Effect of mindfulness-based intervention on perceived stress among breast cancer patients undergoing chemotherapy

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Abstract

Introduction: Breast cancer is the second most prevalent disease among women in India and one of the most dangerous and lethal. Chemotherapy-treated breast cancer patients may have perceived stress, which is defined as emotions of mental or physical exhaustion that make them feel angry or anxious. Mindfulness-based intervention (MBI) gives some ideas in line with the conventional mindfulness technique. **Purposes:** (i) To assess the effect of MBI on perceived stress among breast cancer patients undergoing chemotherapy. (ii) To determine the association between perceived stress with selected demographic variables among breast cancer patients undergoing chemotherapy. **Methods:** The current quantitative pre- and postexperimental study was carried out in two oncology departments of selected cancer hospitals, Bhubaneswar. A total number of 40 breast cancer patients of perceived stress receiving chemotherapy and data were gathered by using a self-structured socio-demographic proforma and a structured Perceived Stress Scale 10. The experimental group received MBI, and a posttest was conducted on the 17th day on both the groups after 10 days of the termination of intervention. This MBI was provided to breast cancer patients for five sessions over five days continuously, each session for 45 min with mindfulness breathing exercises, progressive muscle relaxation techniques, practising meditation, and guided imagery technique. **Results:** The study findings illustrated that reduction of perceived stress among female breast cancer patients undergoing chemotherapy with ($t = 2.2463$) ($P = 0.0306$) at the $P < 0.05$; furthermore, there is one socio-demographic variable which had association with perceived stress that is history of psychiatric illness ($\chi^2 = 14.1176$) ($P = 0.0009$) and others had no association with perceived stress. **Conclusion:** MBI was an effective therapy for reducing the perceived stress of breast cancer patients undergoing chemotherapy.

Keywords: Breast cancer patients, chemotherapy, effect, mindfulness-based intervention (MBI), perceived stress

Introduction

"Optimism is the faith that leads to achievement. Nothing can be done without hope and confidence."

-According to Helen Keller

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Cancer is the largest cause of death globally, with breast cancer being one of them, afflicting 2.3 million women worldwide in 2020 and taking the lives of 685000 people.[1] According to WHO, men account for 0.5–1% of all breast cancer cases approximately.[2] Breast cancer is expected to have a projected burden of over 3 million new cases and 1 million fatalities by 2040.[3] In the 140 nations out of 184 in the globe, it is the cancer that is most often diagnosed in women.[4] Breast cancer is the most common cancer among Indian females, with an age-adjusted prevalence of 25.8 per 100,000 women and a fatality

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rate of 12.7 per 100,000 women.[5] According to the American Cancer Society, around 2,700 males were having breast cancer in 2022, compared to 287,000 women.[6] According to **The Centers for Disease Control and Prevention,** 11% of incidents of breast cancer in women under 45 are considered to be general. This year, breast cancer is predicted to affect 26,393 women under the age of 45.[7]

Patients with breast cancer have a worse survival rate in India than in Western nations, owing to the early age of onset, late stage of illness at presentation, delayed commencement of final care, and inadequate/fragmented treatment.[8,9] People are developing breast cancer as a result of lifestyle changes such as consuming more alcohol, having fewer children, using birth control pills, using menopausal hormone treatment (postmenopausal hormones), financial troubles, personal problems, and so on.[10] They are suffering from physical and psychological troubles as a result of a deadly illness condition, such as pain, alopecia, nausea, anxiety, stress, depression, lack of appetite, and so on.[11,12]

There are several therapies available around the globe, including pharmaceutical treatment and psychotherapy. Chemotherapy is a type of pharmaceutical treatment, while mindfulness-based intervention (MBI) is a type of psychotherapy. Chemotherapy-treated breast cancer patients may have perceived stress, which is defined as emotions of mental or physical exhaustion that make them feel disappointed, angry, or anxious.[13,14] Perceived stress comes from the disease condition and is one of the most crucial psychological variables since it measures how unpleasant, unexpected, and unpredictable person's life circumstances are. Mental health problems have a huge impact on the global burden of sickness. Stress is the fundamental problem with this disease that affects everyone on the planet.[15,16]

Treatment modalities that employ a mindfulness strategy are known as MBIs which have another names mindfulness-based cognitive therapy, mindfulness-based stress reduction therapy, etc., found to be effective for stress reduction among breast cancer patients. MBIs stress some ideas in line with the conventional mindfulness technique, such as acceptance, nonjudgment, and objectivity of all thoughts, feelings, and experiences.[17] The mindfulness methodology is used in MBIs, which are psychotherapeutic treatments. Primary care is an important health care setting for managing common chronic illnesses, and a successful MBI tailored for this environment might assist millions of people throughout the world.[18] All therapy practitioners can provide MBI to those in need.

MBI is a mental exercise that entails consciously and thoroughly acknowledging one's current experience.[19] The main goal of MBIs is to approach therapy through a stress-reduction perspective. It has seven components: Sensation, Judgement, Memory, Feeling, Imagination, Thought, and Belief.[20] It is a comprehensive package comprising mindfulness breathing exercises and techniques of stress management.[21,22]

Previous studies have suggested that MBI is a very resourceful tool for stress relaxation in breast cancer survivors and mental health conditions. Due to the scarcity of the literature in India and Odisha and the practice of the therapy, this study has been opted.

Methods

Design and sample

The current research is quantitative. The inquiry lasted nine months and used the purposive sampling approach. The study was done in the inpatient oncology departments of two distinct cancer hospitals (Experimental group: Sparsh and Control group: PBMH hospital) in Bhubaneswar. The population of the study consisted of breast cancer patients (adult age group) (40) in these two hospitals in which 20 were in the MBI group and 20 were in the control group. The study's variables were the dependent variable perceived stress, MBI as an independent variable, and demographic factors as needed.

Ethical aspect of the study

In order to conduct the study, an Ethics Committee Approval from the Institution Ethics Committee of KIIT University, KIMS, Bhubaneswar (KIIT/KIMS/IEC/1113/2023) and a written institutional permission, from the centre where the study was conducted were obtained. Individuals who were included in the study were informed about the objective of the study and their informed consents, both verbal and written, were received.

Data collection

The data of the study were collected by using the Perceived Stress Scale (PSS 10) and demographic data before starting the administration. The entire questionnaire was completed within 15–20 min. The study included 40 female breast cancer patients undergoing chemotherapy (Interventional group: 20, Control group: 20) who satisfied the study's inclusion criteria, which included female breast cancer patients of adult age, cancer stages I, II, and III, and a score of 25 on the PSS 10 scale. The Perceived Stress score for breast cancer patients undergoing chemotherapy was used to measure the Perceived Stress Scale.

Criteria for sample selection
Inclusion criteria
The study included the following participants
- Breast cancer patients who were willing to participate.
- Female breast cancer patients of the adult age group with Stages I, II, and III.
- Who had a score ≥25 as assessed through the PSS 10 scale
- Understood Odia/English.

Exclusion criteria
The study excluded the following participants -
- Who did not receive the intervention completely.
- Who were very sick and medically unstable.

Instruments

Demographic and clinical variables

By interviews, a total of 21 demographic and clinical questionnaires were gathered from breast cancer patients receiving chemotherapy with felt stress. This was not scored and was solely used for analytical purposes. The goal of the investigation was conveyed. Age, religion, educational qualification, marital status, satisfied with family life, causes of perceived stress, no. of child, occupation, monthly income, family history of cancer, family history of cancer in first-degree relative, worried about child's likelihood of having cancer, history of psychiatric illness, history of psychiatric medicine, duration of illness, stage of breast cancer, cycle of taking chemotherapy, no. of chemotherapy cycles completed, undergone surgery of mastectomy, undergone radiotherapy, and location of the residence were all factors that were included in a 21-item self-structured socio-demographic proforma.

Perceived stress scale for breast cancer patients

The PSS 10 is a 10-item questionnaire designed to assess how much stress people believe they are under. The interpretation of the PSS 10 score was dependent on the breast cancer patients, resulting in a decrease in felt stress. The reactions of breast cancer patients having chemotherapy were used to score them. The ratings were consistent for statements with numbers 1, 2, 3, 6, 9, and 10: never (0), almost never (1), sometimes (2), fairly often (3), very often (4), and remaining statements with numbers 4, 5, 7, and 8: never (4), almost never (3), sometimes (2), fairly often (1), and very often (0). The PSS 10 scale was converted to Odia language for the reliability of the tool.

Intervention

The samples were then given MBI for five sessions over five days continuously, each session for 45 min with mindfulness breathing exercises, progressive muscle relaxation techniques, practising meditation, and guided imagery technique to the interventional group and nothing to be given to the control group. Data were collected from both the experimental and control groups on the first day. The experimental group received 45 min of mindfulness breathing exercise on the second day. On the third day, a recap and practise were provided to the same subjects for the first 10 min, followed by meditation using breathing techniques for 35 min. On the fourth day, participants were offered progressive muscle relaxation for 35 min after recapping and practising for 10 min. On the fifth day, recap and practise were done for the first 10 min, followed by guided imagery for 35 min [Figure 1]. Then, on the 17th day, a posttest was performed to determine the success of the therapy.

Analysis

SPSS 20.0 was used for inference and descriptive statistical analysis. Data were expressed in terms of their mean (standard deviations), as opposed to categorical variables, which were stated using frequency and percentage. To analyse the connections between demographic parameters and felt stress, paired and unpaired
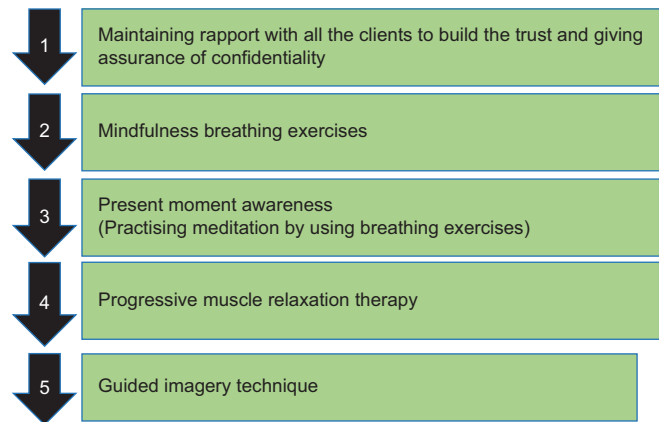

Figure 1: Diagram showing the techniques of mindfulness-based intervention

t tests, as well as Chi-square were performed, and the Mann–Whitney *U*-test was used to examine one of the demographic variables (number of cycles completed). The statistical significance level for the investigation was established at $P < 0.05$.

Results

The analysis included 40 study participants—20 in the interventional group and 20 in the control group—who fulfilled the exclusion and inclusion criteria. To analyse socio-demographic characteristics [refer to Table 1] and degree of perceived stress [refer to Figure 2], the distribution of frequencies and percentages was determined. [A paired *t*-test, unpaired *t*-test [refer to Tables 2 and 3] was used to assess the effect of the MBI on felt stress, and a Chi-square test was used to determine the relationship between perceived stress and selected socio-demographic characteristics.

Discussion

The impact of MBI on perceived stress among breast cancer patients following chemotherapy was supported in this study. According to the study findings, MBI aided study participants in overall stress reduction.

The current study's findings are consistent with those of a study conducted in 2022 by Jia-Yuan Zhang JY *et al.*[10] on the effectiveness of a nurse-led mindfulness-based Tai Chi Chuan (MTCC) program on perceived stress and anxiety and posttraumatic growth of breast cancer survivors and the result showed that compared with the wait-list control group, the Post Traumatic Growth (PTG) level in the MTCC group was much higher after the 8-week intervention and the follow-up ($F = 374.98$, $P < .000$) and MTCC increased the level of PTG, and the effect persisted 1 year after intervention. In addition, PSS ($F = 55.22$, $P < .000$) and SAS ($F = 148.92$, $P < .000$) scores were significantly decreased at T2 and T3.

An Randomized Controlled Trial (RCT) was conducted by Motahareh Mirmahmoodi *et al.* in 2020[11] on "The Effect of

Table 1: Socio-demographic variables of breast cancer patients (*n*=40)

		Interventional group (*n*=20) Mean±S.D		Control group (*n*=20) Mean±S.D	
Age		56.25±9.59		51.05±11.27	
No. of chemotherapy cycles completed		3.33±3.44		3.33±2.50	
Items	**Variables**	***n***	**%**	***n***	**%**
Religion	Hindu	18	90	16	80
	Muslim	2	10	2	10
	Christian	0	0	1	5
	Others specify	0	0	1	5
Educational qualification	No formal education	2	10	2	10
	Primary education	13	65	7	35
	Higher secondary	2	10	5	25
	Graduation	1	5	2	10
	Postgraduation and above	2	10	4	20
Marital status	Married	16	80	16	80
	Unmarried	1	5	1	5
	Divorce	0	0	1	5
	Separated	0	0	0	0
	Widow	3	15	2	10
Satisfied with family life	Yes	15	75	18	90
	No	5	25	2	10
Family history of cancer	Yes	4	20	5	25
	No	16	80	15	75
Causes of perceived stress	Family/Relationship issues	0	0	1	5
	Financial issues	1	5	3	15
	Disease-related concerns	19	95	16	80
	Caregiver burden	0	0	0	0
	Career-related concerns	0	0	0	0
	None of the above	0	0	0	0
	Others specify	0	0	0	0
Number of children	1	1	5	5	25
	2	13	65	11	55
	3	5	25	4	20
	0	0	0	0	0
	N/A	1	5	0	0
Occupation	Unemployed/housewife	9	45	5	25
	Student	0	0	0	0
	Business/Self-employed	2	10	8	40
	Private job	3	15	4	20
	Government job	6	30	3	15
Monthly family income	≥184,376	0	0	0	0
	92,191–184,370	0	0	0	0
	68,967–92,185	1	5	0	0
	46,095–68,961	4	20	0	0
	27,654–46,089	8	40	1	5
	9232–27,648	5	25	6	30
	≤9226	2	10	13	65
Family history of cancer in the first degree relative	Yes	5	25	4	20
	No	15	75	16	80
Worried about child's likelihood of having cancer	Yes	10	50	11	55
	No	10	50	9	45
History of psychiatric illness	Yes	3	15	0	0
	No	17	85	20	100
	If yes, specify	0	0	0	0
History of psychiatric Medicine	Yes	0	0	0	0
	No	19	95	20	100
	If yes, specify	1	5	0	0
Stage of breast cancer	Stage I	4	20	4	20
	Stage II	7	35	8	40
	Stage III	9	45	8	40

Contd...

Items	Variables	n	%	n	%
Duration of illness	6 months–3 years	18	90	16	80
	3–6 years	1	5	3	15
	6–9 years	1	5	1	5
	>9 years	0	0	0	0
Cycle of taking chemotherapy	Every week	12	60	8	40
	Every 2 weeks	6	30	8	40
	Every 3 weeks	2	10	4	20
	Every 4 weeks	0	0	0	0
Undergone surgery for mastectomy	Yes	12	60	4	20
	No	7	35	16	80
	If planned in future	1	5	0	0
Undergone radiotherapy	Yes	5	25	4	20
	No	15	75	15	75
Location of residence	If planned in future	0	0	1	5
	Near the centre (<20 km)	10	50	8	40
	Far away from centre (>20 km)	10	50	12	60

Table 1: Contd...

Table 2: Paired '*t*' test scores of perceived stress among breast cancer patients (N=n₁+n₂=40)

	Mean±S.D	Mean difference	Paired '*t*'	P
Experimental Group				
Pretest	26.65±3.6168	2.85	2.2463	0.0306
Posttest	23.8±4.372		(df=38)	
Control Group				
Pretest	27±5.16	−0.75	0.3728	0.7113
Posttest	27.75±7.369		(df=38)	

Table 3: Unpaired '*t*' test scores of perceived stress among breast cancer patients (N=n₁+n₂=40)

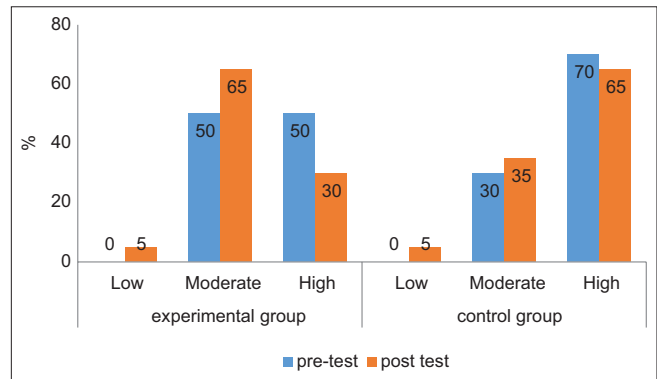| Experimental Group	Mean±S.D	Mean difference	Unpaired '*t*'	P
Pretest				
Experimental group	26.65±3.61	0.35	−0.24	0.805
Control group	27±5.16		(df=34)	
Posttest				
Experimental group	23.8±4.372	3.95	−2.061	0.0461
Control group	27.75±7.369		(df=31)	

Figure 2: Bar diagram showing the distribution of pretest and posttest scores of perceived stress in experimental and control groups

In this current study, the comparison of the mean pretest perceived stress score in the intervention group was 26.65 with a standard deviation of 3.6168, while the mean posttest score was 23.8 with a standard deviation of 4.372. After MBI, the mean difference for the degree of freedom 38 was 2.85, and the paired *t*-test value was 2.2463. As a consequence, the *P* value was 0.0306, which was highly significant.

A correlational study was conducted by Carrianne J Leschak *et al*.[12] in 2020 on associations between perceived stress, amygdala reactivity to social threat and C-reactive protein in breast cancer survivors and the result found that the employment status (employed vs retired/other) was significantly related to both perceived stress [t (18.52) = 2.154, P = 0.045] and threat-related amygdala activity [left: $t(35)$ = 1.620, P = 0.057; right: $t(35)$ = 2.355, P = 0.012], such that employed participants had lower stress and lower amygdala activity. However, controlling for age and employment status in analyses did not change the results. (No other demographic or socioeconomic variables collected were related to perceived stress or threat-related amygdala activity).

As per the present study, Inferential statistics, i.e., Chi-square was used to check the level of significance with the perceived

Mindfulness-Based Stress Reduction Group Counseling on Psychological and Inflammatory Responses of the Women With Breast Cancer" and the result showed the mean scores of perceived stress in the control group were 28.64 and 28.04 before and after the intervention, respectively, and the mean score of perceived stress in the intervention group decreased from 33.68 to 28.09 after the intervention. The perceived stress of the intervention group was significantly higher than that of the control group before the intervention, but this difference was not significant after the intervention. Considering the confounding effect of treatment type and perceived stress score before the study, the Analysis of Covaiance (ANCOVA) test showed no significant difference in perceived stress score after intervention (*P* = 0.14).[15,16]

stress of study participants on socio-demographic variables. The level of association between perceived stress of breast cancer patients undergoing chemotherapy with socio-demographic variables in the interventional group depicts the presence of a significant association between the socio-demographic variable history of psychiatric illness ($\chi^2 = 14.1176$, level of freedom = 2, and $P = 0.0009$) with preassessment level of perceived stress among breast cancer patients undergoing chemotherapy in the interventional group. Other demographic variables like religion ($\chi^2 = 1.1966$), educational qualification ($\chi^2 = 7.1499$), marital status ($\chi^2 = 0.7746$), satisfied with family life ($\chi^2 = 2.9744$), causes of perceived stress ($\chi^2 = 2.4561$), no. of children ($\chi^2 = 6.5010$), occupation ($\chi^2 = 4.0883$), monthly family income ($\chi^2 = 4.2628$), family history of cancer ($\chi^2 = 0.3686$), family history of cancer in the first-degree relative ($\chi^2 = 3.8632$), worried about child's likelihood of having cancer ($\chi^2 = 2.3590$), history of psychiatric medicine ($\chi^2 = 0.5668$), stage of breast cancer ($\chi^2 = 3.0077$), duration of illness ($\chi^2 = 1.1966$), cycle of taking chemotherapy ($\chi^2 = 2.7564$), undergone surgery/mastectomy ($\chi^2 = 1.3309$), undergone radiotherapy ($\chi^2 = 2.3322$), and location of residence ($\chi2 = 4.3590$) were not having any association with the pretest level of perceived stress in the interventional group.

Conclusion

The primary finding of this study was that after administering MBI, there was a substantial drop in the level of perceived stress of breast cancer patients receiving chemotherapy. As a result, MBI is beneficial in decreasing perceived stress in breast cancer patients receiving chemotherapy. There is a significant reduction in the level of perceived stress among breast cancer patients undergoing chemotherapy in the experimental group ($P = 0.0306$).

Implication for nursing

- **Nursing practice:** Knowledge of MBI will empower nurses to reduce the perceived stress and fasten the recovery process of breast cancer undergoing chemotherapy.
- **Nursing education:** The nurse should be equipped with up-to-date knowledge on MBI so they will be able to import appropriate knowledge on the reduction of perceived stress among breast cancer patients undergoing chemotherapy.
- **Nursing research:** This study finding can be utilised for literature review for researchers, used for guidance of researchers to make their study more effective.
- **Nursing administration:** Nurse administrators can encourage evidence-based practice and provide funds for conducting seminars, workshops, and conferences regarding the benefits of MBI.

Limitations

- Procedure is quite time taking.
- Varying breast cancer patients had varying degrees of concentration, for which they received personalized therapy.

Recommendations

Based on the findings of the study, the investigator proposed the following recommendations for further study,

- This study can be conducted with a large number of samples for better generalization.
- Other treatment strategies might be used to perform the study.
- The inquiry may employ a variety of individuals.
- The investigation might be carried out in a different geographical location.

Author contributions

Conception and design: Soumi Naskar, Mrs. Sanjukta Dixit.

Collection and assembly of data: Soumi Naskar.

Data analysis and interpretation: Soumi Naskar.

Manuscript writing: Soumi Naskar.

Final approval of manuscript: Soumi Naskar, Mrs. Sanjukta Dixit, Dr. Jigyansa Ipsita Pattnaik.

Accountable for all aspects of the work: Soumi Naskar.

Ethics accordance

In accordance with the declaration of Bhubaneswar, India.

Conflicts of interest

There are no conflicts of interest.

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