

Psychological Interventions in Chemotherapy-Induced Nausea and Vomiting in Women with Breast Cancer: A Systematic Review

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What's Known

- Nausea and vomiting are considered as the most common side effects of chemotherapy with a prevalence rate of 40% to 96%.
- Limited impact, high cost, and numerous complications of antiemetic pharmaceuticals as well as the simplicity, feasibility, and efficiency of psychological interventions have led patients to prefer non-pharmacological treatments.

What's New

- Psychological interventions such as cognitive-behavioral therapy, progressive muscle relaxation therapy, yoga, and guided imagery assuage chemotherapy-induced nausea and vomiting in women with breast cancer.

Abstract

Background: Nausea and vomiting are considered the most common side effects of chemotherapy, and they can affect different dimensions of the lives of women with breast cancer. Thus, the management of these complications is of great significance. Various interventions are drawn upon to alleviate nausea and vomiting. This review aimed to investigate the effects of psychological interventions on chemotherapy-induced nausea and vomiting among women with breast cancer.

Methods: A systematic review of clinical or quasi-experimental clinical trials published from 2000 to 2020 on the effects of psychological interventions on nausea and vomiting induced by chemotherapy in women with breast cancer was conducted via a comprehensive search in web search engines including Google Scholar and PubMed and databases such as Web of Science, Scopus, ScienceDirect, Cochrane Library, Springer, Elsevier, Magiran, and Scientific Information Database (SID). Medical Subject Heading (MeSH) was employed with the following keywords: nausea, vomiting, breast cancer, chemotherapy, and psychological intervention. The quality of the included studies was assessed via the Jadad scale.

Results: Nine studies were included in this systematic review. Psychological interventions in chemotherapy-induced nausea and vomiting in women with breast cancer consisted of cognitive-behavioral therapy, progressive muscle relaxation training, yoga, and guided imagery. The results indicated that in all the studies, except one, the interventions improved conditions and reduced chemotherapy-induced nausea and vomiting.

Conclusion: The results of this study indicated that psychological interventions such as cognitive-behavioral therapy, progressive muscle relaxation training, guided imagery, and yoga alleviated nausea and vomiting induced by chemotherapy in women with breast cancer. Therefore, it is recommended that these interventions be applied by healthcare providers to ameliorate nausea and vomiting in these patients.

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Introduction

Breast cancer is the most common type of cancer among women¹⁻³ and is responsible for 33% of all cancers and 19% of deaths from cancer in women.⁴⁻⁶ Breast cancer is the second leading cause of

death after lung cancer.^{5, 7} Chemotherapy is an important therapeutic option for women with breast cancer.⁸⁻¹⁰ However, it has several side effects such as nausea and vomiting, which are the most commonly reported complications.^{11, 12} The incidence of these complications has been reported to range between 40% and 96%.^{9, 10, 12} Women with breast cancer undergoing chemotherapy experience varying degrees of these complications, which can influence various aspects of their life including its quality.¹¹⁻¹⁴ Therefore, managing chemotherapy-related nausea and vomiting is of critical importance in these patients.^{10, 15, 16}

Different methods such as antiemetic drugs,¹⁷ acupuncture,^{13, 18} ginger administration,^{19, 20} and psychological interventions such as progressive muscle relaxation training (PMRT),^{16, 21} guided imagery,²² and yoga¹⁰ have been suggested for managing nausea and vomiting caused by chemotherapy in women with breast cancer. Studies indicated that pharmaceutical therapies were not sufficient to cope with these complications.^{16, 23} The limited impact, high cost, and numerous complications of pharmaceutical antiemetic drugs on the one hand and the simplicity, feasibility, and efficiency of psychological interventions (e.g., PMRT and guided imagery) on the other hand have led patients to prefer non-pharmacological treatments. Accordingly, the use of a combination of non-pharmaceutical and pharmaceutical therapies is recommended to alleviate chemotherapy-related nausea and vomiting given that these treatment strategies have different efficiencies.^{10, 24-26}

A comprehensive review of the available literature on this issue showed only one recent systematic review regarding a series of complementary therapies.²⁵ Nonetheless, the effects of psychological interventions on nausea and vomiting engendered by chemotherapy in women suffering from breast cancer have remained neglected. Given the dearth of adequate information on this field, the present study aimed to review the effects of psychological interventions on chemotherapy-induced nausea and vomiting among women with breast cancer.

Patients and Methods

Data Collection

A systematic review of articles published from 2000 to 2020 was conducted through a comprehensive search in web search engines including Google Scholar and PubMed, and databases such as Web of Science, Scopus, ScienceDirect, Cochrane Library, Springer, Elsevier, Magiran, and Scientific Information Database (SID). Moreover, the references of the selected

articles were used to find other relevant studies. The databases were searched from January 22 to July 15, 2020. The language of the articles was either Persian or English. Medical Subject Heading (MeSH) was utilized with the following keywords:

["Nausea" OR "Vomiting" OR "Emesis"] AND ["Breast Cancer" OR "Breast Neoplasm" OR "Mastectomy" OR "Breast Tumor" OR "Breast Carcinoma" OR "Mammary Cancer" OR "Breast Malignant" OR "Malignancy"] AND ["Chemotherapy" OR "Adjuvant Chemotherapy" OR "Neo-Adjuvant Chemotherapy" OR "Drug Therapy" OR "Adjuvant Drug Therapy" OR "Pharmacologic Therapy" OR "Pharmacotherapy" OR "Medicine Treatment"] AND ["Intervention" OR "Psychological Intervention" OR "Supportive Intervention" OR "Support Group" OR "Cognitive Behavioral Therapy" OR "Mindfulness" OR "Mindfulness-based Stress Reduction" OR "Yoga" OR "Psychotherapy" OR "Behavior Therapy" OR "Relaxation" OR "Hypnosis" OR "Counseling" OR "Group Counseling" OR "Guided Imaginary" OR "Acceptance and Commitment Therapy" OR "Spirituality Therapy" OR "Coping Therapy" OR "Emotion-Focused Therapy"]

Data Selection

All the studies considered for the systematic review met the following inclusion criteria: clinical or quasi-experimental clinical trials published from 2000 to 2020 on the effects of psychological interventions on chemotherapy-induced nausea and vomiting in women with breast cancer, reporting the sample size, presenting the full text in English or Persian, and reporting the results of the interventions. Studies that did not meet these criteria and those whose abstracts had been presented in congresses without full texts, were excluded from the study.

Data Extraction

After the recruitment of all relevant studies through systematic search, duplicated articles were excluded. Irrelevant articles, which were identified by titles, abstracts, or full texts, were also excluded. Two independent researchers selected the final papers. In the event of a disagreement, a third researcher made the final decision.

The required data were extracted after reading the abstract and full text of the eligible articles. The researcher used the PRISMA Checklist for reporting systematic reviews.²⁷ The required data consisted of author name, study type, study aim, study location, study instrument, sample size, participant age, publication year, intervention follow-up, and results. The data were then categorized and presented as part of the final report (table 1).

Table 1: Description of the results of the included studies

NO.	Authors/Year	Location	Aims	Age (year)	Sample Size	Tool	1- Type of Intervention 2- Duration of Interventions 3- Follow-up of Interventions	Results S: Significant NS: Nonsignificant
1	Aybar and colleagues ²⁸	Turkey	The effects of relaxation and breathing exercise on nausea and vomiting in patients with breast cancer undergoing chemotherapy	60	60	FLI-C VAS	1- Relaxation and breathing exercise 2- Six sessions (one session per day after chemotherapy sessions) for 15–20 minutes 3- Days of one to six (after chemotherapy)	Relaxation and breathing exercise decreased the frequency and severity of nausea and vomiting after chemotherapy. (S)/P<0.05
2	Kim and colleagues ²⁹	South Korea	The effects of psychological interventions based on CBT on women with breast cancer undergoing chemotherapy and at a high risk of depression	60	60	HADS QLQ-C30 POMS	1- Psychological interventions based on CBT 2- Seven sessions (one session per week) for 30–60 minutes 3- Before, immediately, and three and six weeks after the intervention	Psychological interventions based on CBT reduced nausea and vomiting. (S)/P<0.05
3	Anestini and colleagues ¹⁰	Canada	The effects of yoga on chemotherapy-induced nausea and vomiting in women with breast cancer	82	82	MANE STAI	1- Yoga 2- Eight sessions (one session per week) for 90 minutes 3- Before and at the end of eight sessions	Yoga did not reduce nausea and vomiting caused by chemotherapy. (NS) Nausea: P=0.6/Vomiting: P=0.4
4	Hosseini and colleagues ²²	Iran	The effects of guided imagery on chemotherapy-induced nausea and vomiting in Iranian women with breast cancer	18-70	55	MANE	1- Guided imagery 2- Three sessions (one session per chemotherapy course) for 20 minutes 3- Before and at the end of the intervention	Guided imagery decreased the frequency and severity of nausea and vomiting post-chemotherapy. (S)/P<0.05
5	Chen and colleagues ³⁰	Taiwan	The effects of relaxation with guided imagery on the physical and psychological symptoms of patients with breast cancer undergoing chemotherapy	65	65	HADS SDS	1- Relaxation with guided imagery 2- Seven sessions (one session per day after chemotherapy sessions) for 20 minutes 3- Before and immediately after the intervention	Relaxation with guided imagery decreased nausea and vomiting post-chemotherapy. (S)/P<0.05
6	Raghavendra and colleagues ³¹	India	The effects of an integrated yoga program on chemotherapy-induced nausea and emesis in patients with breast cancer	30-70	62	MANE STAI BDI FLIC	1- Yoga 2- Four sessions (one session per chemotherapy course) for 30 minutes, daily one-hour sessions at intervals between chemotherapy courses 3- Before and after four chemotherapy courses	Yoga decreased the frequency and severity of nausea and vomiting after chemotherapy. (S) Nausea: P=0.01/Vomiting : P=0.05
7	Molassiotis and colleagues ¹⁶	Hong Kong	The effectiveness of PMRT and imagery techniques in the management of chemotherapy-induced nausea and vomiting in women with breast cancer	30-59	71	MANE STAI POMS	1- Progressive muscle relaxation 2- Six sessions for one hour 3- Before and after chemotherapy (every day) and on day seven and day 14	The intervention reduced the number and duration of nausea and vomiting, especially within the first four days after chemotherapy. (S) P<0.05

8	Yoo and colleagues ³²	South Korea	Efficacy of PMRT and guided imagery in reducing chemotherapy side effects in patients with breast cancer	30	60	MAACL FACT-B and a researcher-made questionnaire for assessing nausea and vomiting	1- Progressive muscle relaxation 2- Six sessions (one session per chemotherapy course) for one hour 3- Before, immediately, and three and six months after the intervention	The intervention reduced nausea and vomiting, especially in the first three days after chemotherapy (S) Nausea: $P<0.001$ /Vomiting: $P<0.01$
9	Molassiotis and colleagues ²¹	Hong Kong	Effects of PMRT in the management of post-chemotherapy nausea and vomiting	7	7	MANE	1- Progressive muscle relaxation 2- Six sessions (first as a 30-minute session before chemotherapy and the reminder as daily one-hour sessions for five days after chemotherapy 3- Before and after chemotherapy every day for up to six days	The intervention reduced the severity and duration of nausea and vomiting after chemotherapy (S) severity of nausea: $P=0.003$ severity of vomiting: $P=0.005$ duration of nausea: $P=0.054$ duration of vomiting: $P=0.019$

FLIC: Functional Living Index for Cancer, VAS: Visual Analog Scale, CBT: Cognitive-behavioral therapy, HADS: Hospital Anxiety and Depression Scale, QLQ-C30: Quality of Life Questionnaire-Cancer, POMS: Profile of Mood State, MANE: Assessment of Nausea and Emesis Scale, STAI: State-Trait Anxiety Inventory, SDS: Symptom Distress Scale, BDI: Beck Depression Inventory, MAACL: Multiple Affect Adjective Check List, FACT-B: Functional Assessment of Cancer Therapy-Breast

Quality Assessment of the Articles

The quality of the included studies was assessed via the Jadad scale or the Oxford quality scoring system. This scale has direct and indirect sections to assess bias control in trial studies.³³⁻³⁷ The direct section consists of three items used to evaluate randomization, double-blinding, and withdrawals, and dropouts.^{33, 34, 38} The three direct items of quality in the Jadad scale are general and applicable to all areas of medical sciences. The present study employed the three direct items.

In this system, the first item is related to the randomization method. A score of one is given for randomization and a score of two for the citation of the steps and the use of an appropriate randomization method. The score ranges from zero to two. The second item refers to the double-blinding of the study. A score of one is given, if the term "double-blind" is mentioned in the study, while a score of two is assigned, if the steps and use of an appropriate blindness method are described. The score ranges from zero to two. The third item refers to the number and causes of sample dropout. A score of one is given, if the number of dropouts and the reasons for the dropouts are reported in the study. The score ranges from zero to one.³³ The overall score on the Jadad scale is five points. A Jadad score of less than three indicates poor quality, whereas a score of greater than three signifies good quality.^{33, 38, 39}

Results

Search Results and Descriptions of the Studies

Our search strategies yielded 31,756 articles, of which 231 studies were retained after the exclusion of duplicate and irrelevant studies. Our abstract and full-text review resulted in the exclusion of 193 and 29 studies, respectively. Ultimately, nine studies were selected for the systemic review (figure 1).

Reviewing the Studies

Study Participants

The participants in all the studies were women with breast cancer undergoing chemotherapy. The women ranged in age from 18 to 75 years old. All the studies mentioned their inclusion and exclusion criteria or the comorbidities of their patients.

Classification of the Interventions

Cognitive-behavioral Therapy

Only one study examined the effects of psychological interventions based on cognitive-behavioral therapy (CBT) on nausea and

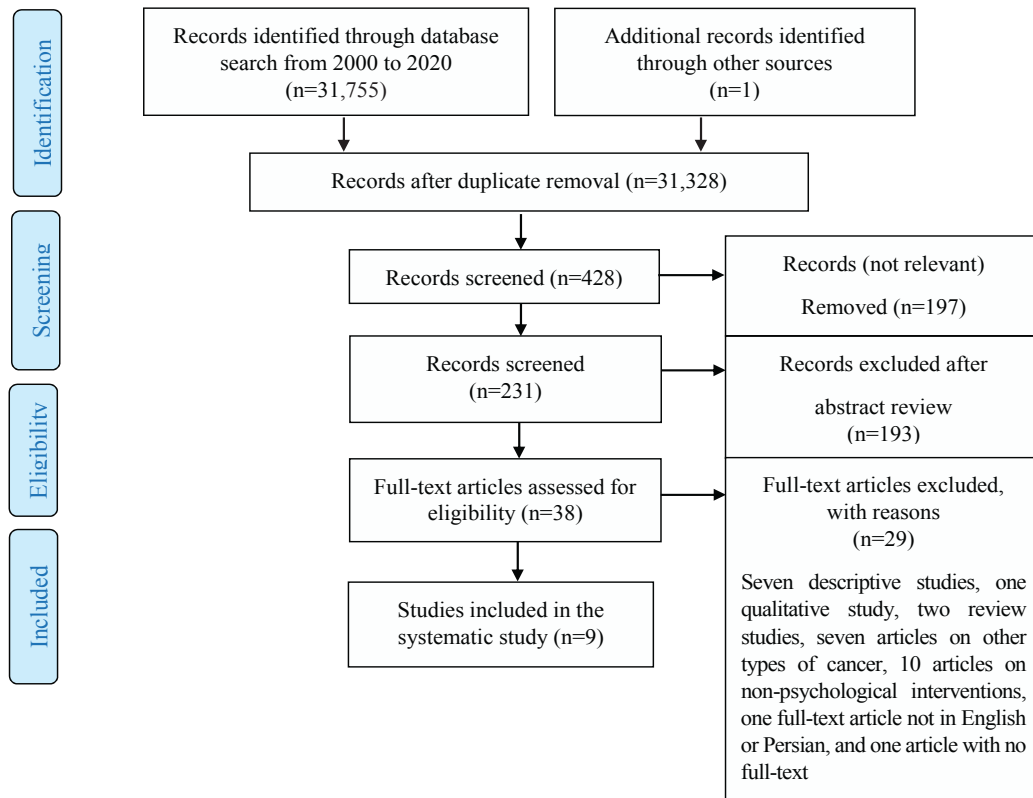


Figure 1: This figure shows the PRISMA flowchart of study selection.

vomiting generated by chemotherapy in women with breast cancer.²⁹ Seven intervention group sessions were held once per week for 30 to 60 minutes. The intervention sessions were in two forms of face-to-face and telephone counseling. Individual face-to-face meetings were conducted, when the patients visited the clinic (sessions one, four, and seven), and telephone counseling was conducted, when the patients did not visit the clinic (sessions two, three, five, and six). The intervention sessions provided information about chemotherapy, management of the side effects of chemotherapy, coping skills for negative emotions during the treatment process, emotional support, body image and self-concept training, coping strategies, stress management, social support, sharing of experiences related to sex life, and self-acceptance. Additionally, an oncology nurse led the intervention sessions, and the control group received routine care.²⁹

Progressive Muscle Relaxation Training

Four studies examined the effects of PMRT on chemotherapy-induced nausea and vomiting in women with breast cancer.^{16, 21, 28, 32} One of these investigations evaluated the effectiveness of PMRT and imagery techniques in the management of nausea and vomiting brought on by chemotherapy in women suffering from breast cancer. Six intervention group sessions were held once per week for two hours. The first

session of PMRT was conducted by a therapist in the hospital one hour before chemotherapy. The remaining sessions were held once per day at home for up to five days after chemotherapy. The intervention group was also provided with a CD containing instructions on how to perform PMRT techniques at home. The control group received routine care (antiemetic pharmaceuticals).¹⁶ Another study examined the effectiveness of PMRT and guided imagery in ameliorating chemotherapy-induced nausea and vomiting in women with breast cancer. Six intervention sessions were held once per chemotherapy course for one hour. The interventional sessions included breathing techniques and PMRT techniques with guided imagery. PMRT included the progressive muscle relaxation (tense-release) of 15 or 16 groups of muscles. The performance of the technique was supervised by a nurse in the hospital one hour before chemotherapy, and the patients received antiemetic drugs 30 minutes prior to chemotherapy. The control group received no intervention except for the routine antiemetic treatment according to the standard protocol 30 minutes before chemotherapy.³² Another investigation assessed the effectiveness of PMRT training in lessening post-chemotherapy nausea and vomiting in women with breast cancer. Six 30-minute individual sessions were held in total. The first session was conducted in

the hospital one hour before the commencement of chemotherapy. The remaining sessions were held once per day at home for up to five days after chemotherapy. PMRT included the progressive relaxation (tension-release) of 11 groups of muscles and deep breathing. A nurse led the intervention sessions.²¹ Another study assessed the effects of relaxation and breathing exercise on nausea and vomiting in patients suffering from breast cancer undergoing chemotherapy.²⁸ Six intervention group sessions were held once per day after chemotherapy sessions for between 15 and 20 minutes. The intervention sessions also provided information concerning chemotherapy, breathing techniques, and relaxation. A nurse led the intervention sessions, and the control group received routine nursing care.²⁸

Yoga

Two studies examined the effects of yoga on chemotherapy-induced nausea and vomiting in women with breast cancer.^{10, 31} One of these studies evaluated the effectiveness of eight yoga-based group sessions arranged once per week for 90 minutes. The yoga sessions included breathing techniques, relaxation, and meditation. During each session, the patients were educated about the importance and benefits of relaxation, definition and causes of stress, power of a concentrated mind and positive imagery, immune system function, benefits of breathing, and importance of daily yoga. During each session, the patients in the intervention group also received a DVD containing 20 to 40 minutes of yoga training techniques. The sessions held in the hospital were conducted by two yoga instructors.¹⁰ Another study examined the effectiveness of yoga in alleviating nausea and vomiting induced by chemotherapy in women with breast cancer. Four intervention sessions were held once per chemotherapy course for 30 minutes in the hospital, and the remaining sessions were held once per day and between chemotherapy courses for one hour at home. The intervention group received routine antiemetic medicines with a 30-minute yoga training session 30 minutes before chemotherapy. For daily exercise, a CD containing one hour of yoga training was provided to the intervention group. The quality of home-based training was examined once in 10 days by a yoga instructor. The control group received routine and supportive care, including a one-hour educational session about chemotherapy and its side effects, as well as anxiety management and diet control strategies. A yoga instructor led the intervention sessions.³¹

Guided Imagery

Two studies assessed the effects of guided imagery on chemotherapy-induced nausea and vomiting in women with breast cancer.^{22, 39} In one of these investigations, three 20-minute intervention sessions were held once per chemotherapy course. The participants were given a CD containing two 10-minute songs and featuring guided illustrations. The first soundtrack was a gentle piece of music with the soothing sound of a water stream and bird songs. The second soundtrack was also a gentle piece of music, accompanied by illustrations, to enable the patients to **visualize a safe and pleasant environment**. The intervention was held before chemotherapy commencement in the hospital. The patients were provided with small headphones, so that ambient sounds could be mitigated, and the environment could be kept calm and silent.²² The other study evaluated the effects of relaxation with guided imagery on the physical and psychological symptoms of patients with breast cancer undergoing chemotherapy. Each patient in the intervention group received one hour of relaxation with guided imagery training before chemotherapy and a CD for performing relaxation with guided imagery, 20 minutes daily at home for seven days after chemotherapy. The control group received routine care.³⁰

Tools

Chemotherapy-induced nausea and vomiting were the measured outcomes in all of the studies. Among the investigations, only one study used a researcher-made questionnaire to measure chemotherapy-induced nausea and vomiting.³² One study utilized the Symptom Distress Scale (SDS), and another employed the European Organization for Research and Treatment of Cancer (EORTC), Quality of Life Questionnaire-Cancer (QLQ-C30) to assess chemotherapy-induced nausea and vomiting.^{29, 30, 40, 41} In one of the studies assessed, the Functional Living Index-Cancer (FLIC) was applied to measure nausea, vomiting, and quality of life.^{28, 42} Five studies drew upon a self-report questionnaire, namely the Morrow Assessment of Nausea and Emesis Scale (MANE).^{10, 16, 21, 22, 31, 43} The State-Trait Anxiety Inventory (STAI) questionnaire and the Hospital Anxiety and Depression Scale (HADS) were used to measure anxiety and depression.^{10, 16, 29-31, 44, 45} In addition to measuring nausea and vomiting, two studies also assessed patient mood using the Profile of Mood State (POMS) survey.^{16, 29, 46} Another study also applied the Beck Depression Inventory (BDI) to measure depression.^{31, 47} Finally, one study recruited the

Table 2: Quality assessment of the articles based on the Jadad scale

NO.	Authors/ Year	Jadad Scale Direct Items			Total Score	Quality
		Was the study described as randomized?	Was the study described as double-blinded?	Was there a description of withdrawals and dropouts?		
1	Aybar and colleagues ²⁸	2	0	1	3	Good
2	Kim and colleagues ²⁹	2	0	1	3	Good
3	Anestin and colleagues ¹⁰	2	0	1	3	Good
4	Hosseini and colleagues ²²	0	0	1	1	Poor
5	Chen and colleagues ³⁰	2	0	1	3	Good
6	Raghavendra and colleagues ³¹	2	0	1	3	Good
7	Molassiotis and colleagues ¹⁶	1	0	0	1	Poor
8	Yoo and colleagues ³²	1	0	1	2	Poor
9	Molassiotis and colleagues ²¹	1	0	1	2	Poor

Multiple Affect Adjective Check List (MAACL) and Functional Assessment of Cancer Therapy–Breast (FACT-B) tools to measure anxiety/depression and quality of life, respectively.^{32, 48, 49}

Quality Assessment of the Studies

The abstracts of 191 studies and the full texts of 35 studies were reviewed. Nine articles, eight in the English language and one in the Persian language, which were published between 2000 and 2020, met the inclusion criteria of our systematic review and were analyzed. According to the Jadad scale, which was used to score the three direct items, five studies presented a complete description of the randomization process,^{10, 28-31} and one study applied non-randomization.²² Only one study failed to describe the number and reasons for the dropout fully.¹⁶ Considering the Jadad score of the three direct items, five of the evaluated studies were of good quality (table 2).^{10, 28-31}

Discussion

In the current systematic review of nine studies, we investigated the effects of psychological interventions on chemotherapy-induced nausea and vomiting in women with breast cancer and observed that psychological interventions such as CBT, PMRT, guided imagery, and yoga ameliorated nausea and vomiting and improved the quality of life.

CBT was one of the psychological interventions, which lessened nausea and vomiting caused by chemotherapy in women with breast cancer. Kim and colleagues reported that CBT reduced chemotherapy-induced nausea and vomiting in women with breast cancer through stress management, breathing and relaxation techniques, coping strategies, emotional support, body image and self-concept

training, and social support.²⁹ The results of studies by Pelekasis and others and Sheikh Abumasoudi and colleagues demonstrated that CBT alleviated stress, anxiety, and depression via the aforementioned mechanisms in women suffering from breast cancer undergoing chemotherapy.^{50, 51}

PMRT and relaxation were among the psychological interventions that relieved nausea and vomiting induced by chemotherapy in women suffering from breast cancer. Molassiotis and colleagues and Yoo and others reported the efficacy of PMRT in alleviating chemotherapy-induced nausea and vomiting in women afflicted with breast cancer.^{16, 32} The results of these studies are consistent with those reported by Molassiotis and colleagues.²¹ Additionally, Aybar and others found that relaxation lightened post-chemotherapy nausea and vomiting in women with breast cancer.²⁸ In their investigation, Suryono and colleagues claimed that relaxation and breathing exercises facilitated relaxation, and mind-body therapies not only assuaged tension and anxiety, but also significantly lessened the severity of nausea and vomiting in patients with nasopharyngeal cancer.⁵² These studies showed that relaxation and PMRT eased chemotherapy-induced nausea and vomiting via stress management and breathing and relaxation techniques.^{16, 28, 32, 52}

Yoga was another efficacious psychological intervention for managing chemotherapy-induced nausea and vomiting in women afflicted with breast cancer. Raghavendra and others showed that yoga relieved chemotherapy-induced nausea and vomiting in this woman population via breathing techniques and deep relaxation.³¹ Meanwhile, Anestin and colleagues reported that yoga reduced chemotherapy-induced nausea and vomiting in patients with breast cancer undergoing chemotherapy;

nevertheless, the results were not statistically significant.¹⁰ The participants in their study were selected from three different hospitals with different guidelines regarding care for patients with breast cancer undergoing chemotherapy. Furthermore, Anestin and colleagues failed to match their intervention and control groups with respect to parameters such as the stage of the disease, education level, and occupation. Consequently, it seems that the above-mentioned parameters might be the main reasons for the reported statistically insignificant impact of the interventions on nausea and vomiting following chemotherapy.

Guided imagery was another psychological intervention with an impact on nausea and vomiting induced by chemotherapy in women with breast cancer. In this regard, Hosseini and colleagues reported that guided imagery reduced the frequency and severity of post-chemotherapy nausea and vomiting in women suffering from breast cancer.²² The results of that study were consistent with the results reported by Chen and others.³⁰ According to Karagozoglu and colleagues, guided imagery had positive effects on chemotherapy-induced anxiety, nausea, and vomiting.⁵³ The results of these studies indicated that guided imagery diminished the side effects of chemotherapy such as nausea, vomiting, anxiety, depression, stress, pain, sleep disturbance, and fatigue through favorable, relaxing mental images and distractions.^{22, 30, 53} Previous research showed that pharmacological treatments fail to completely decrease the incidence of chemotherapy-induced nausea and vomiting. Therefore, non-pharmacological interventions are preferred by patients.²⁸

Overall, our article review showed that psychological interventions such as CBT, PMRT, yoga, and guided imagery could be employed as effective interventions to assuage chemotherapy-induced nausea and vomiting in women with breast cancer.^{21, 28, 31, 32} In most of the evaluated studies, interventions were implemented by specialists such as nurses, who had important responsibilities in the management of nausea and vomiting among patients with cancer undergoing chemotherapy.^{21, 29} In addition, the majority of the studies featured multiple follow-ups with consistent results, which could be the main reason for the efficacy of such interventions in alleviating nausea and vomiting experienced by women with breast cancer undergoing chemotherapy.^{16, 28, 29, 32} Still, these studies seem to have failed to take into account some significant factors. For instance, the study by Molassiotis and colleagues had

a very small sample size and lacked a control group for better comparisons, which might undermine the generalizability and validity of their study.²¹ Another case in point is the study by Yoo and others, who used a researcher-made questionnaire to assess nausea and vomiting among women suffering from breast cancer; they should, however, utilized a standardized questionnaire for this purpose, as did the other studies.³²

The fact that we had no access to the full text of some articles and excluded non-English and non-Persian studies can be regarded as the limitations of the present study.

Conclusion

The results of this study indicated that psychological interventions such as CBT, PMRT, guided imagery, and yoga improved chemotherapy-induced nausea and vomiting in women with breast cancer, with most of the studies subjected to scrutiny possessing good quality. Therefore, it is recommended that these interventions be applied by healthcare providers to reduce nausea and vomiting in women with breast cancer undergoing chemotherapy.

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Authors' Contribution

E.S: Acquisition of data, systematic search, independent review for eligibility, interpreted findings, drafting and revising the manuscript; Z.Sh: contributed in study design, participated in independent review for eligibility and edited the final manuscript and provided critical revision for important intellectual content; Z.H: contributed in study design, participated in independent review for eligibility and edited the final manuscript and provided critical revision for important intellectual content; F.E: conception of the work and definition of intellectual content, contributed in study design, did independent review for eligibility, identifying the studies and independently reviewing for eligibility, revising the manuscript; All authors have read and approved the final manuscript and agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are

appropriately investigated and resolved.

Conflict of Interest: None declared.

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