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Fire Needle Therapy for Plaque Psoriasis: A Narrative Review

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Abstract: ***Psoriasis is a chronic, immune-mediated inflammatory skin disease, of which plaque psoriasis is the most common subtype. Fire needle therapy, as a traditional external treatment modality of Chinese medicine, has received widespread attention in the treatment of psoriasis in recent years. This article provides a narrative review of the clinical efficacy, safety, and mechanisms of fire needle therapy in the treatment of plaque psoriasis. Existing evidence shows that fire needle therapy alone or combined with Chinese herbal medicine can significantly improve patients' Psoriasis Area and Severity Index (PASI) scores, increase overall response rates, improve quality of life, and demonstrate potential mechanisms in regulating the balance of T cell subsets and inhibiting inflammatory signaling pathways such as TLR4/NF-κB and STAT3. Fire needle therapy has a favorable safety profile, with most adverse reactions being mild and transient. This article also analyzes the limitations of existing research and offers perspectives for future directions.***

Keywords: Fire needle therapy, Plaque psoriasis, Narrative review.

1. Introduction

Psoriasis is a chronic, relapsing, immune-mediated inflammatory skin disease that affects approximately 2%–3% of the global population [1]. Typical clinical manifestations are localized or widely distributed scaly erythema or plaques [2], of which plaque psoriasis is the most common clinical phenotype [3].

In China, the burden of comorbidities among psoriasis patients is noteworthy, with approximately 19.5% of patients having hypertension, diabetes, coronary heart disease, or malignant tumors [3]. The pathogenesis of psoriasis is not yet fully understood. It is currently believed that the immune pathway involving interleukin-23 (IL-23) and T helper 17 (Th17) cells represents the core mechanism of psoriasis [4]. Current conventional treatments for psoriasis include topical therapy, phototherapy, systemic immunomodulators, and biologic agents [5]. However, there is currently no curative treatment for this disease [6]. Western medicine uses topical glucocorticoids, vitamin D derivatives, and calcineurin inhibitors as first-line options for mild psoriasis, while phototherapy and systemic immunosuppressants or targeted biologic agents are used for moderate-to-severe patients [6]. Clinical practice still faces numerous challenges, including adverse reactions, treatment resistance, high costs, inter-individual variability in efficacy [5], and treatment bottlenecks caused by immune drift [7]. Furthermore, switching of biologic agents is often implemented in the management of moderate-to-severe psoriasis, whether due to insufficient efficacy, intolerance, or adverse effects [8]. Some biologic agents can induce cutaneous adverse drug reactions, including serious and even life-threatening events such as Stevens-Johnson syndrome, posing new challenges in the management of refractory cases [9]. Therefore, exploring safe, effective, and cost-effective complementary and alternative therapies is of significant clinical importance.

From the perspective of Chinese medicine, psoriasis falls within the categories of "white boils" (bai bi) and "pine skin tinea" (song pi xuan). In analyzing Zhao Bingnan's academic characteristics and medication principles, Chen Tongyun and colleagues pointed out that blood heat is an intrinsic factor of the body and constitution, and constitutes the primary basis for the onset of psoriasis, with emphasis on treatment from the blood aspect [10]. Pei Yue et al. studied the medication rules of Chinese medicine master Xuan Guowei in treating psoriasis, summarizing his approach of treating from the blood aspect with emphasis on the pathogenesis of dryness, toxins, and stasis [11]. Song Wei et al., in summarizing Professor Ai Rudi's experience in the staged differentiation and treatment of psoriasis vulgaris with Chinese herbal baths, proposed that blood heat, blood stasis, and blood dryness all manifest signs of dampness accumulation, with blood-heat dampness-toxin accumulating in the skin as the core pathogenesis [12]. Li Yuanwen and Qu Xing, in their study of the Yanjing Jin's Dermatology School, pointed out that blood-heat toxin excess is the core pathogenesis of psoriasis [13]. The above Chinese medicine theories provide a profound theoretical basis for the treatment of psoriasis using fire needle therapy to "use heat to attract heat" and "disperse fire to release pathogens."

Fire needle therapy is one of the traditional external treatment modalities of Chinese medicine. Specially made needles are heated until red-hot and then quickly inserted into acupoints or skin lesions, combining the stimulation of "needling" with the warming effect of "moxibustion" [14]. Fire needle therapy is widely used in dermatology and can treat various skin diseases such as acne, vitiligo, and neurodermatitis [15–17]. In recent years, clinical studies on fire needle therapy for psoriasis have increased, but a systematic synthesis of its clinical evidence is still lacking. This article aims to provide a narrative review of the clinical efficacy, safety, and possible mechanisms of fire needle therapy in treating plaque psoriasis, with a view to informing clinical decision-making and future research.

2. Historical Evolution, Operational Characteristics, and Acupoint Selection of Fire Needle Therapy

2.1 Historical Evolution

Fire needle therapy has a long history, with its theoretical foundations traceable to the Yellow Emperor's Inner Canon (Huangdi Neijing). The "quenching needling" (cui ci) mentioned in the Yellow Emperor's Inner Canon represents the prototype of fire needle therapy, which was initially used to treat bi syndromes, sinew-channel diseases, and cold patterns [18]. With the deepening of clinical practice, later physicians expanded its indications to encompass carbuncles, skin diseases, pain disorders, and other conditions. Clinical needs have driven the diversification of fire needle instrument forms [18]. From the connotation of "quenching needling," later generations developed "medicated fire needles" and sulfur fire needles—the former combining the thermal effects of medication, while the latter enhances the warming effect through sulfur combustion. In modern times, electric fire needles have emerged, integrating electrothermal technology into traditional instruments, which has not only expanded the application scope of fire needling but also provided new approaches for the combined use of fire needling and medications [18]. Zhao et al. [18] clarified the foundational roles of filiform needles, lancet needles, and round-pointed needles in the development of fire needling by examining the relationship between the nine needles in the Yellow Emperor's Inner Canon and fire needling, reinforcing the theoretical framework of "differentiated needling based on syndrome differentiation." The optimization of fire needle materials and forms has enabled deeper application in complex clinical conditions: material innovations directly solved problems such as susceptibility to oxidation and deformation seen in traditional needles, making fire needle operation more stable and reliable; designs such as multi-head fire needles and V-shaped fire needles improved treatment efficiency while reducing burn risk, facilitating the transformation of fire needling from a single therapy to a comprehensive approach [18].

2.2 Operational Standards

Standardized operational protocols for fire needle therapy are now available. According to the group standard Fire Needle (T/CAAM 0001–2022) issued by the China Association of Acupuncture and Moxibustion, fire needles are typically made of high-temperature-resistant tungsten-manganese alloy materials, with needle body diameters generally ranging from 0.25 to 0.50 mm, selected according to the treatment site and lesion depth. During operation, the needle body is heated until red-hot or white-hot, then quickly inserted into the predetermined site at a depth of approximately 3–10 mm. Generally, the needle is not retained or is retained for only a few seconds before rapid withdrawal [19].

2.3 Functions and Acupoint Selection

When a fire needle penetrates the skin, the temperature remains above 200–300°C. Fire needling combines the stimulation of filiform needling with the thermal effect of moxibustion, which can "use heat to attract heat" and "disperse fire to release pathogens," thereby draining fire, detoxifying, and guiding pathogenic heat to the surface [20]. Fire needling can warm and unblock the meridians, promote qi and blood circulation, and drive out pathogenic wind. When blood is sufficient, wind disperses, and itching ceases [20]. In treating plaque psoriasis, the principle of acupoint selection is primarily based on local Ashi points (surrounding needling of skin lesions), often combined with channel-based acupoint selection. According to clinical experience and published research protocols, commonly used acupoints include Back-Shu points (such as Feishu [BL13] and Geshu [BL17]), Zusanli (ST36), Xuehai (SP10), and Dazhui (GV14) [14,21]. For itching without visible skin changes, fine fire needles can be heated red-hot and used to prick Feishu (BL13), Geshu (BL17), Xuehai (SP10), Quchi (LI11), Sanyinjiao (SP6), and Fengchi (GB20) to accelerate skin blood circulation, promote local metabolism, and improve immune function [20]. Treatment is typically administered once weekly, with 4 weeks constituting one course [21,22]. Standardized operation is the prerequisite for ensuring efficacy and safety.

3. Clinical Evidence of Efficacy

3.1 Randomized Controlled Trials

Several randomized controlled trials have evaluated the clinical efficacy of fire needle therapy for plaque psoriasis. A multicenter, randomized, single-blind clinical trial (78 cases) by Liu et al. [22] showed that after 4 weeks of treatment, the PASI score in the fire needle group was significantly lower than that in the control group. The PASI 50 response rate in the fire needle group was 77.14%, compared with 42.11% in the control group, with a statistically significant difference. In addition, fire needle therapy significantly improved patients' quality of life. There was no significant difference in recurrence rates between the two groups (0% vs. 6.06%, $P > 0.05$), indicating that the efficacy of fire needling was well maintained during the follow-up period.

However, another multicenter randomized controlled trial (151 cases) by Pan et al. [23] reached a slightly different conclusion: the fire needle group did not achieve a significant improvement in PASI scores compared with the control group ($P > 0.05$), but showed significant advantages in alleviating TCM syndromes ($P < 0.05$) and improving patients' quality of life ($P < 0.05$). This study suggests that the efficacy of fire needling may not only be reflected in objective indicators of lesion area and severity but also in improving patients' overall symptoms and quality of life. The discrepancies between studies may be related to differences in treatment duration, control interventions, baseline severity of enrolled patients, and selection of TCM syndrome types.

Multiple domestic clinical studies further support the efficacy of fire needling. Li [24] reported that fire needling combined with Huoxue Jiedu Decoction significantly reduced PASI scores, TCM syndrome scores, pruritus grades, and quality of life scores in patients with plaque psoriasis (blood stasis pattern) compared with baseline. Dun and Wang [25], in 122 patients with psoriasis vulgaris, found that the overall response rate of Liangxue Xiaofeng Powder combined with fire needling was 91.80%, significantly higher than the 78.69% in the control group ($P < 0.05$), and the combination group was superior to the Chinese herbal medicine-only group in reducing PASI scores and TCM syndrome scores. Li [26] similarly reported that modified Xuefu Zhuyu Decoction combined with fire needling for psoriasis vulgaris (blood stasis pattern) had the advantages of significant efficacy, high

safety, and low recurrence. Deng et al. [27] also confirmed that Huoxue Jiedu Decoction combined with fire needling significantly improved clinical symptoms in patients with blood-stasis type psoriasis.

3.2 Systematic Review and Meta-Analysis Evidence

At the level of synthesized evidence, multiple systematic reviews and meta-analyses support the clinical value of fire needling. The quantitative evidence synthesis by Liu et al. [28] included multiple studies and showed that fire needling was effective for psoriasis (P = 0.0002; RR = 1.20, 95% CI: 1.09–1.33) and was associated with lower recurrence rates (P = 0.005; RR = 0.48, 95% CI: 0.29–0.80). The meta-analysis by Wang et al. [29] (including 15 RCTs) further demonstrated that oral Chinese herbal medicine combined with fire needling significantly increased the overall response rate (OR = 3.49, 95% CI: 2.25–5.41), reduced PASI scores (MD = -5.31), and effectively improved TCM syndrome manifestations and pruritus severity scores. Zhang et al. [30] reviewed the clinical research progress of fire needling for common skin diseases and noted that numerous studies have shown promising application prospects for fire needling in various dermatological conditions. The Guidelines for the Integrated Chinese and Western Medicine Diagnosis and Treatment of Psoriasis Vulgaris [2], issued by the World Federation of Chinese Medicine Societies, also lists fire needling as one of the recommended therapies, reflecting academic recognition of its clinical value.

4. Safety Evaluation

In terms of safety, fire needle therapy for plaque psoriasis is generally well tolerated. The systematic review by Liu et al. [28] showed that adverse events after fire needling were similar to those in patients who did not receive fire needling (P = 0.38; RR = 0.67, 95% CI: 0.28–1.63), with no reports of serious adverse events. The multicenter RCT by Liu et al. [22] also reported no fire needling-related serious adverse events; the adverse reactions were mainly transient pain at the needling site, minor bleeding, or local redness and swelling, all of which were transient and self-resolving.

However, some safety concerns associated with the clinical application of fire needling require attention. Yuan et al. [31] pointed out that the lack of safety valves during ignition and extinguishing of the fire needle poses inherent safety risks to the instrument itself. Moreover, since fire needle operation requires rapid needling and involves human factors such as the practitioner's skill level, the actual depth of needle insertion is not entirely controllable. The above factors lack quantitative and qualitative studies, which limits the use of fire needling in the current era of precision medicine [31]. Studies on fire needling for other skin conditions similarly support its safety. Sun et al. [17] reported no serious adverse events in their study of fire needling for neurodermatitis; Zhu et al. [15] confirmed its good safety profile in a study of fire needling combined with doxycycline for acne. The above evidence suggests that, under standardized operational protocols, fire needle therapy is a relatively safe external treatment modality, although risks need to be further controlled through standardized training and operational specifications.

5. Potential Mechanisms of Action

5.1 Immunomodulation of T Cell Subsets

The core immunopathological mechanism of psoriasis involves abnormal T cell activation and imbalance of Th1/Th2 and Th17/Treg homeostasis, with the IL-23/Th17 pathway being a central link [4]. Multiple studies have shown that fire needling can regulate peripheral blood T cell subsets. Dun and Wang [25] found that after treatment with Liangxue Xiaofeng Powder combined with fire needling, patients' $CD4^+$ T cell levels and $CD4^+/CD8^+$ ratios significantly increased, while $CD8^+$ T cell levels significantly decreased, suggesting that fire needling can correct T cell subset imbalance in psoriasis patients. The systematic review by Liu et al. [28] summarized that after fire needling treatment, $CD8^+$ T cells, Th1 cells, IL-2, and IFN-γ decreased, while $CD4^+$ T cells, Th2 cells, IL-4, and IL-10 increased, suggesting that fire needling may exert therapeutic effects by promoting the shift of Th1/Th2 balance toward an anti-inflammatory direction. Deng et al. [27] similarly reported that fire needling combined with Chinese herbal medicine could correct Th1/Th2 imbalance, enhance immune function, and reduce inflammatory responses in patients.

5.2 Regulation of Inflammatory Signaling Pathways

Recent basic research has further elucidated the molecular mechanisms of fire needling. Wang et al. [32], in a psoriasis-like mouse model, found that fire needling significantly reduced PASI scores, epidermal thickness, and levels of inflammatory cytokines such as IL-23, IL-17, TNF-α, and IL-1β in skin lesions. Mechanistic exploration revealed that fire needling reduced the formation of neutrophil extracellular traps (NETs) and significantly suppressed the expression of TLR4, MyD88, p-NF-κB, and LCN2 proteins in skin tissue, suggesting that the anti-inflammatory effects of fire needling are closely related to inhibition of the TLR4/NF-κB/LCN2 signaling pathway.

Feng et al. [33], in an imiquimod-induced psoriasis-like mouse model, further found that both local fire needle encircling needling and acupoint fire needling (Dazhui [GV14], Zusanli [ST36]) reduced the expression of Ki-67 (a marker of proliferating keratinocytes), inhibited T cell infiltration, and decreased the mRNA expression of inflammatory cytokines IL-17, IL-22, and TNF-α, with inhibitory effects superior to dexamethasone. Notably, the acupoint-based fire needling showed better efficacy in inhibiting IL-22 levels. Furthermore, fire needling reduced the p-STAT3/STAT3 ratio, suggesting that it may improve psoriatic skin lesions by inhibiting STAT3 signaling pathway activation and regulating Th17 cell inflammatory cytokine release [33].

In summary, the mechanisms of fire needle therapy for plaque psoriasis appear to be multi-targeted, involving T cell subset regulation, restoration of Th1/Th2 balance, reduction of NETs formation, and inhibition of key inflammatory signaling pathways such as TLR4/NF-κB and STAT3.

6. Discussion and Future Perspectives

This review systematically synthesizes the available evidence on fire needle therapy for plaque psoriasis. Overall, fire needle therapy, used alone or in combination with Chinese herbal medicine, demonstrates certain clinical advantages in improving PASI scores, increasing overall response rates, and enhancing quality of life and pruritus symptoms, with a favorable safety profile. Its mechanisms involve immune regulation and intervention in inflammatory signaling pathways, characterized by multi-target effects.

However, the existing evidence still has several limitations. First, due to the nature of acupuncture interventions, blinding of researchers and participants is difficult, especially in fire needle operations, which are challenging to fully blind, potentially introducing performance and detection biases [21]. Second, there is heterogeneity in conclusions among different RCTs. For example, Liu et al. [22] reported significant improvement in PASI scores, while Pan et al. [23] did not observe significant between-group differences in PASI scores; this may be related to differences in sample size, treatment duration, control medications, and baseline severity of enrolled patients. Third, most existing studies have short follow-up periods (mostly 4–8 weeks), lacking long-term follow-up data to assess the long-term efficacy and recurrence rates of fire needling. Fourth, the operational parameters of fire needling (such as needle specifications, insertion depth, degree of heating, frequency, and course of treatment) have not been standardized across studies, which may affect the reproducibility of therapeutic effects [19,21]. Fifth, the precision of fire needle operation still faces challenges; issues such as the controllability of insertion depth and the safety of the ignition device lack quantitative and qualitative studies [31]. Sixth, most published RCTs have been conducted in mainland China, with some being single-center, small-sample designs, limiting the generalizability of the evidence.

Future research should address the following aspects: (1) designing more rigorous multicenter, large-sample, sham-controlled randomized controlled trials to further confirm the specificity of fire needling efficacy; (2) conducting long-term follow-up studies to evaluate the long-term efficacy, recurrence rates, and safety of fire needling; (3) standardizing fire needling operational protocols and quality control standards, and developing precision fire needling techniques to improve comparability across studies and stability in clinical practice; (4) combining modern omics technologies and molecular biology methods to deeply explore the systems biology mechanisms of fire needling in psoriasis, providing a scientific basis for precision application; and (5) conducting studies on the combined use of fire needling with biologic agents and other modern therapies to explore the potential for synergistic effects of integrated Chinese and Western medicine.

7. Conclusion

Fire needle therapy for plaque psoriasis can improve patients' PASI scores, increase overall response rates, and improve quality of life and pruritus symptoms, with a favorable safety profile. Its mechanisms may be related to regulating T cell subset balance, inhibiting the TLR4/NF-κB and STAT3 inflammatory signaling pathways, and reducing NETs formation. Although the current evidence has limitations, fire needle therapy, as a safe, convenient, and economical external therapy in Chinese medicine, has good clinical application prospects. More high-quality, standardized clinical studies are needed in the future to further validate and promote its use.

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