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Original Article

The Relationship between Fear of Disease Progression, Social Support, and Hospital Anxiety and Depression in Elderly Patients with Cancer: A Cross-Sectional Survey in Iran

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Abstract

Background: One of the main causes of stress in patients with cancer is fear of disease progression (FoP). This study aimed to determine the relationship between fear of disease progression, social support, and hospital anxiety and depression in elderly patients with cancer.

Methods: In this descriptive-analytical study, 165 elderly patients with cancer were selected by simple random sampling in Babol, Iran, in 2021. Data were collected using a demographic questionnaire, the Fear of Disease Progression Short Form questionnaire (FoP-Q-SF), the Hospital Anxiety and Depression Scale (HADS), the Social Support Appraisals Scale (SS-AS), and the Abbreviated Mental Test (AMT). Statistical analyses were performed using SPSS version 26.

Results: The mean total FoP score was 31.64 ± 13.93, indicating a low level of fear of disease progression. Overall, 44.2% of the patients had high FoP, whereas 55.8% had low FoP. The mean social support score was 16.43 ± 5.92 (high), the mean hospital anxiety score was 6.96 ± 0.43 (healthy), and the mean hospital depression score was 7.09 ± 0.46 (mild). FoP was significantly and negatively correlated with social support ($r = -0.503$, $P = 0.01$) and significantly and positively correlated with hospital anxiety ($r = 0.749$, $P < 0.01$) and hospital depression ($r = 0.772$, $P < 0.01$).

Conclusion: The findings suggest that promoting social support and reducing anxiety and depression may help decrease FoP in elderly patients with cancer. These findings may provide a basis for developing and implementing effective interventions for this population.

Keywords: Fear, Disease Progression, Social Support, Anxiety, Depression, Elderly, Cancer

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Introduction

Today, the development of chronic diseases is one of the most painful events in human life, and cancer is undoubtedly one of the most common chronic diseases in recent decades. As of January 1, 2025, approximately 18.6 million people in the United States were living with a history of cancer, and this number is projected to exceed 22 million by 2035 [1]. In Iran, the number of new cancer cases is predicted to increase from 112,000 recorded cases in 2016 to about 160,000 in 2025 [2].

Cancer has a profound effect on the lives of patients and their families [3] and is closely associated with psychological problems [4]. One of the main causes of stress is fear of disease progression (FoP) or fear of recurrence (FoR) [5], which refers to fear of disease progression and its psychological, social, and biological consequences. This feeling is a reactive, non-pathological fear of which the patient is fully aware [6]. It is one of the most important, common, and severe problems among patients with cancer [7], and is often related to the disease, its treatment, and the associated psychological consequences [8]. Approximately 56% of patients with cancer worldwide [9] and 49% of patients with cancer in Iran experience this fear. FoP is an appropriate and normal response to the experience of a chronic, debilitating, or potentially fatal disease [6] and has many negative effects on patients with cancer. Depression and anxiety are among the most common psychological disorders in patients with cancer [10].

One of the factors that effectively reduces anxiety and depression is the level of social support (SS) that individuals receive [11]. SS can facilitate the psychological adjustment of individuals experiencing major health-related stressors and, by enhancing their understanding of stressful events, reduce the impact of stress and minimize the effects of unpleasant experiences [12]. SS is the perception that an individual is cared for and loved, is valued, respected, and belongs to a network of mutual communication [13, 14]. SS is an important health-related factor [15, 16], promotes adaptation, and may improve coping with crises such as a cancer diagnosis [4, 17, 18]. SS is also associated with fear of disease progression in patients with cancer [19].

However, due to the increasing prevalence of cancer across all age groups, particularly among older adults [20] , knowledge gained from studies in this population is important for the development of comprehensive nursing care strategies for patients with cancer and their caregivers. Healthcare professionals, especially nurses, should assess these patients for fear, anxiety, mental health problems, and other related factors and implement appropriate interventions to reduce these problems. Given the importance of this issue and the limited research conducted in this field, this study was designed to determine the relationship between fear of disease progression, social support, and hospital anxiety and depression in elderly patients with cancer

Methods

In this cross-sectional descriptive-analytical study conducted in 2021, the study population consisted of elderly patients with cancer who had medical records in hospitals and the offices of oncologists and general surgeons in Babol, Iran. After receiving a letter of introduction from Babol University of Medical Sciences, the researcher visited physicians' offices and Ayatollah Rouhani and Shahid Rajaei hospitals, which provide inpatient and outpatient services for patients with cancer. After obtaining permission from the hospital directors and hematologists, oncologists, and general surgeons, eligible patients were identified from the lists of patients admitted to the oncology wards, outpatient chemotherapy and radiotherapy units, and cancer clinics during the previous months. Patients who met the inclusion criteria were selected using simple random sampling.

First, each eligible patient was assigned a number. The numbers were written on separate pieces of paper, placed in a container, and randomly selected until the required sample size was reached. The selected patients were then contacted by telephone and invited to attend the hospital, clinic, or physician's office accompanied by a family member. After confirming that the participants met all the inclusion criteria, the researcher explained the purpose of the study, the questionnaire completion process, the voluntary nature of participation, the participants' right to refuse or withdraw from the study, and the confidentiality of the collected information. Written informed consent was then obtained. The questionnaires were subsequently completed through face-to-face interviews conducted by the researcher. Patients who did not attend the hospital, outpatient clinics, or physicians' offices for any reason (e.g., completion of treatment, discontinuation of treatment, or inability to attend the hospital) were excluded from the study and replaced with other eligible participants. To ensure that the participants were aware of their diagnosis, family members, nurses, or physicians were first asked whether the patient had been informed of the diagnosis. This was then confirmed during a private interview with the patient. In addition, if the patient experienced pain or had difficulty concentrating during the interview, questionnaire completion was postponed to another suitable time. Data were collected using a

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demographic questionnaire, the Fear of Disease Progression Short Form questionnaire (FoP-Q-SF), the Hospital Anxiety and Depression Scale (HADS), the Social Support Appraisals Scale (SS-AS), and the Abbreviated Mental Test (AMT).

Inclusion criteria

The inclusion criteria were as follows: age ≥60 years, willingness to participate in the study (providing written informed consent), at least 6 months since cancer diagnosis [21], awareness of the cancer diagnosis for at least 3 months [7], no other chronic diseases [7], no history of previous malignancy [21], a score of ≥8 on the AMT [22], not receiving palliative care (e.g., end-of-life pain management), no history of psychological disorders based on the patient's medical records [21, 23], and adequate vision and hearing [24].

Exclusion criteria

The exclusion criterion was withdrawal of consent or unwillingness to continue participation in the study.

Sample size

Based on previous study [24] , the required sample size was calculated to be 158 using Formula 1. Assuming a 4% attrition rate, the final sample size was increased to 165 participants. In this formula, the first type error $\alpha = 0.05$, the second type error $\beta = 10\%$, the test power $z_{1-\beta} = 1.28$ and the correlation coefficient $r = 0.26$.

Formula 1

$$c = \frac{1}{2}\ln\frac{1+r}{1-r}$$

$$c = \frac{1}{2}\ln\frac{1+0/26}{1-0/26}$$

$$N = \frac{(z_{1-\frac{\alpha}{2}} + z_{1-\beta})^2}{c^2} + 3$$

$$N = \frac{(1/96 + 1/28)^2}{0/26^2} + 3$$

Measurement

AMT

The AMT consists of 10 simple and brief questions that assess concentration, attention, orientation, and short- and long-term memory. It is used to screen for cognitive impairment, including dementia and delirium, in older adults. A score of 8 or higher was required for participation in the study. The validity and reliability of this questionnaire were confirmed, with a Cronbach's alpha coefficient of 0.76 for internal consistency and a test–retest reliability coefficient of 0.89 [22].

FoP-Q-SF

The FoP-Q-SF developed by Herschbach et al. in 2005, consists of 12 items and four subscales (affective reactions, partnership/family issues, occupation, and loss of autonomy) [25]. Items 1, 2, 3, 5, 9, and 10 assess affective reactions; items 4 and 12 assess occupation; items 6 and 11 assess partnership/family issues; and items 7 and 8 assess loss of autonomy. Each item is scored on a 5-point Likert scale ranging from 1 (never) to 5 (very often), with higher scores indicating greater fear of disease progression. The total score is calculated by summing the item scores and ranges from 12 to 60 [26]. A cut-off score of ≥34 was used to define high FoP [22]. In Iran, the Persian version of this questionnaire demonstrated good reliability, with a Cronbach's alpha coefficient of 0.94 [6]. In the present study, the face validity of the questionnaire was confirmed by 10 faculty members of the Ramsar School of Nursing and Midwifery. Its reliability was assessed using the test–retest method on 20 participants and yielded a Cronbach's alpha coefficient of 0.93. These participants were not included in the main study.

SS-AS

The SS-AS was developed by Vaux, Phillips, and Holly (1977) and consists of 23 items in three domains: family (8 items; items 2, 4, 7, 9, 11, 13, 18, and 22), friends (7 items; items 1, 6, 10, 15, 16, 19, and 23), and others (8 items; items 3, 5, 8, 12, 14, 17, 20, and 21). The items are answered as "Yes" or "No," with "Yes" scored as 1 and "No" scored as 0. Items 3, 10, 13, 21, and 22 are reverse-scored. The total score ranges from 0 to 23, with higher scores indicating greater social support and lower scores indicating lower social support [27]. The Persian version of the questionnaire demonstrated good reliability, with a Cronbach's alpha coefficient of 0.83 [28].
In the present study, the face validity of the questionnaire was confirmed by 10 faculty members of the Ramsar School of Nursing and Midwifery. Its reliability was

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assessed using the test–retest method on 20 participants and yielded a Cronbach's alpha coefficient of 0.74. These participants were not included in the main study.

HADS

The HADS was first introduced by Zigmond and Snaith [29] as a screening tool for psychiatric disorders in general hospital clinics. This instrument is used to assess anxiety and depression in outpatients [8, 29] older adults [10] patients with cancer undergoing treatment [30] and hospitalized patients [31]. The questionnaire consists of 14 items and includes two subscales: seven items assess anxiety and seven items assess depression. Each item is scored on a four-point Likert scale, with response options ranging from 0 to 3. Items 1, 3, 5, 7, 9, 11, and 13 assess anxiety, whereas items 2, 4, 6, 8, 10, 12, and 14 assess depression. The total score for each subscale ranges from 0 to 21. Scores of 0–7 indicate no anxiety/depression, 8–10 mild, 11–14 moderate, and 15–21 severe anxiety or depression. Items 2, 4, 6, 7, 12, and 14 are reverse-scored [29]. The reliability of the anxiety subscale has been reported with Cronbach's alpha coefficients ranging from 0.76 to 0.84, while that of the depression subscale has ranged from 0.76 to 0.86 [32-35] .

Data analysis

All statistical analyses were performed using SPSS version 26, and a significance level of $P < 0.05$ was considered. Descriptive statistics (mean, standard deviation, tables, and graphs) and inferential statistics (independent-samples t-test, one-way analysis of variance [ANOVA], and Pearson's correlation coefficient were used to analyze the data. To determine the associations between demographic characteristics and the quantitative variables, forward stepwise linear regression analysis was performed. First, the prerequisites for the regression model were examined for the multiple regression analysis. The results indicated that the significance level of the Kolmogorov-Smirnov test (0.191, which is greater than 0.05) confirmed the normality of the model's residuals, while the Durbin-Watson statistic (1.625) falling within the 1.5 to 2.5 range demonstrated the independence of the residuals. Furthermore, to examine multicollinearity among the independent variables, the Variance Inflation Factor (VIF) and tolerance indices were utilized; given that the VIF values were less than 10 and the tolerance values exceeded 0.1, no multicollinearity issue was observed among the independent variables. A scatter plot was also used to examine the homogeneity of residual variances; however, the resulting plot revealed no trend indicating such homogeneity. Therefore, all conditions for the regression model were met, allowing for the use of multiple regression analysis.

Results

The participants ranged in age from 60 to 92 years, with a mean age of 68.2 years. Of the 165 participants, 88 (53.3%) were male and 77 (46.7%) were female. A total of 141 (85.5%) were married, and 24 (14.5%) were widowed. The majority of the participants (107; 64.8%) had a diploma-level education, 158 (95.8%) had basic health insurance coverage, 110 (66.7%) did not have supplementary health insurance, 84 (51%) lived with their spouse, 71 (43%) were housewives, 91 (55.2%) reported an unstable financial situation, and 118 (71.5%) considered their family income sufficient to cover household expenses.

The frequency distribution of the disease-related characteristics of the elderly patients with cancer is presented in Table 1 .

Table 1: Frequency distribution of disease characteristics of the elderly with cancer

Cancer characteristics		Frequency	Percentage
Family history of cancer	Yes	70	42.4
Types of treatment	Surgery	3	1.8
	Chemotherapy	37	22.4
	Radiotherapy	2	1.2
	Surgery-Chemotherapy	73	44.2
	Surgery-radiotherapy	9	5.5
	Chemotherapy-radiotherapy	15	9.1
	Surgery-chemotherapy-radiotherapy	26	15.8
Metastasis	Yes	103	62.4
Treatment status	Treated	165	100
	Cured	-	-
	Colon	36	23
	Gastric	30	18.2
	Breast	28	15.8
	Etc...	16	9.7
	Esophageal	12	7.3
	Prostate	10	6.1
	Brain	10	6.1
	Blood	7	4.2
	Pancreas	6	3.6
	Liver	6	3.6
	Ovary	4	2.4
Duration of cancer (months); M ±SD		18.01±23.94	

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Fear of disease progression (FoP) :

Among the participants, 43.7% endorsed the item "Being afraid of disease progression", representing the most frequently reported expression of FoP. In contrast, 69.7% of the participants reported "Being afraid of no longer being able to pursue hobbies" as the least frequently endorsed expression of FoP. The results, broken down by questions regarding the FoP, are presented in Table 2.

The mean total FoP score was 31.64 ± 13.93. Overall, 44.2% of the patients had high FoP, whereas 55.8% had low FoP (Table 3).

Table 2: **FoPQSF statistical description, by (n=165z) individual question**

Items	SD ± Mean	**Lower-upper**
1. Being afraid of disease progression	1.51. ± 3.09	2.86-3.33
7. Being afraid of relying on strangers for activities of daily living	1.41 ± 3.02	2.8-3.24
4. Being afraid of becoming less producting at work	1.4 ± 2.92	2.7-3.14
12. Being afraid to not being able to work any more	1.35 ± 2.92	2.72-3.13
5. Being afraid of having physical symptoms e.g. rapid heart beat, stomsh ach	1.53 ± 2.8	2.58-3.04
9. Being afraid of sever medical treatments	1.55 ± 2.72	2.49-2.98
11. Worrying about what will happen to the family if something should happen to the patient	1.36 ± 2.67	2.45-2.89
6. Being afraid of the possibility that the children could contract cancer	1.55 ± 2.53	2.27-2.78
2. Being nervous prior to doctors oppoitments or periodic examinations	1.54 ± 2.39	2.16-2.64
10. Worrying about the medication could damage the body	1.43 ± 2.3	2.09-2.54
3. Being afraid of pain	1.45 ± 2.21	2-2.46
no longer being able to persue hobbies Being afraid of 8.	1.29 ± 2.01	1.84-2.21

Social support (SS)

The mean and standard deviation of the SS were 16.43 ± 5.9, indicating a high level. Among the elderly patients with cancer, 141 individuals (85.5%) received relatively high SS, while 24 (14.5%) received low SS. Furthermore, the mean and standard deviation for the SS components were found to be as follows: family support (5.14 ± 1.63), friends' support (4.86 ± 2.74), and support from others (6.43 ± 2.22) (Table 3).

Table 3: Descriptive information of FoP and SS in the elderly with cancer

Variable	**M ±SD**	**Max-Min**	**Intensity**	
			Upper N. (%)	**Lower N. (%)**
FoP	31.64 ±13.93	12-60	73(44.2)	92(55.8)
Emotional reaction	15.55±7.76	6-30		
Job	5.84±2.53	2-10		
Family	5.21± 2.6	2-10		
Loss of independence	5.04± 2.43	2-10		
SS	16.43 ±5.92	0-21	141(85.5)	24(14.5)
Family support	5.14± 1.63	0-6		
Friends support	4.86± 2.74	0-7		
Others support	6.43± 2.22	0-8		

A total of 151 (91.5%) participants endorsed the item "My family really respects me", representing the highest level of perceived social support. In contrast, 57 (34.5%) participants endorsed the item "I feel a strong bond with my friends", representing the lowest level of perceived social support. HAD: Descriptive information of HAD in the elderly with cancer is shown in table 4 .

According to the table 4, Hospital Anxiety score was within the healthy range. From the perspective of 56 (33.9%) elderly people participating in the study, the phrase "worrying thoughts go through my mind." The highest expression of HA was identified. In addition, from the perspective of 140 (84.9%), the phrase "I feel as restless as I have to be on the move." The lowest expression of HA was identified. As well as, the hospital depression score was at a mild level. From the perspective of 69 (41.9%) elderly people, the phrase "I do not feel successful:" The highest expression of HD was identified. In addition, from the perspective of 140 (84.9%), the phrase "I have lost interest in my appearance." The lowest expression of HD was identified.

There is a significant negative relationship between FoP and social support in the elderly with cancer ($r = -0.503$, $P<0.01$). This means that as SS increases, FoP decreases. There is also a significant negative relationship between the components of FoP and SS of the elderly with cancer. There is a positive significant relationship between FoP and HA ($r = 0.749$, $P <0.01$). This means that with increasing HA, the FoP increases and a positive significant relationship between FoP and

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HD (r <0.772, P <0.01). This means that with increasing rates of HD, the FoP increases .

There is a statistically significant relationship between FoP and gender, marital status, education level, supplementary insurance coverage, life status, employment status, financial status, income adequacy, number of children and number of households (P <0.05). The results showed that there was a statistically significant relationship between FoP and variables of cancer type, type of treatment and cancer stage (P <0.05). The results showed that the FoP in the elderly with malignant cancer compared to benign, in the elderly with three concomitant treatments, surgery, chemotherapy and radiotherapy compared to other treatments, and in the elderly in the third stage of cancer compared to the elderly in the second stage, cancer is more. The results showed that there is a statistically significant relationship between SS and cancer variables (P <0.05) and the level of SS in the elderly with malignant cancer is higher than with benign. There is a statistically significant relationship between HAD with variables of cancer type and cancer stage (P <0.05), and the rate of HA and HD in the elderly with malignant cancer compare to benign and the third stage of cancer compare to the second stage of cancer is higher. According to table 5 the results showed the significant relationship between FoP, HA and HD with metastasis (P<0.05) and FoP with type of treatment (P<0.05) .

According to other results, there is a statistically significant correlation between the FoP and the variables of age, gender, marital status, education level, health insurance coverage status, supplementary insurance coverage status, cohabitation status, employment status, financial status, family income adequacy, number of children and family size (P<0.05). The results showed that the level of FOP in women compared to men, widowed compared to married, in the elderly with primary education compared to higher education, in the elderly without supplementary insurance coverage, living with children or relatives and acquaintances or living alone were more common than the elderly who live with their spouses or children, also housewives than employed or retired, the elderly with unstable financial status, and insufficient income compared to sufficient income .

The results showed a statistically significant relationship between SS and the variables of marital status, education level, ownership status, supplementary insurance coverage, living status, financial status, family income adequacy, age and family size (P<0.05). Therefore, the amount of SS in married elderly compared to widows, in the elderly with a level of higher education compared to primary level education, in owning a private residential household compared to rented ownership, in the elderly with supplementary insurance coverage, who live with their spouses and children compared to other ones, in the elderly with a stable financial situation, with sufficient income, were more than the others.

The results showed that there is a statistically significant relationship between HAD and the variables of gender, marital status, educational level, supplementary insurance coverage, living status, employment status, financial status and family income adequacy (P<0.05).

Therefore, the rate of HAD in women compared to men, in elderly widows compared to married people, in elderly people with a primary education level compared to elderly people with higher education level, in elderly people without supplementary coverage, who live with children or relatives and acquaintances or alone compared to the elderly who live with their spouses and children was more common in the elderly housewives compared to employed or retired elderly, with unstable financial status, and with no sufficient income were more than others.

According to table 6 after confirming that the model assumptions were met. The independent variables (demographic characteristics, SS, and HAD) were entered into four models. Depression was entered in the first model and explained 59% of the variance in the FoP. Subsequently, the variables of employment status and HA were entered into models 2 through 4, ultimately explaining 64% of the variance in the FoP (independent variables).

Table 4: Descriptive information of HAD in the elderly with cancer

Variable	M± SD	Max-Min	Intensity N (%)			
			Normal	Mild	Moderate	Severe
HA	6.96±0.43	0-21	104(63)	14(8.5)	18(10.9)	29(17.6)
HD	7.09±0.46	0-21	104(63)	22(13.3)	17(10.3)	22(13.3)

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Table 5: Correlation between clinical charactristics and FoP, SS, HA and HD in the elderly with cancer

Clinical charactristics	FoP	SS	HA	HD
	M± SD	M± SD	M± SD	M± SD
Family History				
yes	.1.16 ±31.28	0.72 ±16.01	0.71 ± 6.62	0.7 ±7.1
No	31.91 ± 1.42	16.74 ± 0.6	7.22 ± 0.64	7.09 ± 0.61
	t =-0.28 P= 0.77	t =-0.78 P= 0.43	t =-0.61 P= 0.54	**t = 0**.006 P=0.99
Type of Treatment				
Chemotherapy	1.68 ±29.32	0.71 ±16.81	0.9 ± 6.94	0.77 ±6.83
Chemotherapy- Surgery	1.76 ± 29.38	0.73 ±16.47	0.74 ±6.35	0.74 ±6.45
Chemotherapy- Radio therapy	2.74 ± 34.33	1.38 ±17.6	1.5 ± 7.2	1.54 ±7.66
Chemotherapy- Radio therapy- Surgery	3.02 ± 37.92	1.27 ± 15.23	1.29 ± 8.24	1.24 ± 9.11
Other	3.55 ±35.07	1.99 ±16.21	1.63 ± 7.28	1.49 ±6.78
	F(4.16) =2.49 P=0.04*	F(4.16) =0.45 P=0.77	F(4.16) =0.55 P=0.69	F(4.16) =1.03 P=0.39
Metastasis				
yes	1.64 ± 36.87	0.82 ± 15.35	0.78 ± 8.61	0.78 ±8.96
No	1.34±28.5	17.08± 0.54	5.97 ± 0.58	5.97 ± 0.54
	t =-3.89 P<0.001*	t =1.83 P= 0.06	t =-2.72 P= 0.007*	**t** =-3.23 P= 0.001*
Duration of Cancer	0.71 P= ،0.02 -r=	0.44 P= ،-0.06 r=	0.94 P= ،0.006 r=	P=0.75 ،0.02 -r=

F: Analysis of variance, t: Independent, r: The Pearson Correlation Coefficient

Table 6: Final regression model of the effect of independent variables on the dependent variable (FoP)

Independent Variable	St.β*	Non-St. Coefficients	t	St. Error	P	CI .95 (Lower-Upper)	
Fixed Coefficient	_	21.46	14.79	1.45	<0.001*	18.62	24.36
HD	0.42	1.007	3.53	0.28	0.001*	0.44	1.57
Employment Status	0.11	3.27	2.32	1.4	0.02*	0.49	6.05
HA	0.27	0.61	2.28	0.27	0.02*	0.08	1.15
Summary of the Final Model	P<0.001,	F=16.72	R^2	=0.66	ADJ.R^2=	0.63	

Discussion

This study investigated the relationships among FoP, SS, and hospital anxiety and depression (HAD) in older adults with cancer. The severity of FoP was low in 55.8% of the participants and high in 44.2%. These findings are consistent with some previous studies [7, 9]. In contrast, other studies have reported lower or higher levels of FoP compared with the present study [24, 36-38]. These discrepancies may be related to cultural differences, inclusion criteria, cancer type, and disease characteristics.

In this study, 43.7% of the participants identified the item "I am afraid that our disease will progress" as the most frequently reported expression of FoP. In a study conducted in Thailand, this concern was ranked as the third major fear among patients with cervical cancer, whereas concerns about family well-being and FoP were ranked first and second, respectively [39]. In a study by Niu et al. (2019) in China, the three main fears were fear of drug-related harm to the body, FoP, and anxiety before routine medical examinations [38]. In another study conducted by Aghdam et al. (2014) in Tabriz, Iran, the main concerns included family-related issues, the future of children, physical symptoms, and fear of bodily harm due to cancer treatment [7].

These differences may be attributed to cultural differences among study populations.

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The results showed that 85.5% of the participants had high social support, whereas 14.5% had low social support. In the study by William et al. (2019), 67.5% of the participants reported having at least one unmet social support need, most commonly related to emotional support (49.5%) and physical support (47%)[40].

Regarding HAD, the findings of the present study are consistent with those of one previous study [39] but are inconsistent with the findings of several other studies [41-43]. These discrepancies may be attributed to differences in the inclusion criteria. In the present study, at least 6 months had elapsed since the participants' cancer diagnosis, which may have allowed anxiety and depression levels to decrease over time. In contrast, the time elapsed since diagnosis was not included as an eligibility criterion in the three aforementioned studies.

In this study, a significant negative relationship was observed between fear of disease progression FoP and SS among elderly patients with cancer, which is consistent with the findings of some previous studies [36, 38]. The results also showed a significant positive relationship between FoP and HAD. These findings are in agreement with those of several studies [6, 44, 45]. In contrast, a study conducted in Thailand reported that only anxiety had a significant positive relationship with FoP [39] while Sarkar et al. (2014) in Germany found that only depression was significantly associated with FoP [26]. These differences may be attributed to variations in the research settings. In Thailand, anxiety is reported to be a more prevalent mental disorder than depression [46] which may explain the stronger association between anxiety and FoP in that context. Similarly, the differences between the present study and the study by Sarkar et al. may be related to differences in the study populations, as the present study included elderly patients with all types of cancer, whereas the study by Sarkar et al. focused on patients of all ages with cervical cancer only.

Cancer survivors experience various forms of distress resulting from problems in multiple domains, such as health, family, and finances. The results showed that higher levels of FoP were observed among women, widowed participants, those with lower educational levels, those without supplementary insurance coverage, individuals living with children, relatives, or acquaintances, housewives, those with unstable financial status and insufficient income, patients with metastatic cancer, and those receiving multiple simultaneous treatments, including surgery, chemotherapy, and radiotherapy. These findings are consistent with the results of several previous studies [2, 5, 7-9, 24, 36, 47].

Limitations beyond the researcher's control included the COVID-19 pandemic, the need to wear two face masks, and conducting data collection during the summer, all of which made interviews and questionnaire completion difficult in some cases. To minimize these limitations, interviews were conducted with appropriate time intervals, allowing participants sufficient time to rest when needed. Another limitation of this study was the participants' psychological and emotional condition while completing the questionnaires, which may have influenced their responses.

Conclusion

With increasing cancer survival, FoP and HAD are becoming prominent clinical issues. Our findings suggest that healthcare professionals should be aware of and screen for FoP and HAD using validated measures, and provide adequate information regarding prognosis, signs and symptoms of recurrence for risk reduction and follow-up. Patients and families should also be informed that FoP and HAD may be important issues in survivorship, which may be associated with stronger social support. Future research should examine the effects of interventions on FoP, HAD, and SS in older adults with cancer.

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Data availability

All 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.

Author's contribution

Narjes Kharestani: Conceptualization, Methodology, Investigation; Fatemeh Shrinkam: Supervision, Reviewing and Editing; Mohsen Vakili: Supervision, Reviewing and Editing; Hengameh Karimi: Supervision, Validation, Writing- Reviewing and Editing, Software.

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Conflicts of interest

There was no conflict of interest in this study.

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Ethical Statement

During this research, the researchers obtained an approval from the Ethics Committee of Babol University of Medical Sciences (IR. MUBABOL. REC. 1399. 350), getting the introduction letter from the school. Introducing researchers to the participants and mentioning the research goals to them, all elderly participants provided informed consent to participate in the study and they had full freedom to withdraw from the current study, ensuring confidentiality of information as well as providing research results to the Research Deputy of Babol university of Medical Sciences and research officials.

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