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premature ovarian insufficiency:

Insuffisance ovarienne prématurée : évaluation de l'acupuncture

1. Systematic Reviews and Meta-Analysis

1.1. Generic Acupuncture

1.1.1. Maunder 2026

Maunder A, Vermeulen N, Vincent AJ, Panay N, Ee C. Complementary therapies for women with premature ovarian insufficiency: a systematic literature review to inform the 2024 update of the ESHRE/ASRM/IMS/CRE-WHiRL guidelines on premature ovarian insufficiency. Climacteric. 2026;29(1):4-12. https://doi.org/10.1080/13697137.2025.2530441

Background	Premature ovarian insufficiency (POI) is associated with reduced quality of life and increased health risks. While hormone therapy (HT) is standard treatment, some women seek other options to treat its sequelae.
Objective	This review explores the role of complementary therapies for POI.
Methods	A systematic search of four databases up to January 2024 identified randomized controlled trials, systematic reviews, meta-analyses and umbrella reviews that examined the use of complementary therapies by women with POI. Outcomes included menopausal symptoms, gonadotropins, antral follicle count, ovarian volume and quality of life. Study quality was evaluated using Cochrane Risk of Bias and A MeaSurement Tool to Assess systematic Reviews (AMSTAR 2).
Results	The search identified 1869 citations, with nine studies meeting the inclusion criteria. Findings suggest that Chinese herbal medicine and **acupuncture** may alleviate menopausal symptoms and regulate gonadotropins in women with POI, although evidence is very limited. There is insufficient evidence for other complementary therapies for POI.
Conclusion	While Chinese herbal medicine may improve menopausal symptoms, there is insufficient evidence specific to POI. There is a clear need for additional and rigorous research on the efficacy and safety of complementary therapies for POI. Evidence does not support complementary medicines as replacements for HT.

1.1.2. Cao 2024

Cao H, Li H, Lin G, Li X, Liu S, Li P, Cong C, Xu L. The clinical value of acupuncture for women with premature ovarian insufficiency: a systematic review and meta-analysis of randomized controlled trials. Front Endocrinol (Lausanne). 2024 Jul 11;15:1361573. https://doi.org/10.3389/fendo.2024.1361573

Objective	The aim of this study was to evaluate the therapeutic implications of acupuncture on improving ovarian function in women diagnosed with premature ovarian insufficiency (POI) through the implementation of randomized clinical trials (RCTs).
Methods	A comprehensive search of eight databases was conducted to identify RCTs up until 5 October 2023. The outcomes included the levels of sex hormones, antral follicle count (AFC), Kupperman score, and total effective rate. The risk of bias (RoB) tool was utilized to evaluate the quality of the included studies. In order to guarantee the robustness and reliability of the findings, subgroup and sensitivity analyses were performed to investigate potential sources of heterogeneity.
Results	A total of **13 RCTs comprising 775 patients** were included in the study. Acupuncture demonstrated significant efficacy in reducing follicle-stimulating hormone (FSH) [SMD = 0.83, 95% CI (0.27, 1.39), I 2 = 92%, p = 0.004], enhancing estradiol levels (E2) [SMD = 0.50, 95% CI (0.07, 0.93), p = 0.02, I 2 = 87%], and increasing anti-Müllerian hormone (AMH) [SMD = 0.24, 95% CI (0.05, 0.44), p = 0.01, I 2 = 8%], as well as improving the overall effective rate [RR = 1.22, 95% CI (1.10, 1.35), p < 0.01, I 2 = 14%]. Subgroup analysis revealed that compared with non-acupuncture therapy, the acupuncture with Chinese herbal medicine (CHM) and hormone replacement therapy (HRT) group exhibited a substantial reduction in FSH levels [SMD = 1.02, 95% CI (0.52, 1.51), I 2 = 60%, p < 0.01]. Furthermore, the acupuncture with CHM group also exhibited a substantial reduction [SMD = 4.59, 95% CI (1.53, 7.65), I 2 = 98%, p < 0.01]. However, only the acupuncture with CHM and HRT group demonstrated a significant increase in E2 levels [SMD = 0.55, 95% CI (0.23, 0.87), I 2 = 12%, p < 0.01].
Conclusion	Acupuncture has demonstrated superiority over non-acupuncture in diminishing serum FSH levels and increasing serum E2, AMH, and the overall efficacy rate in women diagnosed with POI. These research findings suggest the necessity for broader-scale research with meticulous designs to fully demonstrate the efficacy and safety of acupuncture in the treatment of women with POI.

1.1.3. Lin 2023 (diminution de la réserve ovarienne)

Lin G, Liu X, Cong C, Chen S, Xu L. Clinical efficacy of acupuncture for diminished ovarian reserve: a systematic review and meta-analysis of randomized controlled trials. Front Endocrinol (Lausanne). 2023 Aug 2;14:1136121. https://doi.org/10.3389/fendo.2023.1136121

Objective	To evaluate the clinical efficacy of acupuncture for the treatment of diminished ovarian reserve (DOR) based on the existing randomized controlled trials (RCTs).
Methods	Nine databases from their inception to December 6th, 2022, were comprehensively searched to retrieve RCTs related to the clinical efficacy of acupuncture for the treatment of DOR. The outcomes of interest were sex hormones level and antral follicle count (AFC). Risk of Bias (RoB) was adopted to assess the quality of the included trials.
Results	A total of **13 RCTs involving 787 patients** were included in this meta-analysis. The review of available evidence revealed acupuncture produced a significant efficacy in decreasing follicle-stimulating hormone (FSH) levels (SMD = -1.07, 95%CI [-1.79, -0.36], p = 0.003), FSH/LH ratio (MD = -0.31, 95%CI [-0.54, -0.09], p = 0.006) and increasing anti-Müllerian hormone (AMH) levels (SMD = 0.25, 95%CI [-0.00, 0.49], p = 0.05), along with AFC (MD = 1.87, 95%CI [0.96, 2.79], p < 0.0001) compared to controls. Compared with electro-acupuncture treatment, manual acupuncture was superior in reducing FSH levels, FSH/LH ratio, and increasing AMH levels and AFC (p < 0.05). A notable association was also seen when acupuncture was combined with traditional Chinese medicine therapy for improving FSH levels, FSH/LH ratio, and AFC (p < 0.05). Besides, a high dose of acupuncture (≥10 acupoints) was more conducive to ameliorating FSH levels, FSH/LH ratio, and AFC (p < 0.05) than a low dose of acupuncture (<10 acupoints). Substantial heterogeneity existed among studies.

Conclusion	Acupuncture may have significant clinical potential for patients with DOR in terms of improving sex hormones level and increasing AFC, although the evidence is drawn with high heterogeneity. This finding suggests that more rigorous trials conducted in diverse regions worldwide are necessary to identify the efficacy of acupuncture for patients diagnosed with DOR.

1.1.4. Wang 2023 (faible réponse ovarienne)

Wang RR, Su MH, Liu LY, Lai YY, Guo XL, Gan D, Zheng XY, Yang H, Yu SY, Liang FR, Wei W, Zhong Y, Yang J. Systematic review of acupuncture to improve ovarian function in women with poor ovarian response. Front Endocrinol (Lausanne). 2023 Mar 13;14:1028853. https://doi.org/10.3389/fendo.2023.1028853.

Objective	To determine the effect of acupuncture in treating poor ovarian response (POR).
Methods	We searched MEDLINE (via PubMed), EMBASE, Allied and Complementary Medicine Database, CNKI, CBM, VIP database, Wanfang Database, and relevant registration databases from inception to January 30, 2023. In this review, both Chinese and English peer-reviewed literature were included. Only randomized controlled trials (RCTs) using acupuncture as an intervention for POR patients undergoing in vitro fertilization were considered.
Results	**Seven clinical randomized controlled trials (RCTs)** were eventually included for comparison (**516 women**). The quality of included studies was generally low or very low. For the meta-analysis, seven studies showed that compared with controlled ovarian hyperstimulation (COH) therapy, acupuncture combined with COH therapy could significantly increase the implantation rate (RR=2.13, 95%CI [1.08, 4.21], p=0.03), the number of oocytes retrieved (MD=1.02, 95%CI [0.72, 1.32], p<0.00001), the thickness of endometrium (MD=0.54, 95%CI [0.13, 0.96], p=0.01), and the antral follicle count (MD=1.52, 95%CI [1.08, 1.95], p<0.00001), reduce follicle-stimulating hormone (FSH) levels (MD=-1.52, 95%CI [-2.41, -0.62], p=0.0009) and improve estradiol (E2) levels (MD=1667.80, 95%CI [1578.29, 1757.31], p<0.00001). Besides, there were significant differences in the duration of Gn (MD=0.47, 95%CI [-0.00, 0.94], p=0.05) between the two groups. However, no statistical variation was observed in improving clinical pregnancy rate (CPR), fertilization rate, high-quality embryo rate, luteinizing hormone (LH) value, anti-mullerian hormone (AMH) value, or reducing the dose of gonadotropin (Gn) values between the acupuncture plus COH therapy group and the COH therapy group.
Conclusion	Acupuncture combined with COH therapy is doubtful in improving the pregnancy outcome of POR patients. Secondly, acupuncture can also improve the sex hormone level of POR women, and improve ovarian function. Furthermore, more RCTs of acupuncture in POR are needed to be incorporated into future meta-analyses.

1.1.5. Li 2020 ☆

Li Y, Xia G, Tan Y, Shuai J. Acupoint stimulation and Chinese herbal medicines for the treatment of premature ovarian insufficiency: A systematic review and meta-analysis. Complement Ther Clin Pract. 2020. [215434]. doi

Background and purpose	Acupoint stimulation and Chinese herbal medicines (CHM) are widely used in the treatment of premature ovarian insufficiency (POI), but the efficacy and safety remain controversial. This systematic review aims to evaluate the efficacy and safety of acupoint stimulation and CHM for POI.

Methods	Seven databases were searched and collected studies comparing acupoint stimulation and CHM with hormone replacement therapy (HRT) from inception to July 31, 2019. The methodological quality of the included trials was assessed in line with the criteria of the Cochrane risk of bias assessment tool.
Results	Meta-analysis was performed in 14 trials, which contained a total of 1030 women with POI. The acupoint stimulation and CHM presented advantages in normalizing of menstrual cycle (RR 2.06, 95% CI 1.62 to 2.61, P < 0.00001) and improving perimenopausal symptoms (RR 2.00, 95% CI 1.56 to 2.56, P < 0.00001) when compared with HRT. After treatment, compared with HRT, acupoint stimulation and CHM effectively decreased the level of follicle stimulating hormone (MD -2.88, 95% CI -5.00 to -0.76, P = 0.008) and increased the level of estradiol (SMD 0.88, 95% CI 0.06 to 1.71, P = 0.04). By contrast, there were no significant between-group differences in the level of luteinizing hormone (MD -3.24, 95% CI -6.77 to 0.29, P = 0.07) and adverse effects (RR 0.31, 95% CI 0.04 to 2.54, P = 0.28).
Conclusion	This meta-analysis suggested that acupoint stimulation and CHM can serve as complementary therapies to alleviate menstrual disorders, perimenopausal symptoms, and serum sex hormone levels in POI females.

1.1.6. Xu 2020 ☆

Xu Yuanbo. [Acupuncture combined with traditional Chinese medicine in the treatment of premature ovarian failure: A meta-analysis]. Modern Chinese Clinical Medicine. 2020. [212891].

Objective	To compare the efficacy and safety between acupuncture combined with traditional Chinese medicine and hormone replacement therapy for premature ovarian failure.
Methods	Articles up to October, 2019 about the randomized controlled trails on the efficacy of treating the premature ovarian failure with acupuncture combined with herbal medicine were included in the electronic retrieval library, which were from China national knowledge infrastructure (CNKI), China Science and Technology Journal Database (VIP), WanFang Database, China Biology Medicine disc (CBM), Pubmed, Cochrane Library, and EMBase. Studies screening and data extraction were performed by two researchers separately. The quality evaluation and risk assessment of the inclusion were carried out by using the criteria provided by the Cochrane. Meta-analysis was conducted with RevMan 5. 3.
Results	A total of **14 randomized controlled trials** were included, involving **879 individual**. The meta-analysis showed that: 1) The total effective rate for the treatment of premature ovarian failure was higher in acupuncture combined with traditional Chinese medicine than in the hormone replacement therapy [OR=3. 41, 95% CI (2. 38, 4. 89), P<0. 05]; 2) The improvement of laboratory indexes (E2, FSH, LH) in patients who received treatment of acupuncture combined with traditional Chinese medicine were superior to those with hormone replacement therapy (SMD=0. 86, -0. 95, -0. 82, P<0. 05); 3) The improvement of the Kupperman score in patients with acupuncture combined with traditional Chinese medicine was superior to those with hormone replacement therapy (SMD=-0. 99, P<0. 05); 4) The main adverse reactions reported were gastrointestinal symptoms, dizziness and nausea. The adverse effects rate were similar in both oacupuncture combined with traditional Chinese medicine group and hormone replacement therapy group [OR=0. 13, 95% CI (0. 01, 1. 17), P=0. 07].
Conclusions	Our analysis found that acupuncture combined with traditional Chinese medicine showed better efficacy than hormone replacement therapy in the treatment of premature ovarian failure. However, the quality of the enrolled studies is low. Consequently, more high-quality randomized controlled trials would be needed in future.

1.1.7. Yin 2020 ☆

Yin Ya-qian, Xu Huan-fang. Acupuncture for premature ovarian insufficiency: a systematic review and meta-analysis. Journal of Acupuncture and Tuina Science. 2020;18(1):24-32. [209302]. doi

Objective	To analyze the effect of acupuncture versus hormone replacement therapy (HRT) for premature ovarian insufficiency (POI).
Methods	China National Knowledge Infrastructure (CNKI), Wanfang Academic Journal Full-text Database (Wanfang), Chongqing VIP Database (CQVIP), China Biology Medicine Disc (CBM), Web of Science, Cochrane Library, PubMed, and Excerpta Medica Database (EMBASE) were searched up to January 31st, 2019 to identify randomized controlled trials (RCTs) evaluating the effect of acupuncture for POI. The primary outcome was the level of basal serum follicle-stimulating hormone (FSH). Secondary outcomes included serum levels of luteinizing hormone (LH), estradiol (E2) and anti-Müllerian hormone (AMH). Two authors extracted data independently and assessed the risk of bias and the methodological quality using the Cochrane's tool. Meta-analysis was conducted by RevMan version 5.3.
Results	**Eight eligible RCTs with a total of 496 POI patients** were included in the meta-analysis. The pooled results showed that there was a significant reduction in the basal serum FSH level (MD=−5.82, 95%CI: −9.76 to −1.87, I2=82%, P=0.004) and a remarkable elevation in the basal E2 level (SMD=0.93, 95%CI: 0.34 to 1.52, I2=88%, P=0.002) in the acupuncture group when compared with the control. Subgroup analysis showed that compared with HRT, a significant decrease in the FSH level was observed in both acupuncture alone (MD=−4.53, 95%CI: −8.96 to −0.10, I2=73%, P=0.04) and acupuncture plus HRT (MD=−9.60, 95%CI: −17.60 to −1.61, I2=50%, P=0.02), while a remarkable elevation of E2 was only found in acupuncture plus HRT (SMD=1.43, 95%CI: 1.03 to 1.82, I2=0%, P<0.00001). There was no significant difference in the LH level between acupuncture and HRT (MD=−3.16, 95%CI: −9.41 to 3.10, I2=0%, P=0.32), only one trial reported AMH, and no significant difference was found between acupuncture and HRT.
Conclusion	The present study indicated that acupuncture had an advantage over HRT in reducing serum FSH level and increasing serum E2 level in women with POI. However, evidence supporting the finding is limited due to the small sample size, potential methodological flaws and significant heterogeneity. Hence, this conclusion still needs to be verified by high-quality RCTs.

1.1.8. Zhang 2020

Zhang J, Huang X, Liu Y, He Y, Yu H. A comparison of the effects of Chinese non-pharmaceutical therapies for premature ovarian failure: A PRISMA-compliant systematic review and network meta-analysis. Medicine (Baltimore). 2020;99(26). [211175]. doi

Background	Premature ovarian failure (POF) is commonly treated with hormone replacement therapy (HRT). Many patients with POF choose acupuncture as a complementary therapy over HRT, due to possible adverse reactions. This systematic review and network meta-analysis (NMA) compares the efficacy of different forms of acupuncture therapies for POF.
Methods	Seven databases including PubMed, the Cochrane Library, Embase, Wanfang database, China National Knowledge Infrastructure database, VIP Chinese Science, and Chinese Biomedical Database were searched for randomized controlled trials (RCTs) of various acupuncture treatments for POF. This time spanned from the date of database inception to January 13, 2020. RevMan 5.3 was used to assess the bias risk of the studies. A NMA of the included studies was performed using Stata14.0.

Results	A total of 408 items were searched in this study, and finally this NMA included 16 RCTS, involving 1,307 patients. It showed that acupuncture (OR:1.35,95%1.24 to 1.47) has the best effectiveness among the four acupuncture (standardized mean difference [SMD]-16.30,95% -31.33 to -1.28) is the most effective and the best in reducing follicle-stimulating hormone levels among the four acupuncture treatments. Acupuncture (SMD 26.67,95%5.95 to 47.40) and acupoint embedding (SMD41.14,95%11.90 to 70.37) were ranked in the top 2 positions, in improving estradiol, whereas acupuncture (SMD-4.90,95% -8.10 to -1.70) was than acupoint embedding and HRT, in reducing luteinizing hormone level. In addition, our conclusions have not changed significantly after the sensitivity analysis.
Conclusion	With clinical evidence summarized by NMA, it is observed that acupuncture is the most promising therapy for improving menopausal symptoms, decreasing serum follicle-stimulating hormone and luteinizing hormone level. Therefore, acupuncture could be effective for patients with POF, who are intolerant to the adverse effects of hormone replacement therapy or who would prefer non-drug therapies. Further multi-center and high-quality RCT studies should be conducted to make our conclusion more rigorous.

1.1.9. Zhang 2020 ☆

Zhang Jinhuan. [Systematic Evaluation and Meta-analysis of Acupuncture-Moxibustion Alone in Treating Premature Ovarian Failure]. Journal of Guangzhou University of TCM. 2020. [212934].

Objective	To systematically evaluate the clinical efficacy of acupuncture-moxibustion alone for the treatment of premature ovarian failure.
Methods	The literature about randomized control trials (RCTs) of acupuncture-moxibustion treatment for premature ovarian failure were searched out from CNKI, VIP, Wanfang, CBM, PubMed, Cochrane Library, and Embase databases. The included RCTs were given quality evaluation by Cochrane bias risk assessment tool. Meta-analysis was carried out by RevMan 5. 3 software.
Results	A total of **16 literature** according with standard were included, involving **1 102 cases** of patients. The Mata-analysis results showed that the overall response rate of acupuncture-moxibustion treatment for premature ovarian failure was superior to that of the western medicine group [OR = 4. 70, 95% CI (3. 34, 6. 61), P < 0. 000 01]. Compared with the western medicine group, the acupuncture-moxibustion alone decreased follicle stimulating hormone (FSH)level [MD =-3. 3, 95% CI (-5. 88, -0. 72), P = 0. 01], decreased luteinizing hormone (LH)level [MD =-5. 81, 95% CI (-7. 42, -4. 20), P < 0. 000 01], and elevated estradiol (E2)level [MD = 24. 15, 95% CI (12. 82, 35. 48), P < 0. 000 1], showing that the effect was superior to that of the western medicine group.
Conclusion	Acupuncture-moxibustion alone treatment for premature ovarian failure is significantly effective for enhancing the response rate and improving hormone level, and has less adverse reactions. But due to the less sample size and lower quality of the included RCTs, the above results need to be verified by more large-scale and high-quality RCTs.

1.1.10. Yang 2017 (network meta-analysis) ☆

Yang Hui-sheng, Fang Yi-gong, Xu Huan-fang, Li Xiao-tong, Shang Jie, Yin Ya-qian. Systematic evaluation on the clinical efficacy of acupoint stimulation therapy for treatment of premature ovarian insufficiency on the basis of network Meta-analysis World Journal of Acupuncture-Moxibustion. 2017;27(3):26-39. [52294].

Objective	To systematically evaluate the effectiveness and safety of acupoint stimulation therapy for treatment of premature ovarian insufficiency (POI).

Methods	Computer retrieval was carried out in such databases as PubMed, Embase, Cochrane Library, web of science, Chinese biomedicine database (CBM), China National Knowledge Infrastructure (CNKI), WanFang and VIP in order to collect the randomized controlled trials (RCT) concerning acupoint stimulation therapy for treatment of POI. Software R 3. 40 and stata 14. 0 were used for Meta-analysis and network Meta-analysis, and RevMan 5. 3 was used for plotting the risk bias diagrams.
Results	**Forty three RCTs** were included in total, involving **3046 POI patients** and 18 acupoint stimulation therapies and comprehensive therapies. Metaanalysis showed: ① The curative effects of acupoint stimulation therapy (RR=1. 25, 95□CI [L07, 1. 45]), acupoint stimulation therapy+Chinese herbal medicine (RR=1. 25, 95□CI [1. 18, 1. 32]) and acupoint stimulation therapy+hormone replacement therapy (HRT) (RR=1. 20, 95□CI [1. 12, 1. 29]) were all superior to that of HRT, indicating that the differences were statistically significant (Z=2. 90, P=0. 04; Z=7. 56, P□0. 000 01; Z=4. 06, P□0. 000 01). ② Compared with HRT, the occurrence rate of adverse effect of acupoint stimulation therapy was lower, and the safety was superior to that of HRT (RR=0. 18, 95□CI [0. 08, 0. 41]), indicating that the differences were statistically significant (Z=4. 08, P□0. 000 1). Forty-two direct comparisons and 110 indirect comparisons were generated according to network Meta-analysis, among which, 38 comparisons were statistically significant. Network Metaanalysis results with HRT as control showed: the therapeutic measures ranking top 3 according to the curative effect sequence were catgut embedment in acupoint, moxibustion and warming-needle moxibustion, successively, and all the 3 measures were monotherapies without reflecting the advantages of comprehensive therapy. HRT ranked 17th among the 18 included therapeutic measures.
Conclusion	On the basis of current evidences, acupoint stimulation therapy has a better clinical efficacy and safety for treatment of POI when compared with HRT. The acupoint stimulation therapies ranking the top 3 have more significant curative effects, but the long-term efficacy and the effect on the ovarian function still need to be further explored. In addition, the conclusion of this study still needs to be verified through a large number of RCTs with reasonable designs and appropriate methods.

1.1.11. Pang 2016 ☆

Pang Yong, Huang Yanyan. [Meta-analysis the effect of acupuncture in treating premature ovarian failure]. Clinical Journal of Traditional Chinese Medicine. 2016;1:108-112. [186968].

Objective	To assess the therapeutic effect of acupuncture and moxibustion for premature ovarian failure (POF).
Methods	Based on Cochrance system assessment methods, the search engine Pub Med, CNKI and databases (till Sept, 2015) including Wan Fang data and VIP database were used to retrieve. The randomized controlled trial of treating POF with the method of acupunture and moxibustion were inserted, the quality of adopted literature were evaluated one by one and valid data were extracted. Meta-analysis was conducted with the assistance of RevMan5. 2 software.
Results	Nine randomized controlled trials (RCTs) involving 719 patients in all with POF were on meta-analysis. Results of meta-analysis indicated: After treatment, there was statistical difference between acupuncture and Western medicine groups on effective rate (P<0. 01)The results of Follicle-stimulating Hormone (FSH) and estrogen (E2) after therapy were better in the acupuncture group than those in the Western medicine group, which had statistical significance (P<0. 05). Four of the 9 literatures referred to reported outcomes of Luteinizing-hormone (LH) and their differences had no statistical significance.

Conclusions	During the treatment to POF, by observing clinically and analyzing the improvement of clinical efficacy and the level of serum hormone, the clinical efficacy of the method of acupuncture and moxibustion is better than that of the method of Western medicine. Since it's difficult to achieve double-blind in the treatment of acupuncture and moxibustion and adopted literatures include some of low quality, so it remains to look forward to that high-quality experiments will provide high-quality evidence.

1.1.12. Jo 2015 ∅

- Jo J, Lee YJ, Lee H. Effectiveness of Acupuncture for Primary Ovarian Insufficiency: A Systematic Review and Meta-Analysis. Evid Based Complement Alternat Med. 2015;:842180. [144903]. doi
- Junyoung Jo, Yoon Jae Lee, Jinmoo Lee, Hyangsook Lee. Effectiveness of Acupuncture for Primary Ovarian Insufficiency: A Systematic Review and Meta-analysis. Integrative Medicine Research. 2015;5(1) supp: 39. [204729]. doi

Objective	This systematic review aimed to assess current evidence from randomized controlled trials (RCTs) on the effects of acupuncture for patients with primary ovarian insufficiency (POI).
Methods	We searched twelve databases to identify relevant studies published before July 2014. The outcomes were serum follicle-stimulating hormone (FSH) levels and resumption of menstruation. Two reviewers independently assessed the risk of bias using the Cochrane's tool, extracted the results, and evaluated the overall level of the evidence using Grading of Recommendations Assessment, Development, and Evaluation (GRADE) criteria.
Results	**Eight RCTs were selected**. Acupuncture significantly lowered serum FSH levels and more women receiving acupuncture reported resumption of menses. However, the results should be interpreted with caution due to a small number of participants, high risk of bias for blinding, and likely publication bias. The level of evidence for FSH level and resumption of menses were assessed as "low" using GRADE.
Conclusion	The current evidence on acupuncture for POI is insufficient to draw a firm conclusion due to scarcity of studies with a low risk of bias and likely publication bias. Further rigorously designed and conducted studies are needed to confirm the effectiveness and safety of acupuncture in patients with POI.

1.2. Specific outcome

1.2.1. In vitro fertilization

1.2.1.1. Jang 2020

Jang S, Kim KH, Jun JH, You S. Acupuncture for in vitro fertilization in women with poor ovarian response: a systematic review. Integr Med Res. 2020;9(2). [208640]. doi

Background	Poor ovarian response (POR) is one reason for infertility. In vitro fertilization (IVF) is frequently used to help achieve pregnancy, and performing acupuncture before IVF may promote ovulation and reduce egg retrieval pain. The purpose of this systematic review was to evaluate the effectiveness of acupuncture on clinical pregnancy rates (CPR) after IVF in women with POR.

Methods	Eight electronic databases were searched in January 2020, and reference lists of retrieved articles and previous review articles were hand-searched. Randomized controlled trials (RCTs) using any type of acupuncture for women with POR undergoing IVF were considered. Risk of bias was assessed using the Cochrane risk of bias standards.
Results	**Three RCTs** were included in this review. CPR and the number of retrieved oocytes were measured in two studies, while the values of anti-Mullerian hormone (AMH) and antral follicle count (AFC) were only reported in one study. In two studies, CPR was higher in the intervention group than the control group [37.8 % vs 24.3 %]. We did not conduct a meta-analysis, as there was a high level of heterogeneity in interventions among the included trials.
Conclusions	This study suggests that acupuncture may improve CPR, AMH, AFC and the number of retrieved oocytes in women with POR undergoing IVF. However it is difficult to conclude that acupuncture is more effective than conventional treatment. Additionally, more clinical trials are needed to evaluate the effectiveness of acupuncture on CPR and other outcomes of POR.

1.2.2. Anxiety and depression

1.2.2.1. Huang 2024

Huang S, Zhang D, Shi X, Zhang Y, Wang X, She Y, Liang C, Li X, Zaslawski C. Acupuncture and related therapies for anxiety and depression in patients with premature ovarian insufficiency and diminished ovarian reserve: a systematic review and meta-analysis. Front Psychiatry. 2024 Dec 2;15:1495418. https://doi.org/10.3389/fpsyt.2024.1495418

Backgound	The decreased ovarian function has a negative impact on the mental health of women and increases the risk of anxiety and depression. A growing number of clinical studies have demonstrated that acupuncture-related therapies can effectively and safely restore hormone levels and improve ovarian reserve function. However, the effectiveness of acupuncture-related therapies in alleviating anxiety and depression symptoms in patients with ovarian hypofunction has not been thoroughly evaluated. Therefore, this study conducted a systematic review and meta-analysis to assess the impact of the different acupuncture-related therapies on the mental health of patients with ovarian hypofunction.
Methods	We comprehensively searched eight famous databases for randomized controlled trials up to October 30, 2024. Databases include PubMed, Web of Science, EMBASE and Cochrane Library, China Biomedical (CBM), China National Knowledge Infrastructure (CNKI), Wanfang Database and VIP Database.
Results	The study included **12 RCTs, involving 780 patients** with ovarian hypofunction, including 403 patients with POI, 297 patients with DOR, and 80 patients with POF. Acupuncture-related therapy was obviously superior to hormone therapy in relieving anxiety symptoms (SMD: -0.90; 95%CI: -1.28, -0.53; P<0.000 01) and depressive symptoms (SMD: -0.82; 95% CI: -1.25, -0.40; P=0.0001).
Conclusions	Acupuncture-related therapy was more effective than hormone therapy in improving anxiety and depression symptoms in patients with ovarian hypofunction. This study supports the use of acupuncture-related therapies for women experiencing decreased ovarian function associated with mental health issues.

1.3. Special Acupuncture Techniques

1.3.1. Comparison of acupuncture techniques

1.3.1.1. Du 2025

Du Z, Ye G, Wei J, Li S, Zhao S, Wang J. Acupoint stimulation methods for premature ovarian insufficiency: a systematic review and network meta-analysis of randomized controlled trials. Front Endocrinol (Lausanne). 2025 Jul 18;16:1604563. https://doi.org/10.3389/fendo.2025.1604563

Objective	To evaluate and rank the efficacy of different acupoint stimulation (AS) therapies in treating premature ovarian insufficiency (POI) through network meta-analysis and to identify the optimal AS regimen for improving sex hormone levels and clinical symptoms.
Methods	Randomized controlled trials in English and Chinese up to November 2024 were searched across eight databases, including the Cochrane Library, PubMed, and CNKI. Participants were women diagnosed with POI according to international or Chinese guidelines. Interventions compared AS modalities (acupuncture, moxibustion, electroacupuncture, etc.) with conventional treatments or placebo. Outcomes included antral follicle count (AFC), FSH, LH, E2, and Kupperman scores, assessed on menstrual days 2–5. Study quality was evaluated with RevMan 5.3, and statistical analyses were performed using Stata 16.0 with SUCRA rankings.
Results	**Fifty-one RCTs (n = 3,754)** were included. Overall methodological quality was low, with high rates of unclear randomization and blinding. Combination AS therapies—particularly those involving moxibustion—significantly improved ovarian function. Acupuncture plus moxibustion increased AFC (MD = 2.04, 95 % CI 1.31–2.77; SUCRA = 75.1%). Auricular seed therapy most effectively reduced FSH (MD = 3.03, 95 % CI 0.45–5.60; SUCRA = 83.7%). Acupuncture reduced LH (MD = 1.52, 95 % CI 0.27–2.77; SUCRA = 58.3%). Moxibustion with tuina (Moxi + MT) produced the highest E2 increase (MD = 11.92, 95 % CI 8.19–15.65; SUCRA = 100%) and greatest improvement in Kupperman score (MD = 4.63, 95 % CI 0.58–8.68; SUCRA = 92.1%). Reported adverse events were mild and self-limiting.
Conclusion	Acupoint stimulation therapies—especially moxibustion-based combinations—appear safe and effective for improving hormonal balance and clinical symptoms in premature ovarian insufficiency, supporting their complementary role in clinical practice.

1.3.1.2. Yi 2025

Yi Y, Ma F, Jiao Y, Zhang R, Yi Y, Ma Y. Comparative efficacy of acupuncture therapies in premature ovarian failure: A systematic review and network meta-analysis. Complement Ther Med. 2025 May;89:103141. https://doi.org/10.1016/j.ctim.2025.103141

Objectives	Premature ovarian failure (POF) is becoming more common and has a major negative impact on women's mental and physical well-being. The use of acupuncture therapies to treat POF has gained popularity. However, the optimal treatment remains uncertain. This study aimed to systematically review the literature and conduct a network meta-analysis (NMA) to compare the efficacy of different acupuncture and related therapies and identify methodologic weaknesses in previous studies.
Design	We systematically searched six databases from their inception to April 2024 for randomized controlled trials (RCTs) of acupuncture therapies for POF. We assessed methodological quality and risk of bias using the RoB 2.0 tool. The NMA was conducted using R and STATA software based on frequency theory, focusing on overall effectiveness rates and hormone levels. Additionally, we critically reviewed methodological limitations and potential biases in the studies included.

Results	**Thirty-seven eligible studies involving 2419 patients** were included in this NMA. The NMA results indicated that moxibustion_catgut implantation at acupoint (MB_CIA) (P-score = 0.88; pooled mean difference (95 % CI): 22.07 (1.61-302.48)) showed the highest improvement in overall effectiveness, while warming acupuncture (WA) (0.95; -27.56 (-45.35 to -9.78)) improved follicle-stimulating hormone (FSH) levels best. WA_MB (0.85; -9.35 (-15.08 to -3.62)) and WA (P-score = 0.77) were most effective for luteinizing hormone (LH) and estradiol (E2) levels, respectively. Confidence in evidence ranged from moderate to very low, with low overall confidence. Key methodologic weaknesses included insufficient allocation concealment, lack of blinding, and small sample sizes.
Conclusions	Acupuncture therapies may effectively improve POF. MB_CIA, WA, and WA_MB seem to be the most effective. However, severe methodological constraints, such as insufficient randomization and a lack of blinding, may reduce trust in these results. To offer robust evidence, high-quality RCTs must overcome these limitations.

1.3.1.3. Zhang 2020

Zhang J, Huang X, Liu Y, He Y, Yu H. A comparison of the effects of Chinese non-pharmaceutical therapies for premature ovarian failure: A PRISMA-compliant systematic review and network meta-analysis. Medicine (Baltimore). 2020;99(26). [211175]. doi

Background	Premature ovarian failure (POF) is commonly treated with hormone replacement therapy (HRT). Many patients with POF choose acupuncture as a complementary therapy over HRT, due to possible adverse reactions. This systematic review and network meta-analysis (NMA) compares the efficacy of different forms of acupuncture therapies for POF.
Methods	Seven databases including PubMed, the Cochrane Library, Embase, Wanfang database, China National Knowledge Infrastructure database, VIP Chinese Science, and Chinese Biomedical Database were searched for randomized controlled trials (RCTs) of various acupuncture treatments for POF. This time spanned from the date of database inception to January 13, 2020. RevMan 5.3 was used to assess the bias risk of the studies. A NMA of the included studies was performed using Stata14.0.
Results	A total of 408 items were searched in this study, and finally this NMA included 16 RCTS, involving 1,307 patients. It showed that acupuncture (OR:1.35,95%1.24 to 1.47) has the best effectiveness among the four acupuncture (standardized mean difference [SMD]-16.30,95% -31.33 to -1.28) is the most effective and the best in reducing follicle-stimulating hormone levels among the four acupuncture treatments. Acupuncture (SMD 26.67,95%5.95 to 47.40) and acupoint embedding (SMD41.14,95%11.90 to 70.37) were ranked in the top 2 positions, in improving estradiol, whereas acupuncture (SMD-4.90,95% -8.10 to -1.70) was than acupoint embedding and HRT, in reducing luteinizing hormone level. In addition, our conclusions have not changed significantly after the sensitivity analysis.Protocol registration number: CRD42020150508.
Conclusion	With clinical evidence summarized by NMA, it is observed that acupuncture is the most promising therapy for improving menopausal symptoms, decreasing serum follicle-stimulating hormone and luteinizing hormone level. Therefore, acupuncture could be effective for patients with POF, who are intolerant to the adverse effects of hormone replacement therapy or who would prefer non-drug therapies. Further multi-center and high-quality RCT studies should be conducted to make our conclusion more rigorous.

1.3.2. Acupuncture plus Chinese herbal medicine

1.3.2.1. Li 2023

Li HF, Zhang JX, Chen WJ. Dissecting the efficacy of the use of acupuncture and Chinese herbal medicine for the treatment of premature ovarian insufficiency (POI): A systematic review and metaanalysis. Heliyon. 2023 Sep 29;9(10):e20498. https://doi.org/10.1016/j.heliyon.2023.e20498

Background	Premature ovarian insufficiency is a multi-factor gynecological disease that has become a major global health problem. In recent years, several trials have explored the treatment of premature ovarian insufficiency using Chinese herbal medicine and acupuncture, but the efficacy and safety of this combination remains controversial.
Methods	This systematic review and meta-analysis aimed to comprehensively evaluate the efficacy and safety of combining Chinese herbal medicine with acupuncture to treat premature ovarian insufficiency. From eight different databases, we retrieved randomized controlled trials wherein Chinese herbal medicine and acupuncture had been compared with western medicine in the treatment of premature ovarian insufficiency. The bias risk assessment stipulated by the Cochrane Collaboration's tool was utilized to evaluate the quality of the chosen randomized controlled trials. This meta-analysis was executed with the help of Review Manager 5.3 and Stata 10.0. The quality of evidence was assessed using the Grading of Recommendations, Assessment, Development, and Evaluation framework.
Results	A total of **10 randomized controlled trials involving 594 premature ovarian insufficiency patients** were included in the analysis. Compared with western medicine, co-treatment with acupuncture and Chinese herbal medicine exhibited a significantly higher total effective rate (relative risk: 1.21; 95% confidence interval: 1.12-1.31; $P < 0.01$, $I2 = 0\%$), but lower levels of luteinizing hormone (standardized mean difference: -0.57; 95% confidence interval: -1.06, -0.08; $P < 0.05$, $I2 = 80\%$), follicle-stimulating hormone, and Kupperman index score. Moreover, the combined intervention increased estradiol level in the serum.
Conclusions	Overall, the data demonstrate that acupuncture plus Chinese herbal medicine is an efficacious and safe treatment option for POI patients. These findings must be verified by conducting large-scale, multicenter, high-quality, and long-term randomized controlled trials.

2. Overviews of systematic reviews

2.1. Maunder 2025

Maunder A, Vermeulen N, Vincent AJ, Panay N, Ee C. Complementary therapies for women with premature ovarian insufficiency: a systematic literature review to inform the 2024 update of the ESHRE/ASRM/IMS/CRE-WHiRL guidelines on premature ovarian insufficiency. Climacteric. 2025 Jul 28:1-9. https://doi.org/10.1080/13697137.2025.2530441

Objective	Premature ovarian insufficiency (POI) reduces quality of life and increases long-term health risks. While hormone therapy remains the standard treatment, some women turn to complementary approaches. This review assessed evidence for such therapies in the management of POI.
Methods	Systematic searches of four databases up to January 2024 identified randomized controlled trials, systematic reviews, meta-analyses, and umbrella reviews assessing complementary therapies in women with POI. Outcomes included menopausal symptoms, gonadotropin levels, antral follicle count, ovarian volume, and quality of life. Study quality was assessed using the Cochrane Risk of Bias tool and AMSTAR 2.

Results	From 1,869 citations, **nine studies** met inclusion criteria. Limited evidence suggests that Chinese herbal medicine and acupuncture may alleviate menopausal symptoms and modulate gonadotropins in POI, but data are scarce and heterogeneous. No sufficient evidence supports other complementary therapies.
Conclusion	Current evidence is insufficient to recommend complementary therapies as alternatives to hormone therapy for POI. Chinese herbal medicine and **acupuncture** may offer symptom relief, but further rigorous research is required to establish efficacy and safety.

2.2. Bai 2024

Bai T, Deng X, Bi J, Ni L, Li Z, Zhuo X. The effects of acupuncture on patients with premature ovarian insufficiency and polycystic ovary syndrome: an umbrella review of systematic reviews and meta-analyses. Front Med (Lausanne). 2024 Nov 25;11:1471243. https://doi.org/10.3389/fmed.2024.1471243

Backgound	Previous studies have suggested that acupuncture could improve the clinical outcomes of women with premature ovarian insufficiency (POI) and polycystic ovary syndrome (PCOS). However recent meta-analyses have provided inconclusive findings. This umbrella meta-analysis aimed to explore the effect of acupuncture therapies on PCOS and POI outcomes.
Methods	A systematic literature search was carried out in in PubMed, Scopus, Web of Science, and Chinese databases, including Wan Fang Data Knowledge Service Platform, CBM, CNKI, and VIP up until April 2024 to gather relevant studies. Inclusion criteria were meta-analyses on the effect of acupuncture or combined therapies with standard medications or traditional Chinese medicine (TCM) on PCOS and POI. The outcomes were pregnancy rates, ovulation rates, hormone levels, glycemic indices, resumption of menstruation, endometrial thickness, live birth rates, abortion rates, and body mass index (BMI). Studies with irrelevant interventions, animal studies, reviews without quantitative analysis, and studies with insufficient data were excluded. Standardized mean difference (SMD) with a 95% confidence interval (CI) and relative risk (RR) with a 95% CI were used as effect sizes to pool the data using a random effects model.
Results	A total of 38 meta-analyses, 20 studies (sample size: 27,106 patients) for PCOS and **18 studies (sample size: 19,098 patients)** for POI, were included. Overall, in women with PCOS, acupuncture therapies were significantly associated with a higher pregnancy rate, ovulation rate, and reduced serum levels of luteinizing hormone (LH), testosterone, LH/follicle-stimulating hormone (FSH), insulin resistance, and BMI. Moreover, FSH, fasting glucose, and fasting insulin levels were improved in subgroup analyses. For POI, acupuncture significantly improved serum levels of LH, FSH, LH/FSH ratio, and estradiol.
Conclusion	Acupuncture-related therapies improve pregnancy rate, and metabolic and hormonal imbalances in patients with POI and PCOS.

3. Clinical Practice Guidelines

⊕ positive recommendation (regardless of the level of evidence reported)
Ø negative recommendation, (or lack of evidence)

3.1. Chinese Nursing Association 2025 ⊕

Jiang L, Xia Q, Yang M. Toward a nurse-oriented management framework for premature ovarian insufficiency: Integration of guidelines and consensus recommendations. Int J Nurs Sci. 2025 Oct 13;12(6):573-580. https://doi.org/10.1016/j.ijnss.2025.10.001

Management of POI patients. Non hormonal treatment : auricular point sticking, acupuncture

3.2. European Society of Human Reproduction and Embryology 2024 ≈

- Panay N, Anderson RA, Bennie A, Cedars M, Davies M, Ee C, Gravholt CH, Kalantaridou S, Kallen A, Kim KQ, Misrahi M, Mousa A, Nappi RE, Rocca WA, Ruan X, Teede H, Vermeulen N, Vogt E, Vincent AJ; ESHRE, ASRM, CREWHIRL, and IMS Guideline Group on POI. Evidence-based guideline: premature ovarian insufficiency. Hum Reprod Open. 2024 Dec 9;2024(4):hoae065. https://doi.org/10.1093/hropen/hoae065
- ESHRE, ASRM, CREWHIRL and IMS Guideline Group on POI; Panay N, Anderson RA, Bennie A, Cedars M, Davies M, Ee C, Gravholt CH, Kalantaridou S, Kallen A, Kim KQ, Misrahi M, Mousa A, Nappi RE, Rocca WA, Ruan X, Teede H, Vermeulen N, Vogt E, Vincent AJ. Evidence-based guideline: premature ovarian insufficiency†‡. Climacteric. 2024 Dec 8:1-11. https://doi.org/10.1080/13697137.2024.2423213

https://www.eshre.eu/Guidelines-and-Legal/Guidelines/Premature-ovarian-insufficiency

Women should be informed that there is limited evidence on the effectiveness of acupuncture for menopausal symptoms in POI and the evidence does not suggest a benefit from adding acupuncture to HT.

3.3. Haute Autorité de Santé (HAS, France) 2021 Ø

- Insuffisance Ovarienne Prématurée (IOP) : argumentaire. Saint-Denis La Plaine: Haute Autorité de Santé (HAS). 2021:104P. [216176]. URL
- Insuffisance Ovarienne Prématurée (IOP) : Protocole National de Diagnostic et de Soins (PNDS) Saint-Denis La Plaine: Haute Autorité de Santé (HAS). 2021:48P. [211336]. URL

Une étude a suggéré que l'acupuncture pourrait, soulager l'anxiété, réduire le stress et améliorer les symptômes de la ménopause (57). Il n’y a pas d’étude randomisée à ce jour prouvant l’efficacité de cette technique.

3.4. European Society of Human Reproduction and Embryology (ESHRE) 2015 Ø

Management of women with premature ovarian insufficiency. European Society of Human Reproduction and Embryology. 2015:161p. [196761].

The other non-pharmacological therapies discussed in the review (homeopathy, vitamin E, magnetic devices and acupuncture) showed no significant benefit. In all studies, side effects were inconsistently reported (Rada, et al., 2010). Women should be informed that for most alternative and complementary treatments evidence on efficacy is limited and data on safety are lacking. Grades of recommendations: B.

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