

## Original Research Article

# Effectiveness of yoga on anxiety, depression and stress level of breast cancer patients undergoing chemotherapy

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### ABSTRACT

**Background:** Breast cancer has ranked number one cancer among Indian females. Women undergoing chemotherapy experience many side effects including alteration in their body image. The present study assessed effectiveness of yoga on anxiety, depression and stress level of breast cancer patients undergoing chemotherapy.

**Methods:** Quantitative Research approach and Randomized Clinical Controlled Trial with Time series design was adopted in the present study. The consecutive sampling technique was done to recruit 100 breast cancer patients fulfilling the eligibility criteria. Recruited patients were randomized to control (N=52) and experiment (N=48) groups by concealed randomization. Written informed consent was taken from each participant. Baseline data was collected during cycle one by using Anxiety depression and stress scale. The patients in the experimental group were taught Diaphragmatic breathing, systematic relaxation and alternate nostril breathing and Joints and Gland neck and shoulder exercises, and were instructed to practice them twice daily at home. They were supervised in practicing these when they received second, third, fourth, fifth and sixth cycles of chemotherapy. Participants in control group received routine care. Data was again collected after 21 days during second, third, fourth, fifth and sixth cycles of chemotherapy.

**Results:** Analysis revealed that at the baseline breast cancer patients in control and experimental group were homogenous in terms of their Sociodemographic and anxiety depression and stress scores. After the yoga intervention the experimental group showed statistically significant difference in anxiety scores from control group during second, third and sixth cycles (p 0.01, p 0.02, p 0.02), in depression score during the second, third, fourth, fifth and sixth cycles (p 0.02, p 0.02, p 0.02, p 0.001, p 0.000), and in stress scores during third cycle (p 0.01) of chemotherapy.

**Conclusions:** On the basis of findings of the study it was concluded that yoga was effective in reducing the anxiety, depression and stress of breast cancer patients undergoing chemotherapy. Therefore, it is recommended as complementary therapy for patients receiving treatment for cancer.

**Keywords:** Breast cancer, Chemotherapy, Stress level, Yoga

### INTRODUCTION

Breast cancer is the second most common cancer in the world and, by far, the most frequent cancer among women with an estimated 1.67 million new cancer cases diagnosed in 2012 (25% of all cancers).<sup>1</sup> Cancer patients

receiving chemotherapy for cancer treatment experience many symptoms of side effects. These symptoms of side effects affect them physically as well as psychologically and exert a negative influence on the treatment and recovery from the disease.<sup>2</sup> Depression is the most frequently related symptom of cancer which constitute to a psychological disorder. Depression becomes worse

during chemotherapy and persists for a long time even after the completion of chemotherapy.<sup>3</sup>

Nurses as important part of the health care team and as care provider, need to increase the use of alternative therapies to improve the physical and psychological performance and feeling of well-being of cancer patients receiving cancer treatment.<sup>4</sup>

Mokhtari Nouri J et al stated that there are variety of commonly used relaxation techniques such as progressive muscle relaxation, imagery, relaxation, Benson relaxation, deep relaxation, selected relaxation and meditation.<sup>5</sup>

Several studies have assessed the effects of yoga on depression, anxiety and stress in breast cancer patients undergoing chemotherapy. Banerjee B et al mentioned a significant decrease in the Hospital Anxiety and Depression Scale scores in the yoga intervention group of breast cancer patients during radiotherapy, whereas the control group displayed an increase in these scores.<sup>6</sup> Rao MR et al. reported an overall decrease in both self-reported state anxiety ( $p < 0.001$ ) and trait anxiety ( $p = 0.005$ ) in yoga group of breast cancer patients undergoing conventional treatment as compared to controls.<sup>7</sup>

Therefore, the present study aimed to determine the effectiveness of yoga on anxiety, depression and stress level (anxiety, depression and stress) of breast cancer patients undergoing chemotherapy.

## METHODS

**Research Approach:** Quantitative Research design was used for the present study. **Research Design:** Randomized Clinical Controlled Trial with Time series design was used in the present study. **Setting:** Present study was carried out at the Cancer Research Institute, Swami Rama Himalayan University Dehradun, Uttarakhand. **Population:** The population of the present study comprised of female patients diagnosed with breast cancer and undergoing chemotherapy belonging to states of Uttarakhand and Uttar Pradesh. **Sample:** Female patients diagnosed with breast cancer and undergoing chemotherapy in Cancer Research Institute, Swami Rama Himalayan University, were selected as sample in the study. **Sample size Calculation:** Sample size calculation was based on previous published literature, at 80 % power of the study ( $\beta$ ) and at 5% level of significance ( $\alpha$ ). Considering 10 % dropout the researcher planned to enroll 50 patients in each group. **Sample size:** A total of 100 breast cancer patients, who were receiving six cycles of chemotherapy were recruited in the present study. **Sampling technique:** Consecutive sampling technique was adopted with concealed randomization to experimental and control groups. Sealed envelopes were used to randomize breast cancer patients into one of two groups (experiment and control) using a lottery randomization process.

## Inclusion criteria

*Breast cancer patients were included if they were*

- Diagnosed to have breast cancer and had undergone breast surgery as primary treatment and were scheduled for receiving adjuvant chemotherapy,
- Females patients of all age groups,
- Willing to participate in the study,
- Not practicing yoga regularly,
- Could follow instructions related to yoga in Hindi language,
- Willing to practice yoga regularly at home,
- Having Zubrod's performance status 0-2(ambulatory >50 % of the time).

## Exclusion criteria

*Breast cancer patients were excluded if they were*

- Having any known metastasis,
- Received chemotherapy before surgery,
- Received chemotherapy after radiotherapy,
- Terminally ill.

## Data collection tool

In the present study Hindi version of ADSS (Anxiety Depression and stress Scale) was used to collect the data. ADSS-BSPSA (By Pallavi Bhatnagar, et al. Anxiety, Depression and Stress Scale). ADSS consisted of total 48 items divided in three subscales which are:

- Anxiety subscale-it comprised of 19 items covering various symptoms that are manifestation of anxiety.
- Depression scale-it consisted of 15 items representing the different symptoms of depression.
- Stress subscale-it is a scale consisting of 14 items which covered the symptoms that people experience in the state of stress.

Scoring-Responses of the items are in terms of 'Yes' or 'No'. Each item is scored 1 if endorsed "Yes" and 0 if endorsed "No" the range of the score was 0-19 for anxiety subscale, 0-15 for depression subscale and 0-14 for stress subscale. Higher score indicated experiencing greater anxiety, depression and stress and vice-versa.

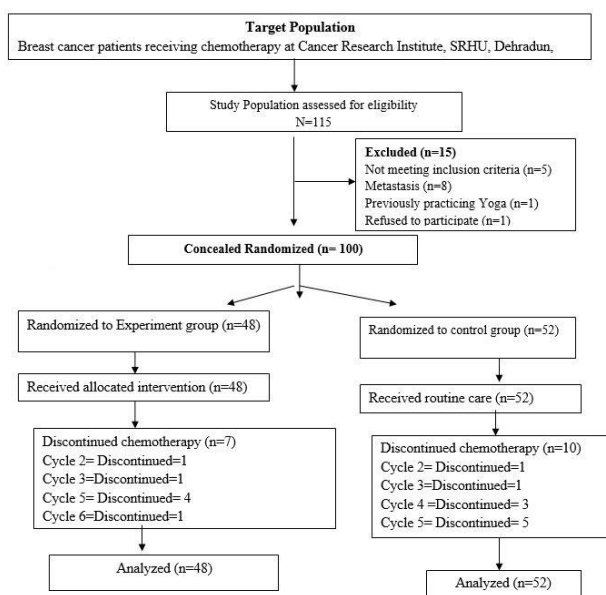
## Data collection procedure

Sealed envelopes with numbers written on them were prepared for concealed randomization of study participants to control and experimental groups. All participants were ambulatory and had a Zubrod's performance status score of 0-2.

Based on inclusion and exclusion criteria, investigator identified the eligible participants, and randomized them to control and experiment groups. Purpose of the study

and process of the data collection was explained, and adequate information was given to the patients and their accompanying relatives, and an informed written consent was obtained from them. They were assured about the confidentiality of their data and their right to leave the study whenever they liked.

During First Cycle of chemotherapy, the investigator handed over Anxiety, Depression, and Stress Scale (ADSS) questionnaire to study participants in the experimental and the control groups to fill. The educated patients filled the questionnaire by themselves. The investigator assisted patients, who had no formal education and were not able to Hindi language, by reading the questionnaire to them and asked them to tick the option best, suited them.



**Figure 1: Consort diagram showing patient recruitment.**

Followed by that, the investigator explained to patients in the experimental group about the benefits of performing yoga during the period of receiving chemotherapy and taught them yoga by demonstrating the steps of diaphragmatic breathing, systematic relaxation, alternate nostril breathing, and neck and shoulder exercises. The return demonstration was done by patients in front of the investigator. The researcher spent two hours with each study patients in the experimental group during the first cycle of chemotherapy.

The researcher provided each one of them a booklet on “Yoga during chemotherapy” which contained information regarding steps of performing diaphragmatic breathing, systematic relaxation, alternate nostril breathing and joints and glands exercises of neck and shoulder in words and pictorial form. The patients were asked to practice the above-mentioned steps twice in a day, morning and evening daily at home and to maintain the record of the same.

When patients came for the second, third, fourth, fifth and sixth cycles of chemotherapy the investigator met each of them individually and gave them Anxiety, Depression, Stress Scale (ADSS) questionnaire to fill and after that supervised them in practicing diaphragmatic breathing, systematic relaxation and alternate nostril breathing while they were receiving chemotherapy.

The investigator reminder calls to patients in the experimental group once in a week to remind them about continuation of yoga practice.

The investigator provided information on diet and care after chemotherapy to patients in the control group. The investigator followed each study participants of both groups all through six cycles of chemotherapy.

## RESULTS

### Analysis of data

Data was analyzed by using statistical software SPSS (version 20). Categorical data expressed as frequency and percentage. Kolmogorov–Smirnov test was used to check the normality of data. Quantitative data expressed as mean  $\pm$  SD and median (minimum-maximum). Chi-square test /fisher exact test was performed to test the proportion between the groups. Independent “t” test was performed to compare the statistical significance between the groups. Since variables followed skewed distribution therefore two groups were compared by using Mann-Whitney test. Within group effect was estimated by Friedman test. Wilcoxon Signed rank test was used to find the difference from the baseline score. Since, it was an experimental trial therefore confidence interval was estimated by using independent “t” test as per the CONSORT guidelines.  $P < 0.05$  was considered as statistical significant results.

### Socio-demographic characteristics of study participants in control and experiment group undergoing chemotherapy

Out of 100 breast cancers patient’s maximum (42.31%) participants were in the age group of 46-60 years in control group, and in experimental group maximum (45.83%) were having age  $\leq$  45 years. Maximum (34.61%) of participants in control group were having no formal education and in experimental group 25% were graduates. With regards to occupation, majority of the participants were homemakers, 92.31% in control and 83.33% in experiment group respectively. Majority of the participants were married, 86.53% in control and 91.66% in experiment group. Maximum (69.23%) in control and 47.92% in experiment group were having more than two children. Majority of the participants were not having history of substance use, 94.23% in control and 100% in experiment group. Majority (84.62%) in control and 66.67% in experiment group were not having history of cancer in the family, only 15.38% in control and 33.33%

in experiment group were having history of cancer in their family. Majority of the participants (65.38%) in the control group had not heard about breast cancer, whereas 52.08% in experiment group had heard about breast cancer.

**Effectiveness of yoga on anxiety, depression and stress level of breast cancer patients undergoing chemotherapy**

H1- There would be significant decrease in anxiety, depression and stress level scores of breast cancer patients undergoing chemotherapy, in experimental group than those in control group after implementation of Yoga, at p<0.05 level of significance.

At the baseline (cycle one) patients in both groups (control and experiment) had similar anxiety, depression and stress mean and median scores. There was no statistically significant difference between the groups. The p value for anxiety (p 0.098), depression (p 0.508) and stress (p0.169).

Therefore, it could be inferred that patients in both groups were homogenous in terms of anxiety depression and stress scores at baseline i.e. first cycle of chemotherapy, suggesting that the patients in two groups were from the same population. Thus, any changes in the findings could be interpreted with confidence as changes due likely to the yoga intervention (Table 1).

**Table 1: Comparison of anxiety, depression and stress scores between control and experimental groups at baseline (cycle one) N=100.**

Scale	Control group N=52		Experimental group N=48		P* value
	Mean±SD	Median (minimum-maximum)	Mean±SD	Median (minimum-maximum)	
Anxiety	3.78±2.12	3 (1-11)	3.27±2.11	3(1-14)	0.098
Depression	4.82±2.28	4.5(2-13)	4.60±2.27	4 (2-13)	0.508
Stress	2.5±1.73	2(0-8)	2.85±1.68	2 (0-9)	0.169

\*Wilcoxon rank-sum (Mann-Whitney) test, p<0.05

**Table 2: Comparison of (ADSS) anxiety subscale between control group and experimental group of breast cancer patients undergoing chemotherapy N=100.**

Chemotherapy Cycles	Anxiety Subscale			Deference (95% Confi. Internal)	p* Value Mann-Whitney Test
	Control Group Mean±SD Median (minimum-maximum)	Experimental Group Mean±SD Median (minimum-maximum)			
<b>Cycle I (N=100)</b>					
Control=52	3.78±2.12		3.27±2.11		0.10
Exp=48		3(1-11)		3(1-14)	
<b>Cycle II (N=98)</b>					
Control=51	4.41±3.05		3.46±2.85	0.94	0.0113**
Exp=47		3(2-17)		2(1-16) (0.24 -2.13)	
<b>Cycle III (N=96)</b>					
Control=50	4.58 ±3.55		3.52± 2.95	1.05	0.0235**
Exp=46		4(1-19)		2(2-18) (0.27 -2.38)	
<b>Cycle IV (N=93)</b>					
Control=47	3.93± 2.91		3.41± 2.39	0.52	0.421
Exp=46		3(0-14)		3(2-12) (0.56 -1.61)	
<b>Cycle V (N=84)</b>					
Control=42	3.92± 2.89		3.40± 3.13	0.52	0.133
Exp=42		3(1-13)		2(2-18) (0.78 -1.83)	
<b>Cycle VI (N= 83)</b>					
Control=42	4.30 ±3.32		3.48 ±3.05	0.82	0.022**
Exp=41		3(1-15)		2(2-14) (0.57 -2.21)	
P value Friedman test	<0.000		<0.000		

\* p<0.05 \*\*Significant

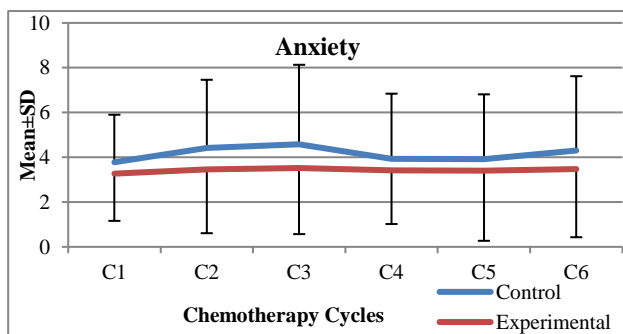
Anxiety subscale- The mean anxiety scores in the control group increased slightly from the baseline in the second and third cycles and decreased in the fourth and fifth cycles and again increased in the sixth cycle, showing significant within the group difference. However, in the experimental group the anxiety scores remained almost same throughout six cycles. The experimental group showed statistically significant difference from control group during second, third and sixth cycles (p 0.01, p 0.02, p 0.02). It could be inferred that yoga was effective in maintaining the low-level anxiety in breast cancer patients undergoing chemotherapy in the experimental group (Table 2 and Figure 2).

Depression subscale- The mean depression scores in the control group was almost same over a period of six cycles. However, in the experimental group the depression scores decreased significantly in cycle two, three, four, five and six from the baseline. The experimental group showed statistically significant difference from the control group at second, third, fourth, fifth and sixth cycles of chemotherapy (p0.02, p 0.02, p 0.02, p0.001, p0.000) respectively. It was interpreted that yoga was effective in decreasing depression in breast cancer patients undergoing chemotherapy in the experimental group (Table 3 and Figure 3).

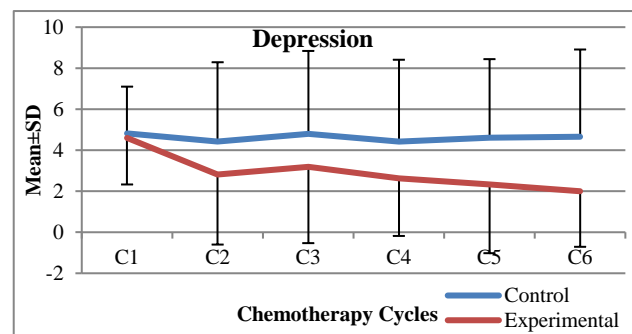
**Table 3: Comparison of (ADSS) depression subscale between control group and experimental group of breast cancer patients undergoing chemotherapy N=100.**

Chemotherapy Cycles	Depression Subscale			p* Value Mann-Whitney Test
	Control Group Mean±SD Median (minimum-maximum)	Experimental Group Mean±SD Median (minimum-maximum)	Deference (95% Confi. Internal)	
<b>Cycle I (N=100)</b>				
Control=52	4.82± 2.28	4.60±2.27		0.508
Exp=48	4.5(2-13)	4(2-13)		
<b>Cycle II (N=98)</b>				
Control=51	4.3± 3.86	2.82± 3.42#	1.60 (0.13 - 3.07)	0.0208**
Exp=47	3(1-14)	1(1-13)		
<b>Cycle III (N=96)</b>				
Control=50	4.8± 4.04	3.19± 3.72#	1.60 (0.02- 3.18)	0.0278**
Exp=46	4.5(0-15)	2(0-13)		
<b>Cycle IV (N=93)</b>				
Control=47	4.42± 3.99	2.63± 2.81#	1.79 (0.38 - 3.21)	0.026**
Exp=46	4(0-14)	2(0-10)		
<b>Cycle V (N=84)</b>				
Control=42	4.61± 3.83	2.33± 3.35#	2.28 (0.72- 3.85)	0.0014**
Exp=42	4.5(0-14)	1(0-12)		
<b>Cycle VI (N= 83)</b>				
Control=42	4.66 ±4.25	2± 2.71#	2.66 (1.10- 4.22)	0.0009**
Exp=41	3.5(0-14)	1(0-9)		
P value Friedman test	<0.000	<0.000		

\* p<0.05 \*\*Significant #Wilcoxon Signed rank test (significant)

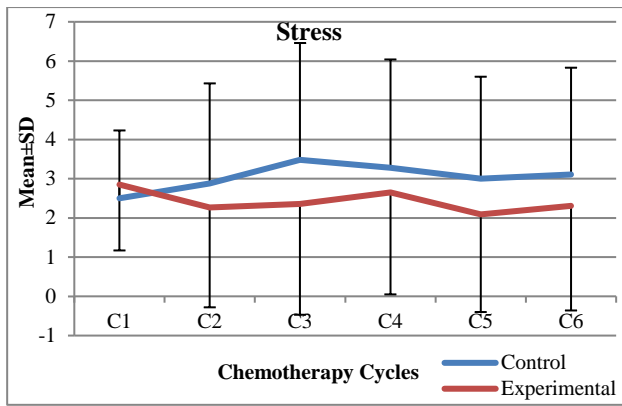


**Figure 2: Line graph showing comparison of mean ± standard deviation scores of anxiety between breast cancer patients undergoing chemotherapy in experimental and control groups.**



**Figure 3: Line graph showing comparison of the mean ± standard deviation scores of depressions between breast cancer patients undergoing chemotherapy in experimental and control groups.**





**Figure 4:** Line graph showing comparison of the mean  $\pm$  standard deviation scores of stress between breast cancer patients undergoing chemotherapy in experimental and control groups.

Stress Subscale- the mean stress score in the control group increased significantly in the third and fourth cycles from the baseline score. In the experimental group the scores differed statistically from the baseline score in the second, third and fifth cycles.

The experimental group showed statistically significant difference from the control group at third cycle ( $p < 0.01$ ). It could be inferred that yoga was effective in maintaining low level stress in breast cancer patients undergoing chemotherapy in the experimental group (Table 4 and Figure 4).

The results of the present study revealed that at the baseline participants of both the group had low level of symptoms of anxiety, depression and stress. But as the chemotherapy cycles continued the participants in the control group reported more anxiety, depression and stress whereas the participants in the experimental group reported decrease in depression and stress level and maintained low level of anxiety. Therefore, it could be interpreted that yoga was effective in maintaining low level of anxiety and reducing the symptoms of depression and stress of breast cancer patients in the experimental group compared to control group. Therefore, the researcher rejected the null hypothesis and accepted the alternate hypothesis stating that yoga was effective in reducing the anxiety, depression and stress level of breast cancer patients undergoing chemotherapy in the experimental group compared to the control group.

**Table 4:** Comparison of (ADSS) stress subscale between control and experiment group of breast cancer patients undergoing chemotherapy N=100.

Chemotherapy Cycles	Stress Subscale		Deference (95% Confi. Internal)	p* Value Mann-Whitney Test
	Control Group Mean $\pm$ SD Median (minimum-maximum)	Experimental Group Mean $\pm$ SD Median (minimum-maximum)		
<b>Cycle I (N=100)</b>				
Control=52	2.5 $\pm$ 1.73	2.85 $\pm$ 1.68		0.169
Exp=48	2(0-8)	2(0-9)		
<b>Cycle II (N=98)</b>				
Control=51	2.88 $\pm$ 2.55	2.27 $\pm$ 2.55#	0.60	0.1201
Exp=47	3(1-13)	2(1-11)	(0.41- 1.63)	
<b>Cycle III (N=96)</b>				
Control=50	3.48 $\pm$ 2.98	2.36 $\pm$ 2.83	1.11	0.016**
Exp=46	3(0-14)#	1.5(0-10)#	(0.07 - 2.29)	
<b>Cycle IV (N=93)</b>				
Control=47	3.28 $\pm$ 2.76	2.65 $\pm$ 2.60	0.63	0.184
Exp=46	3(0-12)#	2(0-10)	(0.46 - 1.72)	
<b>Cycle V (N=84)</b>				
Control=42	3 $\pm$ 2.60	2.09 $\pm$ 2.49	0.90	0.086
Exp=42	3(0-12)	1(0-10)#	(0.20 -2.01)	
<b>Cycle VI (N= 83)</b>				
Control=42	3.11 $\pm$ 2.72	2.31 $\pm$ 2.67	0.80	0.099
Exp=41	2(0-10)	1(0-9)	(0.37 -1.98)	
P value Friedman test	<.0001**	<.0001**		

\*  $p < 0.05$  \*\*Significant #Wilcoxon Signed rank test (significant)

**DISCUSSION**

The present study evaluated the effect of yoga on anxiety, depression and stress level of breast cancer patients

undergoing chemotherapy. The results revealed that breast cancer patients undergoing chemotherapy in the control and the experimental groups had anxiety mean scores (3.78 $\pm$ 2.12 and 3.27 $\pm$ 2.11) at the baseline and the

anxiety level slightly increased in control group throughout the six cycles ( $4.30 \pm 3.32$ ) of chemotherapy but the experiment group had same mean scores ( $3.48 \pm 3.05$ ). Patients in both groups also had symptoms of depression with mean scores ( $4.82 \pm 2.28$  and  $4.60 \pm 2.27$ ) at the baseline, the depression scores remained same ( $4.66 \pm 4.25$ ) throughout the six cycles of chemotherapy in the control group but the depression mean scores decreased in the experimental group over the time period ( $2 \pm 2.71$ ). The stress mean scores of the control and the experimental groups were ( $2.5 \pm 1.73$  and  $2.85 \pm 1.68$ ) at the baseline, the stress scores slightly increased in the control group ( $3.11 \pm 2.72$ ) throughout the six cycles of chemotherapy but in the experimental group the stress scores remained similar to the baseline throughout six cycles of chemotherapy. The results of the present study were supported by the study conducted by Pandey M et al (2006) on distress, anxiety, and depression in cancer patients undergoing chemotherapy reported that the mean anxiety scores were  $3.33 \pm 3.5$  while for depression it was  $4.07 \pm 3.24$ .<sup>8</sup> Dhruva A et al revealed that treatment group showed gradual improvements in stress, sleep disturbance, anxiety, and mental quality of life at both the midpoint and study endpoint.<sup>9</sup>

Similar Sudarshan M studied yoga therapy for breast cancer patients. They reported a consistent trend in decreased scores on the anxiety and depression scales of the Hospital Anxiety and Depression Scale questionnaire, although without statistical significance.<sup>10</sup>

Similarly, Saniah AR, Zainal NZ reported breast cancer patients undergoing chemotherapy experienced high level of depressive and anxiety symptoms. However different coping strategies were adopted to cope with their illness, chemotherapy treatment, practical and family problems, emotional and physical symptoms.<sup>11</sup> Another study by Shayan A. et al on effectiveness of stress management on the quality of life and stress of women suffering from breast cancer reported a significant difference in the average scores of stress in the test and control groups before and after the intervention ( $P < 0.000$ ) and stress of the test group compared to the control was reduced in the post-test and follow-up.<sup>12</sup>

The results were further supported by randomized clinical trial conducted by Charalambous A et al reported that intervention group's mean anxiety score and depression score changes were significantly different compared to the control's ( $b = -29.4$ ,  $p < 0.001$ ;  $b = -29.4$ ,  $p < 0.001$ , respectively).<sup>13</sup>

## CONCLUSION

Therefore, on the basis of results of the present study it was concluded that yoga was effective in reducing the symptoms of anxiety, depression and stress level of breast cancer patients undergoing chemotherapy.

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