Psychology Research and Behavior Management

Dovepress

open access to scientific and medical research

Open Access Full Text Article

ORIGINAL RESEARCH

Assessment of psychological distress among cancer patients undergoing radiotherapy in Saudi Arabia

This article was published in the following Dove Press journal:
Psychology Research and Behavior Management

Turky H Almigbal[1]
Khalid M Almutairi[2]
Jack B Fu[3]
Jason M Vinluan[2]
Eyad Alhelih[4]
Wadi B Alonazi[5]
Mohammed Ali Batais[1]
Abdulaziz A Alodhayani[1]
Murad A Mubaraki[6]

[1]College of Medicine, King Saud University, Riyadh, Saudi Arabia; [2]Department of Community Health Science, College of Applied Medical Science, King Saud University, Riyadh, Saudi Arabia; [3]Department of Palliative, Rehabilitation, and Integrative Medicine, University of Texas Md Anderson Cancer Center, Houston, TX, USA; [4]College of Nursing, King Saud University, Riyadh, Saudi Arabia; [5]College of Business Administration, King Saud University, Riyadh, Saudi Arabia; [6]Clinical Laboratory Sciences Department, College of Applied Medical Sciences, King Saud University, Riyadh, Saudi Arabia

Background: Cancer patients under psychological distress have reduced compliance with treatment and prolonged hospitalizations. Identifying cancer patients who may be more likely to suffer from psychological distress over the disease trajectory is essential to targeting the proper interventions and providing the best care. In this descriptive cross-sectional study, we aim to assess the levels of emotional and physical distress, depressive symptoms, and social concerns of cancer patients undergoing radiotherapy treatment in Saudi Arabia.

Methods: A total of 148 cancer patients undergoing radiotherapy from five different public tertiary-level hospitals in Saudi Arabia participated in this study. The survey was conducted by a trained researcher from November 2015 through April 2016. The Psycho-Oncology Screening Tool was used to identify levels of distress of cancer patients undergoing radiotherapy. Emotional and physical distress, depressive symptoms, and social concerns in receiving psychosocial services were assessed.

Results: The findings show above average levels of physical and emotional distress was (342.07±78.9) and social concerns was (7.27±1.68). Age was a significant predictor of psychological distress and in social concerns ($P<0.05$). Marital status and employment status emerged as significant predictors of depressive symptoms and social concerns (<0.05), ($P<0.001$), respectively. The patients' type of cancer was significantly associated with the level of physical distress, emotional distress, and depressive symptoms ($P<0.05$).

Conclusion: Cancer patients undergoing radiotherapy displayed above-average levels of distress. This may have significant implications on their adherence for treatment and patient outcomes. Routine screening and support services or psychosocial care for patients are warranted among cancer patients undergoing radiotherapy.

Keywords: psychological distress, cancer patients, radiotherapy, Saudi Arabia

Background

Cancer patients live with the burden of the disease and its treatment. Receiving a diagnosis of cancer is associated with psychological symptoms secondary to significant distress such as feeling of pain, hopelessness, fear, anxiety, and depression.[1] They also experience psychological distress due to the consequence of illness.[2] Previous reports show that the most common psychiatric disorders experienced by cancer patients are fatigue, anxiety, depression and adjustment disorder after the use of adjuvant therapy.[3–5] Evidence suggest that the occurrence of some psychological symptoms elevates in patients under radiotherapy.[6]

Correspondence: Jason M Vinluan
Department of Community Health Science, College of Applied Medical Science, King Saud University, P.O. Box 642, Riyadh 11421, Saudi Arabia
Tel +966 55 765 1783
Fax +966 469 3625
Email Jvinluan@ksu.edu.sa

submit your manuscript | www.dovepress.com
DovePress
http://doi.org/10.2147/PRBM.S209896

Radiotherapy is now one of the most effective means for local or regional control of cancer.[7] Cancer patients receive radiotherapy either as their primary treatment or as adjuvant treatment along with chemotherapy and/or surgery.[7,8] About 45% of patients with malignancy require radiotherapy.[7] Approximately, 50% of these patients are treated with the goal of curing or improving the survival rate by increasing the local control, whereas the other 50% receive palliative treatment.[9] Previous studies also show that the period of radiotherapy may provide a valuable opportunity for screening and intervening for psychological distress.[10–12] Identifying patients suffering from psychological symptoms in the earliest period is necessary to provide appropriate care and interventions.[10]

Psychological distress is prevalent in cancer patients and has been associated with poor survival of cancer patients.[13–15] It can occur at any time during the course of the disease and may worsen over time.[14,16] Identification of factors associated with poor psychosocial outcomes in cancer patients who were treated with radiotherapy might aid the health care team in identifying who might be in need of additional psychosocial support. Several studies show that younger cancer patients, female patients or patients in general who perceive that their treatment is palliative may be more likely to suffer from psychological distress.[17–20] Furthermore, other demographic factors such as ethnicity and cancer type may influence the level of psychological distress.[12,20,21]

Although psychological distress among cancer patients is expected, various studies have shown that anxiety and depression are significant and prevalent problems that affect patient quality of life.[22,23] In Saudi Arabia, studies show that social and emotional functions were the lowest and most troubling symptoms among cancer patients.[24,25] In fact, evidence indicates that patients with first-year after cancer diagnosis be likely to have a poor emotional well-being, social function and general health.[24] Given the importance of psychological assessment of cancer patients, only few studies in Saudi Arabia have been conducted to explore the psychological morbidity. Compared to Western countries, studies related to psycho-oncology particularly patients undergoing radiotherapy are a neglected or isolated subject. Furthermore, cancer patients under psychological distress have reduced compliance with treatment and prolonged hospitalizations.[22,26] Identifying cancer patients who may be more likely to suffer from psychological distress over the cancer trajectory is essential to targeting the proper interventions and providing the best care.

Based on the authors' knowledge and literature search, there is a scarcity of research studies which encompass the level of psychological distress among patients undergoing radiotherapy. The primary objective of this study is to assess the level of emotional and physical distress, depressive symptoms, and social concerns of cancer patients undergoing radiotherapy in Saudi Arabia. A secondary objective is to identify demographic and clinical characteristics associated with distress, depression and social concerns.

Methods

Design and setting

A descriptive cross-sectional study was performed at five different public tertiary-level hospitals in Saudi Arabia, from November 2015 to April 2016. These hospitals were selected because they are the largest referral hospitals for cancer patients and established by the Ministry of Health (MOH) of Saudi Arabia. Cancer patients in Saudi Arabia who go through radiation therapy mostly takes place in outpatient clinics and usually take 5 days a week to 8 week depending on the cancer type and location.

Study population

Patients had to be at least 18 years of age and above, with a confirmed diagnosis of cancer-based from patients' medical records; receiving radiotherapy; and able to speak and understand either Arabic or English. All patients previously diagnosed with psychiatric condition were excluded from the study.

Ethical consideration

Ethical approval was obtained from the College of Applied Medical Science at King Saud University (CAMS 49-36/37) and from each of the selected hospitals prior to distribution of the survey questionnaires.

Instruments

Two surveys instruments were administered. The first part of the questionnaire was the demographic and clinical characteristics data that include age, gender, marital status, level of educational attainment, employment status, primary cancer type, age when diagnosed with cancer, number of children and a self-rating of their overall health status. The participants were asked to rate their overall health status and responded using a 5-point adjectival scale ranging from poor (0) to excellent (4).

The second part of the questionnaire was the Psycho-Oncology Screening Tool (POST) is a validated screening instrument used to identify the level of distress of cancer patients undergoing radiotherapy. It is a 33-item self-reported survey designed to evaluate emotional and physical distress, depressive symptoms, social concerns, willingness to receive psychosocial services, and level of support.[27] The POST is only one-page and can be completed by the participants in fewer than 5 mins. The POST consists of three components. The first component (which measures emotional and physical distress) consists of six VASs rating fatigue, anxiety, confusion, depression, anger, and pain. Study participants were asked to indicate their symptom level over the past week by drawing a vertical mark across a horizontal 100-mm line that included a left-side anchor of "None" and a right-side anchor of "Most possible." The researcher measured the distance from the start of the line to the point where the respondent's mark crossed the horizontal line to get a numerical rating that corresponded to the number of millimeters for each VAS. In addition to individual item VAS scores (range 0–100), a total physical and emotional distress score was calculated by summing the six VAS scores (total score range from 0 to 600).

The second component of the POST consists of two subscales: one that measures depression and the other that measures social concerns. The Depressive Symptoms Subscale is a list of 14 items assessing the somatic, cognitive, and emotional symptoms of depression to which patients responded either yes or no (yes = 1 point, no = 0 points). The total Depressive Symptoms Subscale score is calculated by summing the 14 item scores (range 0–14). The Social Concerns Subscale included a list of 13 yes or no items (yes = 1 point, no = 0 points) divided into practical concerns (six items), family/social concerns (five items), and spiritual/religious concerns (two items). The social concerns items were summed to create a total score ranging from 0 to 13.

The third component consists of four questions that assess patient interest in receiving psychosocial assistance. The first two questions ask whether the respondent would be interested in individual and/or group services. The last two questions assess the respondent's sources of support, as well as the perceived adequacy of the support.

For this study, to ensure the cultural appropriateness and adaptation of the instrument, a forward-translation and back-translation methods were performed. One of the authors (EA) and professional language translator emphasize a conceptual language translation such as using a simple, clear and concise question for the patients. All of the authors including the professional language translator compared the translated instrument to the original English version and approved the Arabic version of the instrument. The Arabic-translated questionnaire was pilot-tested on a sample of patients (n=30) to ensure the clarity, understandability and cultural relevance of the items. Patients' medical record number was saved and recorded to ensure that all patients from the pilot study were not included in the larger study. After the pilot testing, the Arabic instrument was modified and adjustments were made as necessary for scoring a better response from the participating subject prior to data gathering. Adjustments were done such as deleting question relating to God and making the translated questionnaire easy to understand for the respondents. The Cronbach's alpha coefficients of the three components that have been used were 0.73 (Physical and Emotional), 0.71 (Depressive Symptoms Scale) and 0.70 (Social Concerns).

Procedure

Prior to the distribution of the questionnaire, the researcher explained the purpose of the study to the patients and that their participation was voluntary. All patients who agreed had provided written informed consent to participate and to review their medical records. We distributed 50 survey questionnaires in each hospital and patients were recruited using a convenience sampling during their visits for radiotherapy. The participants were assisted by a trained researcher and an oncology nurse while answering the questionnaire. In order to ensure anonymity, no names or other identifiable information were included in the questionnaires or database. Also, researchers checked medical records to confirm the validity of diagnosis, age of diagnosis, treatment method, and stage of disease.

Statistical analysis

All data were entered and analyzed using SPSS 22 (Chicago, IL, USA). Patient characteristics were summarized using descriptive statistics. All continuous data were presented as mean ± SD while categorical data were presented as frequencies and percentages (%). All numeric variables were tested using independent *t*-test and ANOVA. Pearson correlation coefficient was used to examine the correlation between variables. Linear regression was done to determine the predictors associated between emotional and physical distress, depression and social concerns and other parameters. The dependent variables used are emotional and physical distress, depression and social

concerns, while the independent variables are demographic characteristics and clinical data of the participants. Non-binary independent variables such as age, marital status and age diagnosed with cancer were dichotomized and coded as "1" and "2." The group categories were: under and over 45, primary and secondary versus bachelor and above, employed versus unemployed, good, fair and poor versus very good and excellent overall health status. Cancer type was dichotomized according to groups of breast and colorectal cancers. These cancers were selected because they are the most prevalent cancer types in Saudi Arabia. Other type of cancer was dropped also in the analysis because of the small sample in the study. A *p*-value below 0.05 was considered statistically significant.

Results

Characteristics of the study sample

Out of 250 questionnaires distributed, 148 respondents (59.19%) took part in the study. The demographics and clinical characteristics of the study sample are presented in Table 1. The respondents were relatively young with a mean age of 46.2±9.26. Only 7% of the participants were 61 or older. The majority of the participants were male (n=88, 58.1%), Saudi nationals (n=128, 85%), employed (n=98, 66.2%) and married (n=128, 86.5%). Almost half of the participants rated their overall health as good (n=75, 50.7%), while 36.2% rated it as very good to excellent and 12.9% reported their overall health as poor to fair.

Level of psychological distress of patients undergoing radiotherapy

Table 2 presents the mean, SDs, and ranges of the POST instrument in which high scores indicate higher level of distress. Participants demonstrated substantial level of physical and emotional distress, depression and social concerns. For the first component of the POST assessing physical and emotional distress, patients' demonstrated distress among the six individual VAS scores (range 0–100). The individual VAS scores were Fatigue (62.16 ±11.2), Anxiety (66.48±13.24), Confusion (68.51±13.62), Depression (67.83±13.72), Anger (68.10±14.34), and Pain (64.10±17.24). The mean total (sum of the six scales) individual VAS's scores was (342.07±78.9) (range 0–600). Regarding the second component of the POST, participants had a mean of 7.75 (SD=1.74) depression characteristics from the Depression Subscale (range 0–14) and a mean of 7.27 (SD=1.68) social concerns from the Social Concerns Subscale (range 0–13). From the third POST component, 78% of the participants were interested in talking to a social worker or behavioral health specialist, while 69% were interested in participating in a support group offered at the cancer center. The majority of the participants had adequate support in coping with their illness and treatment (n=104, 70%) and 40% of the participants reported that family was the most common source of support.

Association of psychological distress of cancer patients undergoing radiotherapy

Table 3 shows the association of psychological distress of cancer patients undergoing radiotherapy on the parameters included in the present study. In level of Physical and Emotional distress had significant inverse correlation with marital status ($P<0.05$), and number of children ($P<0.001$). There was a moderate, positive association found between overall health status and Physical and Emotional distress of patients (r=0.043, n=148, $P<0.001$). In Depressive symptoms domains, only employment status made a significant association found on the study parameters (r=−0.10, n=148, $P<0.05$). Meanwhile, employment status (r=−0.26, n=148, $P<0.001$) and number of children (r=−0.27, n=148, $P<0.001$) show moderate, inverse association ($P<0.001$) with social concerns. Other parameters were found no significant associations.

Factors associated with psychological distress of patients undergoing radiotherapy

Table 4 presents the predictors of psychological distress of cancer patients undergoing radiotherapy included in the present study. Preliminary analyses were conducted to ensure no violations of the normality, linearity and multicollinearity. In the final model, five variables emerged as significant predictor of physical and emotional distress of cancer patients undergoing radiotherapy. Age was a significant predictor of psychological distress ($P<0.05$). Younger patients complained of more physical and emotional distress symptoms than older patients. Age diagnosis of cancer as considered a predictor of physical and emotional distress recording a higher beta value (beta=0.28, $P<0.05$) followed by overall health status of patients (beta=0.22, $P<0.05$).

Marital status emerged as significant predictor of depressive symptoms and social concerns ($P<0.05$).

Table 1 Demographic and clinical characteristic of participants

Characteristic	N (148)	%
Age (years)	M 46.26 SD 9.26	
Below 40's	46	31.1
41–50	58	39.2
51 and above	44	29.7
Gender		
Male	86	58.1
Female	62	41.9
Nationality		
Saudi	126	85
Non-Saudi	22	15
Marital status		
Single	20	13.5
Married	128	86.5
Education attainment		
Primary	20	13.5
Secondary	47	31.8
Bachelor and above	81	54.7
Employment status		
Employed	98	66.2
Unemployed	50	33.8
Cancer type		
Breast	58	39.2
Colorectal	64	43.2
Other	26	17.6
Age of cancer diagnosis	M 42.34 SD 8.89	
Below 40's	68	45.9
41–50	51	34.5
51 and above	29	19.6
Number of children		
0–2	53	35.8
3 or more	95	64.2
Rate your overall health status		
Excellent–very good	54	36.2
Good	75	50.7
Fair–poor	19	12.9

Employment status was linearly correlated with domains of depressive symptoms and social concerns ($P<0.001$) recording a higher beta value (beta=0.38, $P=0.001$). Unemployed patients felt more anxious and had a social issue than patients who were employed ($P<0.001$). The patients' type of cancer was found to be significantly correlated with domains of depressive symptoms. For example, breast cancer patients felt more depressed ($P<0.05$) and distressed ($P<0.05$) than patients with other types of cancer. The age of patients diagnosed with cancer was found to be significantly correlated with social concerns ($P<0.001$). The results showed that patients who were diagnosed with cancer at a younger age experienced had more social concerns ($P<0.05$). As can be seen in Table 3, physical and emotional distress and social concerns ($P=0.001$) significantly correlated with the number of children of the patients. The analysis shows that physical and emotional distress ($P<0.001$) as well-social concerns ($P<0.05$) greatly impacts the overall health status of patients undergoing radiotherapy.

Discussion

This study examined the level of psychological distress of patients undergoing radiotherapy in Saudi Arabia. It has identified that majority of the participants were younger and quietly highly educated patients. In addition, almost 50% of the respondents were diagnosed with cancer below the age of 40's. This indicates that the prevalence of cancer in Saudi Arabia increased considerably among younger age group. An alternate explanation is that cancer in Saudi Arabia is a sensitive issue and most patients do not want to participate and discuss their condition particularly older patients. We believe that this has impacted the level of resources, support, and concerns patients experienced in the study.

Our study found substantial level of distress, depression, and social concerns among cancer patients undergoing radiotherapy. The level of fatigue found in our study was comparable to the previous study conducted in India and Malaysia.[28,29] Fatigue was found as one of the most common symptoms among patients undergoing radiotherapy in Arabic and Western countries.[30–33] Previous study reported that fatigue was commonly mixed with depression and anxiety which form one symptom cluster among cancer patients.[34,35] The level of depression and anxiety found in our study was high compared with the level of fatigue. The level of depression and anxiety found in the current study was above average might be because of the demographic characteristics of our study sample. Specifically, majority of the respondents were in younger age and diagnose their condition below age of 40's which could be linked to high levels of depression.[36,37] Symptoms of depression were also observed among cancer patients undergoing chemotherapy.[38,39] Most cancer patients experience multiple symptoms due to the nature of their disease and its treatment.[40] It is recommended that approximately half of

Table 2 Mean, SDs, and ranges of scores of different measures

Scale	No. of items	M	SD	Potential range	Observed range
Physical and Emotional Distress [a]	6	342.07	78.9	0–600	0–550
Depressive Symptoms[a]	14	7.75	1.74	0–14	0–14
Social Concerns[a]	13	7.27	1.68	0–11	0–11
Interest in services	**No**	**Possibly**	**Definitely**		
Interested in talking to a social worker or behavioral health specialist about these or any other concerns.	32 (21.6)	78 (52.7)	38 (25.7)		
Interested in attending a support group if one were offered at the cancer center.	46 (31.1)	57 (38.5)	43 (29.1)		
Social support	**No**	**Yes**			
Do you have adequate support to help you cope with illness and treatment?	41 (27.7)	104 (70.3)			
From which of the following sources do you receive support	**N**	**(%)**			
Spouse/family	60	40.5			
Friends	29	19.6			
Religious community	20	13.5			
Counselor/therapist	9	6.1			
Medical staff	13	8.8			
Other	17	11.5			

Notes: [a]High scores indicates higher level of distress, symptoms and concerns (range of possible scores; Physical and Emotional Distress 0–600; Depressive Symptoms 0–14; Social Concerns 0–13).
Abbreviation: M, mean.

all new cancer patients should receive radiotherapy.[41] The delivery of radiation to control tumors provides side effects which often results in deterioration of the physical and psychosocial conditions of these patients.[40,42]

Our findings also show several demographic factors associated with the level of distress, depression, and social concerns. Younger age was associated with greater distress and social concerns than older cancer patients. The high level of psychological distress among younger cancer patients was also found in a study in Korea in which anxiety or depression was greater among patients below 65 years old than patients more than 65 years old.[37] However, a study from Norway identified greater levels of anxiety among middle-aged cancer patients and lower levels of anxiety patients under 30 and over 70 years old.[19] This discrepancy supports our findings that age was a significant predictor in psychological distress of cancer patients undergoing radiotherapy as well as in other studies.[17,43–45] For example, in a 5-year observational study done by Burgess et al, shows a dropping point of prevalence of depression and anxiety among breast cancer patients for the first to fifth year.[44] From 48% of prevalence of depression and anxiety to 15% in the fifth year.[44] A possible reason for this finding is that the impact of cancer among younger patients is generally unexpected and they may find it difficult to accept the nature of disease and its treatment. For example, young breast cancer patients having mastectomy or breast surgery and early menopause caused by the treatments may find it more difficult to accept changes in the body and that can be a distressing experience. Previous studies have reported older age was strongly correlated with less psychological distress and a strong moderator of resilience than younger cancer patients.[46,47] Resilience is a person's capacity to handle hardships and stressors in life.[48] Viewed in this context, older patients are capable of recovery and may have developed skills during their lifetime to recover toward psychological distress. Thus, younger cancer

Table 3 Association of level of psychological distress of cancer patients undergoing radiotherapy

N=148	Physical and Emotional Distress	Depressive Symptoms	Social Concerns
Age	0.03	−0.01	−0.04
Gender	−0.07	−0.09	−0.05
Marital status	−0.17*	−0.07	0.15
Educational attainment	−0.11	−0.07	−0.08
Employment status	0.07	−0.10*	−0.26**
Cancer type	−0.22**	−0.14	−0.09
Age diagnosed with cancer	0.05	−0.06	0.05
Number of children	−0.25**	0.03	−0.27**
Overall health status	0.43**	0.03	0.11

Notes: Data presented as coefficient (R). *Denotes significance at 0.05 level. **Denotes significance at 0.01 level.

patients may be in particular need of support and interventions that will increase their resilience and help lessen the psychological distress during cancer treatment. This may effectively prolong the goal of cancer treatment beyond patients' survival.

The type of cancer was significantly associated with distress and depression symptoms. Breast cancer patients feel more depressed (P=0.046) and distressed (P=0.017) than patients with colorectal cancer. Our results were contrary to a previous study conducted in the United States that examines the variations of anxiety and depression among the most common cancer types.[49] In that study, lung, gynecological, and hematological cancer patients reported the highest levels of distress at the time of cancer diagnosis. However, a review study done by Stiegelis et al found no significant correlation between cancer site and psychological distress.[50] Future studies are needed that assess patients' cancer type and other identified predictors such as physical, behavioral and social stressors because this might reflect differences in prognosis, treatments or potentially in models of care of cancer patients undergoing radiotherapy. Stressors are nutritional deficiencies, emotional resentments and frustrations, relationship/marriage difficulties and lack of social support. They may also provide a better understanding of the daily challenges and concerns of individuals diagnosed with cancer, while providing the information for clinicians, researchers, and policy makers to meet the needs of this patient population. Another highlight of this study is the domains of physical and emotional distress as well as social concerns that significantly influence the overall or global health status of cancer patients undergoing radiotherapy. This finding implies the psychosocial impact of the disease and its treatment among cancer patients. A need for psychosocial support focusing on managing and adopting coping strategies with the disease and its treatment might help patients in developing higher risk of emotional disturbances.[51]

The present study stresses the importance of support services or psychosocial care for cancer patients. Approximately, 80% of the participants were interested in talking to a social worker or behavioral health specialist, while 69% were interested in attending a support group offered at the cancer center. With regard to intervention strategies used to reduce anxiety and/or depression, a combination of psychological education and supportive psychotherapy may be effective to support cancer patients undergoing radiotherapy. In Finland, breast cancer patients thought they would have felt more supported if they had received more information about their disease.[52] Furthermore, communication between the patient and the physician and treatment team remains a keystone of care particularly with cancer patients. Identifying patients in need of psychosocial intervention by screening for psychological distress or available social support could enhance any effect on well-being.

Limitations

The present study is limited in terms of sample size. We believe that cancer patients' particularly older patients conceal their feelings, and as well as the relative who were the ones who decide for their patients do not want to disclose the patient's situation. Other variables like comorbid conditions and concomitant medications were not assessed which consider another limitation of the study. In addition, the assessment tool was developed from the Western nation, and may not be applicable in Saudi Arabia because of the norms in Saudi Arabia may differ on the scales. However, the instrument was translated in the Arabic language by a professional language translator and modified pilot tested with an acceptable

Table 4 Predictors of psychological distress of cancer patients undergoing radiotherapy

Predictors	Physical and emotional distress				Depressive symptoms				Social concerns			
	B	95% CI	β	*P*-value	B	95% CI	β	*P*-value	B	95% CI	β	*P*-value
Age	−1.52	−3.98, 0.94	−0.18	**0.020**	0.04	−0.01, −0.09	0.20	0.429	0.32	−0.02, 0.08	0.17	**0.001**
Gender	−51.60	−93.80, −9.40	−0.33	0.353	0.41	−0.49, 1.33	0.12	0.545	0.63	−0.22, 1.50	0.18	0.221
Marital status	−8.70	−55.08, 37.67	−0.04	0.759	1.30	0.23, 2.37	0.27	**0.018**	0.90	−0.07, 1.87	0.19	**0.013**
Educational attainment	28.83	−3.74, 61.40	0.18	0.084	0.09	−0.62, 0.82	0.03	0.189	−0.49	−1.17, 0.17	−0.14	0.149
Employment status	40.17	−4.30, 84.66	0.25	0.122	1.41	0.39, 2.44	0.38	**0.001**	−1.71	−2.65, −0.77	−0.47	**0.002**
Cancer type	−21.40	−56.40, 13.60	−0.14	**0.012**	0.72	−0.02, 1.46	0.21	**0.033**	−0.14	−0.84, 0.56	−0.04	0.071
Age diagnosed with cancer	47.77	−1.87, 97.43	0.28	**0.059**	−1.21	−2.32, −0.09	−0.31	0.943	−0.84	−1.89, 0.20	−0.21	**0.001**
Number of children	−46.61	−80.46, −12.77	−0.28	**0.007**	−0.63	−1.39, 0.12	−0.18	**0.037**	−0.88	−1.59, −0.18	−0.25	**0.017**
Overall health status	50.44	6.22, 94.67	0.22	**0.026**	−0.50	−1.49, 0.48	−0.10	0.381	0.85	−0.07, 1.79	0.17	**0.007**

Note: Physical and Emotional Distress adjusted R^2=0.18, Depressive Symptoms Adjusted R^2=0.14, Social Concerns Adjusted R^2=0.231. Bold text indicates *P*-value significant at *P*<0.05.
Abbreviations: B, the unstandardized b coefficients; CI, Confidence Interval for B; β, Beta coefficients.

level of Cronbach Alpha. Future research should investigate in more detail these differences between cancer types. Lastly, convenience sampling was used to select the participants, probably may restrict the generalizability of the findings of the study and do not reflect the psychological distress of cancer patients undergoing radiotherapy in Saudi Arabia. However, these findings may form a preliminary database that might be useful for health authorities in assessing the current level of psychological distress among cancer patients undergoing radiotherapy in Saudi Arabia. Such studies may help in developing or enhancing psychosocial intervention programs for cancer patients undergoing radiotherapy in the whole country at a larger level. This might also serve as a criterion for good functioning or comparison if it is possible.

Conclusion

Cancer patients undergoing radiotherapy in Saudi Arabia demonstrate substantial level of physical and emotional distress, depression, and social concerns. Furthermore, many are interested in accessing support services. Though the present study covers a small sample size, the results may provide preliminary information on the likely presence of psychological distress among cancer patients undergoing radiotherapy in Saudi Arabia. Addressing these issues can not only improve quality of life but also adherence to cancer treatments. Patients who were young and have certain primary cancers may demonstrate greater susceptibility to these issues. Routine screening should be performed and psychosocial support services should be available for these patients. Future studies should include the level of distress before and after radiotherapy and differences between cancer types. Further research might investigate the efficacy of psychosocial support therapy and efforts to improve methods reducing psychological distress among cancer patients undergoing radiotherapy.

Ethics approval and consent to participate

Ethics approval was attained from the College Applied Medical Science of King Saud University (CAMS 49-36/37) and Institutional Review Board of each hospital. Patients have provided informed consent prior to enrollment in this study. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee in accordance with the 1964 Helsinki Declaration.

Author contributions

All authors contributed to data analysis, drafting or revising the article, gave final approval of the version to be published, and agree to be accountable for all aspects of the work. All authors have provided consent for publication.

Acknowledgments

The authors would like to extend their sincere appreciation to the Deanship of Scientific Research at King Saud University for funding this Research group NO (RG# 1435-024).

Availability of data and materials

The data set used is locked and stored in the College of Applied Medical Science at King Saud University and can be obtained from the principal investigator on reasonable request.

Disclosure

The authors certify that there are no conflicts of interest with any financial organization or anything else regarding the material discussed in the manuscript.

References

1. Breen SJ, Baravelli CM, Schofield PE, Jefford M, Yates PM, Aranda SK. Is symptom burden a predictor of anxiety and depression in patients with cancer about to commence chemotherapy? *Med J Aust*. 2009;190:S99e–S104.
2. Fann JR, Thomas-Rich AM, Katon WJ, et al. Major depression after breast cancer: a review of epidemiology and treatment. *Gen Hosp Psychiatry*. 2008;30:112–126. doi:10.1016/j.genhosppsych.2007.10.008
3. Mitchell AJ, Chan M, Bhatti H, et al. Prevalence of depression, anxiety, and adjustment disorder in oncological, haematological, and palliative care settings: a meta-analysis of 94 interview-based studies. *Lancet Oncol*. 2011;12:160–174. doi:10.1016/S1470-2045(11)70150-4
4. Iwamitsu Y, Shimoda K, Abe H, Tani T, Okawa M, Buck R. Anxiety, emotional suppression, and psychological distress before and after breast cancer diagnosis. *Psychosomatics*. 2005;46:19–24. doi:10.1176/appi.psy.46.1.19
5. Janaki MG, Kadam AR, Mukesh S, Nirmala S, Arul Ponni RBS, Rajeev AG. Magnitude of fatigue in cancer patients receiving radiotherapy and its short term effect on quality of life. *J Cancer Res Ther*. 2010;6:1. doi:10.4103/0973-1482.63566
6. Badr H, Gupta V, Sikora A, Posner M. Psychological distress in patients and caregivers over the course of radiotherapy for head and neck cancer. *2014 Oral Oncol*. 2014;50:1005–1011. doi:10.1016/j.oraloncology.2014.07.003
7. Baskar R, Lee KA, Yeo R, Yeoh KW. Cancer and radiation therapy: current advances and future directions. *Int J Med Sci*. 2012;9(3):193–199. doi:10.7150/ijms.3635
8. Arruebo M, Vilaboa N, Sáez-Gutierrez B, et al. Assessment of the evolution of cancer treatment therapies. *Cancers (Basel)*. 2011;3(3):3279–3330. Published 2011 Aug 12. doi:10.3390/cancers3033279
9. Wong P, Han K, Sykes J, et al. Postoperative radiotherapy improves local control and survival in patients with uterine leiomyosarcoma. *Radiat Oncol*. 2013;8:128. doi:10.1186/1748-717X-8-128
10. Cruzado JA, Hernández-Blázquez M. Mental disorder screening on cancer patients before and after radiotherapy and at the 1-month follow-up. *Support Care Cancer*. 2018:26(3):813–821. Epub 2017 Sep 23. doi:10.1007/s00520-017-3894-2.
11. Hahn CA, Dunn R, Halperin EC. Routine screening for depression in radiation oncology patients. *Am J Clin Oncol*. 2004;27:497–499. doi:10.1097/01.coc.0000135377.28001.01
12. Holtzman AL, Pereira DB, Yeung AR. Implementation of depression and anxiety screening in patients undergoing radiotherapy. *BMJ Open Qual*. 2018:7(2):e000034. Published 2018 May 7. doi:10.1136/bmjoq-2017-000034.
13. Hamer M, Chida Y, Molloy GJ. Psychological distress and cancer mortality. *J Psychosom Res*. 2009:66(3):255–258. Epub 2009 Jan 16. doi:10.1016/j.jpsychores.2008.11.002.
14. Chida Y, Hamer M, Wardle J, Steptoe A. Do stress-related psychosocial factors contribute to cancer incidence and survival? A systematic quantitative review of 40 years of inquiry. *Nat Clin Pract Oncol*. 2008;5:466–475. doi:10.1038/ncponc1134
15. Lavelle C, Ismail MF, Doherty K, Bowler A, Mohammad MM, Cassidy EM. Association between psychological distress and cancer type in patients referred to a psycho-oncology service. *Ir Med J*. 2017;110(6):579.
16. Murray SA, Kendall M, Grant E, Boyd K, Barclay S, Sheikh A. Patterns of social, psychological, and spiritual decline toward the end of life in lung cancer and heart failure. *J Pain Symptom Manage*. 2007;34(4):393–402. doi:10.1016/j.jpainsymman.2006.12.009
17. Pascoe S, Edelman S, Kidman A. Prevalence of psychological distress and use of support services by cancer patients at Sydney hospitals. *Aust N Z J Psychiatry*. 2000;34:785–791. doi:10.1080/j.1440-1614.2000.00817.x
18. Holmes N, Williamson K. A survey of cancer patients undergoing a radical course of radiotherapy, to establish levels of anxiety and depression. *J Radiother Pract*. 2008;7:89. doi:10.1017/S1460396908006304
19. Aass N, Fossa SD, Dahl AA, Moe TJ. Prevalence of anxiety and depression in cancer patients seen at the Norwegian Radium Hospital. *Eur J Cancer*. 1997;33:1597–1604. doi:10.1016/S0959-8049(97)00054-3
20. Stark D, Kiely M, Smith A, Velikova G, House A, Selby P. Anxiety disorders in cancer patients: their nature, associations, and relation to quality of life. *J Clin Oncol*. 2002;20:3137–3148. doi:10.1097/01.COT.0000289366.79595.91
21. Zabora J, BrintzenhofeSzoc K, Curbow B, Hooker C, Piantadosi S. The prevalence of psychological distress by cancer site. *Psychooncology*. 2001;10:19–28. doi:10.1002/1099-1611(200101/02)10:1<19::AID-PON501>3.0.CO;2-6
22. Guo Z, Tang H, Li H, et al. The benefits of psychosocial interventions for cancer patients undergoing radiotherapy. *Health Qual Life Outcomes*. 2013;11:121. doi:10.1186/1477-7525-11-83
23. Fallowfield L, Ratcliffe D, Jenkins V, Saul J. Psychiatric morbidity and its recognition by doctors in patients with cancer. *Br J Cancer*. 2001;84:1011–1015. doi:10.1054/bjoc.2001.1724
24. Ahmed AE, Almuzaini AS, Alsadhan MA, et al. Health-related predictors of quality of life in cancer patients in Saudi Arabia. *J Canc Educ*. 2018;33:1011. doi:10.1007/s13187-017-1198-3
25. Nageeti TH, Elzahrany HR, Gabra AO, Obaid AA, Jastania RA. Quality of life assessment of breast cancer patients in Saudi Arabia. *J Fam Community Med*. 2019;26:98–102.
26. Pelletier G, Verhoef MJ, Khatri N, Hagen N. Quality of life in brain tumor patients: the relative contributions of depression, fatigue, emotional distress, and existential issues. *J Neurooncol*. 2002;57:41–49. doi:10.1023/A:1015728825642

27. Kilbourn KM, Bargai N, Durning PE, Deroche K, Madore S, Zabora J. Validity of the Psycho-Oncology Screening Tool (POST). *J Psychosoc Oncol*. 2011;29(5):475–498. doi:10.1080/07347332.2011.599359
28. Nautiyal V, Lal P, Verma M, Yadav R, Singh N, Kumar S. Evaluation of fatigue in head and neck cancer patients undergoing (intensity modulated radiation therapy) radiotherapy: a prospective study. *Asian J Oncol*. 2015;1:44–48. doi:10.4103/2454-6798.165111
29. Biswal BM, Kumaraswamy N, Mukhtar F. Prevalence of fatigue among cancer patients undergoing external radiotherapy. *Southeast Asian J Trop Med Public Health*. 2004;35(2):463–467.
30. Xiao C, Beitler JJ, Higgins KA, et al. Fatigue is associated with inflammation in patients with head and neck cancer before and after intensity-modulated radiation therapy. *Brain Behav Immun*. 2016;52:145–152. doi:10.1016/j.bbi.2015.10.016
31. Jacobsen PB, Thors CL. Fatigue in the radiation therapy patient: current management and investigations. *Semin Radiat Oncol*. 2003;13(3):372–380. doi:10.1016/S1053-4296(03)00021-3
32. Karthikeyan G, Jumnani D, Prabhu R, Manoor UK, Supe SS. Prevalence of fatigue among cancer patients receiving various anticancer therapies and its impact on quality of life: a cross-sectional study. *Indian J Palliat Care*. 2012;18(3):165–175. doi:10.4103/0973-1075.105686
33. Ghosn M, Boutros C, Geara S, Kattan J, Nasr F, Chahine G. Experience with palliative care in patients with advanced cancer at a tertiary care hospital in a developing country. *Support Care Cancer*. 2011;19:573–575. doi:10.1007/s00520-010-1056-x
34. Fiorentino L, Rissling M, Liu L, Ancoli-Israel S. The symptom cluster of sleep, fatigue and depressive symptoms in breast cancer patients: severity of the problem and treatment options. *Drug Discov Today Dis Models*. 2011;8(4):167–173. doi:10.1016/j.ddmod.2011.05.001
35. So WK, Marsh G, Ling WM, et al. The symptom cluster of fatigue, pain, anxiety, and depression and the effect on the quality of life of women receiving treatment for breast cancer: a multicenter study. *Oncol Nurs Forum*. 2009;36(4):E205–E214. doi:10.1188/09.ONF.E205-E214
36. Vodermaier A, Linden W, MacKenzie R, Greig D, Marshall C. Disease stage predicts post-diagnosis anxiety and depression only in some types of cancer. *Br J Cancer*. 2011;105(12):1814–1817. doi:10.1038/bjc.2011.503
37. Chung J, Ju G, Yang J, et al. Prevalence of and factors associated with anxiety and depression in Korean patients with newly diagnosed advanced gastrointestinal cancer. *Korean J Intern Med*. 2018;33(3):585–594. doi:10.3904/kjim.2016.108
38. Yusof S, Zakaria FN, Hashim NK, Dasiman R. Depressive symptoms among cancer patients undergoing chemotherapy. *Procedia – Social Behav Sci*. 2016;234:185–192. doi:10.1016/j.sbspro.2016.10.233
39. Bhattacharyya S, Bhattacherjee S, Mandal T, Das DK. Depression in cancer patients undergoing chemotherapy in a tertiary care hospital of North Bengal, India. *Indian J Public Health*. 2017;61(1):14–18. doi:10.4103/0019-557X.200252
40. Waller A, Williams A, Groff SL, Bultz BD, Carlson LE. Screening for distress, the sixth vital sign: examining self-referral in people with cancer over a one-year period. *Psychooncology*. 2011;2:388–395.
41. Moding EJ, Kastan MB, Kirsch DG. Strategies for optimizing the response of cancer and normal tissues to radiation. *Nature Revi Drug Discovery*. 2013;12(7):526–542. doi:10.1038/nrd4003
42. Durante M, Loeffler JS. Charged particles in radiation oncology. *Nature Rev Clin Oncol*. 2010;7:37–43. doi:10.1038/nrclinonc.2009.183
43. Christensen S, Zachariae R, Jensen AB, et al. Prevalence and risk of depressive symptoms 3–4 months post-surgery in a nationwide cohort study of Danish women treated for early stage breast-cancer. *Breast Cancer Res Treat*. 2009;113:339–355. doi:10.1007/s10549-008-9920-9
44. Burgess C, Cornelius V, Love S, Graham J, Richards M, Ramirez A. Depression and anxiety in women with early breast cancer: five years observational cohort study. *BMJ*. 2005;330:702. doi:10.1136/bmj.38343.670868.D3
45. Politi MC, Enright TM, Weihs KL. The effects of age and emotional acceptance on distress among breast cancer patients. *Support Care Cancer*. 2007;15:73–79. doi:10.1007/s00520-006-0098-6
46. Cohen M, Baziliansky S, Beny A. The association of resilience and age in individuals with colorectal cancer: an exploratory cross-sectional study. *J Geriatr Oncol*. 2014;5(1):33–39. doi:10.1016/j.jgo.2013.07.009
47. Egan M, Burke E, Meskell P, MacNeela P, Dowling M. Quality of life and resilience related to chemotherapy-induced peripheral neuropathy in patients post treatment with platinums and taxanes. *J Res Nurs*. 2015;20(5):385–398. doi:10.1177/1744987115574296
48. Eicher M, Matzka M, Dubey C, White K. Resilience in adult cancer care: an integrative literature review. *Oncol Nurs Forum*. 2015;42(1):E3–16. doi:10.1188/15
49. Alwhaibi M, Sambamoorthi U, Madhavan S, Bias T, Kelly K, Walkup J. Cancer type and risk of newly diagnosed depression among elderly medicare beneficiaries with incident breast, colorectal, and prostate cancers. *J Natl Compr Canc Netw*. 2017;15(1):46–55. doi:10.6004/jnccn.2017.0006
50. Stiegelis HE, Ranchor AV, Sanderman R. Psychological functioning in cancer patients treated with radiotherapy. *Patient Educ Couns*. 2004;52(2):131–141. doi:10.1016/S0738-3991(03)00021-1
51. Fritzsche K, Liptai C, Henke M. Psychosocial distress and need for psychotherapeutic treatment in cancer patients undergoing radiotherapy. *Radiother Oncol*. 2004;72(2):183–189. doi:10.1016/j.radonc.2004.03.015
52. Luutonen S, Vahlberg T, Eloranta S, Hyväri H, Salminen E. Breast cancer patients receiving postoperative radiotherapy: distress, depressive symptoms and unmet needs of psychosocial support. *Radiother Oncol*. 2011:100(2):299–303. Epub 2011 Feb 11. doi:10.1016/j.radonc.2011.01.014.