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REVIEW

Comparative Effectiveness of Chinese Patent Medicines for Chronic Prostatitis/Chronic Pelvic Pain Syndrome: A Bayesian Network Meta-Analysis

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Objective: Chronic Prostatitis/Chronic Pelvic Pain Syndrome (CP/CPPS) presents with persistent pelvic pain, urinary symptoms, and psychological burden, severely affecting patients' quality of life. While antibiotics and α-blockers are commonly prescribed, their long-term efficacy is limited and adverse reactions are frequent. Chinese patent medicines (CPMs) have emerged as promising alternatives, yet the lack of head-to-head evidence among formulations hinders evidence-based clinical recommendations.

Methods: Eight databases—CNKI, WanFang, VIP, SinoMed, PubMed, Web of Science, Embase, and the Cochrane Library—were searched from inception to November 1, 2025. Randomized controlled trials enrolling adults with CP/CPPS treated with CPMs versus standard therapy (ST) were included. Bias was assessed with ROB 2, and evidence certainty with CINeMA. A Bayesian network meta-analysis was performed, and outcomes were summarized using forest plots, league tables, and SUCRA curves in RStudio.

Results: Seventy-six trials (n=8431) involving 12 CPMs were analyzed. All studies were conducted in China, and all CPMs outperformed ST in enhancing the total effective rate and reducing NIH-CPSI scores. Shuangshi Tonglin Capsules (SSTL) ranked highest for both overall efficacy (OR = 5.6; 95% CI [2.0, 17]; SUCRA 73.8%) and NIH-CPSI reduction (MD = −8.0; 95% CI [−11, −4.8]; SUCRA 93.3%). SSTL also provided the largest improvements in pain (MD = −5.4; 95% CI [−8.0, −2.8]) and quality of life (MD = −4.3; 95% CI [−5.7, −2.9]).

Conclusion: Compared with ST, CPMs significantly improved CP/CPPS symptoms, with SSTL showing the greatest overall benefit. However, since all included studies originated from China, the generalizability of these findings to other populations may be limited.

Keywords: chronic prostatitis, chronic pelvic pain syndrome, Chinese patent medicines, network meta-analysis

Introduction

Chronic Prostatitis/Chronic Pelvic Pain Syndrome (CP/CPPS) is a multifactorial disorder defined by pelvic pain persisting beyond three months. Symptoms frequently include discomfort in the prostate, perineum, penile root, testicles, lower abdomen, and sacral region, often accompanied by urinary disturbances such as urgency, frequency, and dysuria.[1,2] The condition is further complicated by sexual dysfunction and psychological disturbances, including anxiety, depression, and sleep disorders, which together exert a profound impact on patients' health and quality of life.[3,4] Prevalence estimates range from 8.4% to 25% internationally and 6.0% to 32.9% in China.[5,6]

Although the exact etiology of CP/CPPS is unknown, multiple mechanisms—including infection, immune response, neuromuscular abnormalities, psychological stress, and lifestyle factors—are believed to contribute. The interplay of these factors complicates diagnosis and underscores the need for multifaceted management. Current treatments encompass antibiotics, α-blockers, anti-inflammatory drugs, 5α-reductase inhibitors, physical therapy, and herbal medicine. In this review, "standard therapy (ST)" refers to conventional Western medical regimens commonly used in CP/CPPS,

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typically including an α-blocker (eg, tamsulosin) with or without a short course of antibiotics (when infection is suspected) and/or non-steroidal anti-inflammatory drugs, consistent with contemporary guideline-based care. However, most offer only limited long-term benefit and carry potential adverse effects. Antibiotics may foster resistance and alter gut microbiota; α-blockers and anti-inflammatories can induce hypotension and gastrointestinal reactions; 5α-reductase inhibitors are associated with sexual dysfunction; physical therapy requires sustained commitment; and the efficacy and safety of herbal therapies remain uncertain.[7] These challenges emphasize the urgency of individualized and sustainable treatment plans.

Produced with standardized manufacturing and rigorous quality control, Chinese patent medicines (CPMs) are regarded as safe therapeutic agents supported by both extensive clinical experience and growing scientific validation. Their ease of use, sustained pharmacological effect, and cost-effectiveness make them well-suited for CP/CPPS treatment, earning recommendations in multiple clinical guidelines.[8] Evidence from randomized trials indicates that CPMs substantially reduce NIH-CPSI scores, relieving pain and urinary symptoms while improving quality of life.[9–12] Recent mechanistic studies further suggest that CPMs may mitigate prostatic inflammation and oxidative stress via specific signaling pathways. For example, Ningmitai capsules attenuate inflammatory responses through the CCL2–MAPK axis and reduce oxidative stress in experimental prostatitis models; Shuangshi Tonglin capsules modulate SIRT1/AMPK and MAPK signaling, inhibiting oxidative stress and inflammation in CP/CPPS models; and Qianlie Jiedu–related investigations implicate IL-6/STAT3 and Th17-cell pathways. Additional component-level data (eg, dioscin, calycosin) show suppression of TLR4/NF-κB or p38MAPK/NF-κB signaling in prostatitis models, providing biological plausibility for CPM effects.[13–16] Combination therapy integrating CPMs with Western medicine demonstrates superior efficacy and safety over Western medicine alone. Mechanistic studies suggest that CPMs may exert therapeutic effects by modulating signaling pathways, suppressing inflammation and oxidative stress, and regulating apoptosis in prostate tissue.[17]

Substantial clinical data support the safety and therapeutic potential of CPMs in CP/CPPS management. However, most trials have compared individual CPMs only with standard therapy, leaving their relative efficacy uncertain. Considering the diverse compositions and mechanisms of different CPMs, a comparative evaluation is clinically necessary to inform treatment choice. A Bayesian network meta-analysis was therefore employed to integrate direct and indirect evidence, allowing simultaneous comparison and ranking of multiple CPMs, which cannot be achieved through traditional pairwise meta-analysis. This study aims to provide robust comparative evidence to guide clinical decision-making. Notably, all included randomized controlled trials (RCTs) were conducted in China, where CPMs are widely used and regulated; thus, differences in drug availability and healthcare settings elsewhere may limit generalizability.

Methods

The study design complied with the PRISMA 2020 statement and PRISMA-NMA extension for network meta-analyses.[18] The protocol was preregistered in PROSPERO (CRD42024574970), with full details presented in Appendix 1.

Search Strategy

A systematic search was conducted in CNKI, WanFang, VIP, SinoMed, PubMed, Web of Science, Embase, and the Cochrane Library to identify RCTs on CPMs for CP/CPPS from database inception to November 1, 2025, with no language or publication-type restrictions applied. Reference lists of included studies and relevant systematic reviews were also screened to capture additional eligible records. Study screening was performed independently by two reviewers, and any discrepancies were resolved in consultation with a third reviewer. Full search strategies are provided in Appendix 2.

Eligibility Criteria

RCTs evaluating CP/CPPS were eligible, irrespective of participants' age or disease duration. The diagnosis of CP/CPPS was required to be based on the National Institutes of Health (NIH) classification or equivalent clinical criteria, characterized by pelvic pain persisting for at least 3 months and exclusion of bacterial infection.

Eligible interventions included CPMs administered alone or as adjuncts to standard Western therapy, with treatment durations of at least 1 week. No restrictions were placed on dosage, formulation, or administration route. Comparators consisted of ST such as antibiotics, α-blockers, and non-steroidal anti-inflammatory drugs, consistent with established CP/CPPS management protocols.

Studies were required to report at least one of the primary or secondary outcomes (eg, total effective rate, NIH-CPSI score, pain, urinary, or quality-of-life domains) measured at the end of treatment or at the last follow-up point. The "Total Effective Rate" refers to the proportion of patients who achieve predefined clinical improvement categories (eg, cured, markedly effective, or effective). Although not an internationally standardized or patient-reported endpoint, TER is widely used in Chinese clinical trials as a pragmatic composite measure of overall therapeutic benefit. Only peer-reviewed RCTs published in English or Chinese were included; conference abstracts, duplicate publications, crossover trials, and studies lacking accessible outcome data were excluded.

Screening Process

All retrieved records were imported into EndNote for duplicate removal. Two reviewers (Reviewer A and Reviewer B) independently screened all titles and abstracts according to predefined eligibility criteria, documenting inclusion decisions and specific reasons for exclusion. Full-text articles meeting initial criteria were then reviewed independently and in duplicate to confirm eligibility. Any discrepancies between reviewers were first discussed to reach a consensus; if disagreement persisted, a third senior reviewer (Reviewer C) was consulted to make the final decision.

Data Extraction

A structured extraction form was developed to collect: (i) study characteristics (author, publication year, country, and design); (ii) participant demographics (sample size, age, sex, and diagnostic criteria); (iii) intervention and control details (treatment protocol, dosage, and duration); (iv) outcomes, including primary measures (overall efficacy and NIH-CPSI total score) and secondary measures (pain and urinary symptom scores, quality-of-life score, expressed prostatic secretion [EPS] white blood cell count, and adverse events); (v) follow-up data; and (vi) methodological quality indicators (randomization, allocation concealment, blinding, and data integrity). Data extraction was conducted independently and in duplicate by two reviewers using the predefined form. Extracted data were then cross-checked for consistency, and any discrepancies were discussed and resolved by consensus or, when necessary, adjudicated by a third reviewer.

Quality Assessment of Evidence

We evaluated methodological quality using the Cochrane RoB 2 tool,[19] focusing on five domains: randomization and allocation concealment, fidelity to intended interventions, management of missing data, reliability of outcome measurement, and completeness of outcome reporting. Trials fulfilling criteria across these domains were rated as low risk of bias. Two reviewers independently assessed each study, with disagreements resolved through consensus. The overall certainty of evidence in the network meta-analysis was assessed with the CINeMA framework,[20] which systematically examines within-study bias, reporting bias, indirectness, imprecision, heterogeneity, and inconsistency to determine evidence confidence levels.

Methods for Evidence Synthesis

Evidence synthesis was conducted through a Bayesian network meta-analysis implemented in R (gemtc, rjags). An evidence network was constructed, with nodes representing interventions, scaled to sample size, and edges weighted by standard errors. Consistency between direct and indirect estimates was evaluated using inconsistency models and the node-splitting technique.

Bayesian estimation was performed via Markov Chain Monte Carlo (MCMC) to obtain Odds Ratios (ORs) or Mean Differences (MDs), which were summarized in league tables. Between-study heterogeneity was quantified using the I^2 statistic and P-values; fixed-effect models were used when $P \geq 0.1$ and $I^2 \leq 50\%$, whereas random-effects models or narrative synthesis were applied when $P < 0.1$ and $I^2 > 50\%$. Treatment rankings were derived from surface under the cumulative ranking curve (SUCRA) values, with higher SUCRA indicating greater effectiveness.

Results

Literature Selection and Study Characteristics

From the 6825 retrieved records, 236 articles underwent full-text review, and 76 RCTs including 8431 adults met eligibility criteria (Figure 1). All trials were conducted in China, with sample sizes ranging from 30 to 138 and intervention periods lasting 2–12 weeks. The mean age of participants was 40.0 years (SD = 6.32), and the mean disease duration was 5.98 years (SD = 1.56). 12 CPMs were investigated as adjuncts to standard treatment, resulting in 13 network interventions: Qianlie Shutong (QLST), Ningmitai (NMT), Qianlie Antong (QLAT), Sanjin (SJ), Qianlie Jiedu (QLJD), Qianlie Beixi (QLBX), Relinqing (RLQ), Qianlie Tongyu (QLTY), Qianlieping (QLP), Qianlie Anshuan (QLAS), and Shuangshi Tonglin (SSTL). Detailed characteristics of the trials and CPM formulations are summarized in Appendix 3.

Risk of Bias, Certainty of Evidence, and Consistency

Appendix 4 summarizes the risk-of-bias evaluation. The main methodological concern was insufficient reporting of blinding procedures and loss-to-follow-up data. Of the 76 trials, 69 (90.7%) were judged low risk for randomization, 65 (85.5%) for

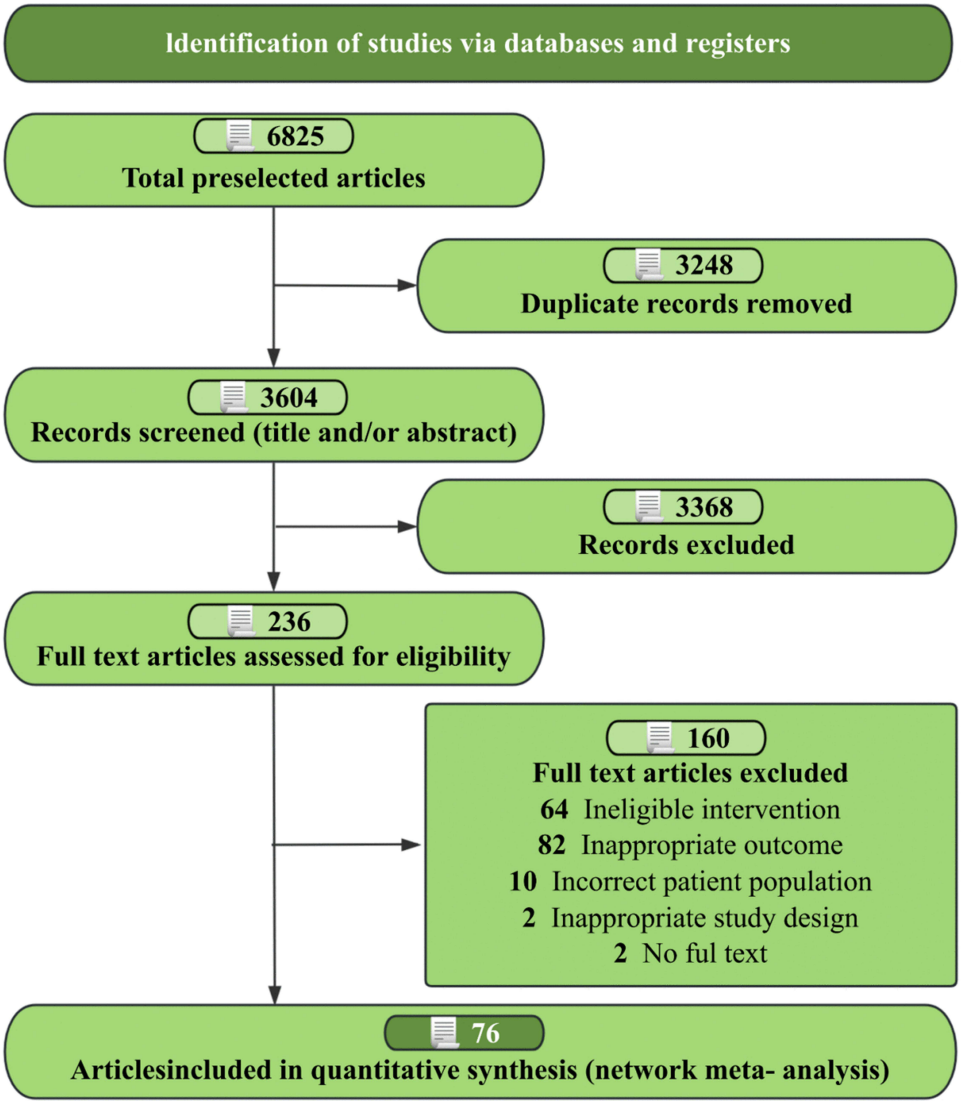

Figure 1 Flow diagram of preferred reporting items identified, included, and excluded for systematic reviews and meta-analyses (PRISMA).

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deviations from intended interventions, 70 (92.1%) for missing data, 74 (97.3%) for outcome measurement, and 70 (92.1%) for selective reporting. Nine trials (11.8%) were classified as high risk, and 4 (5.2%) were rated as having some concerns.

Network consistency was high, as indicated by concordance between direct and indirect estimates (Appendix 6 and 7), and I^2 statistics confirmed low heterogeneity (Appendix 5). All networks satisfied transitivity, ensuring valid indirect comparisons (Appendix 8, Figure S1 and Table S1). CINeMA analysis showed most pairwise comparisons had low confidence, with a minority reaching moderate or high levels (Appendix 8, Figure S2 and Table S2). Funnel plots demonstrated no evidence of small-study effects (Appendix 9). Together, these results confirm the methodological soundness and credibility of the synthesized evidence.

Total Effective Rate

The analysis of total effective rate included 73 RCTs with 8032 participants. Compared with ST, all CPMs yielded significant improvements (Figures 2 and 3). SSTL achieved the highest effect size (OR = 5.6; 95% CI [2.0, 17]; SUCRA 73.8%), followed by QLBX (OR = 5.4; 95% CI [2.8, 11]; SUCRA 74.7%) and QLST (OR = 4.8; 95% CI [3.7, 6.1]; SUCRA 74.1%) (Appendix 11 and Table S3). Pairwise comparisons showed that QLST (OR = 2.21; 95% CI [1.08, 4.53]) and QLJD (OR = 2.24; 95% CI [1.00, 5.06]) were significantly more effective than WLT (Appendix 12 and Table S10). CINeMA assessment indicated predominantly moderate-to-high certainty for this endpoint (Appendix 8 and Table S2).

Pain Symptom Score

Pain symptom scores were analyzed across 47 RCTs involving 5137 participants. SSTL ranked highest for pain reduction (MD = −5.4; 95% CI [−8.0, −2.8]; SUCRA 95.3%). Compared with ST, all CPMs except QLBX, QLTY, and QLP produced significant improvements. Indirect network estimates confirmed SSTL's superiority over NMT (MD = 3.37; 95% CI [0.64, 6.13]), QLAT (MD = 2.95; 95% CI [0.10, 5.82]), QLBX (MD = 4.14; 95% CI [0.94, 7.35]), and QLP (MD = 3.64; 95% CI [0.44, 6.84]) (Appendix 10 and Figure S3). Full SUCRA rankings and pairwise data are presented in Appendix 11 (Table S4) and Appendix 12 (Table S11).

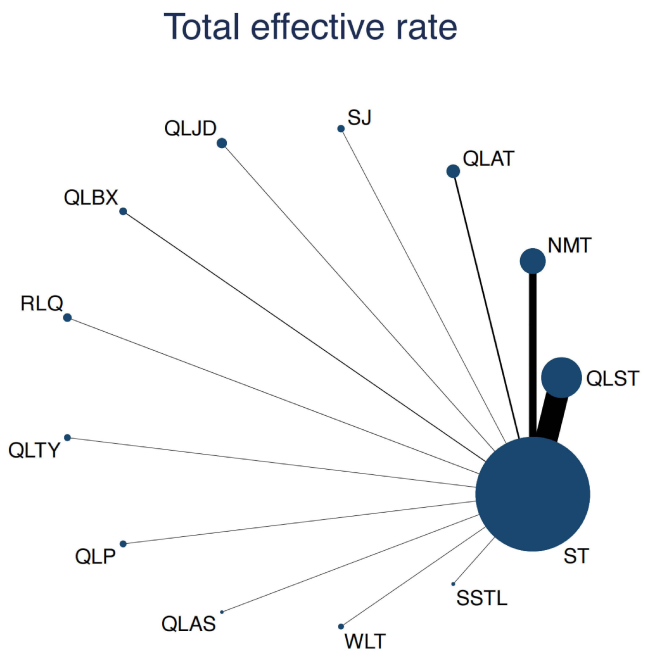

Figure 2 Network plot of available comparisons of CPMs for CP/CPPS.

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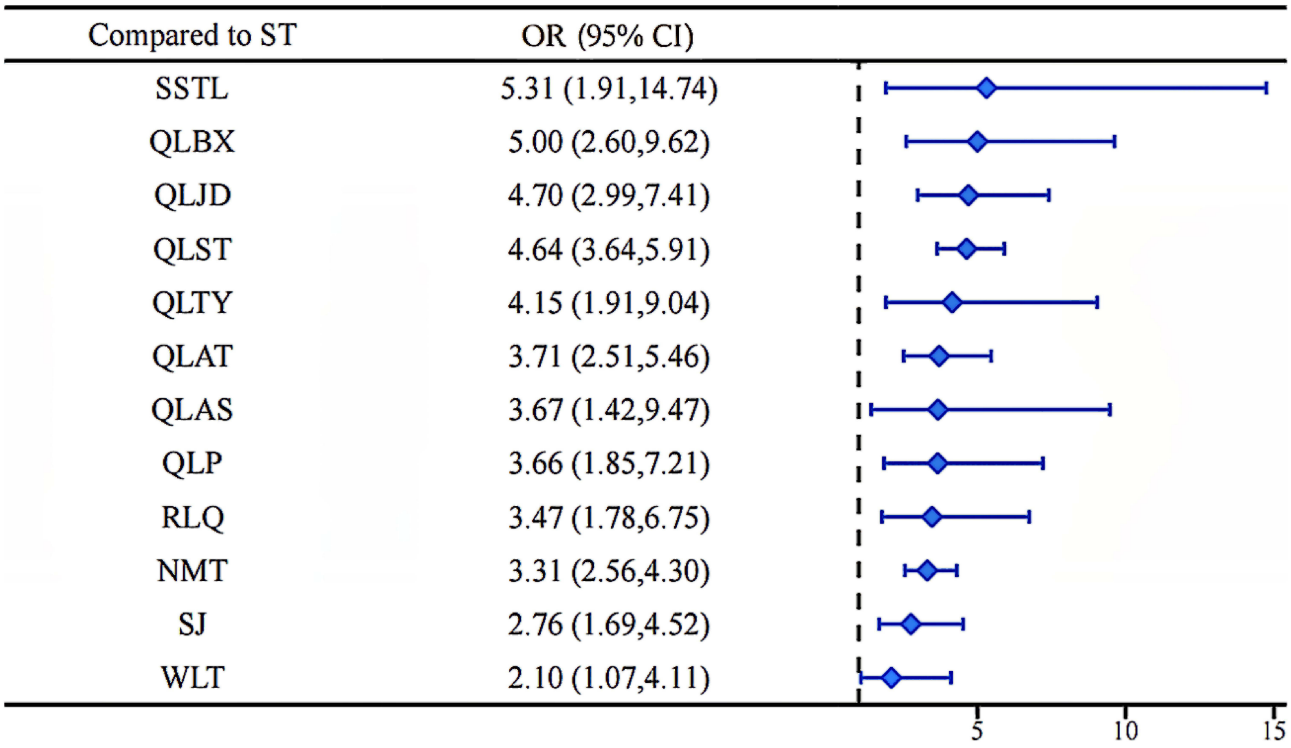

Figure 3 Forest plot of available comparisons of CPMs for CP/CPPS.
Abbreviations: QLST, Qianlie Shutong Capsules; NMT, Ningmitai Capsules; QLAT, Qianlie Antong Tablets/Capsules; SJ, Sanjin Tablets; QLJD, Qianlie Jiedu Capsules; QLBX, Qianlie Beixi Capsules; RLQ, Relinqing Granules; QLTY, Qianlie Tongyu Capsules; QLP, Qianlieping Capsules; QLAS, Qianlie Anshuan Tablets; WLT, Wenglitong Capsules; SSTL, Shuangshi Tonglin Capsules; ST, Standard treatment.

Urination Disorder Score

Results of the Urination Disorder Score network meta-analysis are shown in Appendix 10 (Figure S4). Following consistency evaluation, several CPMs significantly outperformed ST: QLST (MD = −1.8; 95% CI [−2.3, −1.4]), NMT (MD = −1.2; 95% CI [−1.7, −0.68]), QLAT (MD = −1.1; 95% CI [−1.8,−0.33]), QLJD (MD = −1.3; 95% CI [−2.1, −0.46]), QLBX (MD = −2.3; 95% CI [−3.4, −1.1]), RLQ (MD = −2.3; 95% CI [−3.3, −1.4]; SUCRA 90.6%), and QLTY (MD = −1.8; 95% CI [−3.6, −0.04]). Additional rankings and indirect effect estimates are available in Appendix 11 (Table S5) and Appendix 12 (Table S12).

Quality of Life Score

Quality-of-life outcomes were analyzed across 41 RCTs comprising 4550 participants. All CPMs except QLAS significantly improved quality of life compared with ST. SSTL demonstrated the largest effect size (MD = −4.3; 95% CI [−5.7, −2.9]; SUCRA 99.6%) (Appendix 10 and Figure S5). Network estimates further confirmed SSTL's advantage over nearly all CPMs, with QLTY being the only formulation without a significant difference. Full SUCRA rankings and indirect comparisons are available in Appendix 11 (Table S6) and Appendix 12 (Table S13).

NIH-CPSI Score

Analysis of NIH-CPSI scores included 58 RCTs with 6515 participants. Compared with ST, all CPMs except QLAS and WLT produced significant reductions. SSTL demonstrated the largest effect (MD = −8.0; 95% CI [−11, −4.8]; SUCRA 93.3%), followed by QLBX (MD = −6.2; 95% CI [−8.5, −3.9]; SUCRA 77.8%) and SJ (MD = −6.1; 95% CI [−8.8, −3.3]; SUCRA 73.4%) (Appendix 10 and Figure S6). Network comparisons confirmed SSTL's superiority over QLJD, QLAS, and WLT. Notably, the observed mean reductions exceeded the minimally important difference (MID) of approximately 6 points established for the NIH-CPSI total score in prior validation studies,[97,98] suggesting that these improvements are not only

statistically significant but also clinically meaningful for patients. Complete SUCRA rankings and pairwise estimates are reported in Appendix 11 (Table S7) and Appendix 12 (Table S14).

EPS White Blood Cell Counts

Significant reductions in EPS white blood cell counts were observed for QLST (MD = −5.59; 95% CI [−7.65, −3.52]), NMT (MD = −5.67; 95% CI [−9.12, −2.22]), SJ (MD = −8.33; 95% CI [−14.88, −1.92]), QLJD (MD = −8.91; 95% CI [−13.54, −4.46]), and QLBX (MD = −6.34; 95% CI [−10.27, −2.40]) compared with ST (Appendix 10 and Figure S7). No statistically significant differences were identified among the remaining CPMs in indirect network comparisons. Detailed results are provided in Appendix 11 (Table S8) and Appendix 12 (Table S15).

Adverse Events

A total of 24 RCTs documented adverse events. The network meta-analysis revealed no significant differences across interventions in both direct and indirect estimates (Appendix 10 and Figure S8). Complete adverse event data are presented in Appendix 11 (Table S9) and Appendix 12 (Table S16).

Sensitivity Analyses and Meta-Regressions

To assess result stability, sensitivity analyses were performed by omitting one study at a time. No exclusions materially changed the pooled effects, and findings remained consistent with the primary analyses (Appendix 13). Meta-regression was used to evaluate potential baseline modifiers, including disease duration, follow-up length, and participant age. None demonstrated a statistically significant association with the primary outcomes (Appendix 14).

Discussion

Principal Findings

In this comprehensive network meta-analysis, we synthesized evidence from 76 RCTs including 8431 participants to assess the comparative efficacy and safety of 12 CPMs for CP/CPPS. Across all included formulations, significant improvements were observed in total effective rate and NIH-CPSI scores relative to ST. SSTL emerged as the top-ranked intervention, yielding the greatest benefits for total efficacy and NIH-CPSI reduction with high-certainty evidence. It also demonstrated the most substantial effects on pain alleviation and quality-of-life enhancement in adults with CP/CPPS.

Shuangshi Tonglin Capsules (SSTL)

Underpinned by TCM theory, CPMs are manufactured using standardized processes and are widely adopted in clinical practice due to their demonstrated efficacy and affordability. While previous meta-analyses have confirmed their benefit in improving CP/CPPS outcomes,[11,99] head-to-head evidence comparing different formulations has been lacking. This study employs a network meta-analysis to address this limitation, identifying SSTL as the most effective intervention.

SSTL is traditionally prescribed to regulate qi and blood and to dispel damp-heat, aligning with the typical presentation of CP/CPPS.[100] Pharmacodynamic studies indicate that SSTL exerts multi-component, multi-target, and multi-pathway effects. Its principal compounds—including quercetin, luteolin, tanshinone IIA, stigmasterol, and berberine—target inflammatory mediators such as PTGS2, HSP90AA1, IL-1B, and IL-6, and modulate IL-17, TNF, and PI3K-Akt signaling pathways, providing a mechanistic rationale for its clinical efficacy.[101]

Strengths and Limitations of This Study

This work represents the most comprehensive and up-to-date Bayesian network meta-analysis of CPMs for CP/CPPS and applies the CINeMA framework to ensure transparent and robust evidence grading. Nevertheless, several limitations should be acknowledged.

All included trials were conducted in China, where CPMs are most widely used, which may limit the generalizability of the findings to broader populations and introduce potential geographic and publication bias. Moreover, most studies did not incorporate syndrome differentiation, a cornerstone of traditional Chinese medicine, which may have influenced

treatment response heterogeneity. The intervention durations varied from 2-12 weeks, restricting the ability to evaluate long-term efficacy or sustained benefits. Variations in sample size, baseline symptom severity, and background therapy (antibiotics, α-blockers, or NSAIDs) may also have contributed to clinical heterogeneity, despite the overall low statistical heterogeneity in the pooled results.

Because CPMs were administered either alone or in combination with different standard treatments, the transitivity assumption underlying indirect comparisons may not have been fully satisfied. Although consistency testing supported the validity of the network, the relative effects between certain interventions should still be interpreted with caution. Some CPMs were supported by only a few trials, reducing confidence in their relative rankings. Finally, methodological deficiencies persisted in several studies, including incomplete reporting of randomization, allocation concealment, blinding procedures, and loss-to-follow-up data, which could lead to performance and attrition bias, although attempts were made to obtain clarifying information from the study authors.

Conclusions

CPMs showed greater symptom improvement than standard therapy in patients with CP/CPPS. SSTL ranked among the more effective options; however, the certainty of evidence—assessed using the CINeMA framework—was generally low to moderate, given the small sample sizes, limited head-to-head comparisons, and short intervention durations. SUCRA rankings were interpreted descriptively, and results should be viewed with caution. Further large, high-quality, multi-center RCTs are needed to confirm these findings and strengthen confidence in the evidence base.

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Disclosure

The authors report no conflicts of interest in this work.

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