Posttreatment Anxiety, Depression, Sleep Disorders, and Associated Factors in Women Who Survive Breast Cancer

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ABSTRACT

Objective: Breast Cancer Survivors (BCSs) experience negative effects on their physical and mental health, including sleep disorders, after the completion of treatment and over the whole spectrum of survival. The aim of this study was to investigate the levels of posttreatment anxiety, depression, and sleep disorders exhibited by women who have survived breast cancer. **Methods:** A descriptive, cross-sectional study was conducted with a population of 170 BCSs, who were monitored as outpatients by two surgical departments of a central Athens hospital for between one and five–5 years after completing their therapy. The data were collected between November 2019 and March 2020 and included demographic and clinical characteristics, as well as the Athens Insomnia Scale to measure sleep disorders and the Hospital Anxiety and Depression Scale to assess the incidence of mental disorders. **Results:** The majority of the patients were aged 61–70 years (41.4%), married (56.9%), with two children (56.3%), and graduates of higher education (41.8%). Of the total population, 53.5% had sleep disorders, 29.4% anxiety, and 18.2% depression. Insomnia had a moderately positive correlation with both anxiety and depression ($r = 0.598$, $P < 0.001$ and $r = 0.584$, $P < 0.001$, respectively), while a strongly positive correlation was found between depression and anxiety ($r = 0.683$, $P < 0.001$). Sleep disorders were associated with factors such as profession ($P < 0.001$), income ($P = 0.01$), the number of minor children ($P = 0.021$), and the number of pathological problems ($P = 0.003$); anxiety was related to the number of minor children ($P = 0.008$) and the use of drug therapy to treat mental disorders ($P = 0.038$); while for depression, the relevant factors were the duration of treatment ($P = 0.029$), the number of minor children ($P < 0.001$), the use of medication for treatment of mental disorders ($P = 0.008$), and sleep disorders ($P = 0.003$). **Conclusions:** Women who have survived breast cancer in Greece show a high rate of anxiety and depression related to the disease, as well as sleep problems that are partly associated with their psychological status, but are also affected by parameters such as income, type of profession, and the presence of minor children in the household.

Key words: Anxiety, breast cancer survivors, depression, sleep disorders

Introduction

Breast cancer is the most commonly diagnosed cancer in women and accounts for almost 1 in 4 cancer cases in women worldwide. The same was true for Greece in 2018, where breast cancer was the most common cancer in women, with an incidence of 27.2%.[1] Given the large number of survivors as a result of early diagnosis and effective therapeutic interventions,[2] the negative effects of disease and treatment during the survival phase, which sometimes persist throughout life, have become a major concern of health professionals.[3]

Breast cancer survivors (BCSs) experience many long-term physical and mental effects. Negative body image, weight gain associated with lifestyle changes and menopause, physical symptoms such as fatigue, hot flushes, pain, and more are indicative of the burden on both physical and mental health.[4-6]

The persistence of negative emotions after the completion of treatment, mainly due to uncertainty and fears about the future, causes disturbances in their regulation and expression. A negative emotional state prevents the expression of positive emotions, resulting in a vicious cycle of negative emotions that increase the risk of developing psychopathological symptomatology,[7,8] such as high levels of depression, anxiety, and sleep disorders.[9,10] Furthermore, people who experience severe anxiety may exhibit physical symptoms without being able to understand their source. The psychological and physical manifestations of anxiety affect people's daily lives and reduce their well-being.[11] The results of a qualitative study that investigated the everyday life of BCSs through a series of 11 interviews showed that, 7 years after the completion of therapy, survivors still avoided getting involved in stressful situations for fear of not being able to manage them.[12] Although the anxiety in BCSs may gradually be reduced, it negatively affects functionality and sexuality and limits sociability.[13-15] In a study by Karakoyun-Celik *et al.* in Turkey, based on a sample of 120 women who had completed treatment and were free of disease, it appeared that high levels of anxiety had a negative effect on quality of life.[13] A more recent systematic review and meta-analysis concluded that anxiety, rather than depression, is more likely to be a problem in long-term cancer survivors.[14] Depression among BCSs can also be the result of fear and anxiety in relation to the recurrence and/or metastasis of the disease.[13] A study of 147 patients showed that depressive symptoms in survivors are the result of their inability to process the experience of the disease against a cognitive background and that depression during the diagnosis phase is not predictive of depression 2 years later.[16] In addition, a cross-sectional descriptive study of BCSs ($n = 222$) 3–8 years postdiagnosis showed that difficulties in adaptation to such things as social constraints and intrusive thoughts are inextricably linked to depression and to the feelings of worthlessness that characterize depressed individuals.[17]

Sleep problems may be related to anticancer treatment and the changes it causes in the endocrine system, affecting the circadian rhythm or causing symptoms of menopause.[18] They may also be related to fatigue,[19] which is a common problem in breast cancer, or may be directly linked to the anxiety experienced by survivors. Anxiety and depression in BCSs are significantly related to sleep disorders, as shown by a study of 246 women, 5.6 years after completion of treatment, as well as studies in the general population.[20,21] Sleep disorders, in particular, insomnia and hypersomnia, are key symptoms of depressive disorder. In the population of woman cancer survivors, depression seems to favor sleep disorders, which gradually turn into an independent mental disorder.[22]

There are few reports concerning the physical and mental conditions of BCSs in Greece, where survivors who have completed their treatment, and are living as disease-free women, have to interact emotionally and socially with their loved ones, but where sincere communication about disease-related issues is constrained by cultural norms. For many former patients, the powerful family network functions as therapy and provides protection and a degree of support should any problems arise during the posttreatment period. However, some patients, having lost their regular communication with healthcare staff at the hospital once treatment is completed, and not receiving any health support from social services or volunteer groups, are unable to find solutions and may suffer from symptoms. In addition, their inability to report any symptoms creates the false picture that survivors return to normal levels of life after successful treatment. It is clear that systematic reporting and requests for support could help make health professionals more aware of the problems faced by survivors, such as the anxiety, depression, and sleep disturbances that have often been observed in other studies. At the same time, health professionals may need to take account of issues related to the symptoms and quality of life of BCSs, since regular monitoring in Greece focuses only on the prompt detection of any cancer recurrence.

The aim of this study was to examine the levels of anxiety, depression, and sleep disorders experienced by women who have survived breast cancer and to examine the relationship between these variables and the factors affecting these variables.

Methods

Research design

We carried out a descriptive, cross-sectional study using

the purposive sampling method. The study sample consisted of BCSs who satisfied the inclusion criteria and attended two surgical departments of an Athens Central Hospital, as outpatients, during the period of November 2019 to March 2020. The study's inclusion criteria were as follows: being in the follow-up phase after completion of treatment (whether taking hormone therapy or not), visiting hospital for a regular 6-monthly checkup, having survived for 1–5 years since the completion of basic anticancer therapy (surgical, chemotherapy, and radiotherapy), disease-free status (absence of local recurrence and of any metastatic disease), and having the ability to speak and understand the Greek language. Moreover, women who had had sleep problems with any cause before their diagnosis were excluded. Of the 205 women who met the inclusion criteria over the above period, 170 consented to take part in the study (response rate 83%). The most common reason for refusal to complete the questionnaires was a lack of available time. The estimated time for completion of the questionnaires was 10 min.

Data collection

The study patients completed the Athens Insomnia Scale (AIS) for the assessment of sleep quality[23] and the Hospital Anxiety and Depression Scale (HADS)[24] to assess the incidence of mental disorders among the women survivors. In addition, the patients completed a questionnaire with demographic and clinical data.

The AIS consists of eight questions and is designed to measure the quantity and quality of sleep. Each question is scored on a four-point rating scale, with possible values of 0–3. A score ≥6 (cutoff value) is 93% sensitive and 85% specific for the clinical diagnosis of insomnia.[23] The value of Cronbach's alpha for the AIS in this study was 0.887, which is considered particularly satisfactory.

The HADS is a handy and reliable tool for recognizing anxiety and depression.[24] HADS has been translated into Greek and validated for a population of patients with advanced cancer and for general hospital patients.[25] It consists of 14 questions (7 for anxiety assessment and 7 for depression assessment) and is rated on a four-point rating scale, with possible values of 0–3. A score >11 is considered pathological, scores <7 are considered nonpathological, while scores from 8 to 10 are considered as moderate. Cronbach's alpha for HADS anxiety was 0.906 and for depression was 0.930.

The data were collected by the basic researcher with the assistance of the physicians who examined the patients, before and after their scheduled checkup.

Statistical analysis

The analysis and description of the data were performed using descriptive statistical methods, which included the expression of numerical data as frequency tables for qualitative variables while as tables with measures of variability and dispersion for quantitative variables. The Kolmogorov–Smirnov test was used to examine the normality of continuous and interval-scale variables.

For the answer to the research questions, appropriate parametric methods (*t*-test and ANOVA) were used to examine the differences in scores in relation to specific characteristics, while correlations were evaluated using the Pearson's coefficient. Finally, a multi-regression model was used to examine whether scores in the anxiety and depression scales predicted insomnia (AIS). All assumptions of linear regression analysis (i.e., homoscedasticity and linearity via examining the scatterplot, normality by examining the distribution of the residuals and independence of error terms [Durbin–Watson], as well as multicollinearity of independent variables [AIS] using the variance inflation factor of tolerance) were examined.

The SPSS V23 Statistical Package was used for the data analysis (SPSS Inc., Chicago, IL, USA). All analyses assumed a level of significance $P < 0.05$.

Ethical approval

The data were collected using questionnaires, after permission had been obtained from the hospital's ethics and research committee. BCSs were verbally informed about the research, and their questions were answered as fully as possible. In addition, out of respect for the situation of the women who would participate in the survey and in accordance with ethical and professional codes, informed consent was obtained from all participants prior to the start of data collection. In addition, protection of the participants' personal data was ensured by having the questionnaires completed anonymously.

Results

Characteristics of participants

Of the 170 women surveyed, the largest proportion were between 61 and 70 years of age (41.4%) and were married (56.9%), with two children (56.3%) [Table 1]. A plurality of the women were graduates of tertiary education (41.8%) and working as civil servants (42.9%) with an annual family income of €10,000 to €20,000 (50%), while almost half of them were retired (47.3%).

The largest percentage of women had undergone three forms of treatment in the past (38.8%), lasting 1 year (45.5%). Chemotherapy and radiotherapy (67.1% and 50.6%, respectively) were the main treatments, while the main current treatment was hormone therapy (84.3%). Main pathological problems were musculoskeletal disorders (37.1%) and hypertension (31.8%), while 18.8% were taking treatment for anxiety and depression and 13.5% were taking treatment for insomnia [Table 1].

Table 1: Demographic and clinical characteristics of the breast cancer survivors		
Variables	***n***	**Percentage**
Age (years)		
18-50	32	18.8
51-60	43	25.3
61-70	70	41.2
≥71	24	14.1
Missing	1	0.6
Family status		
Married	95	55.9
Unmarried (single, divorced, widowed)	72	42.4
Missing	3	1.8%
Number of children		
0	1	0.6
1-2	122	71.8
≥3	21	12.3
Missing	26	15.3
Minor children		
0	118	83.1
1-3	24	16.9
Missing	28	15.9
Level of education		
No education	2	1.2
Primary school	30	17.6
Secondary/high school	67	39.4
Tertiary education	71	41.8
Pensioner (yes/no)		
Yes	79	46.5
No	88	51.8
Missing	3	1.8
Profession (current or, if retired, previous profession)		
Worker/farmer	16	9.4
Self-employed	12	7.1
Private employee	34	20.0
Civil servants	72	42.4
Homemakers	34	20.0
Missing	2	1.2
€0-4999	9	5.3
€5000-9999	38	22.4
€10,000-19,999	81	47.6
Over €20,000	34	20.0
Missing	8	4.7
Number of past treatments		
1	7	4.1
2	58	34.1
3	66	38.8
4	39	22.9
Duration of treatment years		
Up to 1	139	81.8
2-5	21	12.4
<5	7	4.1
Missing	3	1.8
Surgical treatment		
No	0	0.0
Yes	170	100.0
Chemotherapy		
No	56	32.9

Contd...

Table 1: Contd...		
Variables	***n***	**Percentage**
Yes	114	67.1
Radiotherapy		
No	84	49.4
Yes	86	50.6
Hormone therapy		
No	70	41.2
Yes	100	58.8
Targeted treatment		
No	163	95.9
Yes	7	4.1
Current treatment		
Hormone therapy	91	84.3
Targeted treatment	9	8.3
Hormone therapy and targeted therapy	2	1.9
Other	6	5.6
No current treatment	62	
Number of pathological problems		
0	17	10.0
1	100	58.8
2	37	21.8
3	10	5.9
4	6	3.5
Treatment for anxiety and depression		
Yes	32	18.8
No	138	81.2
Treatment for insomnia		
Yes	23	13.5
No	147	86.5

Descriptive data of variables

Insomnia scale (AIS) item scores are presented in Table 2, where low average scores were observed in all the items in the questionnaire. Mean scores were 0.69 ± 0.82 for the question "sleepiness during the day" and 1.04 ± 0.89 for the question "awakenings during the night." The mean score for the overall scale was also low (6.64 ± 5.19) and the values ranged from 0 to 23.

The participants' responses to the questions about anxiety and depression are presented in Table 3. The highest average scores appeared on the anxiety scale (questions 1–4), with values between 1.219 and 1.341, indicating that anxiety was higher than depression among the study participants. Similarly, 4 of the 5 lowest average scores belonged to the depression scale (1, 3, 5, and 7), ranging between 0.747 and 0.906. In addition, study participants reported pathological levels of anxiety or pathological levels of depression (29.4% and 18.2%, respectively), while normal levels of anxiety were present in 52.9% of the respondents and normal levels of depression in 65.9%.

Overall, the mean anxiety score was 7.78 ± 5.04, while the mean depression score was 6.42 ± 4.69. In addition,

Table 2: Item score distribution in the Athens Insomnia Scale

Scale items	Mean	SD
Sleep induction	1.00	0.92
Awakenings during the night	1.04	0.89
Final awakening earlier than desired	0.76	0.86
Total sleep duration	0.81	0.91
Overall quality of sleep	0.80	0.87
Sense of well-being during the day	0.87	0.90
Functioning during the day	0.70	0.79
Sleepiness during the day	0.69	0.82
Mean total score	6.64	5.19

SD: Standard deviation

Table 3: Item score distribution in the Hospital Anxiety and Depression Scale

	Mean	SD
Anxiety		
I feel tense or wound up	1.341	0.924
I get a sort of frightened feeling as if something awful is about to happen	1.241	1.041
Worrying thoughts go through my mind	1.219	1.077
I can sit at ease and feel relaxed	1.271	0.972
I get a sort of frightened feeling like "butterflies" in the stomach	0.953	0.834
I feel restless as I have to be on the move	0.994	0.910
I get sudden feelings of panic	0.771	0.942
Mean total score	7.78	5.04
Depression		
I still enjoy the things I used to enjoy	0.906	0.944
I can laugh and see the funny side of things	1.035	0.978
I feel cheerful	0.747	0.792
I feel as if I am slowed down	1.172	0.748
I have lost interest in my appearance	0.822	1.031
I look forward with enjoyment to things	0.971	0.945
I can enjoy a good book or radio or TV program	0.781	1.077
Mean total score	6.42	4.69

SD: Standard deviation

Table 4: Frequencies of insomnia, anxiety, and depression levels

Insomnia levels		n (%)	
No insomnia problems		79 (46.5)	
Insomnia problems (≥6)		91 (53.5)	
Anxiety and Depression levels	**Without anxiety-depression n (%)**	**Lower cutoff point n (%)**	**Upper cutoff point n (%)**
Anxiety	90 (52.9)	30 (17.6)	50 (29.4)
Depression	112 (65.9)	27 (15.9)	31 (18.2)

slightly more than half of the study participants (53.5%) reported problems related to insomnia [Table 4].

Effect of breast cancer survivor characteristics on anxiety, depression, and sleep disorders

The differences in mean AIS scores, anxiety, and depression in demographic and clinical factors were investigated using the *t*-test for independent samples and variance analysis (ANOVA) [Table 5]. The mean depression score increased with the years of treatment, with values of 5.94 for treatments lasting less than a year and 8.62 for treatments lasting 2–5 years, while for treatments lasting more than 5 years, the mean depression rate was extremely low ($P = 0.029$). The number of minor children had a positive association with higher scores for insomnia ($P = 0.021$), anxiety ($P = 0.008$), and depression ($P < 0.001$).

Profession ($P < 0.001$), income ($P < 0.01$), and the number of pathological problems ($P = 0.003$) had a statistically significant association with the participants' degree of insomnia. More specifically, higher average scores were associated with occupations requiring heavier labor, or those without social contact, even above the critical value of 6. Thus, farmers (mean = 11.19) and homemakers (mean = 7.50) had the highest average scores in the AIS, while freelancers had the lowest (mean = 4.75).

In addition, women with income 0–5000 showed higher AIS scores (mean = 10.22), while this value decreased with increasing income category, the lowest values being for the category €10,000 up to €20,000 (mean = 5.72). The number of pathological problems was positively associated with both insomnia ($P = 0.003$) and depression ($P = 0.028$) [Table 5].

Women receiving treatment for anxiety and depression had higher mean values for both indexes, indicating a possible relationship between these two conditions ($P = 0.038$ and $P = 0.008$, respectively). More specifically, women who were receiving treatment had higher mean scores for both anxiety (mean = 9.44) and depression (mean = 8.38), while women who were not under treatment had lower rates (anxiety: mean = 7.39; depression: mean = 5.96). Similar results were observed for the AIS index.

Finally, women being treated for insomnia had higher mean values for both the anxiety index and the depression index. More specifically, women undergoing insomnia treatment had higher mean scores for both anxiety (mean = 10.52, $P < 0.005$) and depression (mean = 9.13, $P = 0.003$), while women who were not receiving treatment had lower scores (anxiety: mean = 7.35, depression: mean = 5.99). Similar results were observed for the AIS index.

Evaluation of the relation between anxiety, depression, and sleep disorders

Regarding the correlations between HADS and AIS, as assessed using the Pearson's coefficient, all three scales appeared to be correlated with each other. The relation was positive and moderate to strong between insomnia and anxiety ($r = 0.598$) and between insomnia and depression ($r = 0.584$), respectively, while the relationship between depression and anxiety was stronger ($r = 0.683$); all correlations were statistically significant ($P < 0.001$).

Table 5: Univariate analysis of the relationships between insomnia, depression, anxiety, and survivors' sociodemographic and clinical characteristics

	Insomnia		P	Anxiety		P	Depression		P
	Mean	SD		Mean	SD		Mean	SD	
Up to 40	5.20	7.76	0.351	8.20	7.26	0.525	10.60	7.95	0.154
41-50	5.19	4.98		6.67	4.58		5.59	4.83	
51-60	6.98	4.51		8.77	4.80		6.60	4.33	
61-70	6.83	5.34		7.46	4.89		5.96	4.39	
71-80	6.18	4.57		7.06	5.65		6.82	4.76	
>80	9.86	7.58		9.14	5.61		9.14	5.73	
Duration of treatment (years)									
<1 year	5.89	4.50	0.392	7.65	4.93	0.554	5.94	4.47	0.029
1 year	6.88	5.23		7.57	5.07		6.45	4.55	
2-5 years	7.52	6.34		9.00	4.97		8.62	5.80	
More than 5 years	4.71	5.09		6.14	6.44		3.00	1.92	
Family status									
Unmarried	7.31	5.49	0.825	7.00	4.38	0.845	6.81	4.56	0.707
Married	6.85	5.11		7.87	4.95		6.44	4.78	
Divorced	5.93	5.31		7.48	4.77		5.67	4.06	
Widowed	6.59	5.51		8.31	5.96		7.10	5.14	
Number of children									
0	5.00	*	0.742	3.00	*	0.905	4.00	*	0.354
1	6.46	5.56		7.61	4.62		5.85	3.92	
2	6.37	4.83		8.04	5.45		6.58	4.81	
3	8.44	5.75		8.56	5.11		7.19	4.43	
4	7.75	6.34		8.75	5.44		11.00	4.69	
6	4.00	*		6.00	*		5.00	*	
Minor children									
0	6.49	5.15	0.021	7.55	5.07	0.008	6.14	4.39	<0.001
1	4.64	3.41		7.86	4.38		5.64	3.08	
2	11.22	6.12		13.11	4.57		12.33	5.12	
3	10.00	*		15.00	*		13.00	*	
Level of education									
None	10.50	2.12	0.107	10.00	7.07	0.335	6.50	9.19	0.777
Primary	8.43	5.78		9.10	4.78		7.03	4.66	
Secondary	6.48	5.19		7.73	5.37		6.57	4.87	
Tertiary	5.93	4.85		7.20	4.76		6.01	4.49	
Profession (current or if retired. previous profession)									
Laborer/farmer	11.19	5.50	0.001	10.50	4.73	0.058	8.75	4.48	0.098
Self-employed	4.75	3.98		5.67	4.33		4.83	3.30	
Private employee	6.79	4.60		8.32	4.81		7.09	5.12	
Public employee	5.44	4.75		7.06	4.98		5.72	4.59	
Housework	7.50	5.68		8.32	5.36		6.82	4.75	
Income									
€0-4999	10.22	5.36	0.010	10.89	4.78	0.242	8.78	2.99	0.465
€5000-9999	8.11	5.90		8.08	5.07		6.39	5.34	
€10,000-19,999	5.72	4.50		7.20	5.16		6.25	4.96	
Over-€20,000	5.85	4.55		7.71	4.70		6.38	3.95	
Number of pathological problems									
0	4.35	3.79	0.003	7.65	5.82	0.496	4.29	3.98	0.028
1	6.40	5.12		7.44	4.90		6.50	4.61	
2	7.41	5.36		8.49	5.36		6.65	4.71	
3	5.90	4.01		7.00	4.24		5.40	3.20	
4	13.67	5.16		10.67	4.13		11.33	6.74	

Contd...

Table 5: Contd...									
	Insomnia		*P*	Anxiety		*P*	Depression		*P*
	Mean	SD		Mean	SD		Mean	SD	
Number of past treatments									
1	7.71	6.37	0.776	7.86	4.52	0.693	8.71	3.77	0.422
2	6.10	5.23		8.34	5.23		6.55	4.31	
3	6.86	5.29		7.67	4.83		6.52	5.28	
4	6.87	4.88		7.10	5.27		5.64	4.28	
Current treatment									
Hormone therapy	5.99	5.06	0.461	6.65	4.51	0.602	5.63	4.42	0.830
Targeted therapy	7.22	4.76		7.78	5.65		6.33	4.09	
Other	9.00	5.55		8.33	3.39		6.33	3.33	
Hormone therapy and targeted therapy	8.00	0.00		9.50	0.71		8.00	4.24	

SD: Standard deviation, *Insufficient sample size

To investigate the degree of linear relationship between AIS and HADS, multiple regression was performed with insomnia as dependent variable and anxiety and depression as independent variables. The results are presented in Table 6. Anxiety and depression appeared to explain 41.6% of the AIS variability ($R^2 = 0.416$, $P < 0.001$). The contribution of anxiety to insomnia was slightly higher ($B = 0.373$) compared to that of depression ($B = 0.329$).

Discussion

Breast cancer is the most common cancer in women. The number of BCS who may be asymptomatic, or may exhibit a range of symptoms that require support, is expected to increase over the coming decades, affecting local health services across the entire spectrum of survival.

The present study investigated the levels of anxiety, depression, and sleep disorders experienced by BCSs, as well as the relationship between these conditions and other characteristics. Our results showed that the anxiety level was normal (≤ 7) in one out of two women and pathological (≥ 11) in about one out of three. Various published studies have yielded similar findings. One study in Greece by Tsaras *et al.*[26] found anxiety in 32% of BCSs. The incidence of psychological distress among cancer survivors is higher than in the general population, although there is a great deal of variation.[8] Similarly, in a study by Crane *et al.*,[9] which included a sample of women of Latin descent, the anxiety level ranged from moderate to high. It is possible that the anxiety experienced by patients decreases temporarily, immediately after the completion of treatment,[27] but the level appears to be higher even 5 years later.[28] The inconsistency among the findings of different studies is probably attributable to the different measurement scales used, the duration of the survival period, and the different cultural environments in which the studies were carried out.

Regarding depression, it was found that the levels were clearly lower than those for anxiety, as about six women in

Table 6: Multiple regression analysis of anxiety and depression variables associated with insomnia variable					
Model factors	Unstandardized coefficients		Standardized coefficients, β	*t*	*P*
	B	SE			
Constant	1.307	0.580		2.253	0.026
Anxiety	0.385	0.084	0.373	4.604	0.000
Depression	0.365	0.090	0.329	4.065	0.000

10 had a normal level and only two in 10 had a pathological condition. These results are consistent with the research conducted by Nurasyikin *et al.*[29] in a sample of 131 survivors. However, other research findings showed that this group of women may have a high rate of depressive symptoms; one example is the study of Ahmadi Gharaei *et al.*,[30] in which 1228 of 2799 women had been diagnosed with depression.

Regarding insomnia, half of the patients in the present study had sleep disorders. Similar results have been reported in other studies, where it was noted that the majority of women have at least one sleep disorder,[31,32] and in particular, 38% suffer from insomnia.[32]

Regarding sociodemographic characteristics, a number of studies found that women with minor children had higher levels of anxiety and depression, perhaps because these women feel a responsibility for their children's upbringing that imposes a greater psychological burden.[33-35]

In addition, the present study found that treatment lasting more than 5 years was associated with low levels of depression. This is in contrast to the findings of other studies, which argued that a long duration of treatment significantly burdens the mental state of women in the survival stage.[36] This paradoxical finding of our study could be explained by the fact that women who have been undergoing treatment for a long time may come to consider it as part of their daily routine.

Both anxiety and depression are more prevalent in young people who have survived cancer compared to older adults.[37] Given that the majority of BCSs in the present study

were in the age range from 61 to 70 years, it is possible that the age of the participants was to some extent responsible for the low levels of anxiety and depression. Moreover, the farther away patients are from the disease and treatment, the better their psychological functioning.[38] The relatively low levels of anxiety and depression may also be related to women's physical health,[33] which in the present study was satisfactory, as shown by the small number of pathological problems. In addition, a high income has been shown to be associated with low levels of anxiety and depression. The impact of the economic situation on the mental health of this particular female population has also been reported.[39]

Similarly, high levels of sleep disorders appear to be significantly associated with certain characteristics of women, such as occupation, income, and the number of minor children, indicating a high level of involvement in everyday problems. Furthermore, women's financial situation appeared to affect sleep disorders significantly, as women with very low income had the highest rate of sleep problems, while problems decreased as incomes increased. Similarly, the study by Otte *et al.*,[20] which compared sleep disorders in women who had survived breast cancer and in those who had not been diagnosed with the disease, found that low income was positively associated with the occurrence of high levels of sleep disorders.

Finally, the present study, along with others, showed that increased levels of anxiety and depression increase sleep disorders.[20,40] In addition, the significant relationship between depression and anxiety in the present study is supported by the studies conducted in a clinical sample and the general population.[41,42]

To conclude, BCSs in Greece show a high rate of anxiety and depression related to the disease, as well as sleep problems that are partly associated with their psychological status, but are also affected by parameters such as income, type of profession, and the presence of minor children in the household.

Limitations

The present study had some limitations. The BCSs were not stratified according to the time elapsed, the stage of the disease, the time of diagnosis, or the type of surgical intervention and previous treatment processes, although the majority of patients all underwent the same basic therapy (surgical, chemotherapy, and radiotherapy). The time interval of 1–5 years since treatment covered a very wide range, and a more detailed analysis might have been able to differentiate the problems investigated. The study was limited to those women who were free of disease at a given time. Medications for anxiety, depression, and insomnia, as well as hormone therapy as a multi-year treatment method, are likely to affect the pathological conditions

investigated. Longitudinal research is thus recommended to establish how women's anxiety, depression, and insomnia are affected by changes in such variables over time. Finally, the small study sample from a single hospital does not allow generalization of our findings. For these reasons, future studies will be needed, taking into account all the above factors, as well as psychosomatic factors such as body mass index, and habits such as smoking and alcohol intake.

Conclusions

Anxiety, depression, and sleep disorders appear to be key problems for women who have survived breast cancer and are interlinked and complementary parts of a woman's psychosocial profile. Anxiety, depression, and sleep disorders are also related to parameters such as income, type of occupation, duration of treatment, and the presence of minor children.

The coexistence of these psychopathological features imposes a burden on women's physical and mental health, highlighting the need for healthcare professionals to design and implement effective interventions for the entire spectrum of survival. Nursing staff should make it a priority to systematically evaluate BCSs for many years after the completion of treatment, for the timely identification of those at risk. The design and implementation of effective interventions can contribute to an improvement in quality of life and the prevention of further physical and psychological incidents, leading to "healthy survival." Recognition of the ongoing needs of cancer survivors has led to proposals for long-term models of care, which are unfortunately only being implemented piecemeal in various countries.

Conflicts of interest

There are no conflicts of interest.

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