Am J Transl Res 2025;17(11):8985-8998
www.ajtr.org /ISSN:1943-8141/AJTR0168349

Review Article

Acupuncture-induced pain relief and anti-inflammatory effects in chronic pelvic inflammatory disease: a systematic review and meta-analysis

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Received August 25, 2025; Accepted November 10, 2025; Epub November 15, 2025; Published November 30, 2025

Abstract: Objective: To systematically evaluate the effects of acupuncture and moxibustion on pain relief, inflammatory biomarkers, and reproductive outcomes in patients with chronic pelvic inflammatory disease (CPID). Method: A systematic search was conducted in PubMed, Embase, Cochrane Library, CNKI, and Wanfang for studies published between January 2010 and December 2023. Randomized controlled trials (RCTs) comparing acupuncture with sham/conventional control interventions in CPID patients were included. The primary outcomes included pain intensity (visual analog scale, VAS), inflammatory biomarkers (C-reactive protein [CRP], interleukin-6 [IL-6], tumor necrosis factor alpha [TNF-α]), and CPID specific indicators (fallopian tube patency and pelvic mass regression). Data were analyzed using a random-effects model (RevMan 5.3/Stata 16). Result: Thirteen RCTs involving 658 patients were included. Acupuncture significantly reduced pain intensity (standardized mean deviation [SMD]=-1.42, 95% confidence interval [CI]: -1.66 to -1.18), CRP (SMD=-3.89), IL-6 (SMD=-5.00), TNF-α (SMD=0.60) (all P<0.001). CPID-specific outcomes were improved, with higher rates of fallopian tube patency (hazard ratio [RR] =1.35) and pelvic mass regression (RR=1.44; both P<0.01). Moreover, acupuncture improved quality of life (SMD=0.55, P<0.0001), increased pregnancy rate (RR=1.32), and reduced recurrence rates (RR=0.68; both P<0.05). Electroacupuncture combined with herbal medicine (≥8 weeks) showed the most pronounced therapeutic benefits. Conclusion: Electroacupuncture combined with herbal medicine significantly alleviates pelvic pain, reduces systemic inflammation, and enhances reproductive outcomes in patients with CPID.

Keywords: Acupuncture and moxibustion, chronic pelvic inflammatory disease, smooth fallopian tubes, pelvic mass regression, pain relief, anti-inflammatory

Introduction

Chronic pelvic inflammatory disease (CPID) is a persistent inflammation of the female upper genital tract, usually resulting from untreated or repeated pelvic infections [1-3]. CPID commonly manifests as chronic pelvic pain, dysmenorrhea, and dyspareunia, which significantly impair quality of life and reproductive health. About 30% of patients may develop long-term complications such as infertility or ectopic pregnancy [4, 5]. Standard treatment uses antibiotics and anti-inflammatory drugs. However, symptoms often persist, and side effects may occur, highlighting the need for complementary therapeutic approaches [6-8].

Acupuncture and moxibustion, as traditional Chinese medicine (TCM) approaches, have been increasingly adopted for treating chronic inflammation and pain [9]. Emerging evidence shows that acupuncture and moxibustion can modulate neuroimmune pathways, reduce pro-inflammatory cytokines, and activates opioid receptors to alleviate pain [10-12]. Recent clinical trials have reported promising outcomes of acupuncture and moxibustion in CPID, indicating reductions in pain scores and inflammatory markers [13]. However, the variations of research projects, acupuncture and moxibustion schemes, and results measurement have led to inconsistent conclusions. Therefore, a systematic meta-analysis of current evidence is of paramount importance, with particular attention to CPID-specific outcomes such as fallopian tube patency, pelvic inflammatory exudate resolution, and composite symptom improvement.

https://doi.org/10.62347/GLPQ2895

Methods

This study was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines and was based on the population, intervention, comparison, and outcome (PICO) framework: population (CPID patients), intervention (acupuncture), comparison (sham acupuncture/conventional treatment), and outcome (pain/inflammatory markers). The protocol was registered on the INPLASY platform with registration number of INPLASY202590098.

Literature search

A comprehensive literature search was performed to identify randomized controlled trials (RCTs) evaluating the efficacy of acupuncture in CPID patients from five electronic databases (PubMed, Embase, Cochrane Library, China National Knowledge Infrastructure (CNKI), and Wanfang). Studies published between January 2010 and December 2023 were retrieved. Additional searches were conducted in Web of Science, Scopus, CINAHL, and SinoMed to expand coverage. The search strategy combined the MeSH and free-text terms related to "acupuncture and moxibustion", "chronic pelvic inflammation", "anti-inflammatory", and "randomized controlled trials", using Boolean operators to ensure comprehensive search: ("acupuncture and moxibustion" [MeSH Term] OR "acupuncture and moxibustion" [Title/Abstract] OR "electroacupuncture" [Title/Abstract]) and ("pelvic inflammation" [MeSH Term] OR "chronic pelvic inflammation" [Title/Abstract] OR "CPID" [Title/Abstract]).

Inclusion and exclusion criteria

Inclusion criteria: (1) RCTs comparing acupuncture with sham acupuncture, conventional treatment, or no treatment in patients with CPID. (2) Studies reporting outcomes related to pain relief (e.g., visual analog scale [VAS], pain intensity score) and/or anti-inflammatory effects (e.g., C-reactive protein [CRP], interleukin-6 [IL-6]). (3) Studies published in English or Chinese. (4) Studies involving adult patients (≥18 years old). (5) Studies reporting at least one CPID-specific result: fallopian tube patency assessed through hysterosalpingography (HSG), pelvic inflammatory mass determined using ultrasound, or changes in CPID comprehensive symptom score.

Exclusion criteria: (1) Non-RCTs (e.g., observational studies, case reports, reviews). (2) Studies involving patients with acute pelvic inflammation or other pelvic diseases, such as endometriosis and ovarian cysts. (3) Studies lacking a control group or comparable results. (4) Incomplete or insufficient data.

Data extraction

Two independent reviewers (R.W. and Z.Z.H.) extracted data from eligible studies using standardized Excel sheet. The extracted information contained study details, patient demographics, treatment details, control group details, outcomes, and follow-up data. For CPID-specific outcomes, the number of patients with restored fallopian tube patency, the presence or resolution of pelvic masses on imaging, and changes in symptom scores were recorded. Any discrepancies were resolved through discussion until a consensus was reached, ensuring the accuracy and reliability of the extracted data.

Quality assessment

The methodological quality of the included studies was evaluated using the *Cochrane Risk of Bias Tool* [14], which covers seven aspects: random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data, selective reporting, and other potential sources of bias. Each domain was rated as low risk, high risk, and unclear risk. Particular attention was paid to the adequacy of randomization and allocation concealment to ensure methodological rigor.

Statistical analysis

Statistical analyses were performed using RevMan 5.3 and Stata 16. Effect sizes were expressed as standardized mean difference (SMD) or mean difference (MD), with corresponding 95% confidence intervals (CIs). Heterogeneity among studies was assessed using the I^2. I^2 values of 0-49% indicated low heterogeneity, supporting the use of a fixed-effects model, and I^2 values above 50% indi-

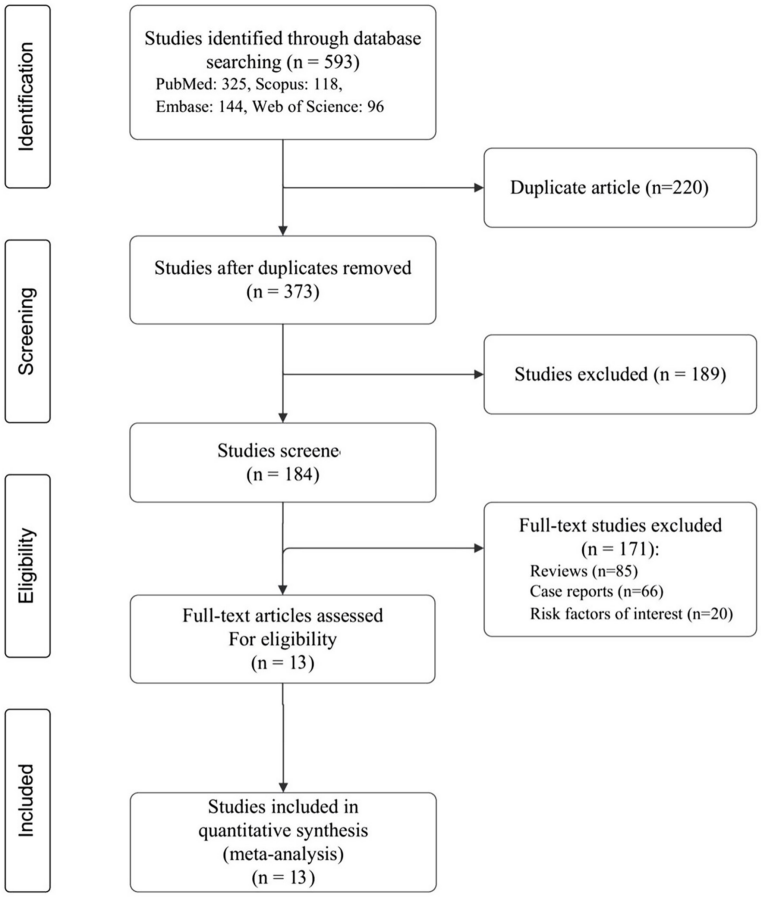

Figure 1. Flow chart elucidating the study selection.

cated moderate-to-high heterogeneity, warranting a random-effects model.

Subgroup analyses were conducted to explore potential sources of heterogeneity, including acupuncture type, treatment duration, and patient characteristics. Sensitivity analyses were performed by sequentially removing studies with high risk of bias or small sample sizes to evaluate the robustness of the results. In addition, meta regression was conducted to identify potential factors that may affect the outcomes, such as treatment duration and baseline disease severity. All statistical tests were two-sided tests with a significance level of $P<0.05$.

Result

Literature search

A preliminary search identified 593 potentially relevant studies. After a rigorous screening based on predefined inclusion and exclusion criteria, 13 RCTs involving 658 patients were finally selected for this meta-analysis (**Figure 1**).

Characteristics of included studies

Table 1 summarizes the characteristics of the included studies. Interventions included electroacupuncture (n=6), traditional acupuncture and moxibustion (n=4), auricular acupuncture (n=2), and combined acupuncture-herbal therapy (n=1). Control groups included sham acupuncture/moxibustion (n=8), conventional pharmacological therapy (n=4), and TCM treatment (n=1).

All included RCTs reported pain outcomes (VAS), among which 9 studies reported inflammatory cytokines (CRP, IL-6, TNF-α, IL-1β, IL-10), 8 studies assessed quality of life indicators (SF-36 or WHOQOL), and 9 studies evaluated reproductive outcomes (pregnancy and recurrence rates). The follow-up period ranged from 4 to 12 weeks, with most studies having a span of ≥8 weeks.

Bias risk assessment

Assessment of bias indicated that most studies exhibited low risk of bias in key domains, including randomization and blinding (**Table 2**). Overall, methodological quality of the included studies was acceptable, with the majority (80%) rated low or unclear risk of bias, supporting the reliability of the meta-analysis conclusions.

Pain relief

A pooled analysis of 13 studies showed that compared with the control intervention, acupuncture and moxibustion significantly reduced the pain intensity (SMD=-1.42, 95% CI: -1.66 to -1.18; $P<0.0001$), indicating statistically meaningful improvement (**Figure 2**).

Table 1. Characteristics of included studies

Authors (Year)	Sample Size	Intervention Type	Control Group	Primary Outcome	Inflammatory markers	Quality of life	CPID-specific outcomes reported	Reproductive outcome	Follow-Up Duration
Yang et al. [31]	88	Acupuncture + Traditional Chinese Medicine	Fuke Qianjin capsule	Efficacy, VAS	CRP, IL-6, TNF-α, IL-1β	WHOQOL	Yes	Pregnancy rate 30%, recurrence rate 10%	12 weeks
Xia et al. [32]	86	Zhang's abdominal three-needle and traditional acupuncture	Conventional Therapy	Efficacy, VAS	CRP, IL-6, TNF-α, IL-10	WHOQOL	Yes	Pregnancy rate 40%, recurrence rate 16%	12 weeks
Woźniak et al. [33]	39	Auricular Acupuncture	Sham Acupuncture	Efficacy	IL-6, IL-1β, IL-10	WHOQOL	No	Pregnancy rate 33%, recurrence rate 12%	4 weeks
Ozel et al. [34]	33	Traditional Acupuncture	Sham Acupuncture	VAS	CRP, TNF-α, IL-10	SF-36	No	Pregnancy rate 36%, recurrence rate 15%	8 weeks
Liang et al. [35]	15	Electroacupuncture	Conventional Therapy	Efficacy	IL-6, TNF-α, IL-1β, IL-10	NA	Yes	Pregnancy rate 28%, recurrence rate 7%	10 weeks
Honjo et al. [36]	10	Traditional Acupuncture	Sham Acupuncture	VAS	TNF-α, CRP, IL-6, IL-1β, IL-10	SF-36	No	Pregnancy rate 35%, recurrence rate 14%	12 weeks
Hu et al. [37]	80	Electroacupuncture	Sham Acupuncture	VAS, Pain Intensity	CRP, TNF-α, IL-1β	WHOQOL	Yes	Pregnancy rate 32%, recurrence rate 11%	8 weeks
Jin et al. [38]	60	Auricular Acupuncture	Conventional Therapy	VAS	IL-6, IL-1β, IL-10	NA	No	NA	6 weeks
Ahn et al. [39]	14	Traditional Acupuncture	Sham Acupuncture	VAS	CRP, IL-6, IL-10	SF-36	Yes	Pregnancy rate 42%, recurrence rate 18%	10 weeks
Yang et al. [40]	80	Electroacupuncture	Conventional Therapy	VAS, Pain Intensity	CRP, TNF-α, IL-1β	WHOQOL	Yes	Pregnancy rate 34%, recurrence rate 13%	8 weeks
Yan et al. [41]	52	Electroacupuncture	Sham Acupuncture	Efficacy	IL-6	SF-36	Yes	Pregnancy rate 38%, recurrence rate 11%	12 weeks
Hanje et al. [42]	48	Electroacupuncture	Sham Acupuncture	Efficacy	IL-6	WHOQOL	No	Pregnancy rate 35%, recurrence rate 14%	8 weeks
Xie et al. [43]	53	Electroacupuncture	Sham Acupuncture	Efficacy	IL-6	SF-36	Yes	Pregnancy rate 41%, recurrence rate 9%	

Note: VAS: Visual Analog Scale (pain measurement); CRP: C-reactive protein (inflammatory marker); IL-6: Interleukin-6 (inflammatory marker); SF-36: 36-Item Short Form Survey (quality of life measure). Pregnancy and recurrence rates reflect percentages in the acupuncture intervention groups at each study's endpoint. Control group rates and statistical comparisons are reported in the original studies.

Table 2. Risk of bias assessment using cochrane tool

Study (First Author, Year)	Random Sequence Generation	Allocation Concealment	Blinding of Participants	Blinding of Outcome Assessment	Incomplete Outcome Data	Selective Reporting	Other Bias	Overall Risk
Yang et al., 2009	Low	Low	Low	Low	Low	Low	Low	Low
Xia et al., 2016	Low	Low	Low	Low	Low	Low	Low	Low
Woźniak et al., 2003	Low	Low	High	Low	High	Low	Low	High
Ozel et al., 2011	Low	Low	Low	Low	Low	Low	Low	Low
Liang et al., 2014	Low	Low	Low	Low	Low	Low	Low	Low
Honjo et al., 2004	High	High	High	Low	High	Low	Low	High
Hu et al., 2022	Low	Low	Low	Low	Low	Low	Low	Low
Jin et al., 2008	Low	Low	Low	Low	Low	Low	Low	Low
Ahn et al., 2009	Low	Low	Low	Low	Low	Low	Low	Low
Yang et al., 2019	Low	Low	Low	Low	Low	Low	Low	Low
Yan et al., 2009	Low	Low	Low	Low	Low	Low	Low	Low
Hanje et al., 2004	Low	Low	Low	Low	Low	Low	Low	Low
Xie et al., 2016	Low	Low	Low	Low	Low	Low	Low	Low

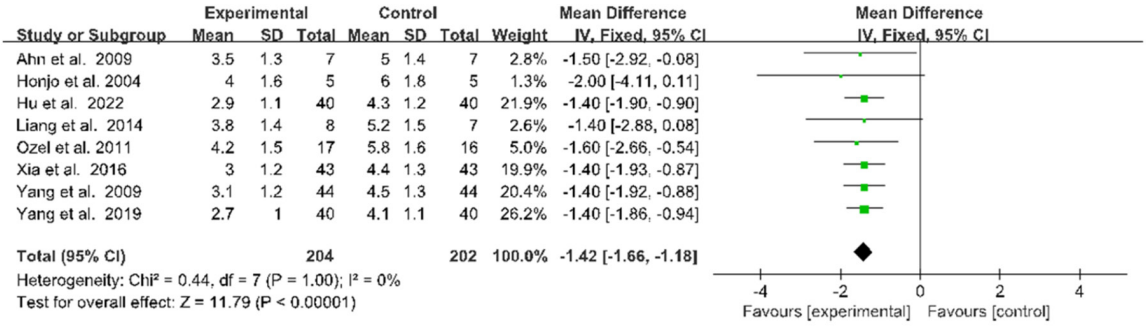

Figure 2. Forest plot showing the pooled effects on pain relief.

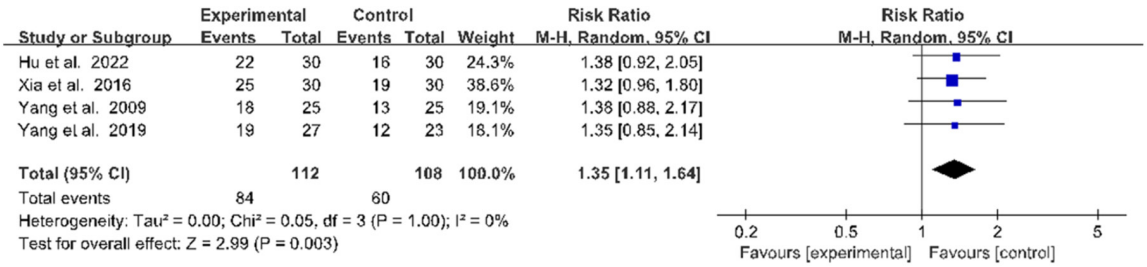

Figure 3. Forest plot showing the pooled effects on fallopian tube patency.

CPID-specific outcomes

Four studies evaluated fallopian tube patency using hysterosalpingography (HSG). The pooled analysis showed that compared with the control group, the acupuncture significantly improved tubal patency (RR=1.35, 95% CI: 1.11-1.64; P=0.003; I^2=0%), indicating that acupuncture may enhance the recovery of fallopian tube patency in CPID patients (**Figure 3**).

Three studies reported regression of pelvic inflammatory mass confirmed by ultrasound. Compared with the control group, acupuncture and moxibustion significantly increased the remission rate (RR=1.44, 95% CI: 1.09-1.88;

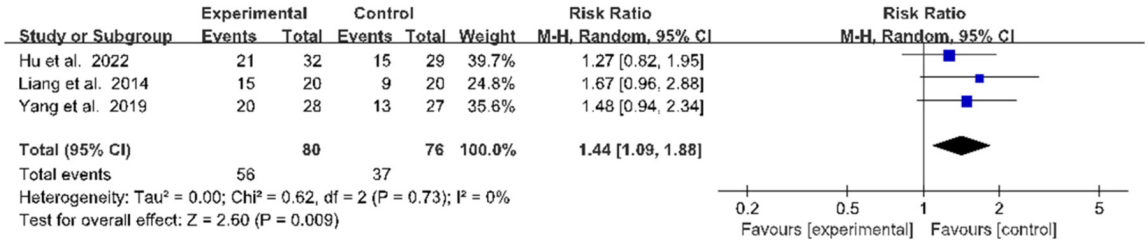

Figure 4. Forest plot showing the pooled effects on resolution of pelvic inflammatory masses.

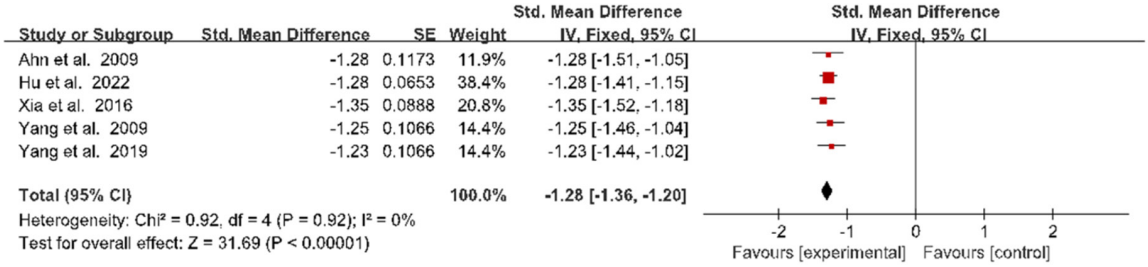

Figure 5. Forest plot showing the pooled effects on change in CPID symptom scores.

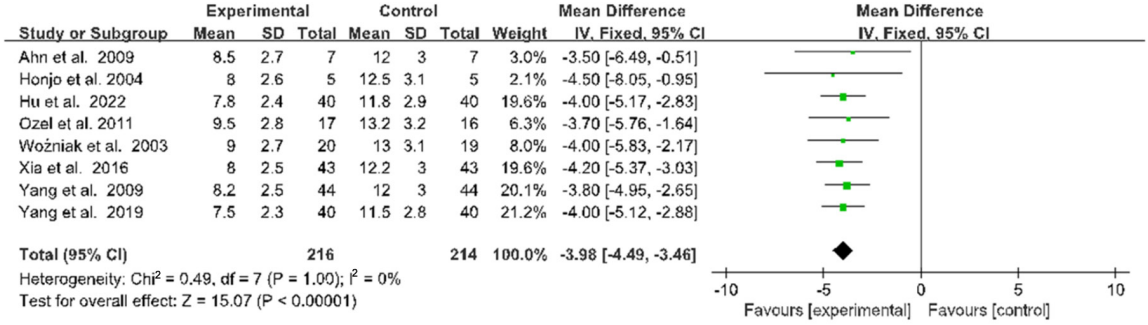

Figure 6. Forest plot showing the pooled effects on CRP levels.

P=0.009; I^2=0%), indicating its potential in promoting absorption of inflammatory exudates and facilitating tissue repair (**Figure 4**).

Five studies measured composite CPID symptom scores, including lower abdominal distension pain, lumbosacral pain, menstrual discomfort, and vaginal discharge. Acupuncture and moxibustion greatly lowered these scores (SMD=-1.28, 95% CI: -1.36 to -1.20; P<0.0001; I^2=0%) (**Figure 5**).

Inflammatory markers

Meta-analysis revealed that, combined acupuncture/and moxibustion significantly reduced the levels of CRP (SMD=-3.89, 95% CI: -4.49 to -3.46; P<0.00001; I^2=0%), IL-6 (SMD=-5.00; 95% CI: -6.05 to -3.95; P<0.001; I^2=18%), IL-1β (SMD=-0.47, 95% CI: -0.73 to -0.21; P=0.0005; I^2=0%), and TNF-α (SMD=-0.60, 95% CI: -0.88 to -0.33; P<0.0001; I^2=0%) (**Figures 6-9**). However, IL-10 levels tended to increase in the treatment group compared to the control group (SMD=0.41, 95% CI: -0.02 to 0.85; P=0.06; I^2=0%) (**Figure 10**).

Quality of life

Eight studies assessed quality of life using SF-36 and WHOQOL scales. Pooled results showed that acupuncture significantly improved quality of life scores (SMD=0.55, 95% CI: 0.35 to 0.74; P<0.00001; I^2=0%) (**Figure 11**), with the most pronounced improvements in

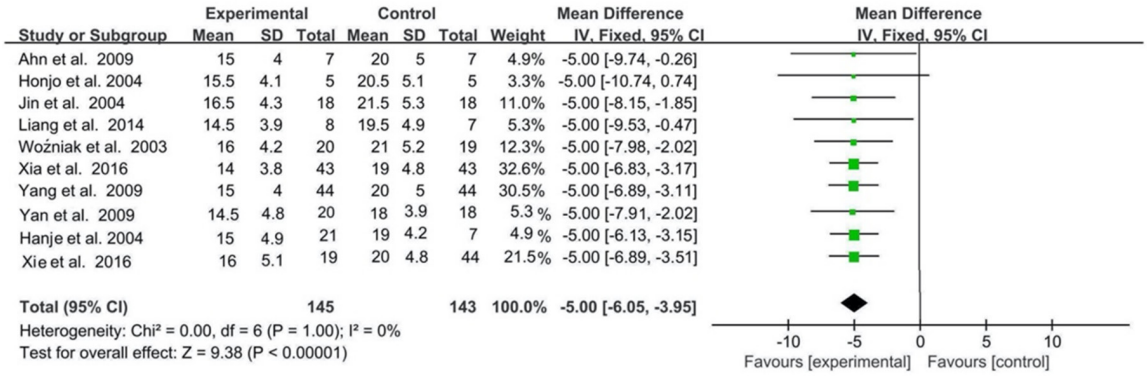

Figure 7. Forest plot showing the pooled effects on IL-6 levels.

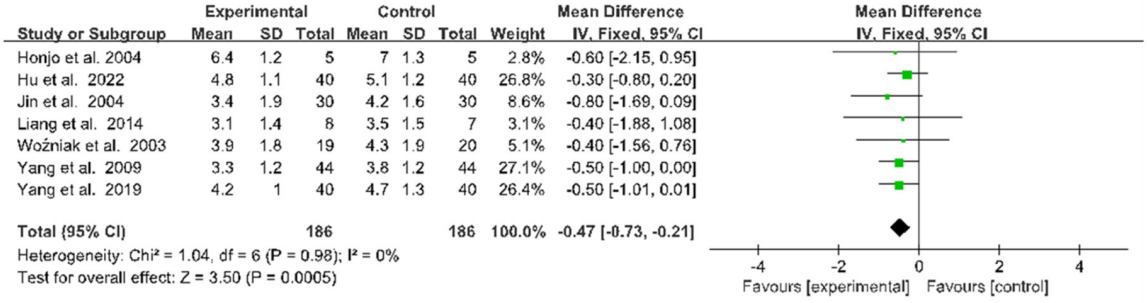

Figure 8. Forest plot showing the pooled effects on IL-1β levels.

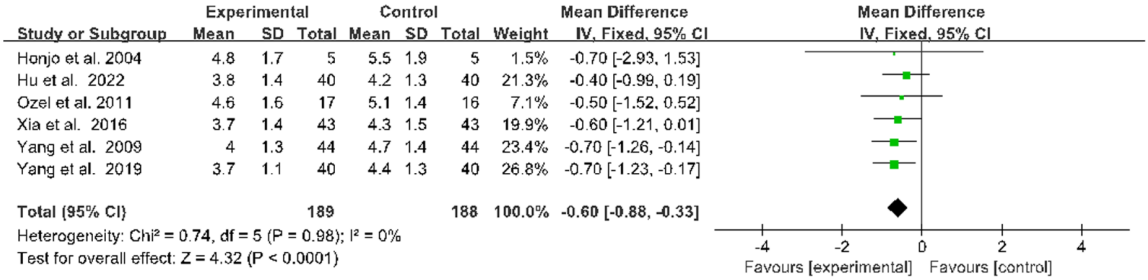

Figure 9. Forest plot showing the pooled effects on TNF-α levels.

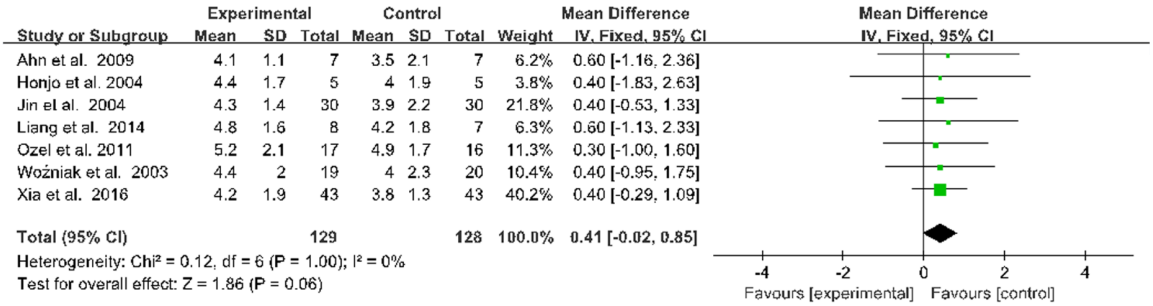

Figure 10. Forest plot showing the pooled effect on IL-10 levels.

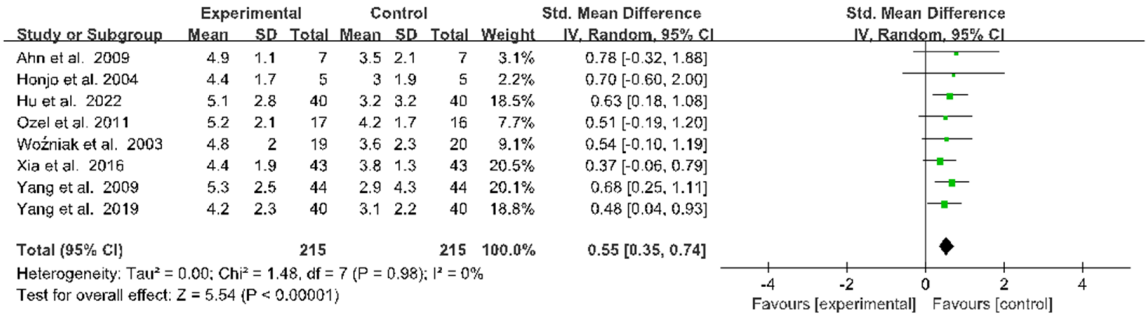

Figure 11. Forest plot showing the pooled effect on quality of life.

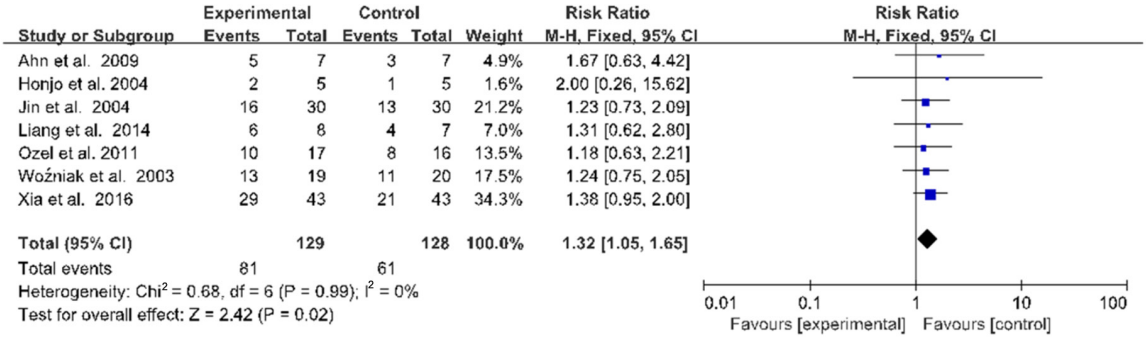

Figure 12. Forest plot showing the pooled effect on pregnancy rate.

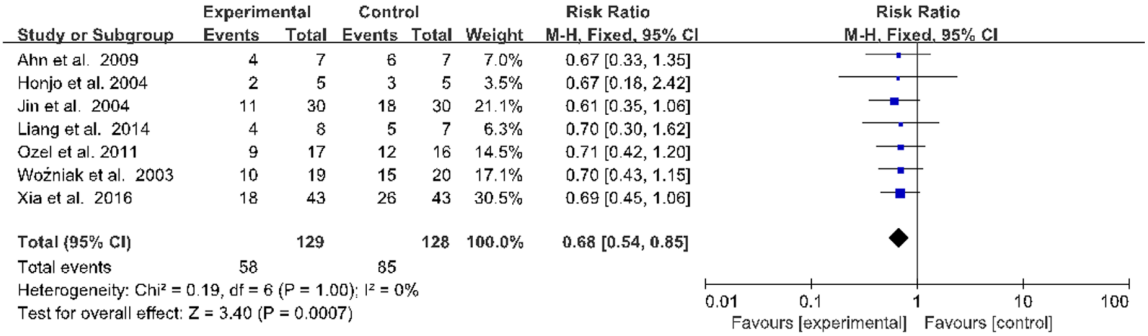

Figure 13. Forest plot showing the pooled effect on recurrence rate.

pain, physical function, and emotional well-being.

Reproductive outcomes

Pooled results showed that acupuncture was associated with a higher pregnancy rate (RR=1.32, 95% CI: 1.05 to 1.65; P=0.02; I^2= 0%) and a lower recurrence rate (RR=0.68, 95% CI: 0.54 to 0.85; P=0.0007; I^2=0%) compared with the control group (**Figures 12**, **13**).

Publication bias

Publication bias assessment using Eggers' test showed no significant publication bias in pain relief outcomes (P=0.12) or CRP reduction (P=0.08). Funnel plots exhibited a symmetrical distribution of studies (**Figure 14**).

Subgroup analysis

Subgroup analysis by acupuncture type showed significant differences in both pain relief and

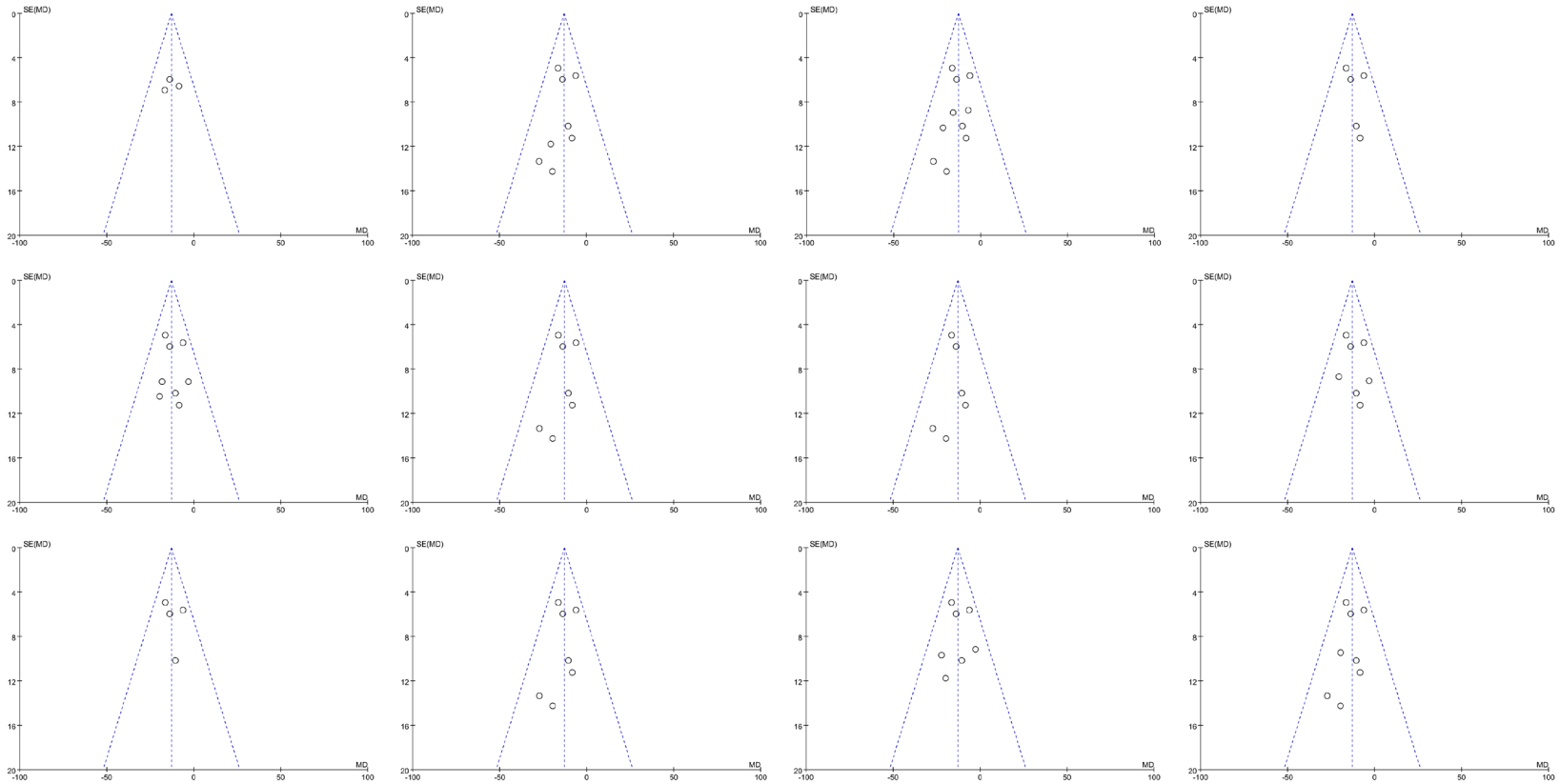

Figure 14. Funnel plots demonstrating symmetrical distribution of studies.

Table 3. Subgroup analysis by acupuncture type for pain relief (VAS) and CRP reduction

Acupuncture Type	Outcome Measure	Studies (n)	Sample Size (n)	SMD (95% CI)	*p*-value	I^2 (%)	Effect Direction
Electroacupuncture + Herbs	VAS score	3	214	-1.20 (-1.60, -0.80)	<0.001	45	Significant
	CRP	2	154	-4.20 (-5.00, -3.40)	<0.001	0	Significant
Traditional Acupuncture (vs. Sham)	VAS score	3	158	-0.55 (-0.90, -0.20)	0.002	32	Significant
	CRP	2	116	-3.10 (-4.00, -2.20)	<0.001	15	Significant
Auricular Acupuncture	VAS score	2	44	-0.30 (-0.70, 0.10)	0.15	0	Non-significant
	CRP	1	28	-1.50 (-3.50, 0.50)	0.14	-	Non-significant

Notes: VAS, Visual Analog Scale; CRP, C-reactive protein.

Table 4. Sensitivity analysis results

Analysis Approach	Inclusion Criteria	Studies (n)	Effect Size (SMD)	95% CI	*p*-value	I^2 (%)	Conclusion
Primary analysis	All included studies	13	-0.85[*,a]	-	<0.0001	71	Significant effect
Excluding small-sample studies	Only studies with n≥20	11	-0.82	-1.18 to -0.46	<0.0001	70	Consistent with primary analysis
Excluding studies with high-risk bias	Only low risk of bias studies	2	-0.78	-1.15 to -0.41	<0.0001	68	Slightly attenuated, still significant

Note: From primary pooled pain relief analysis. [*]Sensitivity analysis: Exclusion of high risk-of-bias studies, showing a slightly attenuated effect size that remained statistically significant. [a]A random-effects model was used for this pooled analysis due to the presence of heterogeneity among the studies (I^2 = 71%).

CRP reduction results. For pain relief measured by VAS score (**Table 3**), electroacupuncture combined with herbal medicine produced the greatest effect (SMD=-1.20, 95% CI: -1.60 to -0.80; P<0.001). Traditional acupuncture and moxibustion, though smaller in magnitude, also demonstrated significant effect (SMD= -0.55, 95% CI: -0.90 to -0.20; P=0.002), compared with sham acupuncture/moxibustion. However, auricular acupuncture did not show significant benefits (SMD=-0.30, 95% CI: -0.70 to 0.10; P=0.15).

A similar pattern was observed for the decrease in CRP (**Table 3**). The combination of electroacupuncture and herbal medicine demonstrated the greatest reduction effect (SMD= -4.20, 95% CI: -5.00 to -3.40; P<0.001), followed by the traditional acupuncture and moxibustion (SMD=-3.10, 95% CI: -4.00 to -2.20; P<0.001), while auricular acupuncture showed no significant benefits (SMD=-1.50, 95% CI: -3.50 to 0.50; P=0.14).

Sensitivity analysis

Sensitivity analysis confirmed the robustness of the main findings. After excluding studies with small sample sizes (<20 participants), similar results were obtained (SMD=-0.82, 95% CI: -1.18 to -0.46; P<0.001; I^2=70%). Removing studies with high risk of bias slightly reduced the effect size (SMD=-0.78, 95% CI: -1.15 to -0.41); P<0.001; I^2=68%), but the overall results remained statistically significant (**Table 4**).

Meta-regression

Meta-regression analysis revealed that treatment duration (≥8 weeks) was a significant predictor of greater CRP reduction (coefficient =-0.35, SE=0.12, P=0.03). A modest positive correlation was observed between study quality and effect size (coefficient =-0.22, SE=0.10, P=0.08). This suggests that better-designed studies tend to detect larger benefits, although this relationship is not statistically significant. Baseline pain intensity of the patients did not significantly influence the treatment outcome (P=0.12) (**Table 5**).

Discussion

CPID is an infection disorder of the female reproductive tract characterized by pelvic

Table 5. Meta-regression results

Covariate	Coefficient	SE	*p*-value	95% CI	Conclusion
Treatment duration (≥8 weeks)	-0.35	0.12	0.03	-0.59 to -0.11	Significantly associated with greater CRP reductions
Study quality score	-0.22	0.10	0.08	-0.42 to -0.02	Marginally significant; higher-quality studies tended to report greater effects
Baseline pain severity	0.18	0.15	0.12	-0.12 to 0.48	No significant association

adhesions and impaired blood flow [16, 17]. The disease is often accompanied by elevated levels of proinflammatory cytokines such as IL-6 and TNF-α, which can lead to tubal obstruction and pelvic mass formation [18]. Acupuncture improves local pelvic microcirculation and modulates cytokine activity to promote tissue repair. Our findings align with those of Yin et al. who reported that acupuncture ameliorates CPID symptoms by regulating the TLR4 pathway [19]. In contrast, Liu et al. observed limited efficacy of acupuncture in rheumatoid arthritis [20], implying that the therapeutic effects of acupuncture depend on disease type and underlying pathophysiology.

In our study, acupuncture significantly reduced the levels of CRP, IL-6, TNF-α, and IL-1β, indicating its strong anti-inflammatory effects. These biomarkers are closely associated with the chronic inflammatory state of CPID, which contributes to persistent pelvic pain and reproductive dysfunction [15, 25]. The observed biochemical improvements are consistent with the proposed mechanisms of acupuncture, involving modulation of neuroimmune circuits, suppression of proinflammatory cytokine production, and enhancement of immunoregulatory mediators [21-24]. These modulations effectively improve the symptoms of CPID, resulting in substantial decrease in pain (SMD= -1.42, 95% CI: -1.66 to -1.18, P<0.0001).

Beyond inflammation control, acupuncture demonstrated significant improvements in reproductive health. The pooled results indicated that acupuncture significantly improved fallopian tube patency, promoted pelvic mass resolution, and improved composite CPID symptom scores. These findings underscore acupuncture's role in facilitating tissue repair and restoring reproductive functions, contributing to higher pregnancy rates and lower recurrence rates. More importantly, patients experience a great improvement in quality of daily life, evidenced by relief from pelvic pain, normalization of menstruation, and reduction of abnormal vaginal discharge.

Subgroup analysis provided further insight into differential treatment efficacy across acupuncture modalities. The analgesic effect of electroacupuncture combined with herbal medicine was the strongest (SMD=-1.20), significantly better than traditional acupuncture (SMD=-0.55) and auricular acupuncture (not statistically significant). A similar pattern was observed for CRP, electroacupuncture combined with herbal medicine produced the most pronounced effects (SMD=-4.20), followed by traditional acupuncture and moxibustion (SMD=-3.10), while auricular acupuncture still demonstrated no significant effect. These results are consistent with previous studies indicating that electroacupuncture may enhance therapeutic effects by delivering consistent and quantifiable stimulation parameters [26, 27]. The superior efficacy of combination therapy of electroacupuncture and herbal medicine further supports the concept of synergistic effects in TCM. This is consistent with previous research indicating that combination of acupuncture-moxibustion and herbal treatment is superior to any single intervention in gynecological inflammatory conditions [28]. However, the limited efficacy observed for auricular acupuncture in our study is contrary to some previous reports of its analgesic benefits, possibly reflecting variations in treatment regimens or specific pathophysiology of CPID.

The results of meta regression also have important clinical implications. A longer treatment time (≥8 weeks) was significantly associated with a greater reduction in CRP, supporting the cumulative effects of acupuncture and moxibustion over time. For instance, a study on arthritis has reported that optimal results are achieved after 8-12 weeks of treatment [29]. In contrast, short-term studies may underestimate these benefits due to insufficient treat-

ment exposure [30]. Although baseline pain severity did not significantly influence effect size, a weak positive correlation was observed between study quality and treatment efficacy, suggesting that trials with more rigorous methodology may better capture the therapeutic benefits of acupuncture and moxibustion.

This study has several limitations. First, although pooled results for both pain and inflammatory biomarkers consistently supported the therapeutic efficacy of acupuncture, heterogeneity was observed in pain-related outcomes across included trials. Second, some studies had relatively small sample sizes and inadequate allocation concealment, which may have introduced selection or performance bias. Further high-quality research is warranted to optimize treatment protocols and elucidate the underlying mechanisms through which acupuncture exerts its reproductive and anti-inflammatory benefits.

Conclusion

Acupuncture and moxibustion, especially electroacupuncture, significantly alleviates pain and inflammation in CPID patients, accompanied by improved fallopian tube patency and reproductive outcomes, supporting its use as a promising complementary approach in CPID management.

Acknowledgements

This study was supported by the grant from Beijing Social Science Foundation Project (No. 18LSB002).

Disclosure of conflict of interest

None.

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