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A meta-analysis and systematic review on the efficacy and safety of traditional Chinese medicine nursing in radiotherapy patients

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► ***Review article***

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ABSTRACT

Background: Radiotherapy is a cornerstone in cancer treatment, but its associated physical discomfort and psychological distress often impair patients' quality of life (QOL). Traditional Chinese Medicine (TCM) nursing, integrating syndrome-based care, emotional regulation, and lifestyle guidance, has been increasingly applied as a complementary approach during radiotherapy, while existing literature has not well explored its overall efficacy and safety. ***Materials and Methods:*** This study aims at systematically elucidating the efficacy and safety of TCM nursing in patients undergoing radiotherapy. Methods: PubMed, Cochrane Library, Web of Science, and China National Knowledge Infrastructure (CNKI) were searched from inception to July 2025. Eligible studies included cancer patients receiving radiotherapy, comparing TCM nursing with conventional nursing or placebo care. Primary outcomes were QOL, anxiety, and depression scores; secondary outcomes included radiotherapy-related adverse events. Relevant meta-analysis relied on RevMan 5.4 and Stata 16.0, along with sensitivity and publication bias analyses. ***Results:*** Eight studies were included. Pooled results showed that TCM nursing significantly improved QOL (MD = 8.81, 95% CI: 7.09–10.52, P<0.001, I^2= 0%) and reduced anxiety (MD = −5.80, 95% CI: −8.33 to −3.28, P=0.001, I^2= 73%) and depression scores (MD = −4.58, 95% CI: −5.65 to −3.50, P<0.001, I^2= 82%). Radiotherapy-related adverse events did not increase significantly (RR = 0.82, 95% CI: 0.63–1.06, P=0.131), with consistent sensitivity results. ***Conclusion:*** TCM nursing may be a beneficial and safe adjunct to radiotherapy, improving QOL and alleviating psychological distress.

INTRODUCTION

Radiotherapy is one of the most important modalities in the comprehensive treatment of malignant tumors [1]. With continuous advancements in radiotherapy techniques of intensity-modulated radiotherapy (IMRT), stereotactic body radiotherapy (SBRT), and image-guided radiotherapy (IGRT), etc., the precision and therapeutic efficacy of tumor irradiation have been substantially improved [2-4]. These technological developments contribute to enhanced local tumor control and improved survival outcomes in patients suffering malignancies of head and neck, breast, lung, and gastrointestinal cancers, etc. [5]. Despite its proven clinical benefits, radiotherapy is frequently associated with a range of acute and chronic adverse reactions, including radiation dermatitis, oral mucositis, fatigue, gastrointestinal symptoms, and psychological distress [6]. These treatment-related complications can significantly impair patients' quality of life (QOL) [7], compromise treatment adherence, and ultimately affect therapeutic outcomes. Consequently, optimizing supportive care strategies during radiotherapy remains an important clinical priority.

Nursing interventions play a crucial role in mitigating radiotherapy-related toxicities and enhancing patients' overall well-being. Conventional nursing care mainly focuses on health education, symptom management, dietary guidance, and psychosocial support [8, 9]. In recent years, the concept of integrative nursing has gained increasing attention, and Traditional Chinese Medicine (TCM) nursing interventions - such as acupoint application, herbal fumigation, moxibustion, massage, and emotional care - have gradually been incorporated into oncology nursing practice [10]. Emerging evidence suggests that TCM nursing may alleviate treatment-related toxicities, reduce anxiety and depression, and improve QOL in patients undergoing cancer therapy [11]. However, relevant studies are often limited by small sample sizes, heterogeneous intervention protocols, and variable methodological quality, leading to inconsistent and sometimes inconclusive findings. Moreover, despite the growing clinical application of TCM nursing during

radiotherapy, a comprehensive and quantitative synthesis of its efficacy and safety is still lacking. Therefore, the novelty of the present study lies in its being the first systematic review and meta-analysis to comprehensively evaluate both the effectiveness and safety of TCM nursing interventions in patients receiving radiotherapy. By quantitatively synthesizing evidence on quality of life, psychological outcomes, and radiotherapy-related adverse events, this study aims to provide an evidence-based foundation for integrative nursing practice and to inform clinical decision-making and future guideline development in radiotherapy care.

MATERIALS AND METHODS

Ethical statement

This study was conducted exclusively based on previously published literature. No new experiments involving human participants or animals were performed; therefore, ethical approval and informed consent were not required. The manuscript was prepared in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The study protocol was prospectively registered on the INPLASY platform (registration number: INPLASY202590032; DOI: 10.37766/inplasy2025.9.0032).

Search strategy

Utilizing PubMed, Cochrane Library, Web of Science, Scopus, and China National Knowledge Infrastructure (CNKI) databases up to July 2025, we conducted a thorough literature review. The search terms combined subject headings and free words related to three main domains: (1) population, including neoplasms, cancer, tumor, carcinoma, and malignancy; (2) intervention, including Traditional Chinese Medicine nursing, TCM nursing, Chinese nursing, integrative nursing, and complementary nursing; and (3) treatment modality, including radiotherapy, radiation therapy, and irradiation. Boolean operators “AND” and “OR” combined these concepts appropriately. In PubMed, filters were applied to limit the search to clinical studies, randomized controlled trials (RCTs), and original research articles. Reference lists from included studies and pertinent reviews were carefully examined for the identification of additional studies.

Inclusion and exclusion criteria

Inclusion criteria: (1) participants were individuals with malignant tumors undergoing radiotherapy, confirmed by pathology or cytology; (2) the intervention group received TCM nursing, including but not limited to acupoint application, herbal fumigation, moxibustion, massage, dietary guidance, or emotional care; (3) the control group received conventional nursing care or placebo interventions; (4) at least one relevant outcome was reported, including QOL, anxiety, depression, or incidence of radiotherapy-related adverse events; (5) study designs were limited to RCTs, controlled clinical trials, or prospective cohort studies; and (6) publications were available as full texts in Chinese or English.

Exclusion criteria: (1) case reports, reviews, conference abstracts, and commentaries; (2) studies lacking a control group or sufficient original data; (3) studies where TCM nursing was combined with other treatments, preventing isolation of its effects; and (4) duplicate publications, with preference given to the study with the largest sample size and most comprehensive data.

Diagnostic criteria

Eligible patients were required to have a confirmed diagnosis of malignant tumors and to have received radiotherapy as one of the main treatment modalities. No restrictions were applied with respect to cancer type. Diagnostic standards followed those described in the included studies.

Study selection

Two independent authors performed literature screening. Titles and abstracts were initially screened to eliminate irrelevant studies, and then potentially eligible articles were fully evaluated to confirm their inclusion. Discrepancies would be resolved through consultation with a third author.

Data extraction

Two reviewers independently took charge of data extraction, and the extracted data were cross-checked for accuracy. The extracted information comprised the first author, year of publication, study region, design, sample size, patient characteristics, intervention details, control measures, outcome indicators, and main results. Efforts were made to reach out to the original authors to acquire any missing data when required.

Standardization of scale scores

QOL outcomes were standardized using the EORTC QLQ-C30 framework. If a study reported raw scores (e. g., 0–60), they were converted to a 0–100 scale according to the official scoring manual. Commonly used scales for assessing anxiety and depression include the Self-Rating Anxiety Scale (SAS), Self-Rating Depression Scale (SDS), and Hospital Anxiety and Depression Scale (HADS). Scores were transformed to ensure consistent direction, where higher scores indicated more severe symptoms. Means and standard deviations were recalculated when necessary to achieve comparability across studies.

Statistical analysis

Statistical analyses relied on RevMan version 5.4

and Stata version 16.0. Continuous variables were represented by mean difference (MD) or standardized mean difference (SMD), both with 95% confidence intervals (CIs), whereas dichotomous variables were indicated by risk ratios (RRs) with 95% CIs. Study heterogeneity evaluation was achieved via the Q test and the I^2 statistic. A fixed-effects model was applied if I^2 was 50% or less and P was greater than 0.10; otherwise, a random-effects model would be applied. A leave-one-out sensitivity analysis engaged in assessing the result robustness. Subgroup analysis was carried out by cancer type, intervention type, and other relevant factors when adequate data were available.

RESULTS

Study selection process

Initially, we identified 87 records through electronic database searches: 53 from PubMed, 3 from the Cochrane Library, 3 from Web of Science, and 28 from CNKI. With 15 duplicates removed, 72 records remained for screening. 37 records deemed irrelevant considering their titles and abstracts were excluded. The full texts of 35 articles were evaluated for eligibility, with 27 studies being excluded: 9 were non-randomized controlled trials, 4 were systematic reviews, 3 were mechanistic descriptions, 3 were case reports, 7 had inaccessible full texts, and 1 lacked relevant outcome indicators. Ultimately, 8 studies satisfying the inclusion criteria were incorporated into the meta-analysis.

Risk of bias assessment

According to analysis results (figure 1), most studies evaluated exhibited a low risk of bias in D1, D3, and D5, as evidenced by the prevalence of green symbols. Some studies exhibited unclear risk (blue symbols), particularly in domains where methodological details were insufficiently reported. High risk of bias (red symbols) was observed in specific domains of two studies, Mao (2024) [17] and Xiao (2025) [18], leading to an overall high-risk judgment for these trials. The remaining studies showed either low risk or unclear overall (yellow symbols). The findings indicate that while the included studies demonstrated generally acceptable methodological quality, enhancements are necessary in randomization procedures and reporting transparency.

Eight studies were included, examining radiotherapy-related nursing interventions in patients with lung, cervical, nasopharyngeal, breast, and mixed cancer types, with total sample sizes of 143 lung, 148 cervical, 148 nasopharyngeal, and 168 breast cancer patients, while cancer-specific numbers were not separately reported in some mixed cohorts. Only one study explicitly reported the use of IMRT [15]. In this study, the prescribed dose ranged from 68 to 70 Gy to the primary tumor volume (GTVnx), 60 to 66 Gy to the high-risk clinical target volume (CTV1), and 50 to 54 Gy to the low-risk clinical target volume (CTV2), all delivered in 30–32 fractions over 6–7 weeks. The involved nodal gross tumor volume (GTVnd) received 60–68 Gy in 30 fractions over a similar treatment duration. Other studies did not provide detailed information regarding radiotherapy techniques or dose prescriptions. All studies employed randomized group designs. In the control groups, patients typically received conventional or comprehensive nursing care, whereas the intervention groups received additional TCM nursing measures. These interventions included dietary therapy, emotional care, acupoint massage, moxibustion, auricular acupressure, five-tone music therapy, and structured health management programs. The studies included had sample sizes between 60 and 168 participants, aged at 35-74 years. The study populations comprised both female-specific cancers (breast and cervical cancer) and mixed-gender cancers (lung cancer and nasopharyngeal carcinoma) (table 1).

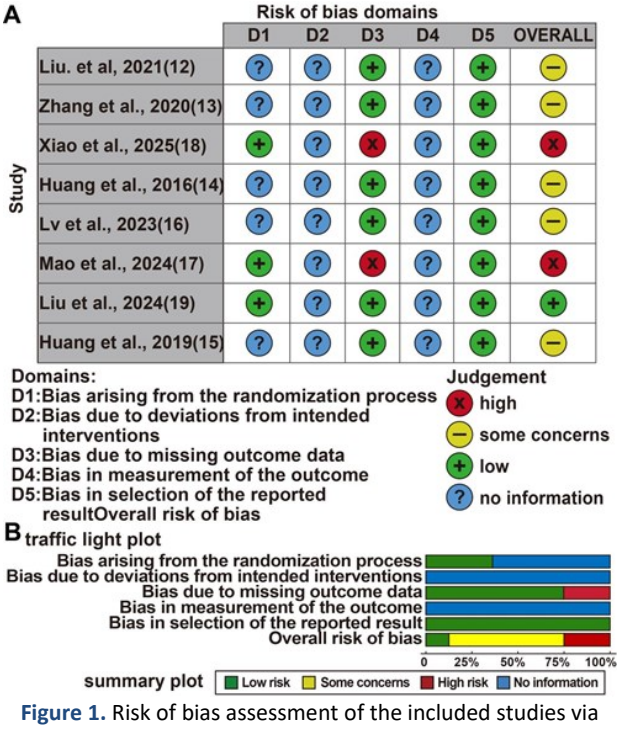


Figure 1. Risk of bias assessment of the included studies via the Cochrane Risk of Bias tool. (**A.** Risk of bias graph presenting the proportion of studies judged as having low, unclear, or high risk of bias across each methodological domain; **B.** Risk of bias summary showing the authors' judgments for each study according to individual bias domains, including random sequence generation, allocation concealment, blinding, incomplete outcome data, selective reporting, and other potential sources of bias).

Table 1. Characteristics of the eight included studies.

First author	Cancer type	Sample size (C/I)	Age (years, mean ± SD)	Gender distribution	Intervention comparison
Liu *et al.*, 2021 (12)	Lung cancer	65 / 65	C: 59.4 ± 12.5 / I: 59.2 ± 12.0	C: 32M/33F; I: 34M/31F	Comprehensive nursing vs Comprehensive nursing + TCM nursing
Zhang *et al.*, 2020 (13)	Cervical cancer	74 / 74	C: 36.6 ± 2.1 / I: 35.9 ± 2.6	Female only	Routine nursing vs Routine nursing + TCM nursing
Huang *et al.*, 2016 (14)	Nasopharyngeal carcinoma	30 / 30	C: 49.0 ± 10.5 / I: 49.0 ± 10.5 (est)	C: 23M/7F; I: 22M/8F	Routine nursing vs Routine nursing + TCM nursing
Huang *et al.*, 2019 (15)	Nasopharyngeal carcinoma	44 / 44	C: 52.4 (SD NR) / I: 52.5 (SD NR)	Balanced M/F	Routine nursing vs Routine nursing + TCM nursing
Lü *et al.*, 2023 (16)	Mixed cancers	40 / 40	C: 70.5 ± 8.8 / I: 70.5 ± 7.8 (est)	C: 21M/19F; I: 22M/18F	Routine radiotherapy nursing vs Optimized TCM nursing management
Mao *et al.*, 2024 (17)	Breast cancer	84 / 84	C: 67.8 ± 8.2 / I: 68.6 ± 8.3	Female only	Conventional nursing vs Integrated nursing (Western + TCM)
Xiao *et al.*, 2025 (18)	Lung, gastric, liver	38 / 38	C: 50.0 ± 7.5 / I: 49.0 ± 8.0 (est)	C: 21M/17F; I: 24M/14F	Conventional TCM nursing vs TCM health management program
Liu *et al.*, 2024 (19)	Lung cancer	40 / 40	C: 67.8 ± 8.2 / I: 68.6 ± 8.3	C: 24M/16F; I: 22M/18F	Comprehensive nursing vs Comprehensive nursing + TCM nursing

Note: C, control group; I, intervention group; M, male; F, female; SD, standard deviation; NR, not reported; TCM, traditional Chinese medicine; est, estimated value. Age was presented as mean ± SD. For studies reporting medians, ranges, or interquartile ranges only, mean values and standard deviations were estimated with the methods of Wan et al. (20) and Luo et al. (21). In all included studies, the intervention groups received TCM nursing interventions in addition to conventional care. Reported TCM nursing measures included dietary therapy, emotional care, acupoint massage or acupressure, moxibustion, auricular acupressure (ear seeds), herbal fumigation or topical applications, five-tone music therapy, Taichi or Baduanjin exercises, foot baths, and syndrome-based health management programs.

Effectiveness of TCM nursing

The meta-analysis confirmed the overall beneficial effects of TCM nursing in patients undergoing radiotherapy. The pooled analysis for QOL demonstrated remarkably higher scores in the intervention group versus the control group (MD = 8.81, 95% CI: 7.09–10.52, P<0.001), with no observed heterogeneity (I^2 = 0%), indicating a stable and reliable improvement in QOL associated with TCM nursing (figure 2A). Regarding anxiety outcomes, the pooled results demonstrated obviously lower anxiety levels among patients receiving TCM nursing (MD = −5.80, 95% CI: −8.33 to −3.28, P=0.001). Although substantial heterogeneity was observed (I^2 = 73%), the included studies maintained a consistent direction of effect, suggesting a potential advantage of TCM nursing in alleviating anxiety during radiotherapy (figure 2B). Similarly, TCM nursing greatly relieved the depression symptoms. The pooled effect estimate indicated a marked reduction in depression scores in the intervention group versus controls (MD = −4.58, 95% CI: −5.65 to −3.50, P=0.001). Despite considerable heterogeneity among studies (I^2 = 82%), the overall direction of effect favored TCM nursing, warranting cautious interpretation of the findings (figure 2C).

Safety of TCM nursing

For safety outcomes, six studies were included in the meta-analysis. According to the pooled analysis (figure 3), the incidence of radiotherapy-related adverse events failed to exhibit an obvious difference between the two groups (RR = 0.82, 95% CI: 0.63–1.06, P = 0.131), implying that TCM nursing is generally well tolerated. Significant heterogeneity was noted among studies (I^2 = 96%), likely due to differences in intervention methods, patient demographics, and adverse event assessment criteria.

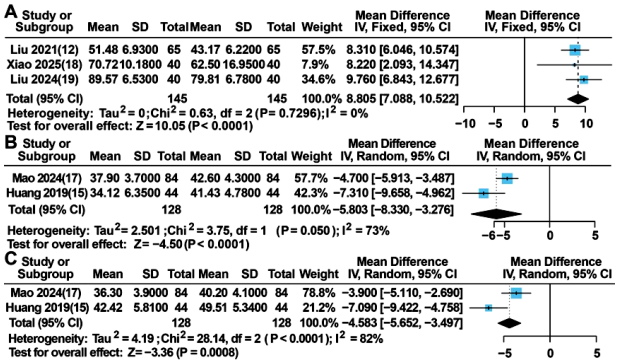


Figure 2. Effects of TCM nursing on patients undergoing radiotherapy. Forest plots mean differences with 95% confidence intervals comparing TCM nursing with routine nursing care. (**A.** Quality of life assessed with a fixed-effects model; **B.** Anxiety outcomes assessed with a random-effects model; C. Depression outcomes assessed with a random-effects model).

A leave-one-out sensitivity analysis engaged in evaluating the robustness of the pooled results. For QOL, the pooled effect remained statistically significant irrespective of which individual study was excluded, with mean differences ranging from 8.30 to 9.48 and all corresponding P values < 0.0001. No heterogeneity was observed across these analyses (I^2 = 0%), indicating highly stable and reliable results (figure 4A). Regarding safety outcomes, excluding any single study failed to materially change the overall findings. The pooled risk ratio remained nonsignificant after omitting individual studies (RR range: 0.71–0.88, all P > 0.050), despite persistently high heterogeneity (I^2 = 94%–97%). These results suggest that the safety outcome was relatively stable, although the substantial heterogeneity indicates the need for more deeply examining potential sources

(figure 4B).

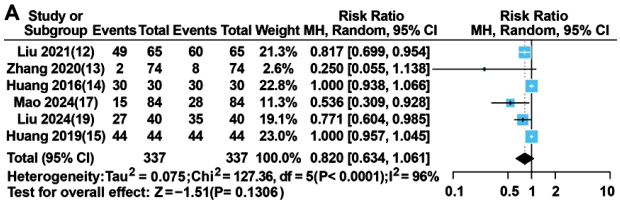


Figure 3. Safety outcomes of TCM nursing in patients undergoing radiotherapy.

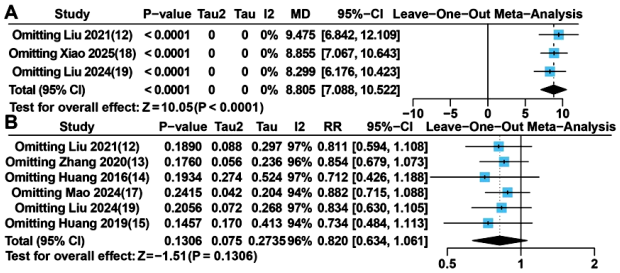


Figure 4. Leave-one-out sensitivity analysis of quality of life, safety, and psychological outcomes. Forest plots illustrate the influence of excluding each individual study on the pooled estimates using the leave-one-out approach. (**A.** Quality of life; **B.** Safety outcomes).

DISCUSSION

The findings of this study support TCM nursing as an important adjunctive approach in the comprehensive management of patients undergoing radiotherapy. Overall, TCM nursing interventions were associated with significant improvements in QOL and meaningful reductions in anxiety and depression symptoms, without an increased risk of adverse events. Sensitivity analyses further supported the tolerability of these interventions, suggesting that TCM nursing may represent a safe and beneficial supportive strategy during radiotherapy.

Supportive nursing care has gained increasing attention in the management of patients receiving radiotherapy for solid tumors, as treatment-related toxicities often compromise both physical and psychological well-being. Previous studies have consistently demonstrated that structured nursing interventions can substantially enhance patient-reported outcomes. For instance, Li *et al.* reported significant improvements in QOL among head and neck cancer patients receiving radiotherapy when comprehensive nursing care was implemented, highlighting its role in alleviating psychological distress and improving overall functioning [22]. Similarly, supportive measures targeting radiotherapy-related complications, such as oral mucositis, have been shown to improve treatment tolerance. Yarom *et al.* demonstrated that topical honey application could reduce the severity of oral mucositis, thereby improving patient comfort during radiotherapy [23].

TCM nursing incorporates a variety of nonpharmacological interventions, including dietary regulation, herbal intake, acupuncture, massage, and auricular acupressure, which aim to restore systemic balance and enhance patients' tolerance to anticancer treatments [24]. Evidence suggests that these approaches may alleviate radiotherapy-induced fatigue, gastrointestinal symptoms, and nutritional decline. Lun-Chien *et al.* reported that Shen-Mai San exerted significant anti-fatigue effects and improved QOL by alleviating Qi–Yin deficiency symptoms in patients receiving radiotherapy or chemotherapy [25]. Likewise, Huang *et al.* observed reduced weight loss among patients receiving inpatient Chinese herbal therapy during radiotherapy, potentially through appetite improvement [26]. He *et al.* further demonstrated that the JianPiHuaTan formula improved QOL and prolonged survival in colorectal cancer patients, suggesting broader benefits beyond symptom control [27]. Taken together, TCM nursing can potentially mitigate radiation-induced injury through its multi-target and low-toxicity characteristics [28].

Acupuncture has also emerged as a valuable supportive intervention in radiotherapy settings. Prospective evidence indicates that acupuncture may effectively relieve treatment-related pain and reduce analgesic requirements during and after radiotherapy [29]. In patients with nasopharyngeal carcinoma, acupuncture has been shown to alleviate xerostomia and improve QOL [30]. Moreover, integrative approaches combining acupoint massage with mindfulness-based stress reduction have demonstrated benefits in bettering sleep quality, reducing fatigue, and alleviating anxiety among breast cancer patients receiving radiotherapy [31]. These findings suggest that acupuncture-based nursing interventions may play an important role in addressing both physical and psychological symptoms during treatment.

Dietary regulation represents another critical component of supportive nursing during radiotherapy. Nutritional interventions have been shown to improve emotional well-being, metabolic health, and treatment tolerance. Klement *et al.* reported that a low-carbohydrate diet improved emotional, social, and sleep function in breast cancer patients [32], while Cardellini *et al.* demonstrated that oral nutritional supplementation during chemoradiotherapy helped maintain body weight and contributed to better survival outcomes in head and neck cancer patients [33]. Similarly, Zeng *et al.* found that rehabilitation nursing combined with nutritional support improved swallowing function and QOL while reducing complications in patients with esophageal cancer receiving chemoradiotherapy [34].

Despite these encouraging findings, consensus regarding the optimal integration of TCM nursing into radiotherapy care has not yet been achieved. Some

studies suggest that integrated nursing models combining conventional and TCM-based approaches may offer additional benefits in terms of physiological function, psychological well-being, and long-term survival, particularly in patients with non-small cell lung cancer [35, 36]. Mechanistically, TCM interventions may modulate the tumor microenvironment, enhance immune function, and improve systemic resilience, thereby supporting their adjunctive role in oncology care [37].

This study acknowledges limitations that suggest promising directions for future inquiry. First, the robustness of the pooled estimates was attenuated due to the relatively small number of included studies coupled with limited sample sizes. Second, there was a substantial heterogeneity, likely attributable to variations in intervention types, duration, and implementation protocols across studies. Finally, most included studies were single-center randomized or controlled clinical trials with variable methodological quality, and some lacked rigorous randomization or blinding procedures. These factors should be considered when interpreting the findings and larger, high-quality multicenter trials should be conducted in future research.

CONCLUSION

Taken together, TCM nursing substantially improves QOL and alleviates anxiety and depression in patients undergoing radiotherapy, without increasing the risk of radiotherapy-related adverse events, indicating good overall tolerability. These findings provide evidence-based support for incorporating TCM nursing into clinical care to optimize patient management and improve prognosis. All these necessitate the conduction of further large-scale, multicenter, high-quality trials to enhance the evidence base and support the standardized implementation of TCM nursing in radiotherapy patients.

***Ethics approval and consent to participate*:** The systematic review and meta-analysis in the study was based solely on previous literature. No new human participants or animals were involved. The study has been registered on the INPLASY platform (registration number: INPLASY202590032, DOI: 10.37766/inplasy2025.9.0032).

***Consent for publication*:** Not applicable.

***Availability of data and materials*:** All data generated or analyzed during this study were included in this published article and its supplementary materials. Additional information can be obtained from the corresponding author upon reasonable request.

***Competing interests*:** No competing interests.

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***Authors' Contributions*:** X.G., conceptualization, data curation, formal analysis, and drafting of the manuscript. M.W., methodology, investigation, supervision, and critical revision. T.L., data curation, validation, and visualization. Z.F., as the corresponding author, took charge of project administration, supervision, and manuscript review. All authors participated in the study design and manuscript review, and granted approval for the final version.

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