

# The effect of demographic and clinical data on anxiety and depression levels in breast cancer patients receiving radiotherapy

Vliv demografických a klinických údajů na úzkost a depresi u pacientek s karcinomem prsu léčených radioterapií

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## Summary

**Purpose:** The aim of this study is to investigate the effects of sociodemographic and clinical data on depression and anxiety levels in patients who undergoing radiotherapy for breast cancer. **Materials and methods:** A total of 111 patients with breast cancer treated in the Radiation Oncology Department of Kayseri City Education and Research Hospital were included in this study. The study was planned prospectively as a survey research based study. Ethics committee approval was obtained. After obtaining the necessary consent for voluntary participation, patients were interviewed face-to-face. The research survey included the Hospital Anxiety and Depression Scale (HADS), as well as demographic and clinical information. Statistical analysis was performed with the collected data. **Results:** According to the results of repeated measures analysis of variance, the mean difference between the 3-month and 6-month measurements of the depression scale values on the first day of radiotherapy was statistically significant ( $P < 0.001$ ). Mean differences were statistically notable for age and marital status variables in anxiety and for age, education level, marital status, employment status, family history of cancer, menopause, surgery, chemotherapy and hormone therapy variables in depression. When the change in the presence ( $> 10$  depression scale) or absence ( $< 10$  depression scale) of depression at three different times of radiotherapy (first day, 3 and 6 months) was examined, a statistically notable difference was found between the depression scale values of patients receiving radiotherapy on the first day, 3 months after radiotherapy and 6 months after radiotherapy ( $P < 0.05$ ). **Conclusion:** According to the results of our study, the psychological health of women with breast cancer was affected during and after radiotherapy. As a response, psychiatric counseling should be considered as a part of the treatment for depression and anxiety that occur during and after treatment in breast cancer patients.

## Keywords

breast cancer – radiotherapy – depression – anxiety – Hospital Anxiety and Depression Scale

The authors declare that they have no potential conflicts of interest concerning drugs, products, or services used in the study.

Autoři deklarují, že v souvislosti s předmětem studie nemají žádné komerční zájmy.

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## Souhrn

**Cíl:** Cílem této studie je prozkoumat vliv sociodemografických a klinických dat na míru deprese a úzkosti u pacientek s karcinomem podstupujících radioterapii. **Materiál a metody:** Do této studie bylo zahrnuto 111 pacientek s karcinomem prsu léčených na oddělení radiační onkologie nemocnice Kayseri City Education and Research Hospital. Studie byla plánována prospektivně jako studie založená na průzkumu. Byl získán souhlas etické komise. Po získání potřebného souhlasu s dobrovolnou účastí ve studii byly s pacientkami vedeny individuální („face-to-face“) rozhovory. Průzkum zahrnoval škálu Hospital Anxiety and Depression Scale (HADS) a také demografické a klinické informace. U shromážděných dat byla provedena statistická analýza. **Výsledky:** Podle výsledků analýzy rozptylu opakovaných měření byl zjištěn statisticky významný průměrný rozdíl mezi hodnotami na škále deprese zjištěnými po 3 a 6 měsících a hodnotami získanými v první den radioterapie ( $p < 0,001$ ). V případě úzkosti byly zjištěny statisticky významné průměrné rozdíly u proměnných jako je věk a rodinný stav a v případě deprese u proměnných jako je věk, dosažené vzdělání, rodinný stav, zaměstnání, výskyt rakoviny v rodinné anamnéze, menopauza, operace, chemoterapie a hormonální terapie. Když byla zkoumána změna ve výskytu (škála deprese  $> 10$ ) nebo absenci (škála deprese  $< 10$ ) deprese ve třech různých časech radioterapie (první den, 3 měsíce a 6 měsíců), mezi hodnotami na škále deprese u pacientek léčených radioterapií zjištěných první den radioterapie a 3 a 6 měsíců po radioterapii byl zjištěn statisticky významný rozdíl ( $p < 0,05$ ). **Závěr:** Podle výsledků naší studie bylo psychické zdraví žen s karcinomem prsu ovlivněno během radioterapie i po ní. U pacientek, u kterých se během léčby karcinomu prsu vyskytne úzkost nebo deprese, by tedy mělo být zvaženo začlenění psychiatrického poradenství do léčby.

## Klíčová slova

karcinom prsu – radioterapie – deprese – úzkost – škála Hospital Anxiety and Depression Scale

## Introduction

Cancer is a very serious health problem that affects people physically and emotionally. Some side effects can be seen depending on both the disease and the treatments applied. This causes reactions in the patient that can be defined as a crisis. A crisis is a period of transition from a healthy life to a new life, illness and being under constant threat. Emotional reactions such as anxiety and depression may be observed in the patient after the crisis [1–3].

In patients with breast cancer, there will be reasons such as deterioration in body image, inadequacy in social support, feeling of helplessness against cancer, inability to meet the needs in the disease process on time, negative experiences in the past, negative perceptions about the disease, isolation due to the disease, prolonged treatment, side effects of the treatment, activity limitation. It increases the uncertainty about the situation and leads to hopelessness. This hopelessness may facilitate the emergence of anxiety and depression (AD) in sick individuals. Both anxiety and depression are among the most common mental disorders in cancer patients [4–6]. The rate of anxiety disorders seen in cancer patients has been reported in a very wide range, ranging from 0.9–49% and for the frequency of depression 4.5–58%. Possible reasons for this difference in prevalence rates are social or demo-

graphic factors, differences in cancer types and treatment [4–11].

Compared to the general population, the rate of pathological AD was found to be higher in patients with breast cancer. Failure to properly diagnose and follow-up AD reduces the quality of life of patients. In patients with poor quality of life, compliance with the treatment plan decreases and the length of hospital stay is prolonged. For this reason, it is important for physicians to know the prevalence of psychiatric disorders such as anxiety and major depression that may occur in patients with breast cancer. Physicians should have a high awareness of the psychosocial changes that these emerging psychological disorders can cause in the patient. It is known that AD in cancer patients negatively affects the prognosis because it harms the patient mentally [12–15].

Some scales have been prepared for the examination of symptoms related to general medical condition for AD. One of the most commonly used of these scales is the „Hospital Anxiety and Depression Scale (HADS)“. The purpose of this scale is to determine the risk group by scanning AD in a short time in patients with physical diseases, not making a diagnosis. In addition, the scale is also used to evaluate the change in the emotional state of the patient. Therefore, the scale does not include any physical symptoms. When patients scored 0–10 for anxiety, patients were defined

as no anxiety, 11 or more anxiety, and 0–7 points for depression as no depression, 8 or more depression. The HADS scale was used in comparison with other scales and it was found to be sufficient in terms of evaluating AS in patients with physical illness [13–18].

In this context, we aimed to determine the effects of sociodemographic and clinical data on AS in breast cancer patients receiving radiotherapy (RT).

## Materials and method

### Purpose of the study

This study was conducted to evaluate the effects of sociodemographic and clinical data on AS in stage 1–3 breast cancer patients receiving RT.

### Ethical aspect of the study and Ethics Committee approval

Permission was obtained from the Erciyes University Non-Interventional Clinical Research Ethics Committee before starting the study. After informing each participant about the purpose of the study, its implementation, the volunteering of participating in the study and that they can leave at any time, their verbal and written consents were obtained by giving a voluntary consent form to those who wanted to participate.

### Conduct of the study

In our study, each patient filled in forms containing informed consent form, de-

mographic and clinical information before the study. In addition, the HADS scale was applied to each patient three times, on the first day of RT, at the end of the 3<sup>rd</sup> month and at the end of the 6<sup>th</sup> month. Patients with a history of metastatic, cerebrovascular events and a known cardiac, orthopedic, neurologic, or serious psychiatric illness were excluded from the study.

**Data collection tools**

Before the study, a questionnaire prepared by the researcher containing the demographic characteristics of the patients and the HADS scale were used to collect the data.

**Demographic characteristics questionnaire**

This form, which was prepared by scanning the literature, consists of questions that include patients’ socio-demographic characteristics, treatment and disease information. It consists of 13 questions to obtain information about the participants’ age, education level, marital status, employment status, comorbidity, family history of cancer, tumor stage, and treatment.

**Hospital anxiety and depression scale**

Developed by Zigmond and Snaith in 1982, the scale addresses the cognitive and emotional symptoms of AD. The scale consists of 14 questions. The scale has 2 subscales with 7 items assessing depression and 7 items evaluating anxiety. The 1<sup>st</sup>, 3<sup>rd</sup>, 5<sup>th</sup>, 7<sup>th</sup>, 9<sup>th</sup>, 11<sup>th</sup>, and 13<sup>th</sup> questions of the scale describe anxiety; Questions 2, 4, 6, 8, 10, 12, 14 measure depression. Responses are evaluated in a three-point Likert format and scored between 0–3. A change was made in order to prevent repetitions of responses, while the first response in one item reflects the severity, the last response in the next item contains direct and reverse expressions, reflecting the highest severity. Reverse statements are included in questions 1, 3, 5, 6, 8, 10, 11, 13.

In Zigmond’s study, the cut-off point of the scale was determined as 7 for anxiety and depression. Scoring of the scale was expressed as 0–7 normal, 8–10 suspicious, and 11 or more pa-

**Tab. 1. Sociodemographic data and clinical findings of the patients participating in the study.**

Quantitative variables	$\bar{X} \pm SD$		
age	55.05 ± 12.14 median (min–max) 56.0 (24.0–84.0)	stages	
		1	1 (0.9)
		2	14 (12.7)
		3	95 (86.4)
Qualitative variables	N (%)	surgery	
age		MRM	38 (34.2)
< 63 years	79 (71.2)	BCS	73 (65.8)
> 64 years	32 (28.8)	chemotherapy	
working status		no	3 (2.7)
no	101 (91.0)	yes	108 (97.3)
yes	10 (9.0)	hormonal therapy	
marital status		no	16 (14.4)
single	16 (15.0)	yes	95 (85.6)
married	91 (85.0)	anxiety measurement 1	
education status		no	50 (45.0)
no	27 (24.3)	yes	61 (55.0)
yes	84 (75.7)	anxiety measurement 2	
family history of cancer		no	58 (52.3)
no	85 (76.6)	yes	53 (47.7)
yes	26 (23.4)	anxiety measurement 3	
menopause status		no	55 (49.5)
pre	41 (36.9)	yes	56 (50.5)
post	70 (63.1)	depression measurement 1	
additional illness		no	30 (27.0)
no	74 (66.7)	yes	81 (73.0)
yes	37 (33.3)	depression measurement 2	
tumor stages (AJCC 2009 stage)		no	8 (7.2)
1	11 (9.9)	yes	103 (92.8)
2	39 (35.1)	depression measurement 3	
3	53 (47.8)	no	11 (9.9)
4	8 (7.2)	yes	100 (90.1)
lymphnode (AJCC 2009 stage)			
0	11 (9.9)		
1	6 (5.4)		
2	44 (39.6)		
3	50 (45.1)		

BCS – breast conserving surgery, MRM – modified radical mastectomy, SD – standard deviation,  $\bar{X}$  – arithmetic mean

tients. When patients score 0–10 for anxiety, patients do not have anxiety; if it is eleven and above, it has anxiety. When

patients scored 0–7 for depression, they were defined as having no depression and having depression of 8 or more [18].

**Tab. 2. Comparison of the Hospital Anxiety and Depression Scale mean scores of the patients participating in the study. According to the multiple comparison test result (Bonferroni), the difference in alphabetical (a, b) exponents indicates statistically significant.**

Variables	Radiotherapy time			P
	first day (N = 111) $\bar{X} \pm SD$	3 months later (N = 111) $\bar{X} \pm SD$	6 months later (N = 111) $\bar{X} \pm SD$	
anxiety	10.31 ± 3.35	9.97 ± 3.25	10.86 ± 3.30	0.136
depression	8.75 ± 2.60 <sup>a</sup>	10.29 ± 2.21 <sup>b</sup>	9.93 ± 2.16 <sup>b</sup>	< 0.001

SD – standard deviation,  $\bar{X}$  – arithmetic mean

Its validity and reliability study was carried out by Aydemir et al. In 1996 and adapted to Turkish society. In this study, it was determined as 7 for anxiety and 10 for depression for the Turkish population [17].

#### Limitations of the study

The findings of the study are limited to a department in a hospital in the province of Kayseri, where the application was made, and the accuracy of the information obtained from the questionnaires.

#### Statistical analysis

The study was originally designed to enroll 111 individuals for a 6-month follow-up. Levene's test was used for the assumption of homogeneity of variance of the data. Shapiro-Wilk test and (q-q and histogram) graphs were used for the assumption of normal distribution of the data. The Cochran Q test was used to compare the change in anxiety and depression status of the patients included in the study on the first day, 3 months and 6 months later, and the McNemar test was used for pairwise comparisons when it was significant according to the Cochran Q test. The independent sample t test was used to compare the means of quantitative variables in two-group variables. One-way repeated measures analysis of variance (ANOVA) was used to compare the means of quantitative variables in comparisons of data between three times (first day, 3 months later, 6 months later). The Bonferroni method was used for multiple compar-

ison. The Pearson correlation analysis was used to determine the direction and strength of the relationship between the scales ( $0.0 < r < 0.20$  very weak,  $0.20 < r < 0.40$  weak,  $0.40 < r < 0.60$  normal,  $0.60 < r < 0.80$  strong and  $0.80 < r < 1.00$  very strong).

The analysis of the data was carried out in the statistical cloud software of TURCOSA (Turcosa Statistical Solutions Ltd. Sti). The significance level was accepted as  $P < 0.05$ .

#### Results

Sociodemographic and clinical data results of the patients are presented in Tab. 1. The mean age was 55.05 (24.0–84.0). A total of 70 patients were postmenopausal, 74 patients were operated on for breast conserving surgery (BCS). A total of 47.8% received stage 3, 97.3% received chemotherapy and 85.6% received hormone therapy.

According to the results of analysis of variance in repeated measurements, the mean differences of the anxiety ( $P = 0.136$ ) variable at three different times (first day, 3 months later, 6 months later) when he received RT were not statistically significant while the mean differences of the depression scale were found to be significant ( $P < 0.001$ ). According to the multiple comparison test, the mean of depression scale 3 months and 6 months after RT was found to be statistically significantly higher than the mean depression scale on the first day of RT ( $P < 0.05$ ) (Tab. 2).

According to the analysis of variance in repeated measurements, the differ-

ences in the mean of age and marital status variables for anxiety scale at three different times (first day, 3 months later, 6 months later) were found to be statistically significant ( $P < 0.05$ ) (Tab. 3). For depression scale, the difference was statistically significant in age groups, education, marital status, employment, family history of cancer and menopause ( $P < 0.05$ ). According to the Student's t test results, for each measurement (first day, 3 months, 6 months) for working and unemployed patients, literate and illiterate patients, patients with pre- and post-menopausal status, and patients with and without additional disease conditions. While the mean differences of the AD scales were not statistically significant, the mean difference in the anxiety scale ( $P = 0.039$ ) 3 months after RT was found to be statistically significantly higher in patients aged 64 and over compared to patients aged 63 and younger. In addition, the average of depression scale ( $P = 0.004$ ) 3 months after radiotherapy was different in patients aged 63 years and younger compared to patients aged 64 years and older.

According to the results of analysis of variance in repeated measurements, patients with surgically modified radical mastectomy and BCS, patients receiving and not receiving chemotherapy, patients receiving and not receiving hormone therapy for each measurement (first day, 3 months later, 6 months later) anxiety scale mean differences were not found significant ( $P > 0.05$ ). According to the results of analysis of variance in repeated measurements, the mean differences of depression scale ( $P < 0.001$ ) in patients with surgical status of BCS, depression scale in patients receiving chemotherapy ( $P < 0.001$ ), and depression scale in patients receiving hormone therapy ( $P < 0.001$ ) were statistically significant. According to the multiple comparison test, the mean depression scale levels of patients with BCS, patients receiving chemotherapy, and patients receiving hormone therapy, 3 months after RT and 6 months after RT, were statistically significantly higher than the mean depression scale on the first day of RT (Tab. 4).

According to the Cochran Q test, there was no statistically significant difference when comparing the state of anxiety

**Tab. 3. Comparison of patients' sociodemographic data information according to the Hospital Anxiety and Depression Scale. According to the multiple comparison test result (Bonferroni), the difference in alphabetical exponents (a, b) indicates statistically significant.**

Variables	Anxiety			P*	Depression			P*
	first day $\bar{X} \pm SD$	3 months later $\bar{X} \pm SD$	6 months later $\bar{X} \pm SD$		first day $\bar{X} \pm SD$	3 months later $\bar{X} \pm SD$	6 months later $\bar{X} \pm SD$	
age group								
63 years and under (N = 79)	10.11 ± 3.44 <sup>ab</sup>	9.57 ± 3.30 <sup>a</sup>	10.99 ± 3.21 <sup>b</sup>	<b>0.030</b>	8.58 ± 2.73 <sup>a</sup>	10.67 ± 2.23 <sup>b</sup>	9.77 ± 2.10 <sup>c</sup>	<b>&lt; 0.001</b>
64 years and older (N = 32)	10.78 ± 3.11	10.97 ± 2.91	10.56 ± 3.56	0.884	9.16 ± 2.24	9.34 ± 1.86	10.31 ± 2.29	0.109
<b>P#</b>	0.344	<b>0.039</b>	0.542		0.295	<b>0.004</b>	0.234	
working status								
no (N = 101)	10.34 ± 3.29	10.01 ± 3.27	10.86 ± 3.30	0.182	8.85 ± 2.51 <sup>a</sup>	10.30 ± 2.23 <sup>b</sup>	9.82 ± 2.09 <sup>b</sup>	<b>&lt; 0.001</b>
yes (N = 10)	10.00 ± 4.08	9.60 ± 3.10	10.90 ± 3.54	0.767	7.70 ± 3.37	10.20 ± 2.10	11.00 ± 2.71	0.079
<b>P#</b>	0.763	0.705	0.972		0.183	0.895	0.100	
marital status								
single (N = 16)	8.69 ± 3.65 <sup>a</sup>	10.00 ± 2.68 <sup>ab</sup>	11.81 ± 3.02 <sup>b</sup>	0.015	8.88 ± 4.03	9.19 ± 1.94	10.13 ± 2.19	0.476
married (N = 91)	10.59 ± 3.24	9.88 ± 3.37	10.76 ± 3.31	0.173	8.70 ± 2.32 <sup>a</sup>	10.53 ± 2.22 <sup>b</sup>	9.89 ± 2.17 <sup>b</sup>	<b>&lt; 0.001</b>
<b>P#</b>	0.035	0.892	0.237		0.810	<b>0.026</b>	0.691	
education status								
no (N = 27)	9.56 ± 3.45	10.44 ± 3.03	10.22 ± 3.70	0.624	8.70 ± 2.87 <sup>a</sup>	9.63 ± 1.71 <sup>ab</sup>	10.41 ± 2.19 <sup>b</sup>	<b>0.032</b>
yes (N = 84)	10.55 ± 3.30	9.82 ± 3.32	11.07 ± 3.16	0.050	8.76 ± 2.53 <sup>a</sup>	10.50 ± 2.32 <sup>b</sup>	9.77 ± 2.14 <sup>b</sup>	<b>&lt; 0.001</b>
<b>P#</b>	0.181	0.388	0.247		0.920	0.075	0.186	
family history of cancer								
no (N = 85)	10.15 ± 3.49	9.86 ± 3.17	10.71 ± 3.28	0.243	8.75 ± 2.82 <sup>a</sup>	10.53 ± 2.15 <sup>b</sup>	9.71 ± 2.00 <sup>c</sup>	<b>&lt; 0.001</b>
yes (N = 26)	10.81 ± 2.83	10.35 ± 3.52	11.38 ± 3.38	0.566	8.73 ± 1.73 <sup>a</sup>	9.50 ± 2.25 <sup>ab</sup>	10.65 ± 2.51 <sup>b</sup>	<b>0.006</b>
<b>P#</b>	0.385	0.505	0.362		0.970	<b>0.037</b>	0.050	
menopause status								
pre (N = 41)	10.34 ± 3.37	10.10 ± 3.42	10.44 ± 3.26	0.903	8.15 ± 2.53 <sup>a</sup>	10.66 ± 2.44 <sup>b</sup>	9.59 ± 2.00 <sup>b</sup>	<b>&lt; 0.001</b>
post (N = 70)	10.29 ± 3.36	9.90 ± 3.16	11.11 ± 3.33	0.082	9.10 ± 2.60 <sup>a</sup>	10.07 ± 2.05 <sup>b</sup>	10.13 ± 2.24 <sup>b</sup>	<b>0.020</b>
<b>P#</b>	0.933	0.759	0.301		0.062	0.178	0.202	
additional disease								
no (N = 74)	10.49 ± 3.29	9.76 ± 3.30	10.91 ± 3.20	0.102	8.77 ± 2.55 <sup>a</sup>	10.39 ± 2.04 <sup>b</sup>	9.76 ± 1.96 <sup>b</sup>	<b>&lt; 0.001</b>
yes (N = 37)	9.95 ± 3.47	10.41 ± 3.13	10.78 ± 3.54	0.586	8.70 ± 2.75 <sup>a</sup>	10.08 ± 2.53 <sup>b</sup>	10.27 ± 2.51 <sup>b</sup>	<b>0.034</b>
<b>P#</b>	0.425	0.323	0.856		0.898	0.487	0.240	

P\* – repeated measure analysis of variance, P# – independent sample t test, SD – standard deviation,  $\bar{X}$  – arithmetic mean

scale at three different times (first day, 3 months later, 6 months later); a statistically significant difference was found in depression (P < 0.001). According to the McNemar test, the difference between the measurement values of the patients

who received RT on the first day with 3 months after RT and 6 months after RT was found to be statistically significant (P < 0.05) (Tab. 5).

In Tab. 6, at the second measurement time of the patients (3 months later), the

relationship between age and depression was negatively very weakly a significant (r = -0.1924). There is a weakly significant negative relationship between anxiety and depression (r = -0.3425). At the third measurement time of the pa-

**Tab. 4. Comparison of patients' sociodemographic data information according to the Hospital Anxiety and Depression Scale. According to the multiple comparison test result (Bonferroni), the difference in alphabetical exponents (a, b) indicates statistically significant.**

Variables	Anxiety			P*	Depression			P*
	first day $\bar{X} \pm SD$	3 months later $\bar{X} \pm SD$	6 months later $\bar{X} \pm SD$		first day $\bar{X} \pm SD$	3 months later $\bar{X} \pm SD$	6 months later $\bar{X} \pm SD$	
surgery								
MRM (N = 38)	10.63 ± 2.89	10.21 ± 3.16	10.76 ± 3.22	0.750	9.18 ± 2.31	10.00 ± 2.54	10.24 ± 2.20	0.162
BCS (N = 73)	10.14 ± 3.57	9.85 ± 3.31	10.92 ± 3.37	0.146	8.52 ± 2.73 <sup>a</sup>	10.44 ± 2.02 <sup>b</sup>	9.77 ± 2.14 <sup>b</sup>	< 0.001
<b>P#</b>	0.462	0.580	0.816		0.204	0.323	0.279	
chemotherapy								
no (N = 3)	9.33 ± 4.93	10.67 ± 1.15	13.33 ± 2.08	0.478	9.33 ± 2.31	9.00 ± 2.65	7.67 ± 1.53	0.422
yes (N = 108)	10.33 ± 3.32	9.95 ± 3.29	10.80 ± 3.31	0.181	8.73 ± 2.62 <sup>a</sup>	10.32 ± 2.20 <sup>b</sup>	9.99 ± 2.15 <sup>b</sup>	< 0.001
<b>P#</b>	0.612	0.709	0.191		0.695	0.308	0.066	
hormone therapy								
no (N = 16)	10.00 ± 3.56	10.25 ± 3.57	11.44 ± 3.41	0.515	8.63 ± 3.03	10.13 ± 2.22	10.00 ± 2.00	0.223
yes (N = 95)	10.36 ± 3.33	9.93 ± 3.21	10.77 ± 3.30	0.214	8.77 ± 2.54 <sup>a</sup>	10.32 ± 2.22 <sup>b</sup>	9.92 ± 2.20 <sup>b</sup>	< 0.001
<b>P#</b>	0.694	0.714	0.456		0.839	0.751	0.886	

BCS – breast conserving surgery, MRM – modified radical mastectomy, P\* – repeated measure analysis of variance, P# – independent sample t test, SD – standard deviation,  $\bar{X}$  – arithmetic mean

tients, the relationship between anxiety and depression was negatively weakly a significant ( $r = -0.2739$ ). There was a very weakly negative relationship between the depression scale values of the patients at 3 months and 6 months later times ( $r = -0.1975$ ), and a very weak positive relationship between the anxiety scale values ( $r = 0.1877$ ).

**Discussion**

AD is more common in breast cancer patients compared to both normal population and psychiatric patients. However, it is a psychological disorder that can be effectively treated with the support of specialists. In fact, AD is a normal reaction to many stressful situations in life, such as cancer [1–3]. Anxiety usually increases with noticing the tumor. Anxiety is a fear-like emotion that is synonymous with anxiety, boredom, anxiety, and worry. Along with anxiety, anger, sleep, loss of appetite and concentration, failure in daily activities, and fear of the future may develop [1]. It peaks during the diagnostic period, the pre-operative pe-

riod, or the RT and chemotherapy period. It decreases within one year after the treatment and the patient calms down [13–15]. The incidence of anxiety in cancer patients is over 50%. Approximately 30% of them have chronic anxiety [1,2]. Anxiety increases again during crisis periods such as hospitalization, initiation of a new treatment, and relapse. Discharge from the hospital or discontinuation of the treatment may be seen with the feeling of helplessness and hopelessness [19–23].

When a cancer diagnosis is made, another reaction other than anxiety is depression. The most common initial response to cancer is shock and disbelief. Seen in this period, the reflection of the diagnosis, the feelings of anxiety and helplessness created by the hard-to-bearing reality appear as a counter-defense. After this, anger and depression may develop [1]. Many studies in the literature have reported that some types of cancer are frequently associated with depression. Again, as seen in many publications, it has been observed that de-

pression increases in cases where the duration of the treatment is prolonged and the treatment becomes more difficult [1–4]. The fact that the incidence of depression is so variable was found to be related to the fact that studies were conducted with different cancer types, different diagnostic methods and patient groups. In the etiology of depression in cancer patients, factors such as cancer type, cancer course and stage, time elapsed after the diagnosis of the disease, hospitalization time, side effects of antineoplastics, treatment stage, treatment success, education level, gender, and ability to cope with the disease have a great impact [5–10].

In the study conducted by Tsaras et al., it is reported that 38.2% of the patients with breast cancer had depression and 32.2% had anxiety [4]. In another study, it was reported that the rate of depression in cases with recurrent breast cancer was 45.5% [22]. Vodermaier et al. looked at the prevalence of anxiety and depression in patients with advanced or advanced cancer with a poor prognosis.

Female patients and younger patients reported more anxiety and depressive symptoms compared to males and healthy subjects. They also reported that the stage of the disease in breast cancer was not directly related to emotional distress [2]. In a study conducted with RT patients, in 70 patients for whom consultation was requested, 38% had major depression, 43% had adjustment disorder. In the control group of 30 patients, 13% had adjustment disorder and 7% major depression [8]. In the study by Park et al., patients diagnosed with breast cancer at a young age (< 40 years) were evaluated using the HADS scale. The mean HADS depression score was 4.4 and the anxiety score was 7.9. As a result, it has been reported that a significant proportion of young women with newly diagnosed breast cancer experience anxiety [3]. In the study conducted by Maraste et al. on 133 breast cancer patients who were referred for adjuvant RT following surgical treatment, anxiety was recorded in 18 patients (14%) and significant depression in patients (1.5%). They reported that at the beginning of adjuvant RT, emotional distress is characterized by anxiety rather than depression, and the risk of morbid anxiety is more common in women with mastectomy, especially in their fifties [13]. Both anxiety and depression rates were found to be high in our study.

In cancer patients, it is expected that attempts to determine the level of AD and reduce AD will positively affect the

**Tab. 5. Evaluation of anxiety and depression at three different times.**

Variables	First day		3 months later		6 months later		P
	no	yes	no	yes	no	yes	
anxiety	50	61	58	53	55	56	0.580
depression	30	81	8	103	11	100	< 0.001

patient’s adherence to treatment and quality of life. Environmental and physical causes trigger AD attacks. Physical and treatment-related causes in cancer patients include infections, metabolic disorders, brain metastases, and especially the treatment (chemotherapy, RT, steroids, antiemetics, etc.) [10–18]. In a review, it was reported that anxiety was seen in all kinds of treatment (chemotherapy, surgery, RT) for breast cancer (stage 0–3A breast cancer, ages 21–65, receiving limited treatment). It was stated that anxiety was highest in patients with mastectomy and before the first chemotherapy infusion. It has been stated that RT regimens do not affect anxiety [11]. In our study, we found that it was seen at the highest level in the 63 years old and younger group and in singles. On the other hand, we found that age, education level, marital status, employment, family history of cancer, menopause, surgery, chemotherapy and hormone therapy variables affected depression. In the study of Tsaras et al. in which they evaluated the prevalence of AD and related factors in

breast cancer patients, they found depression at the rate of 38.2% and anxiety at the rate of 32.2%. According to the results of univariate and multivariate analysis, they reported that age, marital status, education level, cancer stage and place of residence, religion, and symptom load are factors associated with depression and anxiety [4]. Kim et al. reported that young breast cancer patients receiving radiotherapy had higher levels of anxiety and depression in the married, non-religious, and high-income group [5]. Hong et al. looked at AD levels in different types of cancer and gave this rate as 57.9% for breast cancer. While the factors affecting the depression of the patients were performance status, pain, age and education level, risk factors for anxiety were reported as performance status, age and gender [20]. It is seen that there are many factors affecting AS, both in our study and in the studies presented in the literature.

Over time, the adaptation process begins when the patient accepts the truth and directs his energy and spiritual power to his new life. It shows that pa-

**Tab. 6. Relationship matrix between variables of the Hospital Anxiety and Depression Scale (Spearman Rho).**

	Age	Anxiety measurement 1	Anxiety measurement 2	Anxiety measurement 3	Depression measurement 1	Depression measurement 2	Depression measurement 3
Age	1	0.0332	0.0452	-0.0565	0.1069	-0.1924*	0.1315
Anxiety measurement 1		1	-0.0043	-0.1483	0.0163	0.0482	-0.0849
Anxiety measurement 2			1	0.0683	-0.0159	-0.3425***	0.1877*
Anxiety measurement 3				1	-0.0727	0.0901	-0.2739**
Depression measurement 1					1	-0.1248	-0.0194
Depression measurement 2						1	-0.1975*
Depression measurement 3							1

\*P < 0.05, \*\*P < 0.01, \*\*\*P < 0.00

tients' AD levels decrease if information is provided and psychological assistance services are provided. When we focus on the consequences of depression, which is such a common psychological disorder in cancer patients, we see that it has very serious consequences and its effect on treatment is undeniable. Kawase et al. formed two groups were formed to examine the effect of RT on AD levels in breast cancer patients receiving RT. They gave only an information booklet to the control group, and both an information booklet and training to the experimental group. Anxiety and Depression Scale was administered before and after RT in both groups. As a result, it was seen that the general average AD scores of the control group did not show a significant difference. As a result, they reported that informing the patient and relieving their anxiety were effective in reducing AD [10]. In our study, it was seen that anxiety was high in the questionnaire study conducted on the first day of RT. In subsequent measurements, it was observed that the scores decreased. This may be due to the fact that the patient was informed about RT.

In our study, when all three measures were examined, it was seen that anxiety scores did not change significantly. We saw that depression increased in the second and third measurements. This difference was statistically significant. It was observed that depression continued in the patients even after the treatment was completed. In their study, Burgess et al. reported that anxiety and/or depression rates are 50% in the first year after breast cancer diagnosis; 25% in the second, third and fourth years, 15% in the fifth year. While the point prevalence was 33% at the time of diagnosis, it decreased to 15% one year later. It has been reported that relapses occur especially in the first three years or up to 45% of this rate [14]. Ho et al. evaluated the HADS scale on 269 women receiving adjuvant treatment for breast cancer and on 148 women who had completed their treatment in the last year. It was observed that AD was at a higher level during the treatment. According to the linear regression results, they stated that both anxiety and depression

were significantly associated with physical and functional well-being [12]. Hopwood et al. followed up patients who received adjuvant RT for breast cancer for 5 years. Anxiety and/or depression levels were 35% before RT. There was no change in these rates over time. It has been seen that young age affects anxiety negatively, chemotherapy affects depression and education level affects negatively both. As a result, it has been reported that the risk factors are effective in AS [15]. Gregorowitsch et al. prospectively performed the HADS scale in patients with ductal carcinoma *in situ* and early stage invasive breast cancer before (beginning) and at 3, 6, 12, 18, and 24 months after the initiation of adjuvant radiotherapy. They found similar anxiety rates in both groups. Depression scores were found to be significantly higher in the group with ductal carcinoma *in situ* at the 6<sup>th</sup>, 12<sup>th</sup> and 18<sup>th</sup> months [21].

### Conclusion

The psychological health of women with breast cancer is affected during and after the treatment. Depending on the depressive effect of radiation in people who receive RT, the frequency of depression may increase in people. Comparisons can be made by considering these patients in the post-treatment period. In AD that occurs during and after the treatment in patients with breast cancer, getting psychiatric opinion should be considered as a part of the treatment when necessary. The fact that the sample was selected from a certain region in the study and the limited number of participants may cause problems in the interpretation of the results. For this reason, studies to be conducted with more sample groups and from different regions will strengthen the reliability of the studies.

### Declarations

Ethics approval and consent to participate Yes, applicable.

### Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request. The authors had permission to use the anonymized database by the national statistics agency, Statistics Turkey.

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### Authors' contributions

YBC and OO contributed to designing the study, statistical analyses, and writing the report, including the first draft of the manuscript. All authors have read and approved the final manuscript.

### References

- Pitman A, Suleman S, Hyde N et al. Depression and anxiety in patients with cancer. *BMJ* 2018; 361: k1415. doi: 10.1136/bmj.k1415.
- Vodermaier A, Linden W, Mackenzie R et al. Anxiety and depression after cancer diagnosis: prevalence rates by cancer type, gender, and age. *J Affect Disord* 2012; 141(2–3): 343–351. doi: 10.1016/j.jad.2012.03.025.
- Park EM, Gelber S, Rosenberg SM et al. Anxiety and depression in young women with metastatic breast cancer: a cross-sectional study. *Psychosomatics* 2018; 59(3): 251–258. doi: 10.1016/j.psym.2018.01.007.
- Tsaras K, Papatathanasiou IV, Mitsi D et al. Assessment of depression and anxiety in breast cancer patients: prevalence and associated factors. *Asian Pac J Cancer Prev* 2018; 19(6): 1661–1669. doi: 10.22034/APJCP.2018.19.6.1661.
- Kim K, Park H. Factors affecting anxiety and depression in young breast cancer survivors undergoing radiotherapy. *Eur J Oncol Nurs* 2021; 50: 101898. doi: 10.1016/j.ejon.2021.101898.
- Li Z, Geng W, Yin J et al. Effect of one comprehensive education course to lower anxiety and depression among Chinese breast cancer patients during the postoperative radiotherapy period – one randomized clinical trial. *Radiat Oncol* 2018; 13(1): 111. doi: 10.1186/s13014-018-1054-6.
- Miranda TPS, Caldeira S, de Oliveira HF et al. Intercessory prayer on spiritual distress, spiritual coping, anxiety, depression and salivary amylase in breast cancer patients during radiotherapy: randomised clinical trial. *J Relig Health* 2020; 59(1): 365–380. doi: 10.1007/s10943-019-00827-5.
- Zaheer S, Gul RB, Bhamani SS et al. The effect of individualized education with support on breast cancer patients' anxiety and depression during radiation therapy: a pilot study. *Eur J Oncol Nurs* 2020; 48: 101826. doi: 10.1016/j.ejon.2020.101826.
- So WK, Marsh G, Ling WM et al. Anxiety, depression and quality of life among Chinese breast cancer patients during adjuvant therapy. *Eur J Oncol Nurs* 2010; 14(1): 17–22. doi: 10.1016/j.ejon.2009.07.005.
- Kawase E, Karasawa K, Shimotsu S et al. Estimation of anxiety and depression in patients with early stage breast cancer before and after radiation therapy. *Breast Cancer* 2012; 19(2): 147–152. doi: 10.1007/s12282-010-0220-y.
- Lim CC, Devi MK, Ang E. Anxiety in women with breast cancer undergoing treatment: a systematic review. *Int J Evid Based Healthc* 2011; 9(3): 215–235. doi: 10.1111/j.1744-1609.2011.00221.x.
- Ho SS, So WK, Leung DY et al. Anxiety, depression and quality of life in Chinese women with breast cancer during and after treatment: a comparative evaluation. *Eur J Oncol Nurs* 2013; 17(6): 877–882. doi: 10.1016/j.ejon.2013.04.005.
- Maraste R, Brandt L, Olsson H et al. Anxiety and depression in breast cancer patients at start of adjuvant radiotherapy. Relations to age and type of surgery. *Acta Oncol* 1992; 31(6): 641–643. doi: 10.3109/02841869209083846.
- Burgess C, Cornelius V, Love S et al. Depression and anxiety in women with early breast cancer: five year observational cohort study. *BMJ* 2005; 330(7493): 702. doi: 10.1136/bmj.38343.670868.D3.
- Hopwood P, Sumo G, Mills J et al. The course of anxiety and depression over 5 years of follow-up and risk



factors in women with early breast cancer: results from the UK Standardisation of Radiotherapy Trials (START). *Breast* 2010; 19(2): 84–91. doi: 10.1016/j.breast.2009.11.007.

16. Brunault P, Toledano A, Aguerre C et al. Impact of late treatment-related radiotherapy toxicity, depression, and anxiety on quality of life in long-term breast cancer survivors. *Bull Cancer* 2012; 99(5): 589–598. doi: 10.1684/bdc.2012.1569.

17. Aydemir Ö, Güvenir T, Küey L et al. Reliability and validity of the Turkish version of hospital anxiety and depression scale. *Turkish J Psychiatry* 1997; 8(4): 280–287.

18. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. *Acta Psychiatr Scand* 1983; 67(6): 361–370. doi: 10.1111/j.1600-0447.1983.tb09716.x.

19. Marrs JA. Stress, fears and phobias: the impact of anxiety. *Clin J Oncol Nurs* 2006; 10(3): 319–322. doi: 10.1188/06.CJON.319-322.

20. Hong JS, Tian J. Prevalence of anxiety and depression and their risk factors in Chinese cancer patients. *Support Care Cancer* 2014; 22(2): 453–459. doi: 10.1007/s00520-013-1997-y.

21. Gregorowitsch ML, van den Bongard HJGD, Young-Afat DA et al. Severe depression more common in pa-

tients with ductal carcinoma in situ than early-stage invasive breast cancer patients. *Breast Cancer Res Treat* 2018; 167(1): 205–213. doi: 10.1007/s10549-017-4495-y.

22. Mehnert A, Veers S, Howaldt D et al. Effects of a physical exercise rehabilitation group program on anxiety, depression, body image, and health-related quality of life among breast cancer patients. *Onkologie* 2011; 34(5): 248–253. doi: 10.1159/000327813.

23. Jenkins PL, May VE, Hughes LE. Psychological morbidity associated with local recurrence of breast cancer. *Int J Psychiatry Med* 1991; 21(2): 149–155. doi: 10.2190/UU5G-MDJ3-U55G-33GQ.