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EFFECTS OF ACUPUNCTURE ON SEMEN QUALITY: THE INTERFACE BETWEEN CHINESE MEDICINE AND ANDROLOGY

EFEITOS DA ACUPUNTURA NA QUALIDADE SEMINAL: A INTERFACE ENTRE MEDICINA CHINESA E ANDROLOGIA

EFECTOS DE LA ACUPUNTURA EN LA CALIDAD DEL SEMEN: LA INTERACCIÓN ENTRE LA MEDICINA CHINA Y LA ANDROLOGÍA

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ABSTRACT

Male infertility represents a significant challenge in global reproductive health, accounting for a substantial proportion of infertility cases worldwide. In this context, acupuncture has emerged as a promising complementary therapeutic approach, demonstrating potential to improve semen quality, regulate hormonal function, and reduce oxidative stress. This systematic review analyzed studies published between 2020 and 2025 in English, on the effects of acupuncture on male fertility, highlighting improvements in sperm motility, concentration, and morphology, as well as modulation of testosterone, follicle-stimulating hormone (FSH), and luteinizing hormone (LH), all essential to spermatogenesis. Evidence suggests that acupuncture acts by modulating the hypothalamic–pituitary–gonadal axis, promoting hormonal balance and enhancing the reproductive environment. Additionally, acupuncture was effective in reducing cortisol levels and reactive oxygen species (ROS), both of which negatively impact sperm quality and fertility potential. However, methodological limitations were identified, including small sample sizes, lack of standardized acupuncture protocols, and heterogeneity in inclusion and exclusion criteria. While the findings are promising, there is a clear need for larger, well-designed randomized controlled trials with standardized and reproducible methodologies to consolidate scientific evidence on the efficacy of acupuncture in the field of Andrology.

Keywords: Acupuncture. Male Infertility. Semen Quality. Andrology. Oxidative Stress. Traditional Chinese Medicine.

RESUMO

A infertilidade masculina representa um desafio significativo para a saúde reprodutiva global, sendo responsável por uma proporção substancial dos casos de infertilidade em todo o mundo. Nesse contexto, a acupuntura emergiu como uma abordagem terapêutica complementar promissora, demonstrando potencial para melhorar a qualidade do sêmen, regular a função hormonal e reduzir o estresse oxidativo. Esta revisão sistemática analisou estudos publicados entre 2020 e 2025, em inglês, sobre os efeitos da acupuntura na

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fertilidade masculina, destacando melhorias na motilidade, concentração e morfologia dos espermatozoides, bem como a modulação da testosterona, do hormônio folículo-estimulante (FSH) e do hormônio luteinizante (LH), todos essenciais para a espermatogênese. Evidências sugerem que a acupuntura atua modulando o eixo hipotálamo-hipófise-gonadal, promovendo o equilíbrio hormonal e melhorando o ambiente reprodutivo. Além disso, a acupuntura foi eficaz na redução dos níveis de cortisol e das espécies reativas de oxigênio (EROs), ambos os quais impactam negativamente a qualidade do esperma e o potencial de fertilidade. No entanto, foram identificadas limitações metodológicas, incluindo amostras pequenas, ausência de protocolos padronizados de acupuntura e heterogeneidade nos critérios de inclusão e exclusão. Embora os resultados sejam promissores, há uma clara necessidade de ensaios clínicos randomizados maiores, bem delineados e com metodologias padronizadas e reprodutíveis para consolidar as evidências científicas sobre a eficácia da acupuntura na área da Andrologia.

Palavras-chave: Acupuntura. Infertilidade Masculina. Qualidade do Sêmen. Andrologia. Estresse Oxidativo. Medicina Tradicional Chinesa.

RESUMEN
La infertilidad masculina representa un desafío significativo para la salud reproductiva global, representando una proporción sustancial de los casos de infertilidad a nivel mundial. En este contexto, la acupuntura se ha convertido en un enfoque terapéutico complementario prometedor, demostrando potencial para mejorar la calidad del semen, regular la función hormonal y reducir el estrés oxidativo. Esta revisión sistemática analizó estudios publicados entre 2020 y 2025 en inglés sobre los efectos de la acupuntura en la fertilidad masculina, destacando mejoras en la motilidad, concentración y morfología de los espermatozoides, así como la modulación de la testosterona, la hormona folículo estimulante (FSH) y la hormona luteinizante (LH), todas esenciales para la espermatogénesis. La evidencia sugiere que la acupuntura actúa modulando el eje hipotálamo-hipofisario-gonadal, promoviendo el equilibrio hormonal y mejorando el entorno reproductivo. Además, la acupuntura fue eficaz para reducir los niveles de cortisol y las especies reactivas de oxígeno (ROS), ambos factores que afectan negativamente la calidad de los espermatozoides y el potencial de fertilidad. Sin embargo, se identificaron limitaciones metodológicas, como el pequeño tamaño de las muestras, la falta de protocolos de acupuntura estandarizados y la heterogeneidad en los criterios de inclusión y exclusión. Si bien los hallazgos son prometedores, existe una clara necesidad de realizar ensayos controlados aleatorizados de mayor tamaño y bien diseñados, con metodologías estandarizadas y reproducibles, para consolidar la evidencia científica sobre la eficacia de la acupuntura en el campo de la Andrología.

Palabras clave: Acupuntura. Infertilidad Masculina. Calidad del Semen. Andrología. Estrés Oxidativo. Medicina Tradicional China.

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INTRODUCTION

Male infertility has been a growing concern in global reproductive health, affecting millions of couples of reproductive age. Data from the World Health Organization (WHO, 2021) indicate that male infertility accounts for approximately 40% of infertility cases in couples, making it a significant issue in the field of assisted reproduction. The decline in semen quality over recent decades has been extensively studied, with various factors identified as contributors to worsening sperm parameters, including chronic stress, environmental pollution, unhealthy lifestyle habits, hormonal dysregulation, and metabolic disorders (Burton et al., 2021; Hagai et al., 2022; Hassan et al., 2020; Skakkebaek et al., 2022).

Semen quality has increasingly been compromised by exposure to endocrine disruptors such as pesticides, heavy metals, phthalates, and bisphenol A, which interfere with hormone production and directly affect spermatogenesis (Skakkebaek et al., 2022; Majzoub et al., 2021). Additionally, factors such as obesity, smoking, excessive alcohol consumption, and diets high in saturated fats have been linked to worsening male infertility, reducing sperm concentration, motility, and morphology (Burton et al., 2021). Male infertility may also be associated with chronic diseases such as diabetes mellitus and hypertension, which alter testosterone levels and impact testicular function (Hassan et al., 2020).

Despite advances in andrology and assisted reproduction, many therapeutic strategies present limitations, particularly in restoring natural male fertility. The use of antioxidants, hormone supplementation, and conventional therapies has shown variable benefits, leading to a growing interest in complementary strategies to optimize male fertility (Zhang; Chen; Zhao, 2021). Among these approaches, acupuncture, an ancient practice of Traditional Chinese Medicine (TCM), has gained attention due to its potential to modulate neuroendocrine functions, improve testicular blood circulation, and reduce oxidative stress (Feng et al., 2022; Cakmak et al., 2023).

Scientific evidence suggests that acupuncture may positively influence seminal parameters, such as increasing sperm concentration, improving motility, and reducing morphological abnormalities. Additionally, this technique has demonstrated a significant impact on regulating reproductive hormones such as testosterone, follicle-stimulating hormone (FSH), and luteinizing hormone (LH), which play fundamental roles in spermatogenesis and testicular function (Budihastuti et al., 2023; Engel et al., 2023).

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Beyond physiological benefits, acupuncture has been associated with improved emotional well-being, reducing stress and anxiety levels, factors frequently linked to male infertility (Wang et al., 2022; Li et al.,2023a). Chronic stress can elevate cortisol levels, disrupting the hypothalamic-pituitary-gonadal axis and inhibiting testosterone production, directly impacting sperm quality and reproductive function (Hao et al., 2025). In this context, acupuncture may act as a neuroendocrine regulator, aiding hormonal balance and mitigating the negative effects of oxidative stress on the testes (Allameh et al., 2021).

Despite the growing interest and increasing number of clinical studies on acupuncture and male infertility, gaps still exist in the scientific literature. One challenge is the methodological heterogeneity among studies, as there is no consensus on standardized acupuncture protocols for treating male infertility. Furthermore, the lack of long-term randomized clinical trials limits the broader clinical application of this technique (Zhou et al., 2024).

Therefore, this systematic review aims to critically assess scientific findings from the past five years regarding the impact of acupuncture on semen quality, providing a synthesis of the available evidence and its potential applications in clinical practice.

METHODOLOGY

This study followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol. Scientific articles published between 2020 and 2025 were analyzed, investigating the effects of acupuncture on seminal quality and male reproductive health, within the field of Andrology.

SEARCH STRATEGY

The search was carried out in two internationally recognized databases: PubMed (National Library of Medicine - NIH) and SciELO (Scientific Electronic Library Online). The descriptors used were selected based on terms indexed in the Medical Subject Headings (MeSH) and the Health Sciences Descriptors (DeCS). The following terms in English were applied, combined by Boolean operators (AND, OR): (“Acupuncture” OR “Electroacupuncture” OR “Laseracupuncture”) AND (“Male Infertility” OR “Seminal Quality”).

The search was refined with the following inclusion criteria: articles that evaluated the effects of acupuncture on male fertility, specifically on seminal quality; studies with a randomized clinical trial (RCT), experimental or meta-analysis, systematic review design

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and studies published in English, between 2020 and 2025; works that presented well-described methods and adequate statistical analyses. In terms of exclusion criteria: articles that did not use acupuncture as the main intervention or electroacupuncture or laseracupuncture methods; non-randomized studies, narrative reviews or case reports; duplicated works or those that did not present sufficient statistical data.

STUDY SELECTION PROCESS

The study selection process was carried out in three stages, in accordance with the PRISMA 2020 guidelines (Page et al., 2021), as shown in Figure 1, in the Results of this article.

In the identification phase, forty-five studies were found in the PubMed (n = 30) and SciELO (n = 15) databases. After removing ten duplicate articles, thirty-five studies proceeded to initial screening. In the screening phase, the titles and abstracts of the remaining thirty-five studies were read, of which twelve were excluded for not meeting the research criteria. Thus, twenty-three articles were selected for full reading. In the eligibility stage, the twenty-three articles were full analyzed, eleven of which were excluded for the following reasons: five articles did not specifically evaluate acupuncture and male infertility; four articles were not randomized controlled trials or systematic reviews and two articles were outside the 2020 to 2025 period.

Finally, in the inclusion part, twelve studies were selected to compose the systematic review of this work, as they met all eligibility criteria. This process ensures the transparency and methodological rigor of the research, following international recommendations for systematic reviews (Page et al., 2021).

RESULTS

The systematic review included twelve studies, including randomized, clinical trials, experimental studies in males, meta-analysis and systematic reviews, published between 2020 and 2025 (Figure 1), in English, more than 2,180 participants undergoing acupuncture for the treatment of male infertility. Detailed analysis of these studies revealed significant improvements in seminal quality, as well as positive effects on hormonal regulation and reduction of oxidative stress (Table 1).

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Figure 1: Diagram of the research flow prepared in the Prisma program (2020).

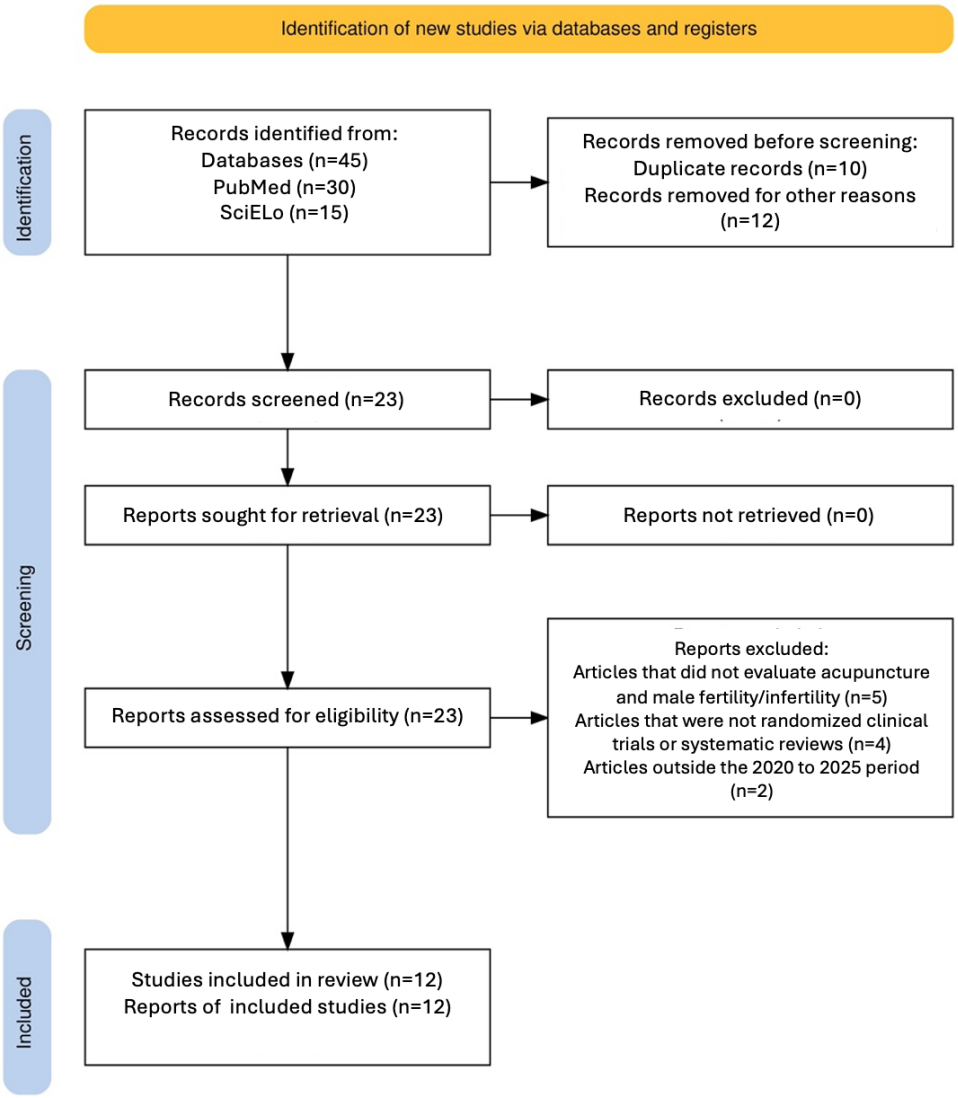

Table 1: Results of the twelve compiled articles, with alphabetical captions: a Specific Pathogen-Free; b C57BL/6 mouse strain; c chemotherapeutic and immunosuppressive drug, to induce asthenozoospermia; d low sperm motility; e Fecal Microbiota Transplantation;f low sperm count;g low-level laser acupuncture; h Total Motile Sperm Count;i hypothalamic–pituitary–gonadal. j high sperm DNA fragmentation index; k Superoxide Dismutase – SOD; l Catalase;m Low sperm count, poor sperm motility and high percentage of abnormally shaped sperm; nMean Difference; o Confidence Interval; p low sperm count; q high percentage of abnormally shaped sperm; r Relative Risk.

Author(s)	Participants	Treatment	Key Takeaways
Hao et al. (2025)	42 male SPFa C57BL/6b mice, randomly allocated into three groups (control, cyclophosphamidec-induced asthenozoospermiad, and acupuncture treated) with 14 mice each.	Daily acupuncture at "Zhibian (BL 54) → Shuidao (ST 28)" points, 20 minutes per session for 14 days; asthenozoospermia induced by intraperitoneal cyclophosphamide	Acupuncture significantly improved sperm parameters and testicular structure and increased T, FSH, LH levels; Restored gut & blood–testis barrier integrity;

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		(50 mg/kg/d for 5 days). Control groups: model and untreated.	Favorably modulated gut microbiota composition, correlating with sperm health; Corrected metabolite imbalances linked to sperm function; FMTe from acupuncture-treated mice replicated reproductive improvements.
Allameh et al. (2021)	48 infertile men diagnosed with oligospermiaf. Participants were randomly assigned to a treatment group and a control group.	The treatment group received (LLLA)g using a 630 nm diode laser, applied to 10 classical acupuncture points (SP6, ST36, REN4). Frequency: 3 sessions per week for 3 months. The control group received no treatment.	The treatment group showed a statistically significant increase in sperm concentration, motility (total and progressive), and normal morphology compared to the control group ($p < 0.05$).
Budihastuti et al. (2023)	44 men with idiopathic infertility, divided into two equal groups (22 participants each): electroacupuncture group and control group.	Electroacupuncture was applied to specific acupoints (Zhongji – REN3, Guanyuan – REN4, Qihai – REN6, Shenshu – BL23) using electric stimulation. Duration: 12 sessions over 4 weeks. Control group received no treatment.	The electroacupuncture group showed a significant increase in both TMSCh and progressive motility compared to the control group ($p < 0.001$).
Smith and Armour (2021)	28 randomized controlled trials (RCTs) including a total of 2,110 participants (infertile men with various sperm abnormalities).	Various acupuncture protocols, including manual acupuncture, electroacupuncture, and auricular acupuncture. Interventions lasted from 2 to 12 weeks, using different point combinations related to fertility and kidney energy (ST36, SP6, REN4, BL23).	Acupuncture showed a significant improvement in sperm motility and morphology, especially in idiopathic infertility. Improvements were also noted in hormonal regulation and pregnancy rates, though with moderate heterogeneity among studies.

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Li et al. (2023b)	The paper synthesizes findings from previously published experimental and clinical studies on male infertility.	The review explores various acupuncture methods, including manual acupuncture, electroacupuncture, scalp acupuncture, and moxibustion. Points commonly discussed: Zusanli (ST36), Guanyuan (REN4), Shenshu (BL23), Sanyinjiao (SP6), among others.	Acupuncture appears to improve sperm quality and hormonal profiles by: Regulating the HPGi axis; Reducing oxidative stress; Enhancing microcirculation; Improving psychological well-being. Evidence quality varies across studies.
Wang et al. (2022)	20 randomized controlled trials (RCTs) involving infertile men and women under psychological stress; included studies had varied sample sizes and clinical profiles.	Various forms of acupuncture, including traditional body acupuncture and electroacupuncture, often combined with counseling or lifestyle advice. Duration and protocols varied.	Acupuncture significantly reduced psychological stress, anxiety, and depression scores in infertile individuals. Some studies also showed higher pregnancy rates in acupuncture groups versus controls.
Jin et al. (2020)	50 infertile men with (DFIj > 30%), divided into treatment (acupuncture) and control (no treatment) groups.	Acupuncture administered 3 times per week for 6 weeks, targeting key points including Shenshu (BL23), Guanyuan (REN4), Taixi (KI3), Sanyinjiao (SP6).	Acupuncture significantly reduced DFIj and increased the activity of antioxidant enzymes (SODk and CATl) in semen. Moderate improvements in motility and morphology were also observed.
Liu et al. (2020a)	60 infertile men with abnormal sperm parameters (oligoasthenoteratozoospermiam). Randomized into two groups: acupuncture (n=30) and control (n=30).	Acupuncture performed 3 times per week for 6 weeks using acupoints: ST36, SP6, REN4, REN6, BL23, DU20. Control group received no intervention.	The acupuncture group showed significant improvements in all sperm parameters and hormonal balance compared to the control group ($p < 0.01$).
Zhou et al. (2024)	11 randomized controlled trials (RCTs) comparing acupuncture alone or combined with other therapies vs. western medicine or Chinese alternatives; total sample size not explicitly stated.	Traditional acupuncture, sometimes combined with moxibustion or western/Chinese	Acupuncture (alone or combined) significantly improved overall efficacy compared to controls. A motility improved

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		medicine; protocols varied. Analyses compared outcomes of acupuncture alone vs. combined interventions against control treatments.	(MDn = 4.79; 95% CIo 3.03–6.54). Sperm viability also improved (MDn = 8.68; 95% CIo 6.82–10.53). No significant effect on semen volume. Other motility metrics (A+B, viability) showed positive trends.
Zhang; Chen; Zhao (2021)	29 randomized controlled trials (RCTs), with a total of 2,180 male participants diagnosed with semen abnormalities (oligospermiap, asthenozoospermia, teratozoospermiaq).	Acupuncture alone or combined with Chinese medicine compared to western medicine or placebo. Most studies used traditional acupuncture (ST36, SP6, REN4, BL23). Treatment duration ranged from 4 to 12 weeks.	Acupuncture significantly improved: Sperm density (MDn = 4.69; 95% CIo: 2.73–6.65); Motility (MDn = 6.75; 95% CIo: 4.01–9.49); Morphology (MDn = 3.12; 95% CIo: 1.49–4.75); No serious adverse events were reported.
Li et al. (2023a)	60 infertile men, divided into 3 groups: acupuncture (n=20), sham acupuncture (n=20), and no-treatment control (n=20).	Acupuncture administered 5 sessions/week, for 4 weeks on points related to fertility (REN4, REN6, ST36, SP6, BL23). Sham group received superficial needling without stimulation.	The acupuncture group showed statistically significant improvements in sperm quality, hormone levels, and psychological well-being compared to both the sham and control groups ($p < 0.05$).
Jia; Wang; Yin (2021)	23 randomized controlled trials (RCTs), totalizing 1,765 infertile men diagnosed with oligospermia and/or asthenozoospermia.	Acupuncture alone or combined with herbal medicine versus western medicine or placebo. Protocols varied in duration and point selection.	Acupuncture significantly improved sperm concentration (MD = 5.84), motility (MD = 7.09), and overall clinical effectiveness (RRr = 1.28) compared to controls. No serious adverse events were reported.

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DISCUSSION

IMPACT OF ACUPUNCTURE ON SEMINAL QUALITY

Male fertility depends on several biological and environmental factors that directly affect semen quality, influencing aspects such as sperm motility, concentration and morphology. Recent studies indicate that acupuncture can play a relevant role in improving these parameters, being a complementary therapeutic approach for male reproductive health (Engel et al., 2023; Feng et al., 2022).

The clinical trial by Allameh et al. (2021), which used laser acupuncture on infertile men diagnosed with oligospermia, reported significant improvements in total sperm count, progressive motility, and normal morphology, when compared to the untreated control group ($p < 0.05$). These findings were corroborated by Budihastuti et al. (2023), who demonstrated that electroacupuncture led to substantial gains in total motile sperm count (TMSC) and progressive motility ($p < 0.001$). These findings support the hypothesis that electroacupuncture, particularly when applied to acupoints associated with reproductive and renal function, may improve seminal quality through improved microcirculation, neurohormonal modulation, and testicular support. Furthermore, the use of objective parameters such as TMSC reinforces the methodological rigor of the study and aligns with the growing body of evidence supporting acupuncture as an effective complementary therapy in male infertility. However, the absence of a placebo or placebo group and the short duration of follow-up indicate the need for larger trials to confirm long-term benefits and establish clinical protocols.

Larger systematic reviews and meta-analyses further validate these observations. For instance, Zhang et al. (2021) evaluated 29 randomized clinical trials with over 2,000 participants and concluded that acupuncture significantly increased sperm density (MD = 4.69), motility (MD = 6.75), and sperm morphology (MD = 3.12), without serious adverse events. Similarly, Jia; Wang; Yin (2021) identified acupuncture as effective in increasing sperm concentration (MD = 5.84) and motility (MD = 7.09), with an overall improvement in clinical effectiveness (RR = 1.28).

Hao et al. (2025) conducted a controlled experimental study using 42 male C57BL/6 mice to investigate the effects of acupuncture on cyclophosphamide-induced asthenozoospermia. They demonstrated that acupuncture not only improved sperm quality but also positively influenced the gut–testis axis, restoring testicular architecture and enhancing sperm motility and viability. An increase in testosterone (T), follicle-stimulating

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hormone (FSH), and luteinizing hormone (LH) levels was observed in the acupuncture group. Notably, the treatment also restored the integrity of both the intestinal and blood–testis barriers and favorably modulated the gut microbiota, which correlated with improved sperm quality. These findings suggest that the effects of acupuncture are not limited to isolated sperm characteristics but are systemic, involving hormonal, oxidative, and even microbiotic regulation (Hao et al., 2025).

In the context of idiopathic infertility, Smith and Armour (2021) observed that acupuncture improved motility and morphology in multiple studies, with enhanced pregnancy rates in some cases. However, they also noted moderate heterogeneity among trials, suggesting variability in protocols and study quality that should be addressed in future research. Notably, Li et al. (2023a) conducted a controlled trial with three groups—acupuncture, sham, and untreated—and observed significant enhancements in sperm quality exclusively in the acupuncture group, reinforcing the notion that the effects are not merely due to placebo or psychological bias.

In the meta-analysis by Zhou et al. (2024), acupuncture, alone or combined with moxibustion or herbal formulations, was shown to significantly outperform Western medical treatments in improving sperm motility and viability. The meta-analysis found notable increases in key parameters, in mean differences, as well as in confidence intervals, such as motility (MD = 4.79); (95% CI: 3.03–6.54) and sperm viability (MD = 8.68; 95% CI: 6.82–10.53). However, there was no significant improvement in semen volume.

Similarly, Jia, Wang; Yin (2021) compared acupuncture, either as a standalone intervention or in combination with herbal therapy, with placebo and Western medical approaches. The results showed that acupuncture significantly improved sperm concentration (MD = 5.84), motility (MD = 7.09), and overall clinical effectiveness (RR = 1.28), further supporting its integration into fertility treatment protocols. Importantly, these benefits were observed without reports of serious adverse events, highlighting the safety of acupuncture compared to the often pharmacologically burdensome treatments used in male reproductive health.

Moreover, Smith and Armour (2021) examined 28 randomized clinical trials with diverse intervention protocols and concluded that acupuncture significantly improved not only sperm quality, but also hormonal balance and pregnancy outcomes. However, the heterogeneity of study designs and acupoint protocols used remains a limitation that restricts direct comparison with standardized pharmacologic therapies.

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Thus, these studies suggest that acupuncture positively influences seminal quality through multiple biological pathways and mechanisms. Despite the variability in treatment protocols, the convergence of findings across clinical trials, meta-analyses, and experimental models reinforces the credibility of acupuncture as a complementary approach in the treatment of male infertility.

HORMONAL INFLUENCE OF ACUPUNCTURE ON MALE FERTILITY

The modulation of hormonal profiles is one of the key mechanisms through which acupuncture exerts its therapeutic effects on male reproductive function (Engel et al., 2023). Several of the reviewed studies highlighted significant changes in reproductive hormones, particularly testosterone (T), follicle-stimulating hormone (FSH), and luteinizing hormone (LH), following acupuncture treatment, suggesting a regulatory effect on the hypothalamic–pituitary–gonadal (HPG) axis (Hao et al. 2025; Liu et al.,2020a; Li et al., 2023a; Li et al., 2023b).

Liu et al. (2020a) found that infertile men with oligoasthenoteratozoospermia who received acupuncture three times a week for six weeks experienced significant hormonal rebalancing, in addition to improved sperm parameters. Similar effects were seen in the trial by Li et al. (2023a), where participants in the acupuncture group exhibited statistically significant improvements in testosterone levels compared to both the sham and control groups ($p < 0.05$).

A broader synthesis of hormonal findings was offered by Li, Zhou; Wang (2023b) in their review. The authors emphasized acupuncture's ability to stimulate the Hypothalamic–Pituitary–Gonadal axis, reduce oxidative damage in Leydig and Sertoli cells, and restore endocrine homeostasis. These hormonal shifts were often correlated with improved semen quality and, in some cases, increased spontaneous pregnancy rates.

Meanwhile, the meta-analysis conducted by Smith and Armour (2021) recognized that while most studies observed hormonal improvements, the degree of change varied due to differences in acupuncture protocols, study duration, and population characteristics. They called for standardized reporting of hormonal data in future trials to better quantify acupuncture's endocrine effects.

It is worth noting that acupuncture appears to regulate hormones in a bidirectional manner, stimulating production when levels are deficient and attenuating hyperactivity when excessive. This adaptogenic effect is consistent with traditional Chinese medicine principles

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and may explain its broad applicability across various subtypes of male infertility (Li et al.,2023a; Li, Zhou; Wang, 2023b; Liu et al., 2020a).

Wang et al. (2022) conducted a systematic review of 20 randomized controlled trials, highlighting the role of acupuncture in alleviating psychological distress among infertile individuals. The results revealed that various acupuncture techniques, from traditional acupuncture to electroacupuncture, were effective in reducing levels of stress, anxiety, and depression in both men and women. These improvements were often accompanied by higher pregnancy rates, suggesting a possible link between emotional well-being and reproductive outcomes. Although the review did not focus exclusively on male infertility, its insights are particularly relevant given that psychological stress is known to negatively affect sperm parameters and hormonal balance. In contrast to other studies that emphasize the direct biological effects of acupuncture on seminal quality and hormonal regulation (Liu et al., 2020a; Jin et al., 2020), Wang et al. (2022) highlight the psychosomatic dimension of infertility treatment. This broader, more integrative approach supports the view that acupuncture can serve as a holistic therapy, addressing both the emotional and physiological dimensions of male fertility. However, the authors state that the heterogeneity of the studies and the interventions included require more standardized protocols to confirm these benefits with greater precision.

Therefore, the influence of acupuncture on male reproductive hormones and its regulatory impact on testosterone, FSH and LH, contributes not only to the improvement of spermatogenesis, but also to systemic reproductive health, positioning acupuncture as a promising adjuvant therapy in the treatment of male infertility (Burton et al.,2021; Engel et al.,2023; Feng et al.,2022).

REDUCTION OF OXIDATIVE STRESS AND IMPACT ON REPRODUCTIVE FUNCTION

Oxidative stress plays a central role in the pathophysiology of male infertility, particularly in cases involving sperm DNA fragmentation, lipid peroxidation of sperm membranes, and mitochondrial dysfunction (Yuan et al., 2020). Some of the reviewed studies emphasized the potential of acupuncture to reduce oxidative stress, thereby improving sperm quality and reproductive outcomes (Hassan et al.,2020; Jin et al.,2020; Liu et al.,2020b).

In a randomized clinical trial, Jin et al. (2020) demonstrated that acupuncture significantly reduced DNA fragmentation index (DFI) in infertile men with DFI > 30%. The

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improvement was attributed to an increase in seminal antioxidant enzyme activity, specifically superoxide dismutase (SOD) and catalase (CAT), suggesting that acupuncture enhances the testicular antioxidant defense system. These biochemical changes were associated with moderate improvements in sperm motility and morphology.

Similarly, the review by Li; Zhou; Wang (2023b) highlighted that oxidative stress is one of the main targets of acupuncture in the treatment of male infertility. The authors explained that acupuncture regulates reactive oxygen species (ROS) production, protects germ cells from oxidative damage, and restores the redox balance in the testes, particularly through the modulation of pathways involving nitric oxide (NO) and glutathione. Hao et al. (2025) similarly, pointed out that acupuncture not only improved sperm parameters but also corrected metabolic imbalances associated with oxidative damage and mitochondrial dysfunction, reinforcing its antioxidant potential.

A meta-analysis by Ma et al. (2023) demonstrated that acupuncture significantly improves sperm parameters such as concentration, motility, and morphology, in addition to reducing antisperm antibodies in cases of male immunological infertility. These benefits are attributed to the immunomodulatory effects of acupuncture and its ability to restore reproductive homeostasis with a low risk of adverse events. Furthermore, when considering external factors that can compromise male fertility, such as exposure to environmental toxins, the study by Majzoub et al. (2021) emphasizes the importance of interventions that counteract oxidative stress and endocrine dysregulation. In this context, the role of acupuncture in strengthening antioxidant defenses and promoting hormonal balance further reinforces its use as an integrative strategy to improve male reproductive potential.

Still on this topic, some studies, such as those by Allameh et al. (2021) and Liu et al. (2020a), although not explicitly focused on oxidative markers, indirectly corroborate this notion. Both reported significant improvements in sperm morphology and motility after acupuncture or laser acupuncture interventions, results often impaired by oxidative stress. It is plausible that these improvements result, at least in part, from increased antioxidant capacity.

As such, the works of the authors studied in this article suggests that acupuncture contributes to male fertility, not only through hormonal regulation and improved circulation, but also by reducing oxidative stress at the cellular and molecular levels. This multifactorial action improves sperm function and viability, reinforcing the relevance of acupuncture as a complementary therapy for patients with sperm oxidative damage or idiopathic infertility

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(Allameh et al., 2021; Hao et al., 2025; Hassan et al., 2020; Jin et al., 2020; Li; Zhou; Wang, 2023b; Liu et al., 2020a; Liu et al., 2020b; Yuan et al., 2020).

CONCLUSION

This systematic review reinforces the growing scientific interest in acupuncture as a valuable adjuvant therapy in the treatment of male infertility. A critical analysis of recent evidence reveals that acupuncture exerts beneficial effects on key reproductive parameters such as sperm concentration, motility, morphology, and DNA integrity. Notably, the benefits of acupuncture extend beyond physical outcomes, contributing to hormonal regulation through the modulation of the hypothalamic–pituitary–gonadal axis and the restoration of antioxidant mechanisms, thereby promoting testicular homeostasis.

However, an in-depth analysis of the included studies reveals a recurring limitation: methodological heterogeneity, including variations in acupuncture point selection, treatment duration, and outcome assessment criteria. Despite these limitations, the consistent positive results observed in both animal models and clinical trials reinforce the credibility of acupuncture's therapeutic potential. Furthermore, its favorable safety profile and capacity to address psychosomatic aspects of infertility position it as a low-risk, patient-centered alternative.

When contextualized within broader environmental and lifestyle challenges—such as exposure to endocrine disruptors and increased oxidative stress—acupuncture emerges not only as a symptomatic treatment, but also as a strategy aligned with the principles of integrative and preventive medicine. Its ability to restore physiological balance through non-pharmacological pathways offers a promising perspective in reproductive care, particularly for individuals seeking alternatives to hormonal or invasive interventions.

Therefore, acupuncture should not be regarded as a replacement for hormonal therapies or andrological medicine, but rather as a complementary, evidence-based tool capable of enhancing therapeutic outcomes, providing holistic care, and promoting health and well-being. Future studies with standardized protocols and long-term follow-up are essential to validate these findings and to consolidate acupuncture as an integrated component of comprehensive male fertility care.

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