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RESEARCH ARTICLE

Psychosocial Needs of Breast Cancer Survivors in the United Arab Emirates (UAE)

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ABSTRACT

Background: Despite the high prevalence of breast cancer, there is limited understanding of the psychosocial needs of cancer survivors in the United Arab Emirates (UAE).

Methods: A survey was conducted to assess the psychosocial needs among 205 breast cancer survivors in the UAE and the association of various socio-demographics and clinical characteristics with the psychosocial needs were analysed.

Results: The informational needs were the highest (mean - 27.99 ± 11.02) among the study participants compared to other psychosocial needs. Healthcare specialists were the most preferred source of information for all the psychosocial needs. Individuals currently receiving treatment ($p=0.006$) and who had longer years of survival ($p=0.006$) had significantly higher informational concerns. Social and financial concerns were significantly higher in expats ($p<0.001$), individuals currently receiving treatment ($p<0.001$) and individuals with longer years of survival ($p<0.001$).

Conclusion: The study shows that there are unmet psychosocial needs among the breast cancer survivors in the UAE and the needs differ based on demographic and clinical characteristics.

Keywords: Breast cancer, psychosocial needs, survivorship, Middle East, quality of life.

Introduction

Cancer is considered as a chronic disease which requires long term post treatment care including psychosocial support, side effects monitoring, follow-up care to screen cancer progression, recurrence or newly developed or secondary cancers; which has become a growing healthcare burden^{1,2}.

Breast cancer survivors not only experience multiple long-term adverse effects of treatment³ but many face a challenge to address the pre-existing comorbidities of their therapies which often lead to other issues like functional decline and poor quality of life⁴⁻⁶. There is no standard psychological or emotional response to a cancer diagnosis, but many patients experience the emotional consequences to be the hardest to deal with⁷.

Cancer diagnosis is described as a dreadful experience which disrupts the life of even the strongest individuals resulting in psychosocial consequences mainly, emotional distress, sadness, depression and anxiety⁷. Studies provide an overview of the issues surrounding provision of cancer survivorship which illustrates the interplay between physical and emotional symptoms and how these are filtered by psychological factors, such as spiritual and existential needs in their impact upon the cancer survivor⁸. Unmet needs can lead to disorientation, instability and mental crisis and cancer patients may need help to gain a sense of control, psychological stability, hope, confidence and a positive view for the future⁹. Several studies have reported that cancer patients mostly suffer from physical, emotional, social, financial and psychological disturbances to a greater extent and unmet needs were highest in the post-treatment phase compared to the other phases of cancer continuum¹⁰. Therefore, understanding the various dimensions of unmet needs has become the important aspect to detect potential determinants that could improve coordination of care and dynamics and meet individualized needs¹¹. In the absence of such understanding, cancer care strategies are less likely to be efficient to meet cancer patients' needs and to provide optimal cancer care.

There is limited understanding of the psychosocial needs despite high prevalence of cancer in the middle east.¹² Moreover, the UAE population demographics might be of particular interest as majority of the population are expats (88%) and the Emirati population constitute to 12% of the population. The UAE national (Emirati population) are provided with full medical coverage by the government of each Emirate while for expatriates,

the extent of health coverage is determined by the employee's salary, designation etc¹³. These factors may exert influence on the accessibility and affordability of cancer services and thereby impact the psychosocial well-being. Therefore, understanding the psychosocial needs of this demographics would help in improving the health care services towards breast cancer patients.

Further studies have reported that psychosocial needs among breast cancer patients varied with the sociodemographic factors. The unmet supportive needs among breast cancer survivors were significantly higher in young patients, patients who had higher education attainment, patients who were unemployed, had survival duration of up to 5 years, and were undergoing active treatment^{14,15}. Breast cancer patients with a survival duration of less than 1 year since surgery showed significantly higher unmet psychosocial needs and patients with survival duration of 1-3 years also experienced significantly higher psychological and information needs than long-term survivors (>5 years)¹⁶. Identification of cancer survivors' needs and the needs variation depending on age, stage of cancer and duration of cancer can help us identify the target group and customize interventions to fill gaps in the service delivery. Therefore, the aim of this study was to identify the psychosocial needs of breast cancer survivors who are currently residing in the UAE.

PRIMARY OBJECTIVE

- Identify the physical, informational, social or financial, emotional and spiritual or religious needs of breast cancer survivors residing in the UAE

SECONDARY (EXPLORATIVE OBJECTIVE)

- Investigate the disparity in the psychosocial needs based on socio-demographical and clinical factors.

Methodology

The study was conducted at Tawam Hospital, UAE during 2021-2022. Approval for the study was obtained from Tawam Hospital Research and Ethics committee, UAE. A survey was designed to understand the the psychosocial needs of breast cancer survivors who are currently residing in the UAE.

STUDY PARTICIPANTS

The study population consisted of all women in the UAE who were diagnosed with breast cancer according to registry in Tawam hospital in 2018. Tawam Hospital as national referral centre serves

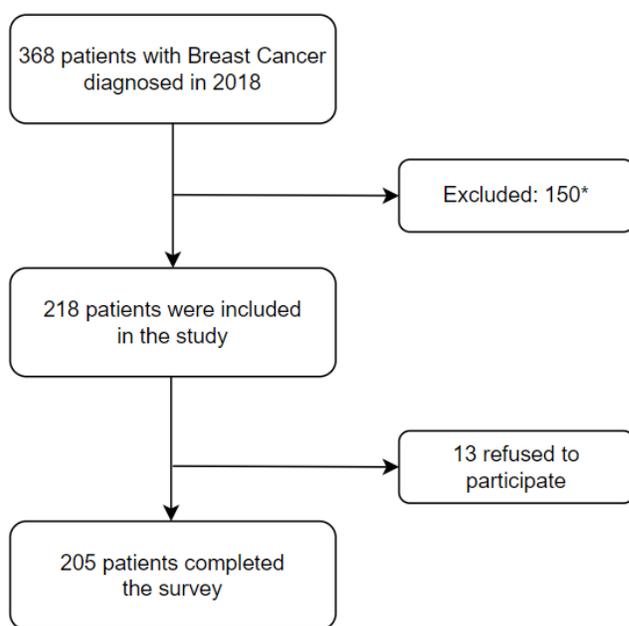
most of the cancer patients in the country and the accessible patients from the hospital could assume to be generalised as target population for the study. Participants were recruited from Tawam Hospital who were identified initially by the Cancer Registry which is located within the Hospital. The target participants were patients who visited the hospital for treatment or follow up and utilizing the time patient spent in the waiting area they were presented with the survey. Patients were approached by a trained research person who explained the survey details and asked for the patient's willingness to participate. Patients who were willing to take the survey were presented with the survey in the clinic rooms available in the Breast Cancer Centre at Tawam Hospital.

All participants willing to participate were provided with the consent form and after signing the informed consent form were presented with the survey. The survey was administered by research

staff who were trained in the procedures of the survey and stayed with the participant until the survey was completed and also addressed any clarifications requested from the participants. The expected time of completion was approximately 30 minutes and refreshments were made available in appreciation for their time.

There were 368 cancer cases diagnosed in the year 2018 at Tawam hospital as reported by the hospital Cancer Registry. Based on the inclusion criteria that patients should be diagnosed with breast cancer and residing in the UAE and exclusion criteria which includes patients with different types of primary cancer and those who did not show up for follow up; 218 patients were included in the study. The survey response rate was 205 (94%) considering the refusal of 13 (3.5%) patients out of a total of 218 patients who participated in the survey (Figure 1).

Figure 1: Flowchart of Study Participants



* 3 were male patients
39 presented with more than one type of Cancer
38 lost follow-up or deceased
70 data missing or unknown

QUESTIONNAIRE

Cancer Survivors Survey of Needs from the Pearlman Mayo Clinic was used in this study to assess the psychosocial needs of the participants¹⁷. The data was collected on 69 items out of which 52 items used to rate psychosocial needs on a six-point Likert scale, with 0 indicating no concerns and 5 indicating extreme concerns. It had six domains:

physical effects, information issues, social issues, emotional aspects, spiritual issues and other issues. The survey contained additional questions on educational needs, preferred learning on topics and what specific topics the patient is interested in learning about. The survey had one question which was designed and studied to measure overall quality of life (QOL) using an 11-point Likert scale

from 0 (as bad as it can be) to 10 (as good as it can be). This item reflected their quality of life in the past one week prior to the survey.

Overall, the survey contained eleven sections aimed to provide awareness and insight into the needs of cancer survivors so those could be evaluated to guide the development of a survivorship program model to address these needs. The survey was translated into Arabic and verified by the two physician members of the Oncology team at Tawam Hospital who were competent in both English and Arabic languages. The surveys were provided in both English and Arabic languages based on participants preference. A hospital translator was present to translate answers for any participants who preferred to complete the surveys in their native language; these translators were trained by the Cancer Centre to consider the sensitive nature of the survey and were committed to following data confidentiality protocols throughout the survey process.

STATISTICAL ANALYSIS

Data analysis was conducted using SPSS software. The statistical analysis includes descriptive statistics of socio-demographics and clinical characteristics (extracted from the Cancer Registry) and survivor's needs. Association of various socio-demographics and clinical characteristics like age, nationality, stage of tumor, years since diagnosis and individuals currently receiving treatment with the psychosocial needs were compared using Student *t*-test or ANOVA. Multivariate regression analysis was applied to compare the differences in each

psychosocial need domain in order to adjust for possible confounding effects by sample differences by adjusting the effect of demographic and clinical characteristics since higher needs may be associated with the extension of disease or tumor characteristics.

Results

DEMOGRAPHICS OF STUDY PARTICIPANTS

A total of 205 women, 54 (26.3%) cancer survivors were UAE nationals and 151 (73.7%) were expatriates. The age range of the study participants was between 22 to 86 years and the mean age of the women was 49 years with 95% CI (47.2 – 50.5).

There were no survivors who presented with advanced disease at the time of diagnosis. The highest number of survivors (n=105, 51.2%) were diagnosed with breast cancer stage II, regional without lymph node involvement followed by stage III, regional with lymph node involvement (n=48, 23.4%). Only 13 (6.3%) survivors were diagnosed with the in-situ stage, which denoted the lowest level of disease when there's no cancer, only abnormal cells with the potential to become cancer. No woman out of 205 women presented with late advanced stage IV in the study sample. The participants who were receiving treatment during the time of survey were 121(59%) and 84(41%) who were not receiving treatment that is they were either in between treatment cycles or in the follow up period after treatment. (Table 1)

Table 1: Summary results of demographic analysis & clinical characteristics of breast cancer survivors

Breast Cancer Survivors Demographic Factors (n=205)	n	%
NATIONALITY		
Emirati	54	26.3
Expatriate	151	73.7
AGE		
< 50 years	113	55.1
≥ 50 years	92	44.9
CLINICAL CHARACTERISTICS		
Years since cancer diagnosis		
≤ 1 year	122	59.5
1-3 years	43	21.0
≥ 3 years	40	19.5
Stage of cancer		
I	39	19
II	105	51.2
III	48	23.4
In-situ	13	6.3
Currently receiving treatment (Treatment Received)		
No	84	41
Yes	121	59
Overall QOL	Mean=9.40 ± 1.262	
Age	Mean= 48.84 ± 11.864	

PSYCHOSOCIAL CONCERNS

The breast cancer survivors expressed higher concerns about their informational needs (mean = 27.9, SD= 11.0) followed by emotional concerns (mean = 15.05, SD= 10.89), social and financial concern (mean = 7.13, SD= 6.32), physical needs

(mean = 6.14, SD= 12.27) and their spiritual or religious needs (mean = 0.20, SD= 0.915) (Figure 2). The preferred learning source for all psychosocial concerns were from healthcare specialist and the commonest concern raised was information concerns. (Table 2)

Figure 2: Psychosocial concerns of breast cancer survivors

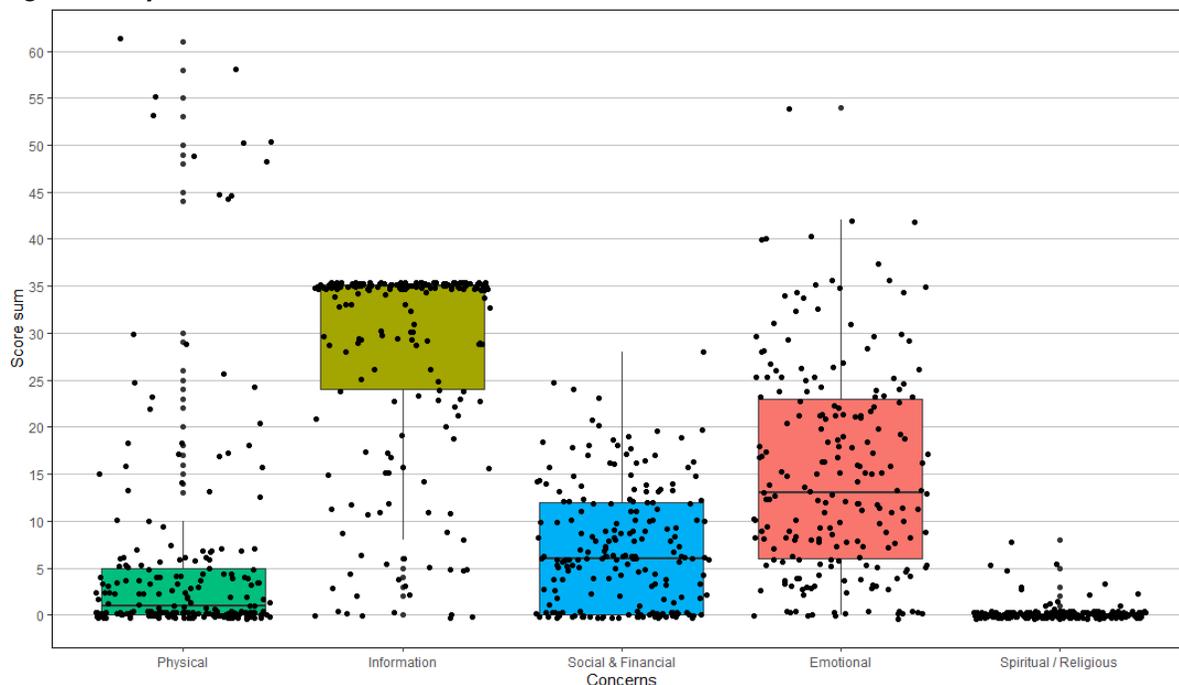


Table 2: Preferred learning source of breast cancer survivors

Concerns	Cancer Survivor	Classes	Healthcare Specialist	Internet	Video	Written Materials
Physical	16 (5.2)	26 (8.5)	177 (57.8)	1 (0.3)	61 (19.9)	25 (8.2)
Social / Financial	16 (5.8)	17 (6.2)	177 (64.6)	2 (0.7)	48 (17.5)	14 (5.1)
Emotional	18 (7.1)	14 (5.5)	172 (68)	1 (0.4)	41 (16.2)	7 (2.8)
Religious / Spiritual	17 (6.4)	85 (32)	113 (42.5)	5 (1.9)	46 (17.3)	0 (0)

ASSOCIATION BETWEEN NATIONALITY AND PSYCHOSOCIAL CONCERNS

A significant difference was found between Emirati and expatriate breast cancer survivors in physical domain (t= -2.180, p< 0.05) as well as social &

financial domain (t=-4.997, p<0.05). There were no significant differences between Emirati and expatriates in other domains of psychosocial concerns including information, emotional and spiritual or religious concerns. (Table 3)

Table 3: Association of demographic and clinical characteristics of breast cancer with psychosocial concerns

Concerns	Characteristics	N	Mean	SD	p-value	
Physical	Nationality	Emirati	54	3.57	8.878	0.008
		Expatriate	151	7.05	13.183	
	Age	< 50 years	113	6.64	12.848	0.431
		≥ 50 years	92	5.52	11.567	
	Stage	In situ	13	10.38	18.675	0.589
		Stage I	39	5	9.389	
		Stage II	105	6.2	11.973	
	Receiving treatment	Yes	121	7.33	13.41	0.012
No		84	4.42	10.252		

Concerns	Characteristics	N	Mean	SD	p-value	
	Years of cancer	≤ 1 year	122	7	13.368	0.187
		1-3 years	43	3.09	7.895	
		≥ 3 years	40	6.78	12.384	
Information	Nationality	Emirati	54	26.41	14.395	<0.001
		Expatriate	151	28.56	9.524	
	Age	< 50 years	113	26.98	11.845	0.003
		≥ 50 years	92	29.23	9.836	
	Stage	In situ	13	24.46	13.036	0.473
		Stage I	39	27.36	11.006	
		Stage II	105	28.99	10.79	
	Receiving treatment	Yes	121	29.63	9.302	<0.001
		No	84	25.63	12.799	
	Years of cancer	≤ 1 year	122	26.6	11.582	0.056
		1-3 years	43	28.91	11.203	
		≥ 3 years	40	31.25	8.123	
Social / Financial	Nationality	Emirati	54	3.59	3.839	<0.001
		Expatriate	151	8.39	6.561	
	Age	< 50 years	113	7.35	6.845	0.026
		≥ 50 years	92	6.85	5.639	
	Stage	In situ	13	6.23	5.118	0.037
		Stage I	39	6.31	5.545	
		Stage II	105	6.49	6.239	
	Receiving treatment	Yes	121	8.42	6.768	0.005
		No	84	5.26	5.104	
	Years of cancer	≤ 1 year	122	6.3	6.16	<0.001
		1-3 years	43	6.21	6.398	
		≥ 3 years	40	10.63	5.628	
Emotional	Nationality	Emirati	54	17.17	10.056	0.149
		Expatriate	151	14.29	11.116	
	Age	< 50 years	113	14.2	11.688	0.136
		≥ 50 years	92	16.09	9.801	
	Stage	In situ	13	12.62	9.456	0.876
		Stage I	39	15.23	10.069	
		Stage II	105	15.18	11.401	
	Receiving treatment	Yes	121	17.22	10.941	0.173
		No	84	11.92	10.096	
	Years of cancer	≤ 1 year	122	13.89	10.57	0.002
		1-3 years	43	13.4	9.5	
		≥ 3 years	40	20.38	11.87	
Religious/Spiritual	Nationality	Emirati	54	0.28	0.96	0.174
		Expatriate	151	0.17	0.9	
	Age	< 50 years	113	0.16	0.786	0.212
		≥ 50 years	92	0.25	1.055	
	Stage	In situ	13	0.38	1.387	0.456
		Stage I	39	0.15	0.587	
		Stage II	105	0.27	1.12	
	Receiving treatment	Yes	121	0.18	0.922	0.459
		No	84	0.23	0.91	
	Years of cancer	≤ 1 year	122	0.23	1.019	0.854
		1-3 years	43	0.16	0.814	
		≥ 3 years	40	0.15	0.662	

* Post hoc analysis between groups that had a p value <0.05 and between stage II and stage III the difference in scores were found to be statistically significant for social/financial concerns.

* Post hoc analysis between groups that had a p value <0.05 and between ≤ 1-year interval and ≥ 3 years and between 1-3 years interval and ≥ 3 years the difference in scores was found to be statistically significant for emotional and social/financial concerns.

ASSOCIATION BETWEEN AGE AND PSYCHOSOCIAL CONCERNS

A significant difference was found age groups < 50 years and ≥ 50 years in the information and social/financial concerns expressed by cancer survivors. Survivors ≥ 50 years of age expressed more informational concerns and less social/financial concerns when compared to survivors less than 50 years of age. (Table 3)

ASSOCIATION BETWEEN STAGE OF CANCER AND PSYCHOSOCIAL CONCERNS

The study found no difference in the psychosocial concerns expressed among the survivors between various stages of cancer except for social/financial concerns expressed between stage II and stage III the difference in scores were found to be statistically significant. (Table 3)

ASSOCIATION BETWEEN TREATMENT RECEIVED AND PSYCHOSOCIAL CONCERNS

Survivors who were currently on treatment expressed more physical, informational and social/financial concerns than survivors who were not on treatment which was found to be statistically significant. (Table 3)

ASSOCIATION BETWEEN YEARS OF DIAGNOSIS OF CANCER AND PSYCHOSOCIAL CONCERNS

Survivors with more than 3 years of cancer diagnosis expressed more statistically significant social/financial concerns and emotional concerns. Between ≤ 1-year interval and ≥ 3 years and between 1-3 years interval and ≥ 3 years the difference in scores was found to be statistically significant. (Table 3)

Multivariate logistic regression analysis

All factors that were significantly associated with the psychosocial concerns with p value of 0.05 and less were subjected to regression analysis. (Table 4)

Table 4: Multivariate logistic regression analysis

	Factors	B coefficient (95% CI)	t value	Significance
Physical concerns	Nationality	3.10 (-0.74-6.94)	1.594	0.113
	Currently receiving treatment	2.55 (-0.89-5.99)	1.460	0.146
Informational concerns	Nationality	1.48 (-1.89-4.85)	0.865	0.388
	Currently receiving treatment	4.24 (1.22-7.23)	2.764	0.006
	Years of cancer diagnosis	2.64 (0.78-4.50)	2.792	0.006
	Age	2.62 (-0.34-5.59)	1.746	0.082
Social and Financial concerns	Nationality	3.98 (2.18-5.79)	4.362	<0.001
	Currently receiving treatment	2.92 (1.32-4.52)	3.595	<0.001
	Stage of cancer	0.76 (-0.20 -1.72)	1.557	0.121
	Years of cancer diagnosis	1.92 (0.93-2.90)	3.837	<0.001

We found that nationality and currently receiving treatment which were significantly associated with physical concerns will not emerge as significant predictors of physical concerns. Currently receiving treatment and more years after cancer diagnosis emerged as independent predictors of informational concerns.

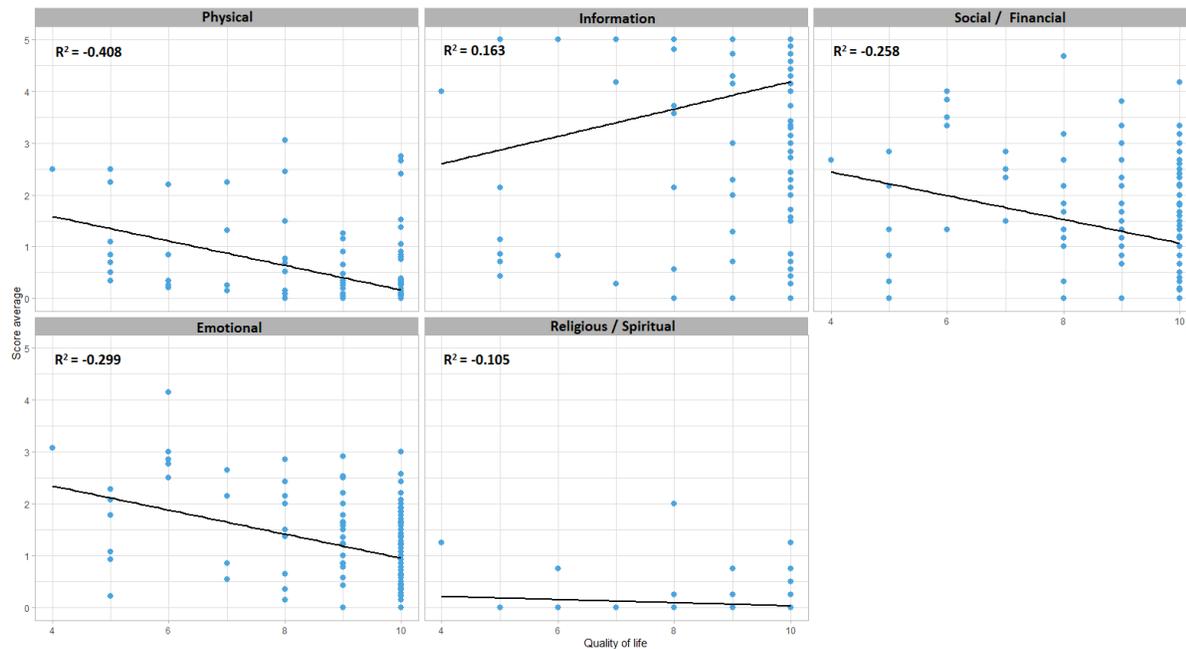
Expats, currently receiving treatment and more the years after cancer diagnosis emerged as independent predictors of social and financial concerns.

Correlation between psychosocial concerns and Quality of life

This study findings show that the majority of cancer survivors deemed their quality of life as good with a mean score of 9.40 ± 1.26 . Correlation between the psychosocial concerns and quality of life showed that there was a significant negative correlation between physical ($r = 0.41, p < 0.001$) social/financial ($r = 0.16, p < 0.001$) and emotional needs ($r = 0.30, p < 0.001$) and quality of life scores except in the informational needs domain which showed a poor positive correlation ($r = 0.16, p$

<0.001). The correlation between religious/spiritual concerns and quality of life was not statistically significant ($r = -0.11$, $p = 0.135$). (Figure 3)

Figure 3: Correlation between psychosocial concerns and Quality of life (QOL)



Discussion

Our study identified that among the five domains of psychosocial concerns of breast cancer survivors the biggest was the information concerns followed by emotional and social, financial concerns. Our findings were similar to other studies which showed that among cancer survivors' needs information concerns exceeded all other psychosocial concerns^{14,18-20}.

Previous studies have also identified that the informational concerns are high among cancer patients and the information needs differ with gender, age, stage and type of cancer²¹⁻²⁴. Breast cancer survivors who were currently on treatment had higher informational needs and this might probably due to the fact that when patients undergo treatment they need to be informed on the nature of the chemotherapy given, how long will the treatment take, what side effects can be expected and how they can manage or improve these side effects thereby increasing the informational needs of the patient.

In addition to information concerns, the second most prevalent extreme concerns for breast cancer survivors were emotional concern. Emotional concerns did not vary with the other characteristics except for years of cancer diagnosis, women with more than 3 years of cancer expressed more emotional concerns than with women less than 3

years. This is supported by studies that have acknowledged breast cancer as a possible traumatic stressor. Longer the years with cancer there is increased time period of exposure to the traumatic stressors of cancer diagnosis and treatment. Further research papers have documented that dealing with breast cancer could result in poor psychological outcomes for instance, post-traumatic stress disorder or enhanced appreciation of life known as post-traumatic growth²⁵. These psychological issues can remain a concern for many survivors and these patients have an increased risk of major depression³. Many women report the need for emotional support for recovery and for well-being^{15,26}.

Regarding social and financial concerns these concerns were more expressed by expats, women currently on treatment and women with more years of cancer diagnosis. Financial concerns were more expressed by expatriates than Emirati women as the UAE government provides full medical coverage to all nationals whereas for expatriates, the insurance is provided by the employers for which the extent of coverage is determined by their salary, designation etc. The health coverage disparity might have played a critical role in determining the access and affordability of treatment options thereby showing significant difference in the social and financial concerns of expats and nationals. Many studies have reiterated

the negative correlation observed between social and financial concerns and quality of life and financial stress associated with poor quality of life²⁷⁻²⁹.

However, financial concerns were less reported in this study compared to other studies this might again be due to the fact that in the UAE health insurance is mandatory even for the expats and employer provides health insurance for its employees which could have reduced the economic burden related to cancer and might have contributed to this finding³⁰⁻³³.

The study findings showed that physical concerns were less mentioned by participants compared to informational and emotional concerns and the physical concerns did not significantly vary among women of different age group, nationality, years of diagnosis of cancer or treatment. Though physical concerns such as pain and fatigue were commonly stated in previous studies, its impact and predictors have not been studied at large^{34,35}

The study observed negative correlation between quality of life and the scores of psychosocial concerns including physical, social, emotional as well as spiritual concerns. The results indicated that the higher the psychosocial concerns (including physical, social, emotional as well as spiritual or religious concerns) and unmet needs of breast cancer patients the lowest is the quality of life as in line with other published literature³⁶⁻³⁸. However, there was a weak positive correlation observed between quality of life and information concerns, while studies have documented that the unmet needs of breast cancer patients have significant negative effect on the quality of life of the patients^{16,39}. We could not explain this weak positive correlation and further exploration is needed to understand this completely.

The study also showed that the most preferred source of information for all the psychosocial needs were healthcare specialists and studies have supported this fact that breast cancer survivors most trusted source of cancer information was their doctors or health professionals^{40,41}. The credibility of the information might be perceived high when it is from the treating doctors or health professionals as the patients trust them more for their clinical expertise and experience and hence why they are the most preferred source of information for all the psychosocial needs⁴².

Study limitations

It is important to consider that the concerns of breast cancer survivors were assessed for a recent

timeframe of the past one week which gave critical insight into women's breast cancer needs and concerns at a potentially reflective point. The approach allowed identification of concerns at that particular phase which undoubtedly overlooked acute psychosocial concerns or needs that they might have confronted earlier. However, if they were asked about the concerns they had years prior, this would introduce a recall bias. The data obtained at one point of the study from the selective group of cancer survivors might not be able to capture the changes in breast cancer survivors' concerns over time and changes over the trajectory of cancer survivorship.

Switching healthcare providers or treatment facilities might have implied some degree of bias in the evaluation of survivors' needs and this factor was not considered in the current study.

Clinical implications

The study findings suggest that psychosocial distress screening and survivorship care to be part of routine care for cancer patients. It also highlights the need to develop survivorship care guidelines and provision of individualized tailor-made treatment survivorship care plan to all survivors. Develop models for cancer survivorship where the patient, their family and the health care providers can work in unison to help empower survivors to manage their survivorship care. It also provides valuable insight to guide policy makers and healthcare providers establishing evidence-based survivorship programs that are culturally appropriate and unique to meet the demands of a multicultural society and to improve awareness and survivorship care among the general public.

Conclusion

This research fills the existing knowledge gap regarding the breast cancer survivors' psychosocial needs in the United Arab Emirates. Survivors' needs could differ by sociodemographic and clinical presentation of the cancer; thus, it is important to design and implement needs based customized interventions to meet their unique needs. Nevertheless, further understanding is needed to design a model to address the dynamics and multifaceted aspects of breast cancer survivors 'needs by conducting further qualitative research which can serve as a framework to guide future oncology practice in the UAE.

Conflict of interest Statement

The authors have no conflicts of interest to declare.

Ethical approval

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Tawam Human Research Ethics Committee, Al Ain, Abu Dhabi, UAE. Approval no: SA/AJ/546.

Patient consent

Informed consent was obtained from all individual participants included in the study.

Data Availability

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Acknowledgments

Conceptualization: Dr. Maria Aamir, Dr. Linda Dubrow-Marshall, Dr. Roderick Dubrow-Marshall, Dr. Mouza Al Ameri; Methodology: Dr. Maria Aamir, Dr. Fatima Alharmoudi, Dr. Anood Alshehhi, Fatima Alhashmi, Dr. Dina Alawlaqi, Dr. Subhashini Ganesan; Formal analysis: Flavia Martinez Cantarutti, Dr. Subhashini Ganesan; Investigation: Dr. Maria Aamir, Dr. Fatima Alharmoudi, Dr. Anood Alshehhi, Dr. Fatima Alhashmi, Dr. Dina Alawlaqi; Writing - original draft preparation: Dr. Maria Aamir, Dr. Subhashini Ganesan; Writing - review and editing: Dr. Maria Aamir, Hagar Ateia, Dr. Subhashini Ganesan, and Dr. Walid Abbas Zaher

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