The Effect of a Mindfulness-Based Stress Reduction Program on Depression and Quality of Life in Cancer Patients

A Meta-Analysis Study

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Mindfulness-based interventions have been receiving growing attention in cancer care. This study was performed to determine the effect of a mindfulness-based stress reduction program on depression and quality of life in cancer patients. The screenings in the study were performed in January to May 2023 through the Cochrane Central Register of Controlled Trials (CENTRAL), PubMed, Web of Science, Science Direct, and YÖK Thesis Center databases. After the reviews, 14 studies were included in the study. This meta-analysis showed that mindfulness-based stress reduction programs were effective on depression (SMD: −0.363; 95% CI: −0.711 to 0.015; $Z = -2.042$; $P = .041$; $I^2 = 85.229\%$) and quality of life (SMD: 0.363; 95 CI%: 0.111-0.615; $Z = 2.822$; $P = .005$; $I^2 = 75.222\%$). The type of cancer (SMD: 0.385; CI: between 0.005 and 0.528; $P = .000$); duration of therapy (SMD: 0.243; CI: between 0.093 and 0.393; $P = .002$); the person providing therapy (SMD: 0.335; CI: between 0.133 and 0.507; $P = .001$); scale used (SMD: 0.290; CI: between 0.148 and 0.432; $P = .000$); and the origin of the study (SMD: 0.298; CI: between 0.158 and 0.438; $P = .000$) moderators were found to play a role in the effectiveness of a mindfulness-based stress reduction program on the quality of life of cancer patients. The mindfulness-based stress reduction program yields positive outcomes by reducing depression, enhancing the quality of life in cancer patients, and promoting overall mental well-being in individuals. **KEY WORDS:** *cancer, depression, meta-analysis, mindfulness-based stress reduction, quality of life* *Holist Nurs Pract* 2025;39(6):381–392

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INTRODUCTION

Cancer stands as one of the foremost challenges of our era. Throughout the 21st century, the incidence and global impact of cancer have steadily risen, making it the second most common cause of death. According to the Global Cancer Statistics Globocan 2020 Report, there were an estimated 19.3 million cancer diagnoses and 9.9 million cancer-related deaths.[1] This complex disease encompasses not only physical but also psychological and psychosocial dimensions, ranking as the second most prevalent disease, following heart disease, in many countries, including Turkey.[2] The surge in metabolic comorbidities, coupled with increased life expectancy and evolving lifestyles, contributes to the growing prevalence of cancer.[3] The Cancer Statistics 2023 Report predicts that the top 3 most frequently diagnosed cancer types in 2023 will be

prostate, lung, and colon cancer among men and breast, lung, and colon cancer among women.[4] For oncology patients, cancer poses a profound threat to their sense of purpose in life and their relationships with themselves and their surroundings. Many patients grapple with anxiety and fear during this journey.[5]

Mental health challenges are also prevalent among oncology patients.[6,7] Receiving a cancer diagnosis, a momentous event laden with stress, significantly increases the perceived burden of stress on these patients, evoking a range of emotional responses.[8] The diagnosis and treatment of cancer often bring about symptoms of anxiety, depression, and fatigue. It is not uncommon for oncology patients to report feelings of depression or for their family members to observe a drastic change in their mood. When depressive symptoms persist for 2 weeks or longer and occur daily, patients may be diagnosed with major depressive disorder, necessitating medication or professional psychiatric support. Importantly, depression also heightens mortality risks among oncology patients.[9,10]

A substantial percentage of cancer patients, up to 38%, exhibit clinically significant levels of depressive and anxiety symptoms within the first 5 years following their diagnosis. What is particularly concerning is that these symptoms often persist even after the cancer has been successfully treated. Depression and anxiety can have a profound impact on a patient's ability to adhere to their treatment regimen and effectively cope with their cancer, potentially exacerbating the progression of the disease. Several studies have reported a connection between depressive and anxiety symptoms and higher cancer mortality rates.[11-14] Given the potential bidirectional relationship between cancer and these emotional symptoms, it becomes crucial to incorporate psychological support into cancer treatment. In this regard, the swift integration of mindfulness-based interventions into the care of oncology patients emerges as a crucial step to reduce psychological issues and enhance their emotional and physical well-being.[15]

The literature has consistently reported positive outcomes from mindfulness-based interventions, particularly in reducing physical symptoms among oncology patients. These interventions have been shown to effectively reduce anxiety, depression, stress symptoms, fatigue, and sleep disturbances.[16] Approaches such as mindfulness-based stress reduction and mindfulness-based cognitive therapy have amassed strong evidence in the context of cancer care.[17,18] They not only enhance the quality of life for cancer patients but also significantly mitigate sleep problems and depression levels.[19-22]

The program, known as mindfulness-based stress reduction (MBSR), is a comprehensive approach that involves weekly group classes and independent practice utilizing various meditative techniques, including sitting meditation, body scanning, yoga, and walking meditations.[23] MBSR seeks to change how individuals "respond" to stressful situations by encouraging a mindful approach as opposed to an "automatic reaction." The program begins by educating participants about the psychophysiology of stress and emotions, equipping them with mindfulness skills to assess specific situations.[24,25] Following each session, participants are assigned mindfulness practices as homework for a week. These practices help them pay attention to their emotions, thoughts, and behaviors during moments of stress, both as part of the program and in their daily lives. Additionally, participants receive audio recordings to guide them through mindfulness meditation exercises.[26]

Originally developed to support the adaptation and quality of life of chronic pain patients, MBSR has also been applied in the context of cancer,[27,28] and empirical evidence underscores the positive impact of the MBSR program on both psychological quality of life (enhanced mindful self-compassion, increased self-compassion, greater cognitive flexibility, reduced depression, anxiety, anger, and stress) and physical quality of life (pain relief, improved physical mobility, better sleep patterns, etc).[29]

After all these considerations, this study aims to investigate the influence of the Mindfulness-Based Stress Reduction program on depression and overall quality of life in cancer patients.

MATERIALS AND METHODS

The study adhered to the PRISMA checklist (Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols Checklist).[30] Literature search, article selection, and data extraction were carried out independently by the first and second investigators to minimize potential bias. The quality assessment of the analyzed studies was performed by the researchers.

Inclusion and exclusion criteria

In this study, studies were screened using the PICOS (Patient, Intervention, Comparison, Outcomes, and Study Design):

- Study group: Cancer patients
- Intervention: Applying mindfulness-based stress reduction
- Comparison: Not applying mindfulness-based stress reduction
- Results: Quality of life and depression
- Study design: Experimental, quasi-experimental, published in Turkish and English.
- Case reports, reports, and reviews were not included in this meta-analysis.

Screening strategy

The search was conducted in the Cochrane Central Register of Controlled Trials (CENTRAL), PubMed, Web of Science, Science Direct, and YÖK Thesis Center databases in January to May 2023 using the keywords "cancer and mindfulness-based stress reduction" or "cancer and quality of life" or "cancer and depression" or "mindfulness-based stress reduction and depression and quality of life" in accordance with MeSH.

Selection of studies

The initial search yielded 13 238 records. After removing duplicate studies, 3267 studies underwent title and abstract screening. Following this evaluation, 78 studies were assessed based on their full texts, and 14 studies were ultimately included in the analysis (Figure 1).

Data extraction

Data extraction was performed using a data extraction form created by the researchers. Information regarding the main findings of the included articles, including author, publication year, research design, and duration of treatment, was collected using this data extraction tool (Table 1).

Research ethics

Since this research is a meta-analysis, it relies on existing studies in the literature.

Evaluation of the methodological quality of the studies

The quality assessment of the articles was carried out using quality assessment forms developed by the Joanna Briggs Institute, tailored to the specific research design. For this study, for randomized

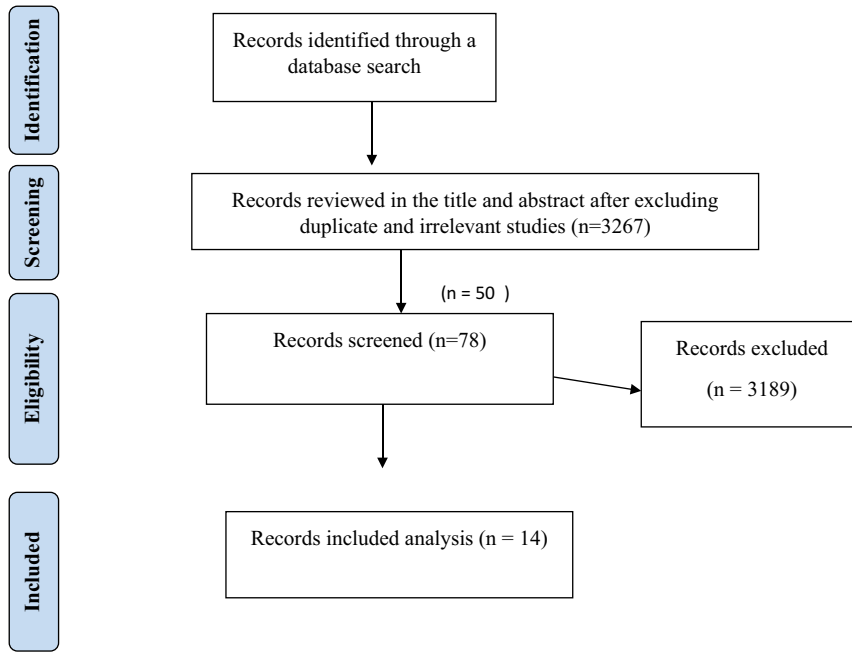

FIGURE 1. Selection of studies according to the PRISMA flow diagram.

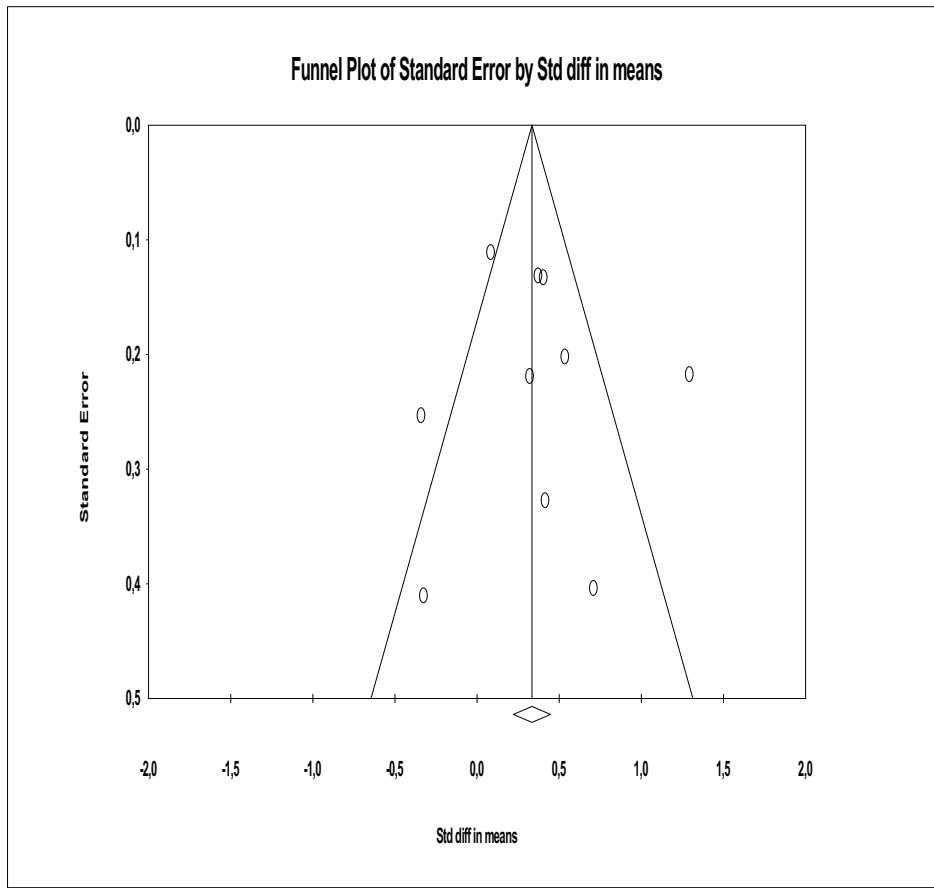

FIGURE 2. Funnel plot of the studies.

controlled trials, 13-question forms[45] and for quasi-experimental studies, 9-question forms[46] were utilized. These questions were answered with options such as "yes," "no," "uncertain," and "not applicable." The methodological quality level of the studies included in the research was categorized as "mediocre" if fewer than 50% of the items were rated as "yes," "moderate quality" if 51% to 80% of the items were rated as "yes," and "good quality" if more than 80% of the items were rated as "yes." The evaluation results for each study are presented in Table 1 under the "Quality Score" as part of the data analysis.

Data analysis

In this study, the statistical calculations were conducted using CMA Ver. 2. Heterogeneity among the included articles was evaluated through the Cochrane Q test and the Higgins I^2 test. A Higgins I^2 value greater than 50% was considered indicative of significant heterogeneity among the studies. For each outcome variable, the Standardized Mean Difference (SMD) was computed along with a 95% confidence interval (CI). In all statistical tests, a significance level of $P < .05$ was considered.

RESULTS

Meta-analysis results on the effect of a mindfulness-based stress reduction program on quality of life

The presence of publication bias concerning the quality of life was assessed using 2 methods: (1) a funnel scatter plot and (2) Egger's regression test.[47]

In the funnel plot, a crucial tool for detecting publication bias, it is observed that the studies within this dataset are evenly distributed at the top of the funnel, displaying a symmetrical pattern. This outcome suggests that there is no evidence of publication bias in this meta-analysis regarding the quality of life (Figure 2).

TABLE 1. Characteristics and Quality Scores of the Articles

Author (Publication Year)	Study Design	Country/ Continent of the Study	Sample Size	Measurement Tools	Type of Cancer	Duration of the Treatment	The Person Providing the Treatment	Quality Score
Reich (2017)[31]	Randomized Controlled	USA	Intervention group: 67 Control grubu:155	The Center for Epidemiological Studies Depression Scale Health-Related Quality of Life (SF-36)	Breast cancer	12 weeks	Research Assistant	Yes: 12/13 No:1/13 Uncertain: 0/13 Inapplicable: 0/13
Yildirim et al (2022)[32]	Randomized Controlled	Turkey	Intervention group: 65 Control grubu: 65	Beck Depression Inventory	Breast cancer	3 weeks	Nurse	Yes: 13/13
Wurtzen et al (2012)[33]	Randomized Controlled	Denmark	Intervention group: 133 Control grubu: 135	The Center for Epidemiological Studies Depression Scale	Breast cancer	8 weeks	Psychologist	Yes: 13/13
Liu et al (2019)[34]	Randomized Controlled	China	Intervention group: 53 Control grubu: 49	Self-rating Depression Scale (SDS) QoL Questionnaire Core 30 Items (QLQ-C30)	Thyroid cancer	8 weeks	Clinical researcher	Yes: 1013 No: 1/13 Uncertain: 1/13 Inapplicable: 1/13
Zhu et al (2022)[35]	Randomized Controlled	China	Deney Intervention group: 50 Control grubu: 51	Functional Assessment of Cancer Therapy-Breast Cancer	Breast cancer	8 weeks	Nurse	Yes: 10/13 No: 1/13 Uncertain: 1/13 Inapplicable: 1/13
Rahmani et al (2014)[36]	Randomized Controlled	Iran	Intervention group: 12 Control grubu: 12	QoL Questionnaire Core 30 Items (QLQ-C30)	Breast cancer	8 weeks	Doctor	Yes: 12/13 No: 1/13 Uncertain: 0/13 Inapplicable: 0/13
Hoffman et al (2012)[37]	Randomized Controlled	The United Kingdom	Intervention group: 114 Control grubu: 115	Functional Assessment of Cancer Therapy-Breast cancer (FACT-B) QOL	Breast cancer	8 weeks	Clinical researcher	Yes: 12/13 No: 1/13 Uncertain: 0/13 Inapplicable: 0/13

(*continues*)

TABLE 1. Characteristics and Quality Scores of the Articles *(Continued)*

Author (Publication Year)	Study Design	Country/ Continent of the Study	Sample Size	Measurement Tools	Type of Cancer	Duration of the Treatment	The Person Providing the Treatment	Quality Score
Carlson et al (2003)[38]	Semi-experimental	Canada	42 people	European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC) QLQ-C30	Breast cancer and prostate cancer	8 weeks	Clinical researcher	Yes: 6/9 No: 2/9 Uncertain: 1/9
Lengacher et al (2016)[39]	Semi-experimental	USA	13 people	CESD, Center for Epidemiological Studies Depression Scale QOL—General health (MOS SF-36)	Breast cancer	8 weeks	Clinical researcher	Yes: 6/9 No: 2/9 Uncertain: 1/9
Schellekens et al (2017)[40]	Randomized Controlled	Netherland	Intervention group: 31 Control grubu: 32	HADS, Hospital Anxiety and Depression Scale QLQ-C30-GHS, Quality of Life Questionnaire Cancer-Global Health Status subscale	Lung cancer	8 weeks	Psychologist and psychiatrist	Yes: 10/13 No: 1/13 Uncertain: 1/13 Inapplicable: 1/13
Albahadly et al (2022)[41]	Semi-experimental	Iraq	40 people	Depression, anxiety and stress scale (DASS-21)	Breast cancer	8 weeks	Clinical researcher	Yes: 6/9 No: 2/9 Uncertain: 1/9
Dobos et al (2015)[42]	Semi-experimental	Germany	117 people	European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC) QLQ-C30	Breast cancer and other cancers	11 weeks	Psychologist	Yes: 8/9 No: 1/9 Uncertain: 0/9
Labella et al (2010)[43]	Randomized Controlled	Canada	Intervention group: 46 Control grubu: 31	Center for Epidemiological Studies Depression—10 (CESD-10)	Gynecologic cancer Neck cancer et al	8 weeks	Clinical researcher	Yes: 11/13 No: 1/13 Uncertain: 1/13 Inapplicable: 1/13
Lengacher et al (2011)[44]	Semi-experimental	USA	19 people	Quality of life SF-36 Health Survey General Health	Breast cancer	8 weeks	Nurse	Yes: 7/9 No: 2/9 Uncertain: 0/9

In addition, publication bias among the studies in this dataset was determined by Egger's method. According to Egger's method, the cut-off point (B0) is 0.571575, 95% confidence interval (−3.31248 to 4.45598), t = 0.3398, df = 8, and 2-way *P* value of .74302. This result indicates that publication bias is not statistically significant.

Effect size values in this meta-analysis were calculated using Cohen's d or Hedges's g.[48]The significance level for statistical analyses was set at 95%. The interpretation of effect sizes followed Cohen's classification (1988), where a value between 0.15 and 0.40 is considered indicative of a small effect.[49]

Figure 3 displays the forest plot of the included studies. Based on the data from these studies, the meta-analysis revealed that the mindfulness-based stress reduction program had a positive impact on the quality of life (SMD: 0.363; 95% CI: 0.111-0.615; Z = 2.822; *P* = .005; I^2 = %75.222; Figure 3).

In meta-analyses, the choice between a fixed effects model and a random effects model depends on whether the included studies exhibit a homogeneous or heterogeneous distribution of effect sizes. To make this determination, a homogeneity/heterogeneity test is conducted. When significant differences are detected in the homogeneity test among the effect sizes representing the impact of the mindfulness-based stress reduction program on quality of life (Q = 36.223; *P* < .05), it suggests that the distribution is not homogeneous. Additionally, the I^2 value of 75% indicates substantial heterogeneity. Consequently, the random effects model was employed for this meta-analysis.

Meta-analysis results on the effect of a mindfulness-based stress reduction program on depression

The presence of publication bias for the depression variable was assessed using 2 methods: (1) a funnel scatter plot and (2) Egger's regression test.[47]

In the funnel plot, it is evident that the studies within the dataset exhibit a symmetrical distribution at the top of the funnel. This finding indicates that there is no evidence of publication bias in this meta-analysis regarding the depression variable (Figure 4).

Furthermore, to assess publication bias among the studies in this dataset, Egger's method was employed. According to Egger's method, the cut-off point (B0) was determined as −3.20510, with a 95% confidence interval ranging from −9.5445 to 3.04413; the t-statistic was found to be 0.25497 with degrees of freedom (df) equal to 6, and the 2-tailed *P* value was found to be .25616. This result indicates that publication bias is not statistically significant.

The interpretation of effect sizes in this meta-analysis followed Cohen's classification (1988), where a value falling within the range of 0.15 to 0.40 is considered indicative of a small effect.[48]

Figure 5 presents the forest plot, displaying the results of the included studies. Based on the data from these studies, the meta-analysis demonstrated that the mindfulness-based stress reduction program had a significant impact on depression (SMD: −0.363; 95% CI: −0.711 to 0.015; Z = −2.042; *P* = .041; I^2 = 85.229%; Figure 5).

In meta-analyses, the choice between a fixed effects model and a random effects model depends on whether the included studies exhibit a homogeneous or heterogeneous distribution of effect sizes. To make this determination, a homogeneity/heterogeneity test is typically conducted. A homogeneity test revealed significant differences in the effect sizes related to the impact of the mindfulness-based stress reduction program on depression (Q = 47.390; *P* < .05). This outcome indicates that the distribution of effect sizes is not homogeneous among the studies. Additionally, the I^2 value of 85% indicates substantial heterogeneity. Consequently, the random effects model was employed for this meta-analysis.

The moderator analysis was conducted only for the quality of life variable, as it is recommended to have at least 10 studies for moderator analysis.[50] Therefore, only the moderator analysis of the quality-of-life variable was conducted. The moderator variables considered in the study were the type of cancer, duration of therapy, the person administering the therapy, the origin of the study, and the scale used. These moderator variables were chosen based on their potential to affect the strength and direction of the relationship between the dependent and independent variables identified during the coding phase.

The effect size values for moderators were found to be as follows: the cancer type (0.385; CI: between 0.005 and 0.528; *P* = .000); the duration of therapy (0.243; CI: between 0.093 and 0.393; *P* = .002); the person who applied the therapy (0.335; CI: between 0.133 and 0.507; *P* = .001); the scale used (0.290; CI: between 0.148 and 0.432; *P* = .000); and the origin of the study (0.298; CI: between 0.158 and 0.438; *P* = .000). All results were found to be statistically significant. In

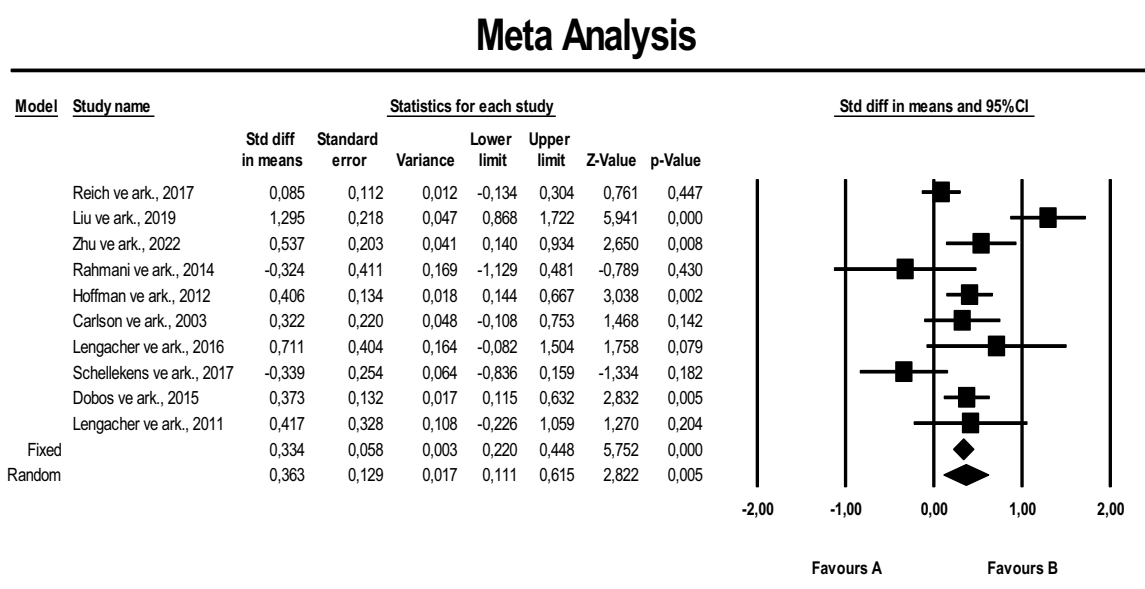

FIGURE 3. Forest plot of quality of life variable (favors group A: control group; favors group B: experimental group).

summary, it was determined that the type of cancer, duration of therapy, the person administering the therapy, the country where the research was conducted, and the measurement tool used played a role in the effectiveness of the mindfulness-based stress reduction program on the quality of life in cancer patients (Table 2).

DISCUSSION

The results indicate that the mindfulness-based stress reduction program was effective in improving depression and quality of life in cancer patients. This finding aligns with previous research, such as a systematic review and meta-analysis conducted by Xunlin et al, which found that mindfulness-based interventions were effective in symptom management. Participants in the mindfulness-based intervention group experienced significant reductions in anxiety, depression, and fatigue levels and significant improvements in quality of life, post-traumatic growth, and awareness levels compared to control groups.[51] Another study focused on individuals with breast cancer and found that the mindfulness-based stress reduction program significantly improved their quality of life, reduced anxiety and depression levels, improved sleep quality, and reduced fatigue symptoms.[52] Similarly, a systematic review and meta-analysis by Castanhel and Liberali found that the mindfulness-based stress reduction program, when applied to individuals with breast cancer, reduced anxiety and depression levels.[53] These findings underscore the importance of mindfulness-based stress reduction interventions in improving the well-being of cancer patients.

In the study, the moderator of the origin of the study was found to be significant. Significant results were found in the study conducted in the United Kingdom, Germany, and China. However, to our knowledge, no study has addressed the moderator of the research. This is likely due to the lack of systematic reviews or meta-analyses investigating the effectiveness of mindfulness-based stress reduction programs.

The duration of the mindfulness-based stress reduction program had a significant impact on individuals' quality of life. Likewise, McCloy also concluded that mindfulness-based interventions effectively improved fatigue and psychological well-being among women with cancer. Interestingly, McCloy's study did not find a significant effect of the intervention duration in their subgroup analysis.[54]

The measurement tool utilized in the study revealed a significant impact of the mindfulness-based stress reduction program on individuals' quality of life. Particularly, the Functional Assessment of Cancer

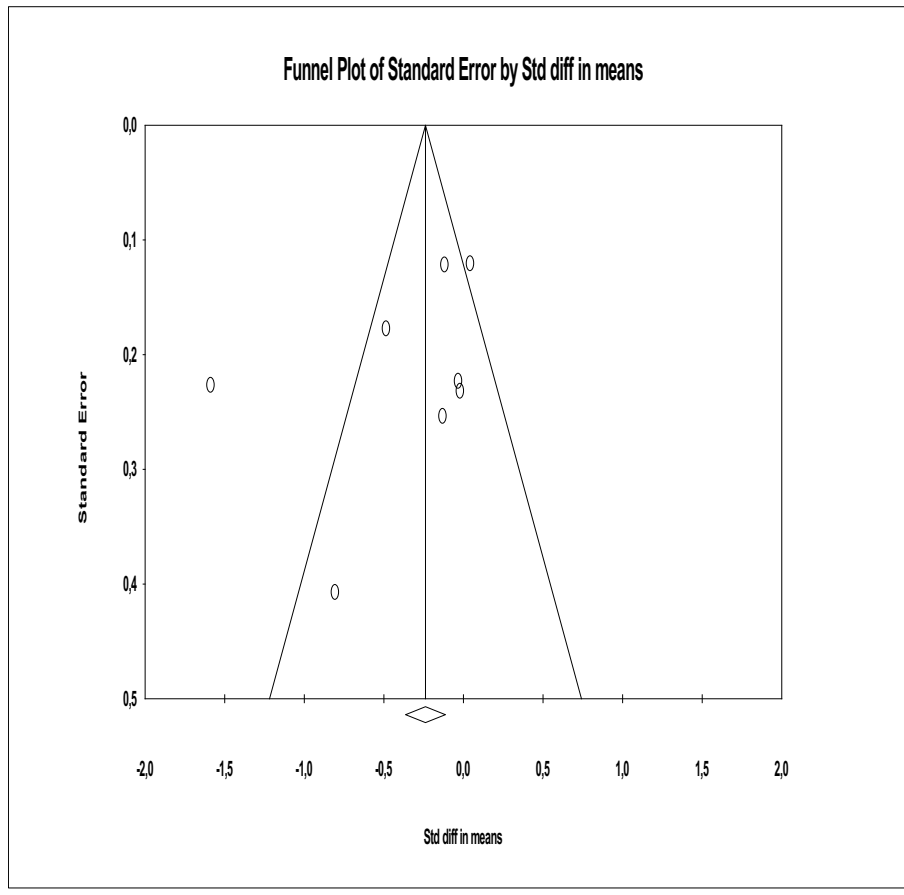

FIGURE 4. Funnel plot of the depression variable.

Therapy—Breast scale yielded significant results. Surprisingly, when reviewing existing literature, no prior studies were identified that addressed the moderating influence of this research tool. It is suggested that this moderator be considered a relevant variable in future research endeavors.

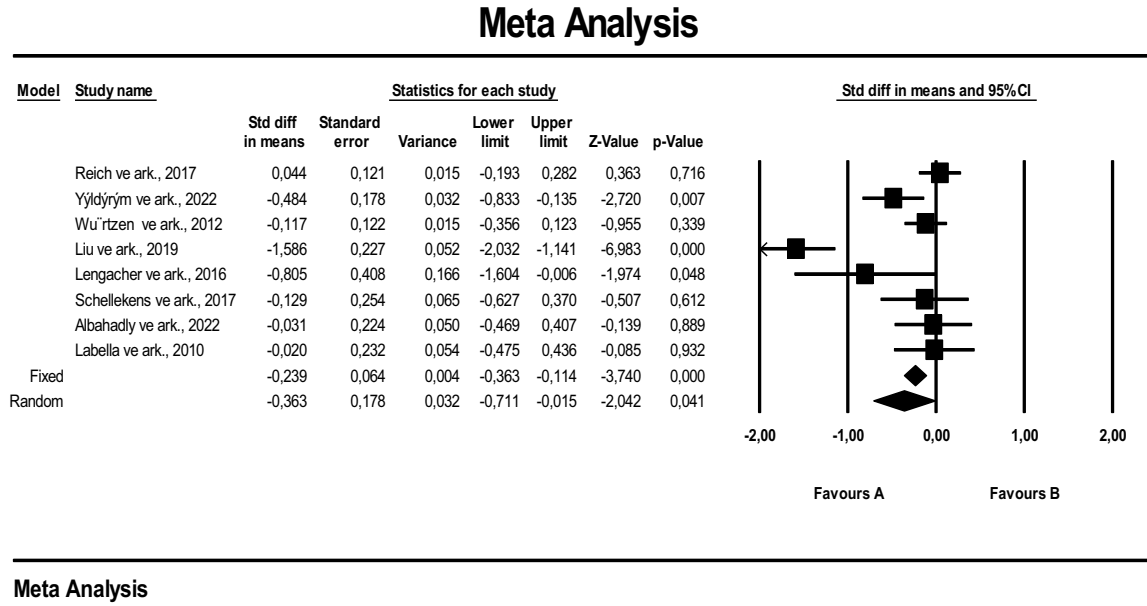

FIGURE 5. Forest plot for the depression variable (favors group A: control group; favors group B: experimental group).

TABLE 2. Moderator Results for the Effect of a Mindfulness-Based Stress Reduction Program on Quality of Life

Moderator	Number of Studies	Effect Size	Standard Error	Lower Limit	Upper Limit	*P*
The origin of the study						
The United States of America	3	0.249	0.172	−0.889	0.537	.149
China	2	0.912	0.379	0.169	1.654	.016
Germany	1	0.373	0.132	0.115	0.632	.005
Iran	1	−0.324	0.411	−1.129	0.481	.430
Netherlands	1	−0.339	0.254	−0.836	0.159	.182
The United Kingdom	1	0.406	0.134	0.144	0.667	.002
Canada	1	0.332	0.220	−0.108	0.753	.142
Total	10	0.298	0.071	0.158	0.438	.000
Type of cancer						
Breast cancer	6	0.305	0.117	0.076	0.533	.009
Lung cancer	1	−0.339	0.254	−0.836	0.159	.182
Thyroid cancer	1	1.295	0.218	0.868	1.722	.000
Breast cancer and prostate cancer	1	0.373	0.132	0.115	0.632	.005
Breast cancer and other cancers	1	0.322	0.220	0.048	0.753	.142
Total	10	0.385	0.073	0.005	0.528	.000
Duration of therapy						
8 weeks	8	0.404	0.176	0.060	0.748	.021
11 weeks	1	0.373	0.132	0.115	0.632	.005
12 weeks	1	0.085	0.112	−0.134	0.304	.447
Total	10	0.243	0.077	0.093	0.393	.002
Type of scale employed						
QoL Questionnaire Core 30 Items (QLQ-C30)	5	0.306	0.267	−0.217	0.829	.252
Health-Related Quality of Life (SF-36)	2	0.119	0.106	−0.088	0.326	.259
Functional Assessment of Cancer Therapy-Breast	2	0.445	0.111	0.227	0.664	.000
QOL-General health (MOS SF-36)	1	0.306	0.404	−0.082	1.504	.079
Total	10	0.290	0.073	0.148	0.432	.000
The person providing the treatment						
Psychologist	5	0.466	0.253	−0.031	0.962	.066
Nurse	2	0.504	0.112	0.166	0.841	.003
Clinical researcher	2	0.237	0.166	−0.777	0.551	.139
Physician	1	−0.324	0.411	−1.119	0.481	.430
Total	10	0.335	0.103	0.133	0.507	.001

The study highlighted that the type of cancer affecting individuals who underwent the mindfulness-based stress reduction program had a significant impact on its effectiveness in enhancing their quality of life. Specifically, the program was found to be particularly beneficial for women with breast cancer, leading to reduced levels of depression, anxiety, and fatigue while also increasing their overall quality of life.[51-55] Moreover, in a meta-analysis conducted by Tian et al, it was revealed that the mindfulness-based stress reduction program had a positive effect on the quality of life of individuals diagnosed with lung cancer.[56]

The study revealed that the person responsible for administering the mindfulness-based stress reduction program had a significant effect on the quality of life of participants, with a particular emphasis on the effectiveness of programs led by nurses. In a related study conducted by Kluepfel et al, it was established that the facilitator of the mindfulness-based stress reduction program played a significant role in influencing the psychological well-being, anxiety levels, and depression levels of participants.[57] This underscores the vital role that nurses play in delivering health care services across various domains.

CONCLUSION AND RECOMMENDATIONS

The study's findings conclusively demonstrate the effectiveness of the mindfulness-based stress

reduction program in reducing depression and enhancing the quality of life among cancer patients. Moreover, the study underscores that various factors, including the type of cancer, therapy duration, the provider of the treatment, the origin of the study, and the choice of measurement tool, contribute to the program's effectiveness in improving the quality of life for individuals with cancer. These meta-analysis results hold significant importance in affirming the positive impact of the mindfulness-based stress reduction program on depression and overall well-being in cancer patients.

A mindfulness-based stress reduction program in cancer patients may contribute to the improvement of individuals' mental health. Therefore, a mindfulness-based stress reduction program can be offered to patients as an option as part of their rehabilitation to help them maintain a better quality of life and reduce their depression levels in the long term. Further research into its efficacy, feasibility and safety for cancer patients in the nursing context is recommended. It is recommended to conduct systematic review and meta-analysis studies to evaluate the effectiveness of the awareness reduction and stress reduction program administered by nurses to cancer patients.

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