International Journal of Biology and Life Sciences
ISSN: 2957-9511 | Vol. 16, No. 2, 2026

Meta-analysis of the Intervention Effect of Cognitive Behavioral Therapy on Chemotherapy Anxiety Population

Fagang Ma, Yancan Wang *, Wei Su, Yangyang Sun, Lin Cheng

School of Nursing, Qilu Medical University, Zibo, Shandong, 255300, China

*** Corresponding author:** Yancan Wang (Email: wangyancan@qlmu.edu.cn)

Abstract: Objective This paper primarily analyzes the impact and extent of cognitive behavioral therapy (CBT) on anxiety levels in chemotherapy patients by reviewing and retrieving literature and relevant journals, aiming to provide theoretical support and practical references for clinical nursing. **Methods** A Meta-analysis was conducted, systematically retrieving literature from databases such as PubMed and CNKI. The time range was set from the initial inclusion date of each database to March 2026. Regarding studies on CBT intervention for anxiety in chemotherapy patients, content analysis and data extraction were performed to summarize the core intervention modules, implementation processes, and effect evaluation indicators of CBT. **Results** This study included 11 studies (n=11), with 2 in English and 9 in Chinese, totaling 1112 cases. The analysis showed that CBT, through its three core modules of cognitive restructuring, behavioral activation, and relaxation training, can effectively help chemotherapy patients recognize and alleviate their negative cognitions, thereby reducing anxiety. Most studies indicated that patients' anxiety scores decreased after CBT intervention, and patients also had a high level of acceptance towards this therapy. **Conclusion** Cognitive behavioral therapy has a significant effect on alleviating anxiety in chemotherapy patients, and its targeted intervention model can effectively improve patients' psychological state. However, in clinical practice, it is necessary to develop different intervention plans based on individual differences among patients. Future research could focus on the long-term effects of cognitive behavioral therapy.

Keywords: Cognitive Behavioral Therapy; Chemotherapy; Anxiety; Cancer; Meta-analysis; Psychological Intervention.

1. Introduction

Chemotherapy is an important component of comprehensive cancer treatment. As one of the main treatment methods for cancer patients, chemotherapy has been routinely used to treat cancer and reduce the risk of recurrence [1]. However, patients are prone to the toxic side effects of chemotherapy during treatment. Exposure to anticancer chemotherapy drugs can lead to many adverse reactions in cancer patients, such as nausea and vomiting, hypotension, kidney toxicity, fatigue, etc., which seriously threaten the physical and mental health and quality of life of cancer patients, exacerbate their psychological stress, and often accompany varying degrees of fatigue, anxiety, depression, and low quality of life issues [2], resulting in poor treatment compliance. Cognitive Behavior Therapy (CBT) is a common psychological treatment method in clinical practice. It is a structured, short-term psychological treatment approach that aims to change patients' negative cognitions and erroneous behaviors through intervention measures, thereby eliminating negative behaviors and alleviating patients' negative emotions [3]. Therefore, this study mainly analyzes the anxiety psychology of chemotherapy patients and investigates the intervention effect of CBT on chemotherapy-related anxiety. It provides important reference information for clinical nursing and mental health institutions.

2. Materials and Methods

2.1. Inclusion and Exclusion Criteria for Literature

Inclusion criteria: (1) Study subjects: patients with pathologically confirmed malignant tumors who underwent chemotherapy; aged ≥18 years; conscious and able to cooperate with nursing interventions and effect evaluations; (2) Intervention measures: The control group received conventional intervention measures; the observation group received cognitive behavioral therapy in addition to the conventional intervention measures of the control group; (3) Study type: Randomized controlled trials (RCTs) publicly published both domestically and internationally; (4) Outcome measures: Anxiety was assessed using the Hamilton Anxiety Scale (HAMA), Self-Rating Anxiety Scale (SAS), Hospital Anxiety and Depression Scale-Anxiety Subscale (HADS-A), or Beck Anxiety Inventory (BAI). Exclusion criteria: (1) Patients from non-RCT studies; (2) Study types such as case reports, reviews, commentaries, editorial letters, in vitro studies, animal experiments, conference abstracts, etc.; (3) Duplicate publications and low-quality literature; (4) Lack of key data and unable to obtain through contacting the authors; (5) Literature without clear source, inclusion, and exclusion criteria of study subjects; (6) Outcome measures without reported anxiety scores or data format unextractable; (7) Non-Chinese or non-English literature.

2.2. Literature Search Strategy

The relevant literature was retrieved from databases such as PubMed, Cochrane Library, Web of Science, Embase, CNKI, VIP, Wanfang, and CBM. The search covered the period from the establishment of the databases to March 2026. The search was conducted using a combination of "subject headings + free-text terms", and references cited in the retrieved literature were also included. Chinese subject headings: "认知行为疗法/化学疗法/焦虑"; Chinese free-

text terms: "认知行为疗法/ 化疗/化学疗法/ 药物治疗/ 焦虑/情志异常"; English subject headings: "Cognitive Behavioral Therapy/ Drug Therapy/ Anxiety"; English free-text terms: "Cognitive Behavioral Therapy / Behavioral Therapies, Cognitive/ Cognition Therapy/ Drug Therapy /Chemotherapy/Pharmacotherapy/ Anxiety/ Angst/ Nervousness / Hypervigilance".

2.3. Literature Screening and Data Extraction

This stage is completed independently by two evaluators; subsequently, the full text of studies that may meet the inclusion criteria is obtained and carefully reviewed to determine the final list of included articles. After confirmation of inclusion, all necessary data required for the study are extracted according to the preset data extraction table.

2.4. Literature Quality Evaluation

In this study, the Cochrane Collaboration's risk of bias assessment tool was employed to evaluate the methodological quality of the included randomized controlled trials (RCTs). The evaluation encompassed seven dimensions: random sequence generation, allocation concealment, blinding of researchers and participants, blinding of outcome assessors, completeness of outcome data, selective reporting of results, and other sources of bias. Each dimension was assessed as low risk, high risk, or unclear, based on the implementation of the study.

2.5. Statistical Methods

Data were merged using RevMan 5.4 software for meta-analysis. All included studies employed the same anxiety assessment tools (HAMA, SAS, HADS-A, BAI). However, due to different measurement units across scales, standardized mean difference (SMD) was used as the effect size indicator, and 95% confidence intervals (CIs) were calculated. If $I^2 < 50\%$ and $P > 0.1$, it indicated low statistical heterogeneity among the included studies, and a fixed-effects model was used for effect size pooling. If $I^2 \geq 50\%$ or $P \leq 0.1$, it indicated significant heterogeneity, requiring further investigation into potential sources. After excluding obvious clinical and methodological differences, a random-effects model was adopted. Sensitivity analysis was conducted using the one-by-one exclusion method to test the robustness of the results. Publication bias was assessed using a funnel plot.

3. Result

3.1. Literature Search Results

After an initial search, a total of 1642 relevant articles were retrieved. Following a step-by-step screening process, 11 randomized controlled trials were ultimately included for meta-analysis. The detailed literature screening process is illustrated in Figure 1.

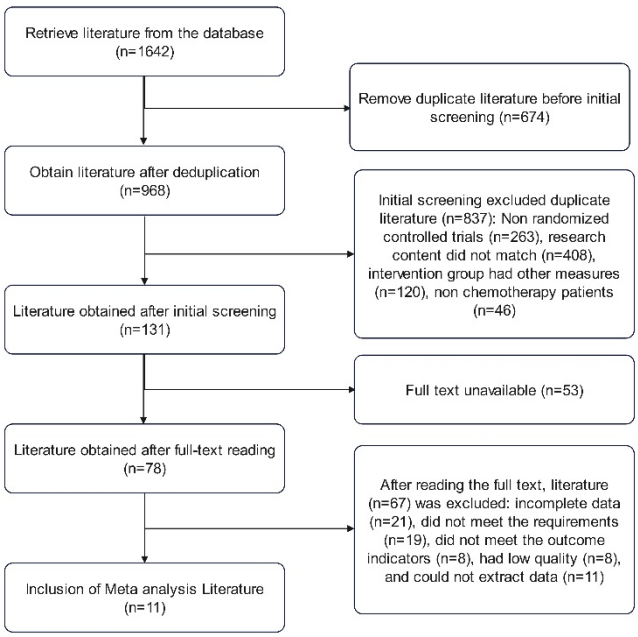

Figure 1. Technology Roadmap

3.2. Basic Characteristics Included in the Study

The paper included a total of 11 randomized controlled trials. The types of cancer included in the study were rectal cancer, cervical cancer, gastric cancer, esophageal cancer, thyroid cancer, laryngeal cancer, nasopharyngeal cancer, hematological cancer, and mixed cancer. The intervention measures in all cases were cognitive behavioral therapy, with intervention durations ranging from approximately 4 weeks for short-term interventions to ≥8 weeks for medium- and long-term interventions. Anxiety assessment tools included the Hamilton Anxiety Scale (HAMA), Self-Rating Anxiety Scale (SAS), Hospital Anxiety and Depression Scale-Anxiety Subscale (HADS-A), Depression-Anxiety-Stress Scale (DASS), and Beck Anxiety Inventory (BAI). The basic characteristics of the included studies are presented in Table 1.

3.3. Quality Evaluation

The methodological quality assessment of the literature involved in this study was conducted using the Cochrane risk of bias assessment tool, and the quality of the 11 randomized controlled trials included was evaluated. The results are as follows:

Table 1. Basic characteristics of included literature

Included literature	Year	Cancer type	Sample size	Age	(Mean±SD)	Intervention Method	Intervention measures	Measuring tool
Duan Haiping [4]	2024	Cervical cancer	E=60 C=60	E=43.00±9.63 C=43.39±9.45	E=8.42±3.02 C=12.63±3.71	CBT	Routine care	HAMA
Han Yao[5]	2024	Hematologic malignancy	E=32 C=33	E=43.00±9.63 C=43.39±9.45	E=46.63±4.72 C=54.48±3.91	CBT	Routine care	SAS
Zhang Liuyan[6]	2023	Thyroid cancer	E=53 C=53	E=51.19±4.28 C=51.16±4.23	E=38.29±3.12 C=45.74±3.45	CBT	Routine care	SAS
Huang Lina[7]	2025	Gastric cancer	E=104 C=104	E=54.22±7.87 C=55.09±7.59	E=25.34±4.15 C=36.42±4.32	CBT	Routine care	HAMA
Zhang Ju[8]	2022	Esophageal cancer	E=39 C=39	E=70.00±9.35 C=68.39±10.58	E=35.83±6.71 C=52.72±6.11	CBT	Routine care	SAS
Fu Shengnan[9]	2021	Nasopharyngeal carcinoma	E=60 C=63	E=49.50±10.25 C=50.50±9.75	E=3.58±0.907 C=4.84±1.516	CBT	Routine care	HADS-A
Hu Shuwei[10]	2022	Mixed carcinoma	E=42 C=41	E=52.00±8.00 C=52.00±8.00	E=35.25±5.94 C=51.73±11.50	CBT	Routine care	SAS
Liu Jiaxin[11]	2023	Rectal cancer	E=56 C=55	E=51.12±5.13 C=50.61±5.81	E=6.07±1.27 C=7.26±1.42	CBT	Routine care	HAMA
Xu Chunyan[12]	2022	Laryngeal cancer	E=60 C=59	E=72.57±4.10 C=72.08±4.08	E=50.28±2.76 C=58.44±3.40	CBT	Routine care	SAS
Abbas et al[13]	2022	Mixed carcinoma	E=30 C=30	E=44.85±10.87 C=45.60±13.55	E=5.00±2.89 C=16.01±6.01	CBT	Routine care	DASS
Sheikhzadeh[14]	2021	Mixed carcinoma	E=19 C=20	E=34.00±8.00 C=34.00±8.00	E=7.42±4.15 C=21.96±6.42	CBT	Routine care	BAI

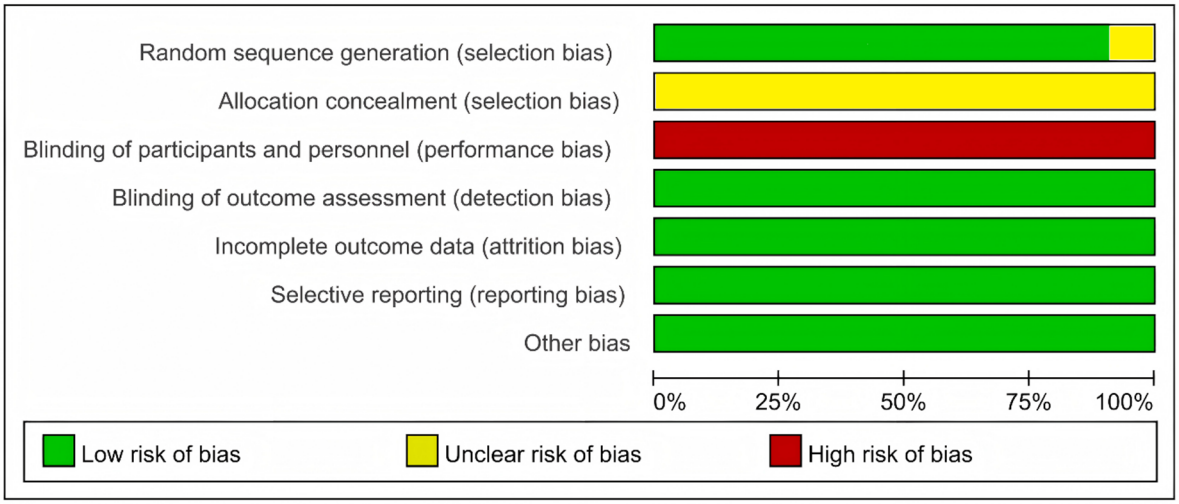

Figure 2. Percentage distribution of various aspects in the quality assessment of included literature

3.4. Meta-analysis Results

This study included a total of 11 randomized controlled trials, SMD=-1.80,95%CI[-1.95,-1.66],with negative SMD values and large absolute values, indicating that the anxiety scores in the CBT group were significantly lower than those in the usual care group, suggesting a significant intervention effect. Statistical significance: P<0.00001,the results are statistically significant. Heterogeneity test results showed that I^2=89%, P<0.00001, indicating high heterogeneity among studies, thus a random-effects model was used for meta-analysis.

The meta-analysis results indicate that cognitive behavioral therapy (CBT) can effectively reduce anxiety in chemotherapy patients, SMD = -1.80(95% CI [-1.95, -1.66], Z = 24.65, P < 0.00001).

subgroup analysis

(1) Analysis by cancer type subgroup

Subgroup analysis was conducted based on "cancer type", dividing the samples into two subgroups: the single-cancer type group (8 studies in total) and the mixed-cancer type group (3 studies in total). The SMD for the single-cancer type group was -1.86, with a 95% CI of [-2.41, -1.31], and a P-value < 0.00001, indicating a highly statistically significant difference, suggesting that cognitive behavioral therapy (CBT) can significantly reduce anxiety scores in patients undergoing chemotherapy for a single cancer type. For the mixed-cancer type group, the SMD was -2.20, with a 95% CI of [-2.71, -1.68], and a P-value < 0.00001, indicating statistical significance, suggesting that CBT can also significantly reduce anxiety scores in patients undergoing chemotherapy for mixed cancer types. Overall heterogeneity: I^2 = 89%. Subgroup difference test: Chi2 = 0.75, df = 1, P = 0.39, I^2 = 0%, indicating no statistical difference in effect sizes between the two subgroups and low heterogeneity between subgroups. The results for both subgroups were completely consistent, with CBT proving superior in both. Therefore, cancer type was not the main source of heterogeneity.

(2) Subgroup analysis based on the evaluation scale

The samples were categorized into two subgroups: the self-report scale subgroup (completed by patients themselves,

including SAS, BAI, and DASS, totaling 7 items) and the observer-report scale subgroup (assessed by doctors or evaluators, including HAMA and HADA-A, totaling 4 items). A random-effects model was used for pooling. The analysis results indicated that in the self-report scale subgroup (I^2=39%, P=0.13), SMD = -2.27, 95% CI [-2.55, -1.99], P<0.00001, with a highly statistically significant difference, suggesting that cognitive behavioral therapy (CBT) significantly reduces patients' self-reported anxiety scores. In the observer-report scale subgroup (I^2=94%, P<0.00001), SMD = -1.43, 95% CI [-2.23, -0.63], P=0.0004, with statistical significance, indicating that CBT also significantly reduces anxiety scores assessed by professionals. Subgroup analysis revealed that regardless of using self-report or observer-report scales, CBT significantly reduces anxiety scores in chemotherapy patients, suggesting that the improvement effect of CBT on anxiety in chemotherapy patients is consistent across different assessment methods. The overall heterogeneity I^2=89%, and subgroup analysis showed that this heterogeneity is partly derived from the scale assessment methods, indicating that scale assessment methods may be a source of heterogeneity among studies.

(3) Subgroup analysis based on intervention period

Table 2. CBT intervention cycle

Included literature	Year	Country	Intervention cycle
Liu Jiaxin2023	2023	China	4 weeks
Duan Haiping2024	2024	China	4 weeks
Han Yao2024	2024	China	5 weeks
Zhang Liuyan2023	2023	China	16 weeks
Huang Lina2025	2025	China	5 weeks
Zhang Ju2022	2022	China	4 weeks
Xu Chunyan2022	2022	China	4 weeks
Fu Shengnan2021	2021	China	6 weeks
Hu Shuwei2022	2022	China	12 weeks
Abbas et al2022	2022	Pakistan	16 weeks
Sheikhzadeh2021	2021	Iran	8 weeks

Subgroup analysis was conducted based on the intervention duration, with an 8-week cutoff dividing the participants into two groups: the short-term intervention group (<8 weeks) and the medium- to long-term intervention group (≥8 weeks). For the short-term intervention group, the Standardized Mean Difference (SMD) was -1.81, with a 95% Confidence Interval (CI) of [-2.42, -1.20], and a P-value of <0.00001. Statistical significance (P<0.00001) indicates that cognitive behavioral therapy (CBT) significantly improves anxiety. The heterogeneity I^2 was 93%, indicating high heterogeneity and suggesting substantial differences among studies. For the medium- to long-term intervention group, the SMD was -2.19, with a 95% CI of [-2.52, -1.85], and a P-value <0.00001, indicating that CBT significantly reduces anxiety scores in chemotherapy patients. The heterogeneity I^2 was 20%, indicating low heterogeneity and suggesting minor differences among studies, with good consistency and robustness within each subgroup. Overall heterogeneity was I^2=89%. Subgroup difference test: Chi2=1.14, df=1, P=0.29, I^2=12.2%, indicating no statistical difference in effect sizes between the two subgroups and low heterogeneity between subgroups. The results in both subgroups were completely consistent, favoring CBT. Therefore, the duration of intervention is not the main source of heterogeneity.

(4) Analysis by patient age subgroups

Since the mean age of the 11 relevant studies fell within the range of 52 years, this was taken as the cutoff point to categorize the samples into two subgroups: the older age group (with a total of 4 studies) with an average age of 52 or older, and the younger age group (with a total of 7 studies) with an average age under 52 years. In the older age group (≥52 years) (I^2=61%), the Standardized Mean Difference (SMD) was -2.41, with a 95% Confidence Interval (CI) of [-2.80, -2.02] and a P-value <0.00001, indicating statistical significance. This suggests that cognitive behavioral therapy significantly improves anxiety in elderly chemotherapy patients. In the younger age group (I^2=85%), with an average age under 52 years, the SMD was -1.68, with a 95% CI of [-2.17, -1.19] and a P-value <0.00001, indicating a highly statistically significant difference. This suggests that cognitive behavioral therapy intervention also positively improves anxiety in younger chemotherapy patients. Overall heterogeneity: I^2=89%, indicating significant differences among all studies. This heterogeneity mainly stems from age grouping (the effect size in the older age group is -2.41, which is greater than that in the younger age group, -1.68), suggesting that patient age may be a contributing factor to inter-study heterogeneity.

3.5. Sensitivity Analysis

Utilizing the Review Manager 5.4 platform, we implemented the single study exclusion method, which involves removing a specific study item by item and recalculating the pooled effect size.

Table 3. Sensitivity Analysis Results

Exclude research	SMD (95%CI)	P	I^2
Liu Jiaxin2023	−1.95 [−2.10,−1.79]	<0.00001	87%
Duan Haiping2024	−1.89 [−2.05,−1.74]	<0.00001	89%
Han Yao2024	−1.80 [−1.95, −1.66]	<0.00001	90%
Zhang Liuyan2023	−1.76 [−1.91, −1.61]	<0.00001	90%
Huang Lina2025	−1.66 [−1.82, −1.51]	<0.00001	87%
Zhang Ju2022	−1.79 [−1.90, −1.61]	<0.00001	89%
Xu Chunyan2022	−1.73[−1.88, −1.58]	<0.00001	89%
Fu Shengnan2021	−1.94[−2.10, −1.79]	<0.00001	87%
Hu Shuwei2022	−1.80 [−1.95, −1.66]	<0.00001	90%
Abbas et al2022	−1.77[−1.92, −1.63]	<0.00001	90%
Sheikhzadeh2021	−1.78[−1.93, −1.64]	<0.00001	90%

The results of the study-by-study exclusion test confirmed that the pooled conclusion of this meta-analysis has good robustness. Specifically, the floating range of the effect size (SMD: -1.95 to -1.66) did not deviate significantly from the original estimate (SMD = -1.80), and the directionality remained constant (both were negative, indicating that CBT was superior to usual care). The P values for each analysis after exclusion were all less than 0.00001, and the confidence intervals did not touch the null boundary (none included 0). In addition, the heterogeneity index I^2 hovered between 87% and 90% and did not significantly decrease with the removal of individual studies, suggesting that the source of this variation was not isolated to a specific study. The high

heterogeneity indicates that the sources of heterogeneity are complex and not caused by a single study, requiring further exploration from other dimensions. The direction of the conclusion and statistical significance remained unchanged, indicating that cognitive behavioral therapy is significantly superior to usual care in reducing anxiety in chemotherapy patients. The results of the sensitivity analysis were good, and the conclusion of this meta-analysis is credible.

Based on the above analysis, even though the heterogeneity of the initial pooled results is at a high level, the series of results from the sensitivity analysis still robustly point to the same trend: cognitive behavioral therapy helps reduce anxiety in chemotherapy patients. Regarding the reasons for the heterogeneity, it is speculated that it may be related to the inconsistency in the types of anxiety rating scales used across studies (self-rating vs. observer-rating) and the different age distributions of the intervention patients. Further rigorous and high-quality studies are still needed for further verification in the future.

3.6. Publication Bias

The literature employs a funnel plot to examine the publication bias in literature research. The test results indicate that the funnel plot exhibits good symmetry overall, suggesting that the included studies do not exhibit significant selective publication. There is no publication bias among the studies, indicating a high credibility of the results. See Figure 3. The Egger regression test was used to further quantify the publication bias. The results showed a regression intercept of -5.80 (95% CI: -13.88 to 2.28), t = -1.63, P = 0.138, indicating good symmetry in the funnel plot and no significant publication bias (P > 0.05).

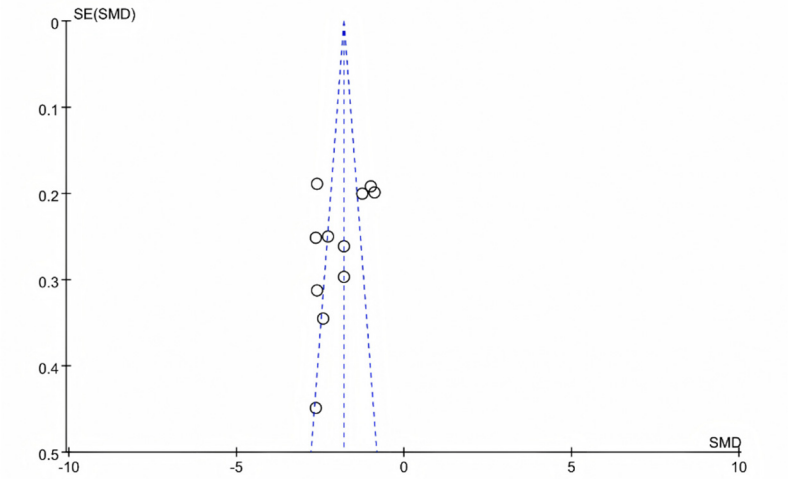

Figure 3. Funnel plot of the impact of cognitive behavioral therapy on anxiety in chemotherapy patients

4. Discussion

4.1. The Overall Impact of Cognitive Behavioral Therapy on Anxiety in Chemotherapy Patients

The meta-analysis results of cognitive behavioral therapy (CBT) on anxiety in chemotherapy patients showed that (SMD=-1.80, 95%CI [-1.95, -1.66]), with a statistical test P<0.00001. The above data indicate that the between-group difference has reached a significant level, suggesting that compared to conventional care mode, CBT intervention can reduce the anxiety scores of chemotherapy patients by an average of 1.80 standard deviation units, demonstrating a clear positive effect. However, the heterogeneity test showed I^2=89%, indicating a high degree of heterogeneity among studies. Subgroup analyses and sensitivity analyses were conducted based on scale type, intervention period, age, and cancer type, and the results all showed that CBT significantly reduces anxiety in chemotherapy patients compared to conventional care. The findings of this study are consistent with those of Abbas [13], Sheikhzadeh [14], and others.

4.2. The Intervention Effect of Cognitive-Behavioral Therapy on Anxiety in Patients with Different Types of Cancer

The combined effect size (SMD) of a single cancer type is -1.86, with a 95% confidence interval (CI) of -2.41 and -1.31, respectively, and P<0.00001, indicating statistical significance. I^2=92%; The combined effect size (SMD) of mixed cancer types was -2.20, with a 95% confidence interval (CI) of -2.71 and -1.68, respectively, and P<0.00001, indicating statistical significance. I^2=44%. The results of the subgroup difference test showed P=0.39, and there was no statistically significant difference in the effect size between the two groups. The results showed that cognitive-behavioral therapy significantly reduced anxiety in both single cancer and mixed cancer chemotherapy patients, and cancer type was not the main source of heterogeneity in this study. CBT has good cross cancer applicability and can be widely applied in chemotherapy patients with different types of cancer.

4.3. The Intervention Effect of Cognitive-Behavioral Therapy on Anxiety Scores Using Measurement Tools.

By studying the sub group analysis of anxiety levels in chemotherapy patients using cognitive behavioral therapy, it was found that the combined effect size (SMD) of self-evaluation scale sub groups was -2.27, 95% CI [-2.55, -1.99], P<0.00001, which was statistically significant. This indicates that cognitive behavioral therapy is significantly better than conventional nursing in patients' self-reported anxiety scores. I^2=39%, Belonging to low heterogeneity, indicating small differences between studies; The combined effect size (SMD) of the subscale was -1.43, 95% confidence interval (CI) was -2.23, -0.63, P=0.0004, which was statistically significant.

This indicates that cognitive behavioral therapy is also significantly better than conventional nursing in terms of anxiety scores assessed by professionals. I^2=94%, It belongs to high heterogeneity, indicating significant differences between studies. Sensitivity analysis has been conducted to prove that the results are not affected by a single study and have strong stability. The results of this study showed that cognitive-behavioral therapy, whether evaluated using self-assessment or peer assessment scales, can significantly reduce anxiety in chemotherapy patients. However, the heterogeneity of the self-assessment scale subgroups was lower (I^2=39%), and the results were more robust; The heterogeneity of subgroups in the evaluation scale is relatively high, mainly influenced by the study of Huang Lina et al. (SMD=-2.61), which may be related to the large sample size (208 cases) or differences in intervention plans.

4.4. The Effect of Cognitive-Behavioral Therapy on Anxiety Intervention in Different Intervention Cycles

The short-term group (<8 weeks) had a combined effect size (SMD) of -1.81, 95% confidence interval (CI) of -2.42, -1.20, P<0.00001, which was statistically significant. I^2=93%; The combined effect size (SMD) of the medium to long term group (≥ 8 weeks) is -2.19, with a 95% confidence interval (CI) of -2.52 and -1.85, and a P value of less than 0.00001, indicating statistical significance. I^2=20%. The results showed that cognitive-behavioral therapy can significantly reduce anxiety in chemotherapy patients, whether in short-term or medium to long-term interventions. The absolute value of the effect size (SMD=-2.19) in the medium to long term group is greater than that in the short term group (SMD=-1.81), and the heterogeneity is lower (I^2=20%), indicating that the anti anxiety effect of CBT is more stable and reliable when the intervention duration is sufficient. This is consistent with the view in previous studies that CBT requires a certain amount of time for cumulative effects.

4.5. The Intervention Effect of Cognitive-Behavioral Therapy on Anxiety in Chemotherapy Patients of Different Ages

The combined effect size (SMD) of the younger group (<52 years old) is -1.68, 95% CI [-2.17, -1.19], P<0.00001, which is statistically significant. I^2=85%; The combined effect size (SMD) of the elderly group (≥ 52 years old) is -2.41, 95% CI [-2.80, -2.02], P<0.00001, which is statistically significant. I^2=61%. The results of the subgroup difference test showed P=0.02, indicating a statistically significant difference in the effect size between the two groups. The results showed that cognitive-behavioral therapy had a significantly better effect on improving anxiety in elderly chemotherapy patients (SMD=-2.41) than in younger patients (SMD=-1.68). It is speculated that the reasons may include: higher anxiety levels and greater room for improvement in elderly patients during chemotherapy; Or elderly patients have better compliance with CBT; However, young patients may face multiple pressures such as work and family, and the sources of anxiety are more complex, resulting in significant individual differences in the effectiveness of CBT.

5. Conclusion

5.1. Cognitive Behavioral Therapy Can Reduce Anxiety in Chemotherapy Patients

Cognitive-behavioral therapy can help patients establish a positive cognitive pattern by improving their negative cognitive patterns, correcting their irrational beliefs, and providing relaxation training, thereby effectively reducing anxiety levels. Meta-analysis confirms that cognitive-behavioral therapy has a clear intervention effect on chemotherapy-anxious individuals, and the medium- and long-term intervention effects are more stable.

5.2. Cognitive Behavioral Therapy Has an Anxiety-Improving Effect on Chemotherapy Patients with Different Characteristics

The research results indicate that cognitive behavioral therapy (CBT) is more effective in alleviating anxiety in elderly patients compared to younger patients. Age can serve as a reference factor in formulating personalized intervention plans in clinical practice. Additionally, CBT significantly reduces anxiety in patients with both single and mixed cancer types, suggesting that this therapy can be widely applied to chemotherapy patients with different cancer types and exhibits good cross-population applicability.

5.3. The Duration of Cognitive Behavioral Therapy Intervention is an Important Factor Affecting the Stability of its Effects

There is significant variation in the effects among studies under short-term intervention, whereas the effects under medium and long-term intervention are highly consistent. Therefore, in clinical practice, it is essential to ensure that cognitive behavioral therapy interventions are of sufficient duration to guarantee the stability and reliability of the intervention effects.

Acknowledgments

First and foremost, I would like to express my gratitude to my supervisor. From the conception of the thesis, through the proposal stage, to the final submission, every step has been inseparable from your meticulous guidance and invaluable advice. Thank you for your continuous assistance. I wish you all the best and peace throughout the year.

Secondly, I want to thank my family and friends for your continuous support and encouragement. You have given me the freedom to make my own choices. It is your trust and encouragement that have provided me with the motivation to keep moving forward. You are my strongest support.

References

[1] Lai, J. (2024). Multi-center evidence translation study on nursing assessment before chemotherapy for cancer patients [Master's thesis]. Southern Medical University.

[2] Xu, Y., Zhang, W., Jiang, S. W., Zhou, X. X., & Zhang, H. Y. (2023). Meta-analysis of the intervention effect of aerobic exercise combined with resistance training on cancer-related fatigue and quality of life in chemotherapy patients. Journal of Nurses' Advanced Studies, (05), 424–430.

[3] Guo, W. X., Zhang, J., Wang, Y. H., Tang, Y., & Liu, N. (2024). Meta-analysis of the impact of cognitive behavioral therapy on

self-management ability and quality of life in patients with colorectal cancer stoma. Jilin Medical Journal, (06), 1484–1490.

[4] Duan, H. P., Luo, M. X., Ji, F. Y., & Wu, Y. L. (2024). The impact of interventions based on cognitive behavioral therapy on psychological status and sleep quality of patients with cervical cancer. Basic and Clinical Cancer Research, (06), 696–698.

[5] Han, Y., & Yu, G. L. (2024). A study on the intervention effect of cognitive behavioral therapy on anxiety and depression in patients with hematological tumors. Psychological Monthly, (14), 147–149, 152.

[6] Zhang, L. Y., Liu, H., Xia, Y. J., et al. (2023). The impact of comprehensive intervention combined with cognitive behavioral therapy on medication adherence and quality of life in patients with thyroid cancer after surgery. Cancer Progress, (20), 2308–2312.

[7] Huang, L. N., & Xing, Y. R. (2025). Application of cognitive behavioral therapy in the fear of disease progression in gastric cancer patients. Journal of Aerospace Medicine, (03), 363–365.

[8] Zhang, J. (2022). Research on the application of cognitive behavioral therapy in the nursing care of esophageal cancer patients undergoing chemoradiotherapy. Contemporary Nurses (Late Edition), (08), 75–77.

[9] Fu, S. N., Chen, Y. Z., Yan, O. Y., Han, Y. Q., & Liu, F. (2021). The impact of cognitive behavioral therapy on anxiety and depression in patients with locally advanced nasopharyngeal carcinoma undergoing concurrent chemoradiotherapy. Cancer Pharmacy, (05), 583–589.

[10] Hu, S. W., Yuan, X. H., Sheng, Y. Y., Yang, Y., & Peng, J. (2022). The impact of different courses of cognitive behavioral therapy on anxiety and depression in cancer patients. Modern Medicine and Health, (12), 2015–2019.

[11] Liu, J. X., & Wang, Y. J. (2023). The effect of cognitive behavioral therapy on negative emotions and immune function in rectal cancer patients undergoing chemoradiotherapy. International Journal of Psychiatry, (04), 860–863.

[12] Xu, C. Y., Ma, L. C., Wei, H., & Chen, H. F. (2022). The application value of "one-on-one" cognitive behavioral therapy in elderly patients after laryngeal cancer surgery. Practical Clinical Medicine, (03), 71–74.

[13] Abbas, Q., Arooj, N., Baig, K. B., Khan, M. U., Khalid, M., & Shahzadi, M. (2022). A clinical trial of cognitive behavior therapy for psychiatric comorbidity and quality of life with Cancer Patients during Chemotherapy (CPdC). BMC Psychiatry, 22(1), 222. https://doi.org/10.1186/s12888-022-03863-w.

[14] Sheikhzadeh, M., Zanjani, Z., & Baari, A. (2021). Efficacy of Mindfulness-Based Cognitive Therapy and Cognitive Behavioral Therapy for Anxiety, Depression, and Fatigue in Cancer Patients: A Randomized Clinical Trial. Iran J Psychiatry, 16(3), 271–280. https://doi.org/ 10.18502/ ijps. v16i3. 6252.