هل من الممكن التأقلم مع الربو بدلا من تناول الدواء؟

كثير من الناس لا يأخذون الأدوية لأنهم يعتقدون أنهم يمكن أن يتأقلموا مع أعراض الربو لديهم. عدم التحكم بالربو قد يؤدي إلى:

- نوعية حياة سيئة (أثناء النشاط والنوم)
- أكثر عرضة لنوبات الربو الشديدة التي تهدد الحياة
- تلف دائم في الرئتين

4.4: طبيبى نصحنى باستخدام أجهزة الاستنشاق الكورتيكوستيرويد. لماذا لا يعطينى قرص كورتيكوستيرويد؟

الجرعة المقننة للكورتيكوستيرويد بالميكروغرام و التي تعد واحدة من المليون من الغرام. الستيرويدات القشرية

في شكل أقراص تأتي بالغرام وهي جرعة أعلى بكثير مما كانت عليه في الاستنشاق. حيث ينصح بأن يتم استخدام أقل قدر من الأدوية. وتستخدم أقراص كورتيكوستيرويد عند الحاجة إلى جرعة أكبر للمحافظة على الربو تحت السيطرة.

4.5: ليس لدي سوى ربو معتدل، ليس لدي أي نوبات الربو. هل يجب ان اتناول الأدوية يوميا ؟

قد يسبب الربو المعتدل أعراض طفيفة، ولكنه يحد من نوعية الحياة ويسبب على المدى الطويل التهاب الشعب الهوائية التي قد تؤدي إلى تلف دائم في الرئتين. لذلك يعالج المرضى الذين لديهم أعراض "خفيفة، وثابتة" بجرعة منخفضة من أدوية التحكم يوميا. ستة من أصل عشرة أشخاص يعانون من الربو لديهم إهمال لأعراض الربو والأعراض لا تأخذ على محمل الجد. إذا كنت تعاني من أعراض الربو الطفيفة ولم تسيطر عليها جيدا فهناك خطر الإصابة بنوبة الربو الحادة.

4.6: هل يجب أن أتناول ادوية الربو اثناء الحمل؟

من المهم جدا لصحة طفلك السيطرة على الربو طوال فترة الحمل. أدوية الربو أثناء الحمل مناسبة للغاية ولكن من الأفضل مناقشة الموضوع مع الطبيب. لا تدخني وتجنبني كل الأماكن التي بها مدخنون.

4.7: أشعر على نحو أفضل هل من الممكن ان اتوقف عن تناول الأدوية الخاصة بي؟

عندما يصبح الربو تحت السيطرة ينبغي النقاش مع الطبيب حول ضبط جرعة الأدوية , لا تتوقف عن تناول أدوية التحكم . إذا قمت بذلك قد يعود التهاب الشعب الهوائية.

4.8: هل " العلاجات البديلة " تساعد في حالة الربو ؟

لا يوجد أي دليل على أي فائدة من العلاجات غير التقليدية لعلاج الربو، مثل الوخز بالإبر، والعلاج بتقويم العمود الفقري، الحجامة، العلاج الطبيعي، العلاج بالأعشاب والعظام. إذا قررت استخدام العلاجات غير التقليدية يجب إخبار الطبيب وتناول أدوية الربو باستمرار.

4،9: هل هناك أدوية يجب تجنبها؟

يمكن لبعض الأدوية أن تسبب أعراض الربو. يمكن للاستيرين أن يؤدي لنوبات الربو في 20٪ من البالغين. تأكد من اخبار جميع العاملين في المراكز الصحية التي تقوم بزيارتها أن لديك الربو (على سبيل المثال، طبيب أسنان، أخصائي، صيدلي). قبل البدء في دواء جديد، دائما أسأل إذا كان الدواء مناسباً بالنسبة للأشخاص الذين يعانون من الربو.

4.10: سمعت أن الستيرويدات القشرية قد تسبب ضعف العظام وقمع النمو. هل هذا صحيح؟

الستيرويدات القشرية المستنشقة هي الأدوية الأكثر فعالية بالنسبة لمعظم المرضى الذين يعانون من الربو. الستيرويدات القشرية المستنشقة في جرعات التي تستخدم لعلاج الربو لم يثبت أنها تسبب ضعف العظام، وقمع النمو، وزيادة الوزن وإعتام عدسة العين. الستيرويدات القشرية المستنشقة هي أقل بكثير من أن تسبب هذه الآثار الجانبية، ولكنها يمكن أن تسبب تهيج الحلق وحة في الصوت. ولكن عندما تؤخذ جرعات الستيرويدات القشرية في شكل أقراص و لفترات طويلة من الزمن فإنها يمكن أن تسبب ضعف العظام وقمع النمو.

4.11: كيف أعرف أن الستيرويدات القشرية المستنشقة لن تسبب مشاكل صحية على المدى الطويل؟

عندما تقرر أن تأخذ أي دواء، يجب الموازنة بين المخاطر المحتملة من تناول الدواء ضد الفوائد. عموما فإن كميات قليلة من الستيرويدات القشرية المستنشقة هي الخيار الأفضل ويتم استخدامها من قبل كثير من الناس لمكافحة الربو.

4.12: هل هناك أدوية تحكم لا تحتوي على الستيرويدات ؟

(لا تحتوي على الستيرويدات. LTRAs مضادات مستقبلات الليكوترين)
و تأتي في شكل أقراص ويكون لها آثار جانبية قليلة.

4.13: لماذا تستخدم ادوية الاستنشاق لعلاج الربو؟

أدوية الربو المستنشقة تذهب مباشرة إلى موقع الالتهاب وانقباض في الشعب الهوائية بدلا من السفر عن طريق الدم للوصول إلى هناك. الأدوية المستنشقة هي العلاج المفضل لعلاج الربو. الأدوية المستنشقة تعمل وصولها للشعب الهوائية لذلك ينبغي تعلم كيفية استخدام تلك الادوية.

4.14: هل استخدم جهاز الاستنشاق بشكل صحيح؟

كثير من الناس لا تستخدم أجهزة الاستنشاق بشكل صحيح، وبالتالي فإن الأدوية لا تصل الشعب الهوائية. من المهم جدا أن تستشير الطبيب، الصيدلي أو مدرب الربو عن كيفية استخدام أجهزة الاستنشاق للتأكد من أن الدواء يصل للرئتين، حيث الحاجة إليها.

4.15: ما هو الفرق بين المسحوق الجاف والمستنشق؟

[، هو علبة مليئة بأدوية الربو المضغوطة. عندما يتم PMDI جهاز الاستنشاق بالبخاخ بالجرعات المقننة]
الضغط على أسفل العلبة، يتم ضخ جرعة محددة من الدواء بحيث يتم استنشاقها مع الهواء و وتسمى أجهزة الاستنشاق بالجرعات المقننة عادة "البخاخة". اما أجهزة الاستنشاق بالمساحيق الجافة فهي تحتوي على مسحوق جاف يتم تنطلق من الجهاز الى الرئتين عند التنفس فيه.

4.16: ما هو وصلة التبادل او المبعد؟

بعض الناس لديهم صعوبة في استخدام البخاخ بشكل صحيح. ويمكن لوصلة التبادل او المبعد المساعدة في ذلك. وهو عبارة عن أنبوب يعلق على البخاخ حيث يوضع الفم على الأنبوب بدلا من البخاخ مباشرة ويؤدي ذلك الى تحسين اندفاع الدواء إلى الرئتين.

17،4: هل يجب استخدام وصلة التبادل او المبعد ؟

وصلة التبادل او المبعد تساعد على الحصول على أفضل وصول للدواء الى الشعب الهوائية ويمكن للصيديلي، اخصائى العلاج الطبيعي التنفسي، مدرب الربو أو الطبيب، شرح كيفية الاستخدام وان يوصي بأفضل جهاز بالنسبة لك.

فمن المستحسن أن الأطفال وصلة التبادل او المبعد مع جهاز الاستنشاق. طريقة الاستخدام السيئة لأجهزة الاستنشاق تؤدي الى ضعف وصول الدواء للرئتين لذلك تأكد من أنك تستخدم أجهزة الاستنشاق بشكل صحيح .

18،4: هل أدوية الربو آمنة؟

- أدوية الربو آمنة إذا كنت تتبع أوامر الطبيب. يراقب الأطباء عن كثب جرعات الدواء في كل زيارة لتقليل خطر الآثار الجانبية.
- بعض الناس يخافون من الادمان على الأدوية الخاصة بهم هذا ليس صحيحا.
- أخرى يشعرون بالقلق من ان أخذ الدواء باستمرار قد يقلل من فاعليته , هذه المشكلة نادرًا ما تحدث وإذا لم تتبع ارشادات الطبيب.

19،4: ماذا تفعل إذا حدثت بعض الآثار الجانبية ؟

- تحدث مع طبيبك عن جميع الأعراض غير العادية.
- لا تتوقف عن الدواء تماما حتى تستشير طبيبك. حتى لا يزداد الربو سوءا.

20،4: نصائح للاستخدام الصحيح لدواء الربو.

- استخدام الدواء بشكل سريع عند إشارة الاولى لازدياد الربو سوءا
- أول بادرة تدل الى ظهور التهاب الجهاز التنفسي العلوي مثل البرد.
- انخفاض في تدفق الذروة (أقل من 80٪ ، أو أقل مما نصحك به طبيبك).
- السعال
- ضيق في الصدر
- الصغير
- ضيق في التنفس.
- نوبة الربو من السهل ايقافها إذا كنت تأخذ الدواء الخاص بك في أقرب وقت تبدأ به الأعراض.
- أدوية الإغاثة السريعة تخفف الأعراض، ولكنها لا تمنع التورم الذي تسببه الأعراض.
- عندما تستخدم أدوية الإغاثة السريعة أكثر من 2 مرات في الأسبوع، قد يكون ذلك علامة على أن التورم في

الشعب الهوائية لديك يزداد سوءا.

- إذا كنت تستخدم أدوية الإغاثة السريعة بهدف تخفيف الأعراض كل يوم، أو تستخدمها أكثر من 3-4 مرات في اليوم الواحد فقد تحتاج إلى متابعة الطبيب على المدى الطويل .
- ادوية التحكم (يمكن اضافة احد ادوية التحكم على المدى الطويل).
- يجب أن تؤخذ أدوية التحكم (الأدوية المضادة للالتهابات) كل يوم، حتى لو كنت لا وجود اي أعراض.
- يجب أن تؤخذ أدوية التحكم (الأدوية المضادة للالتهابات) بانتظام حتى تعمل جيدا.

4،21: ما هي أهداف علاج الربو؟

- منع دخول المستشفى أوزيارة الطوارئ.
- منع الغياب عن المدرسة.
- منع اضطرابات النوم.
- إتاحة المشاركة الكاملة في الأنشطة مثل اللعب، والتمارين، والرياضة.

4،22: وصلة التبادل او المبعد و البخاخ

جمعية الربو توصي أي شخص، في أي عمر، و يستخدم البخاخ ينبغي له استخدام وصلة التبادل او المبعد وهي متاحة للشراء من الصيدليات.

كيفية استخدام البخاخ مع وصلة التبادل او المبعد:

1. يهز جهاز الاستنشاق جيدا قبل الاستعمال (ثلاث أو أربع هزات)
2. يتم إزالة الغطاء من جهاز الاستنشاق و وصلة التبادل إذا كان بها غطاء
3. وضع وصلة التبادل في جهاز الاستنشاق
4. قم بالزفير، بعيدا عن وصلة التبادل
5. ضع وصلة التبادل في الفم، وضع المبسم بين أسنانك وأغلق شفطيك حولها
6. اضغط على رأس الاستنشاق مرة واحدة
7. تنفس ببطء حتى تأخذ نفسا كامل إذا سمعت صوت صفير هذا يعني انك سريع للغابة ويجب الابطاء قليلا .
8. امسك النفس مدة عشر ثوان ثم تنفس.

4.23: جهاز الاستنشاق (البخاخ)

يجب عليك اتباع التعليمات المرفقة مع الدواء.
وفيما يلي طريقة لاستخدام أجهزة الاستنشاق.

استخدام أجهزة الاستنشاق دون وصلة التبادل:

1. يهز جيدا قبل الاستعمال الاستنشاق (ثلاث أو أربع هزات)
 2. إزالة الغطاء
 3. الزفير، بعيدا عن جهاز الاستنشاق
 4. ضع البخاخ في الفم، وضع الميسم بين أسنانك وأغلق شفثيك حولها .
 5. تبدأ في التنفس ببطء ثم اضغط على رأس الاستنشاق مرة واحدة وحافظ على التنفس ببطء حتى تأخذ نفسا كاملة
 6. ازل جهاز الاستنشاق من الفم، وامسك النفس لمدة عشر ثوان ثم تنفس .
- إذا كنت بحاجة الى نفخة ثانية انتظر 30 ثانية ثم قم بهز جهاز الاستنشاق مرة أخرى، وكرر الخطوات 3-6. يجب تدوين اسفل العلبة عدد المرات التي قمت بها باستخدام البخاخ وذلك لتتوقع الوقت الذي يجب به تجديد وصفة الدواء.
- يجب تخزين كافة انواع اجهزة الاستنشاق في درجة حرارة الغرفة.

®DISKUS 4،24:ديسكوس

- ® نفذ ما يلي لجرعة واحدة:DISKUSطريقة استخدام ديسكوس
- : ضع الدواء على راحة يدك، و ضع إبهام يدك الأخرى على قبضة الإبهام DISKUS 1. فتح علبة الديسكوس وادفع قبضة الإبهام حتى تستقر في مكانها
2. حرك الذراع بعيدا عنك قليلا يصبح الدواء جاهزا
 3. الزفير، بعيدا عن جهاز الاستنشاق
 4. ضع الديسكوس في الفم، وضع الميسم بين أسنانك وأغلق شفثيك حولها .
 5. تبدأ في التنفس ببطء وحافظ على التنفس ببطء حتى تأخذ نفسا كاملة
 6. ازل الديسكوس من الفم، وامسك النفس لمدة عشر ثوان ثم تنفس .
 8. دائما تحقق من عدد الجرعات المعطاة من خلال العداد اسفل العلبة لمعرفة عدد الجرعات المتبقية.
- لا تستخدم وصلة التبادل مع الديسكوس أو أي من أجهزة الاستنشاق التي تحتوي على المسحوق الجاف.

®Turbuhaler 4،25: جهاز التيربوهيلر

- ®، قم بما يلي لجرعة واحدة: Turbuhaler لاستخدام جهاز التيربوهيلر
1. قم بفك الغطاء واحمله بشكل مستقيم .
 2. ادر القبضة الملونة من جهاز التيربوهيلر باقصى قدر ممكن ، ثم ادر الكل بشكل معاكس. اذا فعلت ذلك

بشكل صحيح تسمع "كليك"

3. الزفير بعيدا عن الجهاز.

4. ضع جهاز التيريوهيلر في الفم، وضع المبسم بين أسنانك وأغلق شفطيك حولها .

5. تبدأ في التنفس ببطء وحافظ على التنفس ببطء حتى تأخذ نفسا كاملة

6. ازل جهاز التيريوهيلر من الفم، قبل الزفير .

8. دائما تحقق من عدد الجرعات المعطاة من خلال العداد اسفل العلبة لمعرفة عدد الجرعات المتبقية بالنسبة

للأجهزة التي ليس بها عداد انظر اسفل العلبة اذا ظهر اللون الاحمر هذا يعني ان الدواء بدأ ينفذ.

®: عند الاستخدام لأول مرة الأولى قم بحمل الجهاز بشكل مستقيم ادر قبضة الجهاز Symbicort سيميكورت

باقصى قدر ممكن ثم ادرها بشكل معاكس. كرر هذا الإجراء مرتين.

5: السيطرة على الربو

5.1: استخدم هذه القائمة لمراقبة التحكم بالربو على أساس منتظم

لتعرف مدى السيطرة على الربو اذا كنت :

- لا وجود لسعال وصفير عند التنفس أو ضيق في التنفس في معظم الأيام
- تمارس الرياضة دون اي مشاكل
- تنام خلال الليل دون الاستيقاظ بسبب الصفير والسعال أو ضيق الصدر
- اختبار قياس التنفس لديك طبيعي
- لا تحتاج إلى استخدام أجهزة الاستنشاق المنجدة 4 مرات أو أكثر في الأسبوع (باستثناء جرعة واحدة يوميا قبل التمرين)

5.2: أسباب عدم السيطرة على الربو

إذا كانت حالة الربو لديك سيئة ، فقد يكون ذلك بسبب انك:

- لا تستخدم أجهزة الاستنشاق بشكل صحيح. اسأل طبيبك أو الصيدلي عن كيفية استخدام أجهزة الاستنشاق.
- تتعرض لاحد المحفزات. حاول تحديد ما يجعل حالة الربو أسوأ لديك والابتعاد عنها. قراءة كتيب أساسيات الربو الذي يتحدث عن محفزات الربو للحصول على معلومات عن الأشياء التي يمكن أن تجعل الربو سوءا.
- تحدث مع طبيبك حول اختبارات الحساسية.
- اذا كنت لا تستخدم ادوية التحكم بانتظام , يجب استخدام ادوية التحكم كل يوم.
- قد يكون لديك شيء آخر غير الربو، مثل العدوى، والتي قد تحتاج دواء آخر مختلف، بالإضافة إلى أدوية الربو الخاص بك.
- هناك مؤشر واحد يشير الى ضعف السيطرة على الربو و هو انك تحتاج إلى أجهزة الاستنشاق المنجدة 4 مرات أو أكثر في الأسبوع بسبب مشاكل في التنفس

6: إدارة نوبات الربو الحادة

نوبة الربو الحادة هي تجربة مخيفة للمصاب وللذين من حوله في كثير من الحالات. لذا فإن الهدف من إدارة الربو هو السيطرة على الأعراض ومنع التفاقم، وتجنب المتابعة الدائمة للربو سواء في ممارساتنا اليومية، أو بزيارة الطبيب.

على الرغم من وجود مجموعة متزايدة من الأدوية، ونشر العديد من البرامج التوجيهية للرعاية الأولية، فما زالت نوبة الربو الحادة هي واحدة من أشد حالات الطوارئ الأكثر شيوعاً التي تواجه الناس. نحن بحاجة إلى وجود خطة واضحة وبسيطة ونهج محدد لمقدمي الرعاية للتعامل مع الوضع الحاد للربو. ولكننا كأطباء نحن بحاجة إلى أن خطة عمل تكشف الناس الأكثر عرضة لحالات الطوارئ ووضع خطة للتعامل مع هذه الحالات. بلغ معدل الوفيات لمرضى الربو ذروته في استراليا في عام 1989، ومنذ ذلك الحين بدأ بالانخفاض ؛ 314 فقط الاستراليين توفوا من مرض الربو في عام 2003 وبنسبة انخفاض 21٪ من وفيات الربو من عام 2002، معظم الوفيات تحدث عند كبار السن وذلك بسبب عدم الوضوح في التشخيص عند هذه الفئة العمرية. تزداد وفيات الربو في بعض المناطق الريفية. بعض الوفيات كان بالامكان انقاذها بسبب سوء تقدير المريض او الطبيب لحدة نوبة الربو .

6.1: المريض 'في خطر' اذا

• قام بزيارات متكررة لقسم الطوارئ أو الطبيب يعاني من الربو الحاد أو دخل المستشفى في الأشهر الـ 12 الماضية

- عانى من نوبة ربو شديدة الحدة أو ادخل الى وحدة العناية المركزة
- لا يستخدم الأدوية الوقائية / يعتمد بافراط على موسعات الشعب الهوائية المستنشقة
- إنكر المرض
- ضعف الالتزام / البصيرة
- عدم إدراك أعراض الربو
- فرط الحساسية الفوري للأطعمة ، وخاصة المكسرات
- الربو الناجمة عن الأسبرين أو غيره من العقاقير المضادة للالتهابات
- ضعف الخدمات الصحية و هناك عوامل أخرى تؤثر في هؤلاء المرضى المصابين بالربو الذين يأتون لقسم الطوارئ مرات عديدة. اشارت دراسة استرالية حديثة بان حوالي ثلث المرضى الذين حضروا إلى أقسام الطوارئ مرات عديدة لتلقي العلاج بسبب ضعف المعرفة بالربو والمتاعب المالية وغيرها من عوائق استخدام الأدوية

6.2: تقييم شدة خطورة الربو يتجه إلى نقطتين:

- هل السبب هو الربو (وليس هناك سبب آخر للانسداد الرئوي الحاد) وهل فعلا يهدد الحياة؟ من خلال التاريخ المرضي والفحص البدني السريع يمكن الإجابة على هذه الأسئلة. إذا كان المريض مضطرب بشدة يجب إعطاء الأكسجين ومستنشق بيتا 2 قصير الاجل على الفور، وإذا كانت النوبة شديدة وتهدد الحياة يجب استدعاء سيارة إسعاف. تذكر أن الأزيز مؤشرا لا يمكن الاعتماد عليه لتقييم شدة نوبة الربو وربما تكون غير موجودة في نوبة الربو الحاد. ان قياس التنفس في وقت مبكر و / أو قياسات تدفق الذروة تعطي مقياسا موضوعيا لمدى الإعاقة في تدفق الهواء، ولكن في النوبات الشديدة العلاج المبكر له الاولوية.

مدى شدة المرض المزمن لدى البالغين غالبا تندرج في فئة خفيفة الى معتدلة فقط حوالي 6٪ من الحالات تصنف على أنها شديدة في 2001. معظم الأطفال الذين يعانون من مرض الربو العرضي الذي تسبب في كثير من الأحيان من قبل عدوى الجهاز التنفسي العلوي، وتحتاج من 6-8 أسابيع للشفاء في هذه الفئة العمرية لدينا نسبة من النوبات الحادة. ولكن معظمها خفيفة، ولكن هذه المجموعة تمثل ما يصل إلى 60٪ من حالات دخول المستشفيات للأطفال .

كتيب ادارة الازمة يقدم معلومات هامة (الجدول 1) تذكر أن أي واحدة من الاعراض الشديدة للربو التي تهدد الحياة يجب أن تؤخذ على محمل الجد.

6.3: العلاج الطارئ يعتمد بالاساس على استنشاق الأكسجين و مضادات بيتا 2. يمكن إعطاء مضادات بيتا 2 بشكل مستمر في حالات الربو الحادة و الخطرة.

6.3.1: مراقبة الاكسجين عند الاطفال – عبارة عن شاشة مع جهاز لقياس نسبة الاكسجين، ولكن عادة لا يلزم في النوبات الخفيفة أو المعتدلة.

6.3.2: استنشاق مضادات البيتتا 2 :

يتم الآن استخدام أجهزة الاستنشاق المقننة و وصلة التبادل للحصول على افضل اداء عند الاطفال. المهم أن نلاحظ ضرورة استخدام وصلة التبادل الصغيرة وقناع الوجه للأطفال تحت 6 سنوات من العمر، ويجب ان تحتوي وصلة التبادل على جرعة واحدة في كل مرة حيث ان كل ستة نفثات تعادل 2.5 ملغ من السالبوتامول، وكل 12 جرعة 5 ملغ. بداية العلاج هي 6-12 نفثات ثم تكرر بعد 20 دقيقة إذا كانت الاستجابة الأولية غير كافية ومن ثم كرر خلال 20 دقيقة لجرعات أخرى (ثلاث جرعات في الساعة الأولى). لاحقا يصبح التوقيت هو كل 1-4 ساعة في النوبات المعتدلة. اما في النوبات تهدد الحياة، مطلوب استنشاق السالبوتامول باستمرار.

6.3.3: الستيرويدات الجهازية

- الجرعة تكون عن طريق الفم هو وهي عبارة عن بريدنيزولون 1 مغ / كغ كجرعة يومية واحدة لمدة 3 أيام، مع احتمال الحاجة إلى اخفاض الجرعة بالتدريج إذا كان الطفل يعالج بشكل روتيني على الستيرويدات القشرية المستنشقة بجرعة عالية. في حالة النوبات تهدد الحياة، ينبغي حقن الميثيل بالوريد في جرعة من 1 مغ / كغ كل 6 ساعات لمدة يوم واحد.

6.3.4: علاجات أخرى

– فاعلية الإيبراتروبوم حتى في النوبات الشديدة مازال أمرا مثيرا للجدل. ان استخدام الأمينوفيلين في الوريد غير محبذ خارج وحدة العناية المركزة.

6.4: الإسعافات الأولية / خطة الطوارئ

- اشهر خطة للإسعاف بالخارج هي خطة $4 \times 4 \times 4$. وهي عبارة عن 4 نفخات من البخاخ ، نفخة واحدة في وقت واحد، مع 4 أنفاس بعد كل نفخة. انتظر 4 دقائق ثم كرر ، في حالة الطوارئ بالامكان صنع وصلة تبادل من اي شيء متوفر على سبيل المثال. الأكواب الورقية الصغيرة او زجاجات المشروبات الغازية وهي فعالة.

المعلومات الهامة التي تحتاج إليها تتعلق بمدة النوبة ومدى استجابة المريض للأدوية. زيادة مدة الأعراض وعدم الاستجابة للعلاج يشيران إلى ان النوبة أكثر شدة مما سبق ، حيث ان الإرهاق والتعب للعضلات قد يعجل فشل في الجهاز التنفسي.

يجب توظيف المعلومات الهامة بهدف توضيح الأسباب التي أدت إلى تفاقم الربو، كاستخدام أدوية الربو ومدى الالتزام بها والتاريخ المرضي للمريض .

عند المرضى المسنين هناك أسباب كثيرة لضيق التنفس وهناك حالات مرضية متعددة. تذكر أن تسأل عن تفاصيل الأدوية الأخرى التي قد تؤدي إلى تفاقم الربو، بما في ذلك المسكنات والأدوية التكميلية.

6.5: ماذا تفعل إذا كان المريض لا يستجيب إلى العلاج

، في هذه الحالة يجب إعادة النظر في تقييمك لشدة النوبة والتشخيصات الأخرى الممكنة.

- هل هناك وجود لجسم غريب بمجرى الهواء ؟
- هل هناك ردة فعل أو حساسية ؟
- وفي المرضى كبار السن، يمكن أن يكون هذا قصور بالقلب أو تفاقم مرض الانسداد الرئوي المزمن؟

• ما هو تأثير الامراض الاخرى على الربو؟

عند علاج الربو يجب الاخذ بعين الاعتبار المضاعفات الاخرى كالتهاب الرئة او تجمع السوائل بالرئة (الاسترواح) , لا تعتبر الاشعة السينية دليلا عند الكبار او الصغار الا في حالة عدم الاستجابة للعلاج او في حالة وجود اعراض .

6.6: قرار ادخال مريض نوبة الربو الشديدة للمستشفى

هو قرار اعتيادي حيث ان المرضى الذين يعانون من نوبة الربو الحادة يجب دخولهم المستشفى ويجب نقلهم بسيارة إسعاف بحالة الطوارئ. اما المرضى الذين يعانون من نوبة الربو الحادة والتي تستجيب للعلاج السريع لا تحتاج عادة دخول المستشفى، ومع ذلك يجب ملاحظتهم لمدة ساعة بعد آخر جرعة من الدواء. العوامل التي قد تؤثر على قرار ادخال المستشفى ما يلي:

- مدة الأعراض - فإن طول المدة يرجح فرصة الادخال للمستشفى
- الاستجابة للعلاج المبدئي
- التاريخ الماضي من التجارب مع علاج الربو
- وجود مسببات نوبات المرض
- عدم وجود الرعاية المنزلية.

6.7: متابعة الربو واحدة من أكثر الخطوات أهمية

. ونحن نعرف أن هناك عوامل يمكن الوقاية منها في إعادة تأهيل المريض . ومع ذلك، فإننا غالبا لا نعرف الكثير عن حياة مرضانا اليومية وخلفيتهم الاجتماعية أو محفزات الربو لديهم , المرضى الذين خرجوا من المستشفى (أولئك الذين لديهم نوبات معتدلة) يحتاجون إلى:


- منبهات بيتا 2 مطلوبة من أجل السيطرة على الأعراض
- استعراض الأدوية (يجب وصف الستيرويد لفترة قصيرة عن طريق الفم، إضافة الى منبهات بيتا طويلة المفعول)

- خطة عمل مكتوبة للربو
- يجب وضع خطة مفصلة حول ما يجب فعله إذا كانت نوبة الربو تزداد سوءا خلال ال 24 المقبلة .
- تجب مراجعة الخطة خلال 24-48 ساعة، ويجب الاخذ بالاعتبار الرعاية الاستباقية بخطة الربو. فمن الأهمية بمكان أن يراجع المرضى الذين ادخلو الى المستشفى سابقا الطبيب بعد وقت قصير من خروجهم ، وايضا يجب الالتزام بمواعيد المستشفيات. وأظهرت دراسة كندية حديثة أن المرضى الذين زارو قسم الطوارئ و كان لديهم موعد مع الطبيب بالرعاية الصحية الأولية وتم الاتصال بهم لتذكيرهم بالموعد تحسنت حالتهم بشكل كبير واصبحوا أقل عرضة للنوبات الحادة حيث كان لديهم بالغالب خطة مكتوبة للتعامل مع الربو حيث ان الكثير من الاعراض اختفت بعد 12 شهرا من المتابعة وهذا يظهر اهمية المتابعة الطويلة الامد لمريض الربو وضمان الشراكة بين المريض والطبيب.


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Appendix 20: Conference attendance



GulfThoracic
مؤتمر الخليج لطب وجراحة الصدر
DUBAI 2014
13-15 MARCH
Grand Hyatt Hotel, Dubai, UAE



The Gulf Thoracic Congress 2014

24 March 2014

Dr. Nashi M. Alreshidi
Salford, Lancashire M5 4WT, United Kingdom

Dear Dr. Alreshidi,

On behalf of the Scientific Committee of the *GulfThoracic Congress 2014*, I would like to extend our congratulations for the acceptance of your abstract "*The impact of a school-based asthma health education programme on quality of life, knowledge and attitudes of Saudi children with asthma*". Your Abstract was highly rated, interesting and informative


The *GulfThoracic Congress 2014* is the fifth joint meeting of the Saudi Thoracic Society (STS), in collaboration with the Emirates Allergy and Respiratory Society (EARS). Collaborating with the American Thoracic Society (ATS), The Pan-Arab Chest Society, TheMeakins-Christie Laboratories- McGill University, Canada with special participation from The Cleveland Clinic Foundation, USA, The Royal Brompton and Harefield Hospitals, UK, and Papworth Hospital – Part of Cambridge University Health Partners, Cambridge- UK.

The Scientific Committee is planning a very comprehensive Scientific Program catering for all specialties of Pulmonary/ Thoracic Medicine covering state-of-the-art Lectures, Update Presentations, Post Graduate Courses, Workshops, Panel Discussions, Interactive Sessions, Master Clinician Sessions, Challenging Clinical Cases, and Research Abstracts Presentations.

Like last year, the Organizing Committee is working hard to make this event a stimulating occasion both scientifically and socially. We will meet you in the glamorous city of Dubai, a fast growing beautiful city with many attractions and rich heritage.



Thank you for sharing your expertise with us at *GulfThoracic Congress* and we look forward to having you in the future.

Sincerely yours,





Prof. Mohamed S. Al Moamary, MBBS ABIM FRCP (Edin) FCCP
Chairman, Scientific Committee, *GulfThoracic Congress 2014- Dubai*
Professor & Consultant, Pulmonary Medicine
King Abdulaziz Medical City- Riyadh
Vice President, Planning, Development and Quality Management,
King Saud Bin Abdulaziz University for Health Sciences (KSAU-HS)
Chairman, Saudi Initiative for Asthma
Editor-in-Chief, *Annals of Thoracic Medicine*
Riyadh, Saudi Arabia


Organized By:




In Collaboration With:



The 10th Annual Meakins-Christie Laboratories International Symposium




ATS




PAN-ARAB CHEST SOCIETY

Featuring:




Thoracic Oncology Forum
TOF2014
The 2nd Annual Meeting of the
Saudi Lung Cancer Group (SLCG)


With Participation From:



Cleveland Clinic



RB&HH
ROYAL BROMPTON
HAREFIELD HOSPITALS



Papworth Hospital NHS Foundation Trust

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The impact of a school-based asthma health education programme on quality of life, knowledge and attitudes of Saudi children with asthmasocial care teams

Nashi Alreshidi, Joan Livesley, Tony Long,

Abstract

Asthma is especially common in Saudi Arabia, affecting 13% of children aged 6-10 years. This makes asthma one of the most common illnesses among children in Saudi Arabia (Al Frayh et al, 2001; Ministry of Health, 2010). Little emphasis has been placed on educating Saudi children themselves to learn more about their asthma and its control. This study was designed to assess the impact of a school-based, nurse-delivered asthma health education programme on asthmatic children's knowledge and attitude towards asthma, quality of life, anxiety level, and school absenteeism.

A quasi-experimental, non-equivalent group, pretest-posttest design was used. The education programme was developed from existing evidence. The Paediatric Asthma Quality of Life Questionnaire, Spence Anxiety Tool, Asthma Knowledge Questionnaire, and Asthma Attitude Questionnaire were employed for data collection in 2013. Intervention (n=130) and control (n=98) groups were drawn from 10 schools in Hail region, Saudi Arabia. Both descriptive and inferential statistics were used to examine differences between groups.

The level of asthma knowledge was increased significantly more in the intervention group than in the control group, but there was no significant effect on children's attitudes toward asthma. The programme led to significantly decreased anxiety and absenteeism from school in children of the intervention group compared to those on the control group. Quality of life increased significantly more for children who experienced the programme.

Why the asthma educational programme impacted positively on students' knowledge, anxiety, quality of life, and school attendance, but not on attitudes towards the condition requires further investigation. Asthma education will now be integrated into the national child health programme, emphasising the provision of health education directly to children as well as measures to inform their parents.

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UK Association of Chief Children's Nurses
(ACCN)
Children's and Young People's Nursing
International Conference

This is to certify that

Nashi Alreshidi

Attended the Association of Chief Children's Nurses
International Conference

'Building the evidence base for practice'

At Jersey General Hospital,
St Helier, Jersey, Channel Islands

4th – 5th September 2014

Signed:



Professor Tony Long
University of Salford

Signed:



Professor Alan Gasper
University of Southampton



Faculty of Nursing at Mutah University

" Women & Child Health: Safe life Journey "

This is to certify that the paper entitled

" The impact of a school-based asthma health education programme on quality of life, knowledge and attitudes of Saudi children with asthma "

Authors: Nashi Al-Reshidi, RN, Phd Student

**has been presented at the 8th Scientific Day which was held on
Wednesday April 16th, 2014**

Dean of Faculty of Nursing
Dr. Noordeen Shogirat



Head of the Scientific Committee
Prof. Omayma Abu Bakr



Certificate of Presentation

This is to certify that

Nashi Masnad Alreshidi

Presented an abstract entitled

**THE IMPACT OF A SCHOOL BASED ASTHMA HEALTH EDUCATION PROGRAMME ON
QUALITY OF LIFE, KNOWLEDGE AND ATTITUDES OF SAUDI CHILDREN WITH ASTHMA**

During the British Society for Allergy and Clinical Immunology – BSACI 2014

Held on

September 28-30, Telford, UK

BSACI 2014 Conference Secretariat

Certificate of Participation



Awarded to

Nashi Alreshidi

*acknowledging the valuable participation in
the 8th Saudi Students' Conference
that was held at Queen Elizabeth II Conference Centre
London, 31st Jan – 1st Feb 2015*

Faisal M. Almohanna Abaalkhail

Saudi Arabian Cultural Attaché in the UK

**Imperial College
London**



الهيئة العامة للسياحة والتراث الوطني
General Authority for Tourism and National Heritage



وزارة التعليم العالي والبحث العلمي
MINISTRY OF HIGHER EDUCATION
الهيئة العامة للسياحة والتراث الوطني
General Authority for Tourism and National Heritage

