Review

The effectiveness of cognitive behavioral therapy in women with gynecological cancer: A systematic review and meta-analysis of randomized controlled trials

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ABSTRACT

Objective: This study aimed to perform a meta-analysis of randomized control trials to evaluate the effects of cognitive behavioral therapy on depression, anxiety, fatigue, distress, the fear of cancer recurrence, and the quality of life in gynecological cancer patients.

Methods: An extensive literature search of PubMed, Web of Science, Scopus, and CINAHL was performed, and a meta-analysis was conducted on ten studies that included 1027 patients. The quality of the data was evaluated using the Cochrane Risk of Bias tool. The effect size of the mean difference and standardized mean difference were computed using Revman 5.4.1.

Results: Gynecological cancer patients receiving cognitive behavioral therapy showed decreases in depression ($P < 0.001$), anxiety ($P = 0.01$), fatigue ($P < 0.001$), distress ($P = 0.03$), and the fear of cancer recurrence ($P = 0.01$) compared to those receiving no treatment, whereas no improvement in quality of life was seen in the cognitive behavioral therapy group ($P = 0.05$).

Conclusions: Cognitive behavioral therapy was shown to be a useful treatment for the symptoms experienced by women with gynecological cancer, with significant effect sizes. However, more research is required to validate the efficacy of cognitive behavioral therapy in patients with gynecological cancer, considering the limitations of this study's small sample size and statistical heterogeneity.

Systematic review registration: PROSPERO- CRD42024516039.

Introduction

Cancer of the cervix uteri, corpus uteri, and ovaries are the most common types of gynecological cancer, accounting for about 130,000 new cases worldwide in 2020.[1] The number of survivors of gynecological cancer in 2022 is estimated to be approximately 1,440,000, and uterine, cervical, and ovarian cancers are all among the top 10 cancers most common in female cancer survivors in the United States.[2] Gynecological cancer patients receive treatment that includes surgery, chemotherapy, and radiation, and treatment outcomes depend on the diagnosis and stage.[3–5] The number of survivors with gynecological cancer has gradually increased due to early detection and improvements in cancer treatment.[3–5]

Women with gynecological cancer experience physical, psychological, and psychosocial cancer-related and treatment-related side effects.

Physical symptoms often include fatigue, neuropathy, lymphedema, and sexual dysfunction.[6,7] Psychological symptoms consist of anxiety and depression.[6,7] Distress is a response to complex issues that can have psychological, social, spiritual, or even physical origins, which can make it difficult to manage cancer symptoms and conform to treatment.[8] Approximately 20% of ovarian cancer patients were reported to have significant levels of distress, which negatively affected both physical and mental function.[9,10] This distress was managed through symptom monitoring and psychosocial counseling in previous studies.[11,12]

A certain amount of fear of cancer recurrence (FCR) was accepted as normal among patients.[13] However, high levels of FCR led patients to death-related thoughts, caused distress, and interrupted their daily activities.[14] These symptoms and side effects associated with gynecological cancer and treatment can persist even after treatment is over and significantly impact the quality of life (QoL).[15] A higher QoL was linked

to both better and progression-free survival.[15] Thus, our attention may be directed toward managing QoL as well as the physical, psychological, and psychosocial symptoms to deliver effective care to women with gynecological cancer throughout the cancer spectrum.[7,15]

Cognitive behavioral therapy (CBT) is a psychological treatment that aims to address a range of physiological and psychological issues in patients by modifying maladaptive emotional responses by correcting irrational cognitive concepts or behaviors.[15] The drawback of CBT is that it necessitates an active approach from the patient, and the outcome may differ based on the patient's characteristics and degree of effort.[16] In addition, the impact of CBT can lessen over time following the intervention.[17,18] Despite these shortcomings, the CBT is an effective treatment for the physical symptoms, mental symptoms, and QoL of cancer survivors, and empirical research has validated multiple CBT techniques.[19,20] The CBT assists cancer patients in more accurately recognizing their negative thought patterns and rectifying incorrect cognition to improve depression, anxiety, and distress, as well as to relieve pain, fatigue, and sleep disorders.[19,20]

Several randomized controlled trials (RCTs) examined how CBT affected depression, anxiety, fatigue, distress, FCR, and QoL of gynecological cancer survivors.[21–23] However, due to the differences in studies' characteristics, including details of CBT interventions and outcome assessment techniques, the results were not consistent or comprehensive. In addition, no meta-analysis studies have confirmed the effectiveness of CBT for various symptoms in gynecological cancer patients. The purpose of the present study was to conduct a meta-analysis of RCTs to thoroughly assess the impact of CBT on depression, anxiety, fatigue, distress, FCR, and QoL in gynecological cancer survivors.

Methods

The Cochrane Handbook for the Systematic Review of Interventions and the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) guidelines were followed in the conduct of this study.[24] The review process was registered under the registration number "CRD42024516039" on the International Prospective Register of Systematic Reviews (PROSPERO).

Data sources and searches

PubMed, Web of Science, Scopus, and CINAHL databases were searched. The researchers looked through all studies met the inclusion criteria and published before March 2024. We also looked through the reviews and the reference lists of all the relevant papers to identify more research. After importing every reference into Microsoft Excel and EndNote software, duplicates were eliminated.

The following terms were used in the central searches. Search filters were structured using a combination of medical subject heading terms for three integrated search themes: "gynecological cancer," "cognitive behavioral therapy," and "randomized controlled trial." The search themes were then combined with "AND," and the search terms of each theme were combined with "OR." Appendix 1 provides examples of each search strategy.

Inclusion and exclusion criteria

The criteria outlined by PRISMA's recommendations for Population, Intervention, Comparison, Outcomes and Study (PICOS) design were met by all studies included in this analysis.[24] We only included RCTs. The participants were women with gynecological cancer, including ovarian, uterine, and cervical cancer. The interventions included CBT, a psychosocial intervention that modifies maladaptive emotional responses by correcting irrational cognitive concepts or behaviors.[15] As the selection strategy was not restricted to standard CBT, it was necessary to read the entire article to ascertain the specific type of CBT that was employed in each study. Studies using treatments based on a

cognitive intervention to change behavior, including acceptance and commitment therapy,[25] mindfulness-based cognitive therapy,[26] and coping and communication-enhancing intervention[27] were included. A control group was specified as either a condition that provided brief information or a control that did not receive any treatment, such as being placed on a waiting list or treated as usual. Exclusion criteria included studies that did not measure depression, anxiety, fatigue, distress, FCR, or QoL; non-RCT; non-CBT intervention; or those lacking sufficient statistical information.

Outcomes

The included studies evaluated either depression, anxiety, fatigue, distress, FCR, or QoL and provided detailed data. Numerous scales were used to measure the results (Table 1).

Data selection and extraction

Among the articles extracted by EndNote software, duplicates were removed. Two authors independently assessed the eligibility of the articles based on the abstract and title. After this first screening, the full texts of the remaining articles were reviewed independently. Reviewers evaluated the full manuscripts of the studies that were found to be potentially relevant based on the inclusion criteria. When there was a disagreement, the two authors resolved it through consensus discussion.

A data extraction form was designed to make entry comparison easier and contained the following details: (a) general information (title, authors, and year of publication); (b) participant information (sample size, inclusion criteria, and demographic characteristics); (c) intervention information (content, setting, and a description of the control group); (d) outcome measures (the type of instruments); and (e) eligibility requirements (whether the study targeted women with gynecological cancer or not, included CBT or not, and was an RCT or not).

Assessment of risk of bias

The quality of the included studies was evaluated by two authors using the Cochrane Risk of Bias version 2 (RoB 2) for RCTs.[28] Each trial's quality evaluation items were divided into seven domains: (a) random sequence generation (selection bias), (b) allocation concealment (selection bias), (c) blinding of participants and personnel (performance bias), (d) blinding of outcome assessment (detection bias), (e) incomplete

Table 1
Scales for measuring outcomes.

Outcomes	Scales
Depression	Beck Depression Inventory (BDI), depressed items of the Hospital Anxiety and Depression Scale (HADS), Patient Health Questionnaire (PHQ-8, PHQ-9), and Self-rating Depression Scale (SDS)
Anxiety	Beck Anxiety Inventory (BAI), anxiety items of the Hospital Anxiety and Depression Scale (HADS), Self-rating Anxiety Scale (SAS), and Generalized Anxiety Disorder (GAD-7)
Fatigue	Piper Fatigue Scale (PFS) and severity items of Fatigue Symptom Inventory (FSI)
Distress	Impact of Events Scale (IES)
Fear of recurrence	Fear of Progression Questionnaire-Short Form (FoP-Q-SF), Concerns About Recurrence Scale (CARS), and Fear of Cancer Recurrence Inventory-Short Form (FCRI-SF)
Quality of life	Global health status items of the European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ-C30), Functional Assessment of Cancer Therapy-General (FACT-G), and Functional Assessment of Cancer Treatment-Ovary (FACT-O)

outcome data (attrition bias), (f) selective outcome reporting (reporting bias), and (g) other sources of bias. The components of each bias domain were rated as either "low risk," "high risk," or "unclear risk."

Data synthesis and statistical analysis

The population's characteristics, outcome measures, length of follow-up, and CBT interventions from each study were extracted and combined into a Microsoft Excel database. All statistical analyses were performed using RevMan 5.4.1 software. Given that the outcome variables were continuous variables, we calculated means and standard deviations. The standard deviations were calculated by multiplying the standard errors of the mean by the square root of the sample size in cases where the studies reported standard errors of the mean. If the same measurement tool was used to obtain the data, the mean difference (MD) was used as the effect size for continuous variables. Otherwise, standardized MD (SMD) was utilized as the composite effect measure to remove the impact of different data scales.

The chi-squared test was used to measure heterogeneity between trials. The thresholds for low, medium, and high heterogeneity were I^2 values of 25%, 50%, and 75%, respectively.[29] A fixed effects model (FEM) was selected for $P > 0.10$ and $I^2 \leq 50\%$, indicating either little or no heterogeneity between studies and the random effects model (REM) was selected in other cases.[29] Possible clinical variations that might lead to heterogeneity were investigated using subgroup analysis.[30,31] Intervention outcomes were assessed at three distinct intervals (one, three, or six months). Previous studies have indicated that the effect of CBT may weaken over time following the intervention.[17,18] It is crucial to address the timing of follow-up after providing the intervention, as research results can be affected by this factor. Sensitivity analysis was utilized to evaluate the reliability of the outcomes, and funnel plots were used to qualitatively assess whether publication bias was present in meta-analyses that included 10 or more studies.[30]

Ethical considerations

The information was combined from the studies that were published. Therefore, ethical approval was not needed for this study.

Results

Study characteristics

The flow diagram for the selection of the included studies is shown in Fig. 1. A total of 536 studies were found in the four databases and three additional studies were found through other sources. The reviewers looked over the titles and abstracts of these references, removed any duplicates, and excluded any that were obviously ineligible or did not meet our inclusion criteria. We acquired full-text versions of the 62 studies that were left and might be eligible for additional assessment. Of these, 47 studies were excluded due to non-RCT analyses, non-CBT interventions, and outcomes related to depression, anxiety, fatigue, distress, FCR, and QoL were not provided. Three other studies were excluded because they were study protocols, and two studies were excluded due to insufficient statistical information. Finally, ten studies were eligible for inclusion. There were 1027 participants in total across the ten included studies.

Table 2 shows the characteristics of the included studies. These investigations were published before March 2024. Three studies came from China, five from the United States, one from Iran, and one from England. Patients with ovarian cancer participated in five trials, those with cervical cancer participated in two, those with uterine cancer participated in one, and those with gynecological cancer participated in two. Except for two studies, the participants in most included studies had a mean age of 50 or older. The implemented interventions comprised CBT as well as its variants, including acceptance and commitment therapy, mindfulness-based cognitive therapy, and coping and communication-enhancing intervention. The intervention's components included cognitive
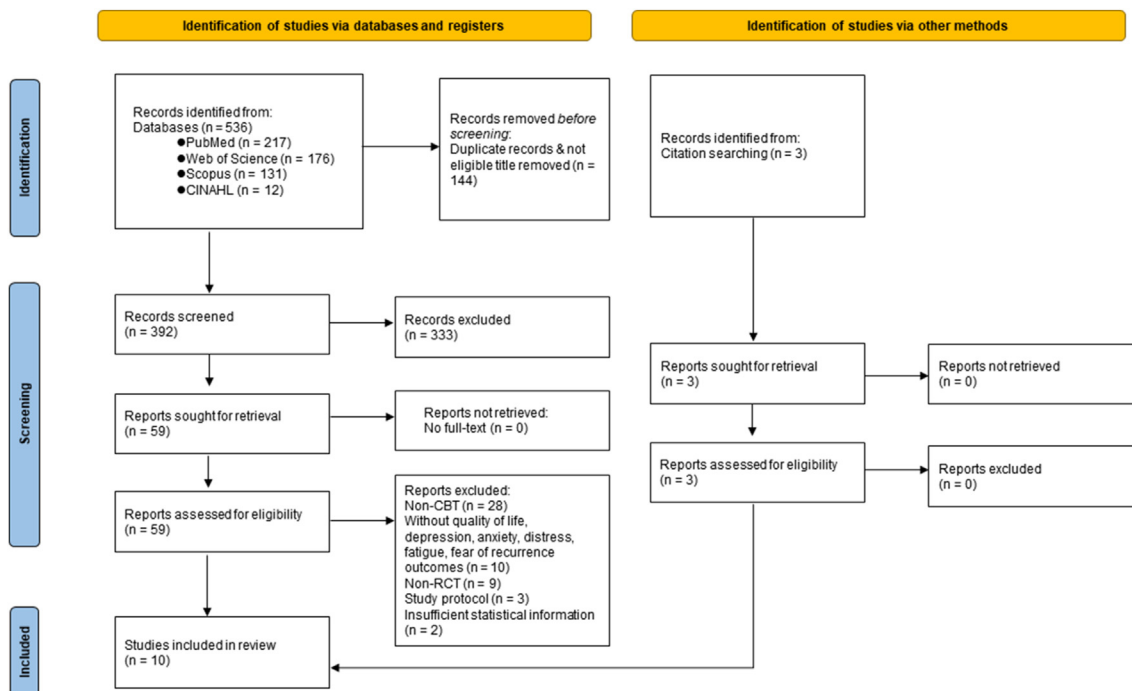

Fig. 1. Flow diagram illustrating the original process of screening and identification of studies. CBT, cognitive behavioral therapy; RCT, randomized controlled trial.

Table 2
Characteristics of the included studies.

Author (year) Country	Sample size (I/C)	Sample characteristics	Age (years)	Intervention/ Control	Contents of intervention	Intervention characteristics	Follow-up	Main outcome Measures	Conclusion
Ahdi derav et al. (2023) Iran	26 (13/13)	Uterine cancer, underwent hysterectomy and received adjuvant therapy such as chemotherapy and/ or radiotherapy	33.6	CBT/Did not receive any intervention	- Psychoeducation - Cognitive restructuring - Behavioral activation - Relaxation techniques - Practicing assertiveness, communication skills, or problem-solving techniques	- Number of sessions: 8 (weekly) - Length: 60–90 mins - Delivered by: trained therapist - Format: Face-to-face, group setting (role-playing)	Within 1 month	- Depression (BDI) - Anxiety (BAI)	Group CBT is effective in reducing anxiety and depression in women after hysterectomy.
Brotto et al. (2012) U.S.	31 (31/9)*	Cervical or endometrial cancer, with hysterectomy (with or without radiation or chemotherapy) at least one year earlier	54.0	Mindfulness-based cognitive behavioral intervention/Wait-list	- Cognitive challenging with a thought record - Introduction to cognitive challenging of maladaptive sexual beliefs - In-session mindfulness practice	- Number of sessions: 3 (monthly) - Length: 90 mins - Delivered by: Psychologist/ sex therapist - Format: Face-to-face	3 months	- Depression (DBI)	A brief mindfulness-based cognitive behavioral intervention was effective for improving sexual functioning.
Frangou et al. (2021) England	107 (54/53)	Ovarian cancer, stage 0–IV	59.5	CBT, Mindfulness, ACT/Standard of care	- Development of coping strategies - Management of cancer-related emotional distress	- Number of sessions: 3 (fortnightly) - Length: 90 mins - Delivered by: doctoral-level clinical or counseling psychologist - Format: Face-to-face	3 months	- Depression (PHQ-9) - FCR (FoP-Q-SF) - QoL (QLQ-C30, global health status)	The CBT-based psychological support provided after chemotherapy did not significantly alter the spontaneously improving trajectory of depression scores at three months but caused a significant improvement in fear of disease progression.
Manne et al. (2007) U.S.	233 (122/ 111)	Gynecological cancer	50.0	Coping and communication-enhancing intervention/ Usual care	- Enhancing coping and support-solicitation skills - Evaluating and altering life priorities - Identifying and dealing with emotional reactions to cancer	- Number of sessions: 7 - Length: 60 mins - Delivered by: social workers or psychologists - Format: Face-to-face, telephone	3 months 6 months 9 months	- Depression (BDI) - Distress (IES)	The coping and communication-enhancing intervention may be effective in treating depressive symptoms among patients with gynecological cancer.
Manne et al. (2017) U.S.	234 (118/ 116)	Gynecological cancer, within six months of diagnosis	55.1	Coping and communication-enhancing intervention/ Usual care	- Teach and practice relaxation skills - Practice cognitive-restructuring techniques with a cancer-related issue - Problem-focused and emotion-focused coping - Skill to cope with fears	- Number of sessions: 7 - Length: 60 mins - Delivered by: social workers, master-level or doctoral-level psycholo-gists, or psychiatrists - Format: Face-to-face, telephone	5 weeks 9 weeks 6 months 12 months 18 months	- Depression (BDI) - Distress (IES) - FCR (CARS)	The coping and communication-enhancing intervention had a significant effect on patients' depression, cancer-specific distress, and emotional well-being during a time when most newly diagnosed patients experience elevated levels of distress.
Petzel et al. (2018) U.S.	35 (15/20)	Ovarian cancer, stage III-IV or recurrent (any stage)	57.8	CBT with social cognitive theory/ Usual care	- Learning library with distress, coping, and stress management - Distress self-monitoring to promote emotional self-management - Medical information	- Number of sessions: Use the program at a minimum of 2–3 times per week - Length: 60 days of unlimited access to their assigned website - Delivered by: care providers (online) - Format: Website	Within 1 month after the 60-day website access was completed	- Depression (HADS_Depression) - Anxiety (HADS_Anxiety) - Distress (IES)	The results indicated the intervention group demonstrated lower distress ($P = 0.06$); blunting was associated with lower depression ($P = 0.04$)

Table 2 (*continued*)

Author (year) Country	Sample size (I/C)	Sample characteristics	Age (years)	Intervention/Control	Contents of intervention	Intervention characteristics	Follow-up	Main outcome Measures	Conclusion
Wright et al. (2023) U.S.	44 (21/23)	Advanced or recurrent ovarian cancer, received PARPi for ≥ 2 months	62.5	ACT/Enhanced usual care	- How to cultivate present-moment awareness and active acceptance to work with fatigue instead of against it - How to accept and detach from difficult thoughts using ACT skills	- Number of sessions: 6–8 (weekly) - Length: 60–75 mins - Delivered by: master's level clinical psychology doctoral trainees - Format: Videoconference, using a HIPAA-compliant platform (zoom for Healthcare)	4 weeks 8 weeks 12 weeks	- Depression (PHQ-8) - Anxiety (GAD-7) - Fatigue (FSI, severity) - FCR (FCRI-SF) - QoL (FACT-O)	Among fatigued adults with ovarian cancer on PARPi, a brief, acceptance-based telehealth intervention was feasible, acceptable, and demonstrated preliminary efficacy in improving fatigue interference, severity, and levels.
Yuan et al. (2023) China	172 (86/86)	Cervical cancer, stage I-IIa	50.3	Cognitive behavioral stress management/ Normal care	- Stress management (cognitive-behavioral explanations of stress and emotions; identified cognitive disorders and automatic thinking; stress coping skills training) - Relaxation training	- Number of sessions: 8 (weekly) - Length: 120 mins - Delivered by: charge nurses - Format: Face-to-face, team (3–7 patients per team)	At discharge 1 month 3 months 6 months	- Depression (SDS) - Anxiety (SAS) - QoL (QLQ-C30, global health status)	Cognitive behavioral stress management is an effective intervention for decreasing anxiety and depression, and improving the quality of life in patients with cervical cancer.
Zhang et al. (2018) China	72 (36/36)	Ovarian cancer, completed primary treatment and decided to receive chemotherapy treatment	Over 75% were the ages of 45–65	CBT and exercise/ Usual care	- Monitor erroneous thinking and build positive thoughts and self-perception - Setting up new goals and improving problem-solving strategies - Relaxation techniques and fatigue management training	- Number of sessions: 12 (weekly) - Length: 60–75 mins - Delivered by: specialist nurses with 10 years of experience - Format: Internet, phone, automated emails	3 months 6 months	- Depression (SDS) - Fatigue (PFS)	Nurse-delivered home-based exercise & CBT have measurable benefits in helping women with ovarian cancer to decrease cancer-related fatigue, and depressive symptoms, and improve their quality of sleep.
Zhou et al. (2020) China	73 (37/36)	Ovarian cancer, after chemotherapy	59.4	CBT combined with the conventional nursing/ Conventional nursing	- Cognitive intervention: Identifying any cognitive problems to be resolved or improved, and seeing the causes of negative emotions or misunderstanding; cognitive notebook - Behavioral interventions - Exercise interventions - Relaxation training	- Number of sessions: Patients use cognitive notebooks daily at home. When the patients return to the hospital for chemotherapy, the nursing staff goes over their notebooks and responds to questions. - Length: Exercise (daily, 10 min), relaxation training (twice a day, 5–10 min), yoga (weekly, 30 min) - Delivered by: nurse - Format: Face-to-face	1 month 3 months	- Depression (SDS) - Anxiety (SAS) - Fatigue (PFS) - QoL (QLQ-C30, global health status)	At-home CBT combined with nursing intervention can significantly improve the recovery of ovarian cancer patients after chemotherapy, including fatigue, anxiety, depression, general health, and sleep quality.

I, Intervention group; C, Control group; CBT, Cognitive Behavioral Therapy; ACT, Acceptance and Commitment Therapy; QOL, Quality of Life; FCR, Fear of Cancer Recurrence; BDI, Beck Depression Inventory; BAI, Beck Anxiety Inventory; HADS, Hospital Anxiety and Depression Scale; PHQ, Patient Health Questionnaire; SDS, Self-rating Depression Scale; SAS, Self-rating Anxiety Scale (SAS); GAD, Generalized Anxiety Disorder; PFS, Piper Fatigue Scale; FSI, Fatigue Symptom Inventory; IES, Impact of Events Scale; FoP-Q-SF, Fear of Progression Questionnaire- Short Form; CARS, Concerns About Recurrence Scale; FCRI-SF; Fear of Cancer Recurrence Inventory-Short Form; EORTC QLQ-C30, European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire Core 30-item; FACT-G, Functional Assessment of Cancer Therapy-General; FACT-O, Functional Assessment of Cancer Treatment-Ovary.

*Nine individuals initially on the waiting list were designated as the control group. In total, 31 people participated in the program: 22 in the immediate treatment group and 9 from the waiting list control group, leading us to categorize all 31 as part of the intervention group. Although these nine individuals were first measured as part of the control group, they later joined the program and were subsequently included in the intervention group.

problem awareness, positive thinking, problem-focused and emotional coping skills training, and cognitive reconstruction exercises. Most interventions used in-person instruction lasting longer than 60 minutes, while others made use of websites, video conferences, and the internet. The follow-up duration varied but was most often measured after one or three months.

Study quality

The quality of the included studies is shown in Fig. 2. The randomized controlled studies that made up the meta-analyses generally demonstrated a reasonable and low risk of biases. All included studies disclosed randomization, but four studies were found to have an unclear risk of selection bias because they did not provide a detailed description of allocation concealment. While three studies described the complete blinding of all participants and personnel, most studies did not report blinding techniques in detail. Nine studies had a low risk of bias in the "blinding of outcome assessment" domain. All studies had a low risk of bias in the "incomplete outcome data", "selective reporting" and "other bias" domains.

Analyses of outcomes

The effects of CBT on depression, anxiety, fatigue, distress, FCR, and QoL were analyzed based on the outcomes measured within three months (Figs. 3 and 4).
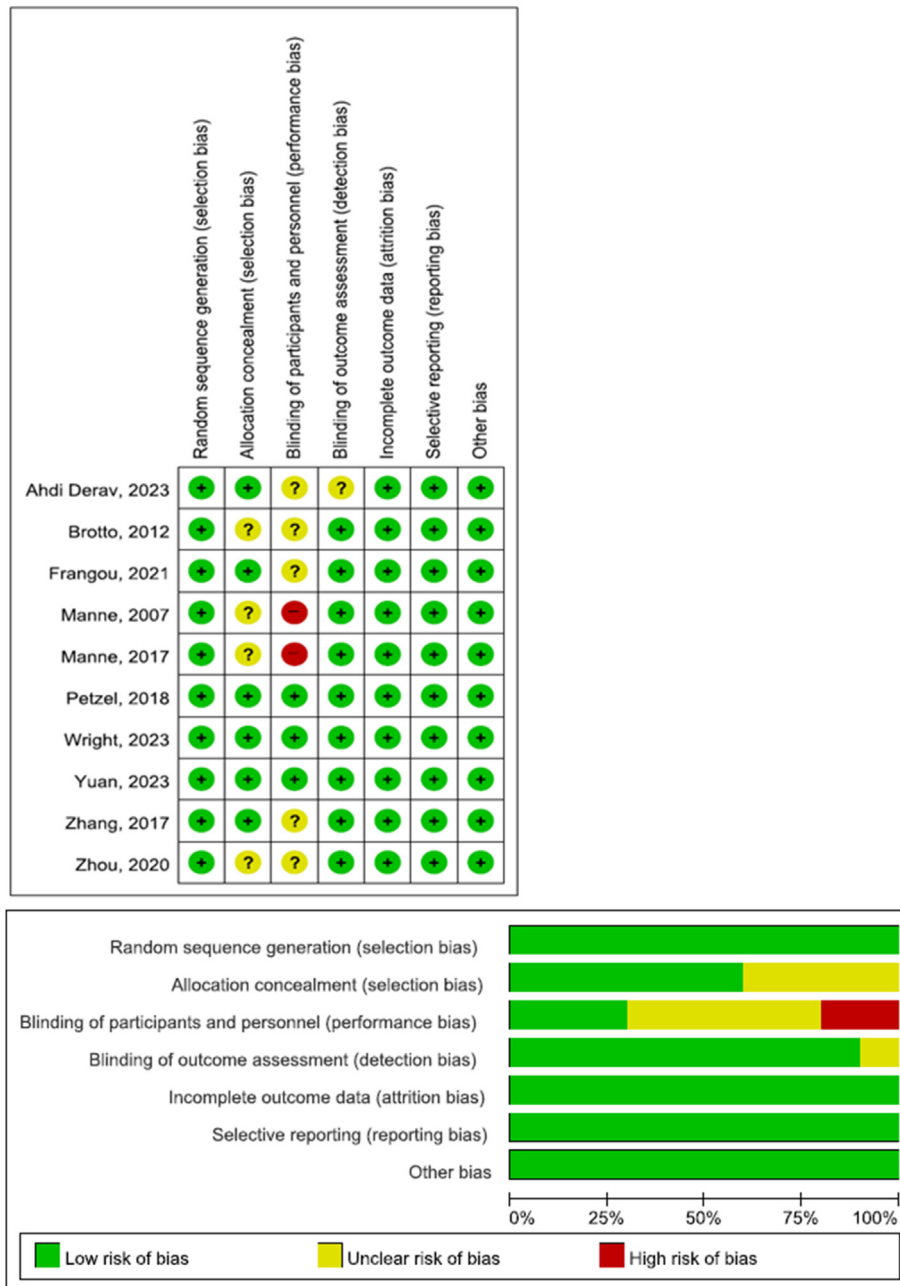

Fig. 2. Assessment of rish of bias.

Depression

Ten studies were found with depression outcomes that were suitable for analysis.[21–23,27,32–37] The REM was used considering the heterogeneity of the test results (I^2 = 76%, P < 0.001) and showed that the CBT group had a significant decline in depression (SMD = −0.53, 95% confidence interval (CI) [−0.83, −0.22], P < 0.001).

Anxiety

Five studies with anxiety outcomes that were suitable for analysis were found.[21,23,32,35,37] The heterogeneity test results (I^2 = 84%, P < 0.001) were considered when using the REM and showed that the CBT group had a significant decline in anxiety (SMD = −0.82, 95% CI [−1.47, −0.17], P = 0.01).

Fatigue

In three RCTs involving 180 women with gynecological cancer, fatigue was assessed, and 86 of them were given CBT.[23,33,35] Because of the low level of heterogeneity (I^2 = 35%, P = 0.22), a REM was used. Compared to the control group, the CBT group exhibited a statistically significant lower level of fatigue (SMD = −0.72, 95% CI [−1.10, −0.33], P < 0.001).

Distress

Three RCTs, including 417 women with gynecological cancer, reported on distress, of which 196 were assigned to receive CBT.[22,27,32] The score of the CBT group was lower than that of the control group. Due to the low heterogeneity (I^2 = 0%, P = 0.59), there was a statistically significant difference in the FEM (MD = −3.22, 95% CI [−6.19, −0.24], P = 0.03). The CBT group showed a significant reduction in distress compared to the control group.

Fear of cancer recurrence

Three RCTs, including 295 women with gynecological cancer, reported on FCR, and 140 of the patients were assigned to receive CBT.[22,34,35] The CBT group received a lower score than the control group. Given the low heterogeneity (I^2 = 0%, P = 0.51), the FEM showed a statistically significant difference (MD = −0.30, 95% CI [−0.53, −0.07], P = 0.01). A significant decrease in FCR was seen in the CBT group compared to the control group.

Quality of life

Four RCTs, including 333 women with gynecological cancer reported on QoL, and 162 patients were assigned to receive CBT.[21,33–35] A REM was employed due to the high level of heterogeneity (I^2 = 68%, P = 0.03), and no statistically significant difference was found (SMD = 0.42, 95% CI [0.01, 0.83], P = 0.05).

Subgroup analyses

Subgroup analyses based on the follow-up period of the intervention were carried out separately to investigate the cause of heterogeneity in depression and anxiety (Fig. 5). Depression follow-up was performed for one, three, and six months. The meta-analysis showed a significant decrease in the one-month intervention duration CBT subgroup (SMD = −0.46, 95% CI [−0.79, −0.13], P = 0.006; I^2 = 64%, P = 0.02), three-month subgroup (SMD = −0.43, 95% CI [−0.75, −0.11], P = 0.008; I^2 = 78%, P < 0.001), and six-month subgroup (SMD = −0.42, 95% CI [−0.74, −0.11], P = 0.009; I^2 = 69%, P = 0.01). The heterogeneity test between subgroups showed that the difference in effect size between the three groups was not statistically significant (Q = 0.03, df = 2, P = 0.99).

Regarding anxiety, follow-up was conducted for one and three months. The meta-analysis of the one-month intervention duration CBT subgroup (SMD = −0.65, 95% CI [−1.11, −0.19], P = 0.006; I^2 = 66%, P = 0.03) and three-month subgroup (SMD = −0.82, 95% CI [−1.61, −0.04], P = 0.04; I^2 = 88%, P < 0.001) showed a significant decrease.

The heterogeneity test between subgroups showed that the difference in effect size between the two groups was not statistically significant (Q = 0.14, df = 1, P = 0.71).

Sensitivity analyses

Sensitivity analyses were conducted as significant heterogeneity existed in the included studies. We performed sensitivity analyses of the three variables' meta-analysis findings, including depression, anxiety, and QoL. We found that the I^2 of heterogeneity in the comparison of depression between the CBT group and the control group did not change significantly after removing each study. We discovered a significant change in the I^2 for heterogeneity from 84% to 0% in anxiety comparisons (I^2 = 0%, P = 0.72) and from 68% to 42% in QoL comparisons between the CBT group and the control group (I^2 = 42%, P = 0.18) after removing one study.[33]

Publication bias analysis

A funnel plot was used to assess the publication bias of the depression data because at least ten articles covered the depression of gynecological cancer patients with CBT interventions. The funnel plot showed no obvious signs of visual asymmetry, indicating no significant publication bias. The reporting of anxiety, fatigue, distress, FCR, and QoL did not meet the publication bias requirements: fewer than ten studies reported these indicators. Therefore, publication bias analysis could not be carried out on these data.

Discussion

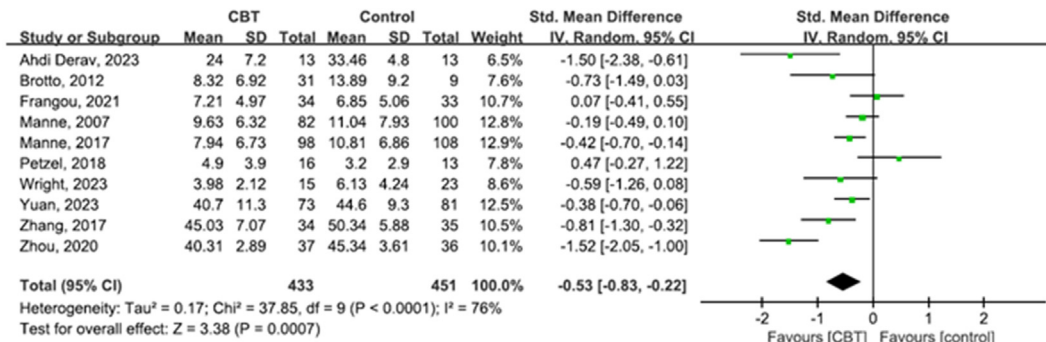*Effect of the cognitive behavioral therapy interventions*

This meta-analysis examined the effect of CBT interventions on depression, anxiety, fatigue, distress, FCR, and QoL by synthesizing data from ten studies. The findings showed that gynecological cancer patients with CBT had improvements in depression and anxiety. Cancer patients were given various psychotherapies to manage their anxiety and depression, such as behavioral activation, interpersonal psychotherapy, and mindfulness-based stress reduction.[38–40] The most popular psychotherapy for depression and anxiety is CBT, which has been demonstrated to be beneficial in treating psychological symptoms.[41] Many meta-analysis studies, which supported our findings, have showed that CBT is effective in reducing depression and anxiety in patients with lymphoma, colon, and breast cancer.[17,42]

The findings showed that CBT interventions reduced fatigue in patients with gynecological cancer. The CBT helped reduce fatigue in cancer patients through two techniques. Cognitive reassessment techniques reminded patients that some of the fatigue stemmed from their cognitive distortions, and behavioral techniques encouraged cancer patients to be more active.[42,43] A prior study on cancer patients found that CBT was more effective than mindfulness-based cognitive therapy at reducing fatigue.[26,42] Although a wide variety of CBT interventions were included in this meta-analysis, further studies divided by CBT types are needed, as there may be differences in outcomes depending on the type of CBT.

The results of this study demonstrated that CBT improved the distress levels of gynecological cancer patients. The CBT helped reduce distress in cancer patients by encouraging adaptive coping with the difficulties related to diagnosis, treatment, and recovery.[44] A previous study of 60 patients recently diagnosed with cancer also revealed that a self-guided web-based CBT program was effective in improving cancer-related distress.[10]

The results demonstrated improvements in FCR in patients with gynecological cancer who underwent CBT. Patients with high levels of FCR experienced distress and difficulties because of maladaptive cognitive styles, such as thinking about death, believing that cancer would return, and having difficult-to-control cancer-related thoughts
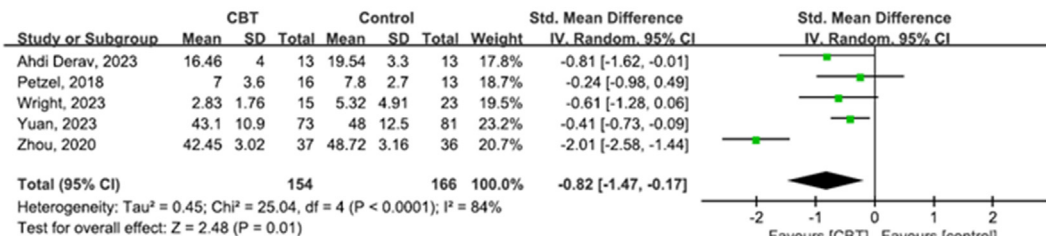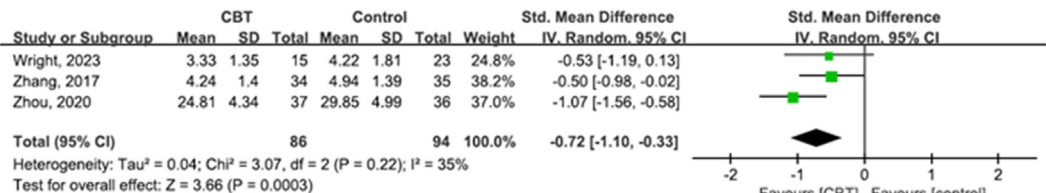
Fig. 3. Comparison of depression, (A) anxiety (B), and fatigue (C) between CBT groups and control groups within three months. CBT, cognitive behavioral therapy.

and imagery.[14,45] The CBT, including the correction of irrational cognitive concepts or behaviors, can be helpful in patients with FCR.[15] Although face-to-face interventions were more effective than short online or telephone interventions, CBT interventions of various formats, lengths, and intensities were effective in lowering FCR in breast cancer patients.[46]

In these findings, the CBT intervention did not significantly improve QoL in gynecological cancer patients. However, some of the studies included in this meta-analysis study showed that CBT had a positive effect on QoL during some follow-up periods.[21,22,33] Considering that only four studies addressed the effect of CBT on QoL, more research is required to ascertain this impact. Furthermore, even if the effect is significant in some areas, it could be obscured because the QoL scale includes four categories. There are four main domains of QoL, and prior research on patients with breast cancer indicated that CBT significantly improved the emotional and functional domains of QoL but not the other domains.[47] Therefore, it is necessary to analyze QoL subscales separately to understand the effect of CBT on the QoL in gynecological cancer patients.

Most of the included studies were deemed not to be at high risk of bias. All experiments were randomized, participants were strictly tracked, and most of the results were recorded. However, several studies had "unclear risk of bias" or "high risk of bias" in two areas. Regarding selection bias, six studies mentioned the allocation concealment in detail, but four studies did not. Allocation concealment is an attempt to lessen

the influence of possible confounding variables.[48,49] If the randomization technique was not good, treatment effects might be overstated.[48,49] In addition, most studies did not have a low risk of performance bias because it was difficult or impossible to completely blind all participants and evaluators while applying the intervention.[50] Further studies should attempt to blind all possible key persons in RCTs involving psychological interventions to minimize the risk of bias.[50]

Subgroup and sensitivity analyses were used to identify the possible sources of heterogeneity. Subgroup analyses were used to investigate potential clinical variations that might lead to heterogeneity.[30] The effect of CBT on depression was assessed at three durations (one, three, and six months), and that of anxiety was assessed at two durations (one and three months). However, there was no decrease in statistical heterogeneity in subgroup analyses, which implied that the follow-up period did not explain statistical heterogeneity.

Sensitivity analyses were used to investigate potential methodological variations that might lead to heterogeneity. Reductions in I^2 heterogeneity were observed in the comparison of anxiety and QoL outcomes in CBT and control groups after removing a single study.[33] An analysis of the reasons found that the risk of selection bias and performance bias was unclear.[48–50] The blinding of participants and staff members was not mentioned in the study, nor was the allocation concealment. In addition, a single study differed from other studies in the way of applying interventions, including daily cognitive notebook homework.[33] Homework is associated with better treatment outcomes in

A. Distress
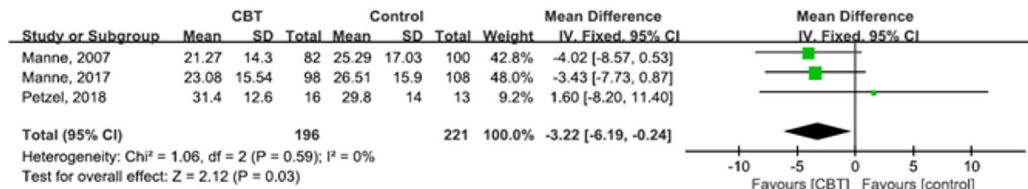
B. Fear of Cancer Recurrence
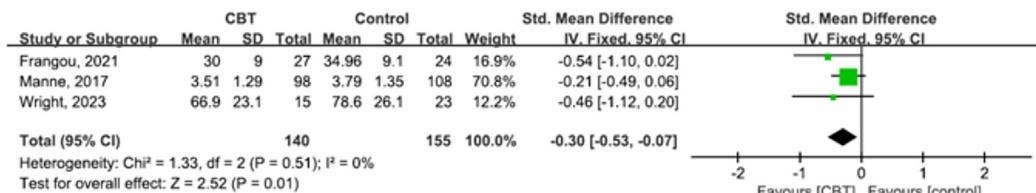
C. Quality of Life
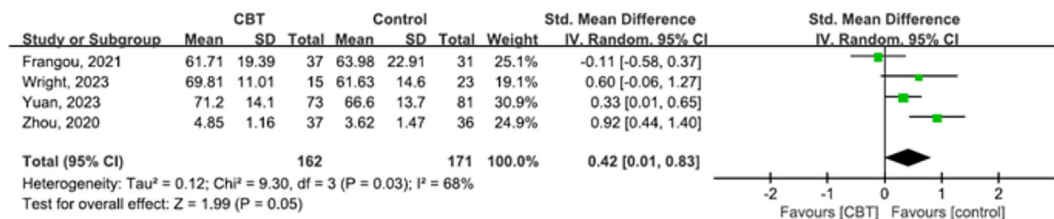
Fig. 4. Comparison of distress, (A) fear of cancer recurrence (B), and quailty of life (C) between CBT groups and control groups within three months. CBT, cognitive behavioral therapy.

CBT, as it typically entails patients practicing skills that they have acquired during sessions.[51] Due to the process of homework and review, the study outcomes of a single study might be significantly improved compared to other studies.[33]

Implications for nursing practice and research

Study findings have several clinical implications for gynecological cancer patients and healthcare providers. First, this study reveals critical considerations for healthcare practitioners treating gynecological cancer patients, emphasizing the importance of incorporating CBT into therapeutic strategies. The integration of CBT is supported by existing literature, highlighting its capacity to improve patient outcomes across functional, psychological, and health-related dimensions.[20] Our findings particularly note the substantial impact of CBT in mitigating depression, anxiety, fatigue, distress, and FCR.

Second, healthcare providers should consider different delivery methods when providing CBT interventions. The studies included in this meta-analysis study conducted CBT education through various methods such as websites, brochures, workbooks, and phones. Previous studies also used many delivery methods including booklet, CD, telephone, chat application, and websites on CBT intervention for cancer patients.[52,53] Face-to-face was effective for self-management, and video, brochures, and websites were accessible and cost-effective.[54,55] Given the different advantages a patient-centered approach to selecting the various delivery method is recommended.

Third, the potential synergistic effects of combining CBT with other therapeutic modalities should not be overlooked. The present meta-analysis includes studies that have successfully integrated CBT with physical and mental health interventions, such as exercise and relaxation training. Previous research has also demonstrated the enhanced effectiveness of CBT when coupled with hypnosis or physical activity interventions,[56,57] suggesting a multi-faceted approach to treatment could yield optimal results.

Limitations

The study had the following limitations. First, most studies had blinding bias risk or unclear allocation concealment, resulting in the low quality of the study. The interpretation of the intervention's benefit may change with the inclusion of low-quality trials.[58] Therefore, high-quality RCTs with the blinding of both participants and staff and specific allocation concealment should be included in additional related studies.

Second, the sample size in this study was comparatively small, as there were only ten English-language papers and 1027 research ambassadors included in the meta-analysis. Small study data typically indicate larger effect sizes, as well as more expansive and imprecise estimates of between-study heterogeneity.[59] Thus, it is necessary to include more studies and subjects, including studies in other languages.

Third, although the efficacy of CBT was supported by all included studies, there were differences in the specific contents, intervention length, delivery methods, measurement tools, and follow-up time for each included study, which could lead to heterogeneity in the results. Future research needs to categorize and examine related items, such as CBT intervention contents, methods, duration, and measurement tools, in greater detail.

Fig. 5. Comparison of depression (A) and anxiety (B) between CBT groups and control groups according to the follow-up period. CBT, cognitive behavioral therapy.

Conclusions

This meta-analysis revealed that CBT had a beneficial impact on gynecological cancer patients' depression, anxiety, fatigue, distress, and FCR, except for QoL, which did not reach statistical significance. Subgroup analyses based on follow-up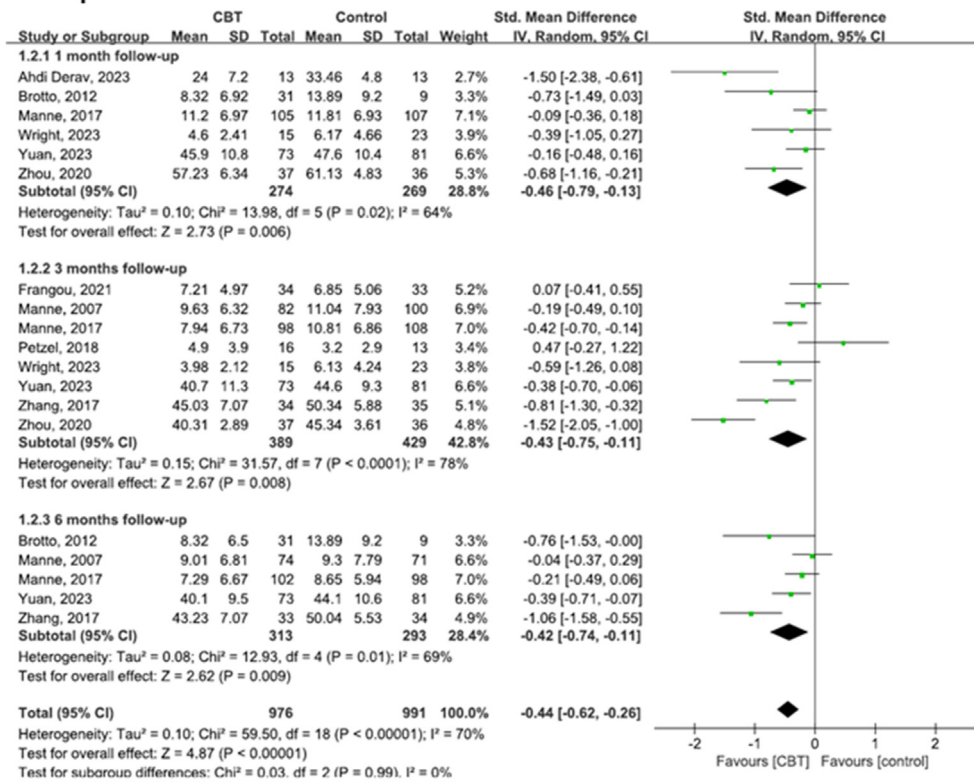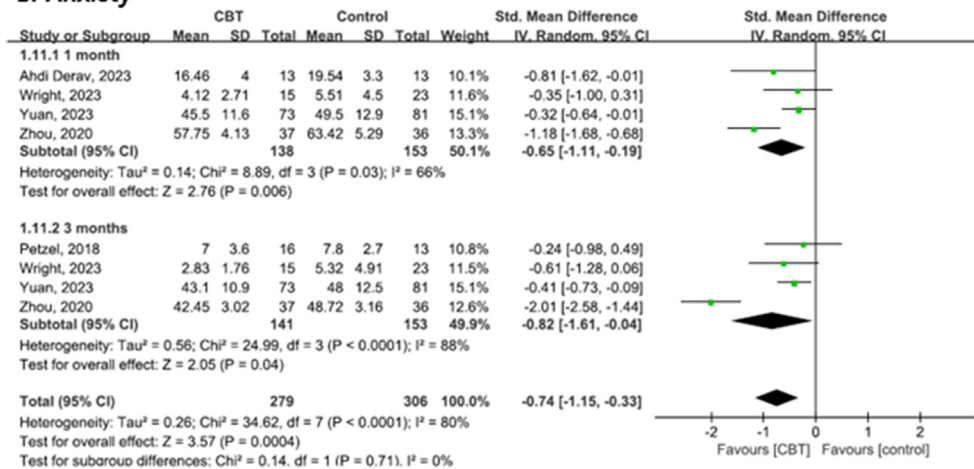 periods did not show a decrease in statistical heterogeneity. Sensitivity analysis showed that some studies might be the cause of heterogeneity in QoL and anxiety.

Applying CBT to the treatment of patients with gynecological cancer or incorporating it into instructional materials could be a beneficial

option for healthcare providers. The CBT has proven beneficial in helping gynecological cancer patients manage their overall symptoms, particularly psychological ones. In clinical practice, psychotherapy, such as CBT, might not be deemed more important than cancer treatment. However, CBT might be useful for gynecological cancer patients experiencing symptoms and side effects during the prolonged course of treatment. Therefore, healthcare providers should be aware of the importance of providing CBT to patients with gynecological cancer. In addition, it is necessary to think about various ways to effectively provide CBT in the treatment process and try to educate patients on CBT appropriately.

Ethics statement

Not required.

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CRediT authorship contribution statement

Eungil Ko: Conceptualization, Methodology, Software, Formal analysis, Investigation, Data Curation, Writing–Original Draft, Visualization. **Yaelim Lee:** Conceptualization, Methodology, Validation, Formal analysis, Investigation, Writing–Review & Editing, Supervision. All authors had full access to all the data in the study, and the corresponding author had final responsibility for the decision to submit for publication. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

Declaration of competing interest

The authors declare no conflict of interest.

Data availability statement

Data availability is not applicable to this article as no new data were created or analyzed in this study.

Declaration of generative AI and AI-assisted technologies in the writing process

No AI tools/services were used during the preparation of this work.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.apjon.2024.100562.

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