

Research Progress on the Use of Cotton-Moxibustion in the Treatment of Skin Diseases

Yao Lu¹, Gaiqin Yang^{1,2,*}, Kun Wang¹, Jia Zuo²

¹School of Acupuncture-Moxibustion and Tuina, Shaanxi University of Chinese Medicine, Xianyang, Shaanxi, China

²Department of Acupuncture and Moxibustion, Shaanxi Provincial Hospital of Chinese Medicine, Xi'an, Shaanxi, China

*Correspondence Author

Abstract: Cotton-moxibustion, also referred to as "thin cotton moxibustion," is a form of direct moxibustion that utilizes heat to eliminate excess heat and dispel stagnant fire, providing therapeutic benefits. It is primarily employed in the treatment of skin conditions, particularly in alleviating symptoms such as itching and pain, and promoting the healing of skin lesions. The procedure is straightforward and well-accepted by patients. This paper reviews recent literature on the application of cotton-moxibustion in treating skin diseases, aiming to standardize its practice and broaden its clinical use. Furthermore, it underscores the importance of preserving traditional principles while fostering innovation to better understand the mechanisms underlying cotton-moxibustion therapy.

Keywords: Cotton-covered Moxibustion, Postherpetic Neuralgia, Neurodermatitis, Psoriasis, Skin Diseases, Itch, Pain.

1. Introduction

Laying cotton moxibustion, also referred to as "cotton moxibustion," "thin cotton moxibustion," or "sticking cotton moxibustion," is a form of direct moxibustion within traditional Chinese medicine (TCM) external therapies. In clinical practice, high-quality cotton is crafted into pads as thin as cicada wings, or combined with medicinal herbs from TCM formulas. These cotton pads are applied flat on the patient's skin lesions and quickly ignited to treat the condition. This article utilizes data from the China National Knowledge Infrastructure (CNKI) and the Wanfang Data Knowledge Service Platform (Wanfang), searching for key terms such as "spider web moxibustion," "cotton spreading moxibustion," "thin cotton moxibustion," "cotton pasting moxibustion," "Yang's cotton pasting moxibustion," "medicinal cotton moxibustion," "fire cotton moxibustion," and "cotton moxibustion." A total of 166 articles were retrieved, primarily focusing on skin diseases. The research findings are summarized below.

2. The Historical Origins of Cotton Moxibustion

Cotton laying moxibustion, a form of direct moxibustion, originated from the traditional Chinese folk practice of "spider web moxibustion," which initially utilized spider webs as a medium before evolving to use dry, clean cotton. This method, also referred to as cotton moxibustion or cotton laying moxibustion, was first recorded in the Qing Dynasty in Zou Cungan's External Treatment of Longevity Formula, where it was described as follows: "Use new cotton to pull a thin layer of paper, measure the width of the ringworm, spread the cotton, apply a little fire to the flower, burn it out instantly, relieve itching immediately, with no burning pain, no need for medication, minimalist, and extremely effective" [1]. This early account highlights the simplicity and efficacy of cotton moxibustion in treating ringworm.

Following the founding of the People's Republic of China, there was a significant push to develop and promote traditional Chinese medicine and its unique external treatment

methods. Yang Jiebin [1] incorporated clinical experience to develop "Yang's cotton paste moxibustion," which he applied to treat various skin diseases. Building on Yang's work, Yang Yunkuan, Zuo Jia, and others [2,3] conducted systematic research on the use of "Yang's cotton moxibustion" for treating conditions such as neurodermatitis and herpes zoster. They also contributed to the standardization of cotton moxibustion procedures and established clinical indications for its use in treating neurodermatitis, herpes zoster, and related skin conditions [4]. Thanks to the continued efforts of researchers, the practice of cotton moxibustion has become increasingly standardized, scientific, and widely adopted in clinical settings for the treatment of skin diseases.

3. Clinical Application of Cotton Moxibustion

3.1 Neurodermatitis

Neurodermatitis, also known as chronic simple lichen, is characterized by intense itching and moss-like changes in the skin. The condition is marked by recurrent episodes and persistent symptoms, which are often difficult to treat [5]. In traditional Chinese medicine, it is referred to as "psoriasis" or "stubborn psoriasis." Huang Dong'e et al. [6] applied plum blossom needles in conjunction with cotton moxibustion to treat neurodermatitis, reporting significant relief of heat toxicity, reduced swelling and pain, with a reported effectiveness rate of 100%. Yang Yunkuan, Diao Canyang, and colleagues [7,8] utilized "Yang's cotton paste moxibustion" for the treatment of localized neurodermatitis, demonstrating a clear therapeutic benefit and a low recurrence rate post-treatment. This approach was found to be more effective than the topical application of dexamethasone urea ointment. Additionally, Yang Guohua et al. [9] employed a combination of plum blossom needle tapping, cupping, and cotton moxibustion in the treatment of 49 cases of neurodermatitis, leading to significant improvement in itching relief, reduction in the extent of skin lesions, and a decreased recurrence rate.

3.2 Eczema

Eczema is commonly associated with factors such as

dampness, wind, and toxicity. Its primary symptoms include itchy, red skin, often accompanied by dryness and lichenification [10]. Zhong Lan [11] suggests that eczema results from a combination of deficiency and the pathogenic influences of "wind", "dampness" and "heat". Cotton moxibustion, which is believed to tonify deficiency, expel pathogens, and alleviate stagnation of fire, has shown promise in treating eczema. This approach can effectively reduce itching, promote the convergence of papules, and accelerate the healing of skin lesions. Wang Pengrui, Hao Lifang, and colleagues [12,13] conducted a randomized trial involving 66 patients with eczema, dividing them into two groups: one treated with cotton moxibustion and the other with compound dexamethasone ointment. The results indicated that cotton moxibustion was more effective in alleviating itching, improving skin lesions, reducing recurrence rates, and enhancing the patients' quality of life index for skin conditions. Furthermore, combined cotton moxibustion therapy was found to significantly relieve itching, promote skin recovery, and minimize adverse effects such as hormone dependence and skin erythema, ultimately improving patients' quality of life [14].

3.3 Herpes Zoster

Herpes zoster, often referred to as "waist wrapping fire pill," typically presents with unilateral skin blisters and erythematous changes in the early stage. In the later stages, patients may experience varying degrees of pain, which can lead to light red pigmentation or even scarring. In Traditional Chinese Medicine (TCM), herpes zoster is primarily attributed to imbalances involving fire, dampness, and blood stasis [15]. Zuoja et al. [16,17] demonstrated that a combined cotton moxibustion treatment for herpes zoster can facilitate scab formation, shorten the duration of pain, prolong the analgesic effects, and reduce the incidence of postherpetic neuralgia, showing superior outcomes compared to oral famotidine hydrochloride treatment. Additionally, Zhu Mei et al. [18] applied a combination of acupuncture, cupping therapy, and cotton moxibustion to treat postherpetic neuralgia, resulting in a significant reduction in TCM symptom scores, effective pain relief, and improved sleep quality in patients. The overall efficacy was superior to that of acupuncture and cupping therapy alone.

3.4 Senile Pruritus

Senile pruritus is characterized by localized or systemic itching, often accompanied by secondary scratch marks and moss-like skin changes [19]. Zhai Jiabin et al. [20] utilized a combination of cotton moxibustion and skin acupuncture to treat pruritus in elderly patients, demonstrating an effective inhibition of itching and promotion of healing in secondary skin lesions, with an overall effective rate of 97.3%. This approach was found to be more effective than treatment with topical dermatitis ointment. In another study, Wang Jie et al. [21] randomly assigned 66 elderly patients with pruritus to either a cotton moxibustion group or a paeonol ointment group. The results indicated that cotton moxibustion significantly reduced both the duration and severity of itching, outperforming the paeonol ointment group.

3.5 Psoriasis

Psoriasis, known as "white heat" in Traditional Chinese Medicine (TCM), is characterized by thick, dry skin patches, often accompanied by itching and pain. Western medical treatments for psoriasis are often associated with recurrence and adverse side effects, such as fatigue, nausea, and skin atrophy [22]. Miao Qixiang [23] suggested that cotton moxibustion, with its ability to address "fire stagnation," can effectively treat the itching and papules caused by blood heat and wind in "white heat" conditions. In a study involving 32 cases of psoriasis, a combination of cotton moxibustion and skin acupuncture achieved a total effective rate of 100%.

Jiesi et al. [24] applied acupuncture at the Back Shu acupoints in combination with local cotton moxibustion to treat progressive psoriasis vulgaris, demonstrating significant improvement in erythema, scaling, infiltration, and itching of the skin lesions, all with high safety and no adverse reactions. This treatment also showed superior long-term efficacy and quality of life improvements when compared to oral Fufang Qingdai capsules and topical Bai Xi ointment. Ji Yu et al. [25] further emphasized that the combination of fire needles and cotton moxibustion has warming and tonifying effects, making it a safe and effective approach for treating plaque psoriasis. For psoriasis vulgaris, this combined treatment is particularly effective in alleviating itching and improving skin lesions.

4. Study on the Mechanism of 3-layer Cotton Moxibustion

4.1 Regulating the Expression of Inflammatory Mediators

Moxibustion uses gentle heat stimulation to regulate the hypothalamic-pituitary-adrenal axis (HPAA), enhance glucocorticoid (GC) anti-inflammatory effects, and improve the inflammatory state of skin diseases. This leads to pain relief and alleviation of itching [26]. Moxibustion activates the cholinergic anti-inflammatory pathway (CAP), which enhances macrophage function, reduces inflammatory factors such as IL-1, IL-6, TNF- α , and HMGB1 in the serum, thereby exerting anti-inflammatory, analgesic, and anti-itch effects, and promoting the recovery of skin lesions [27]. The thermal stimulation of moxibustion also induces the release of carbon monoxide from endothelial cells, which helps relax vascular smooth muscle and increase blood flow in local small arteries, capillaries, and the entire microcirculation. Additionally, it promotes the expression of heat shock protein-32 (HSP-32) and enhances the antioxidant stress response, which accelerates the metabolism of local inflammatory factors and supports the anti-inflammatory and skin lesion repair processes [28].

4.2 The Initiating Role of TRP Family in Moxibustion

The transient receptor potential (TRP) channel family is a group of non-selective cation channels in mammals that respond to various external stimuli, such as light, heat, and pressure. It consists of six subfamilies: TRPC, TRPV, TRPM, TRPML, TRPA, and TRPP. Among these, TRPV1, TRPV2, and TRPV3 are particularly relevant to the thermal stimulation effects of moxibustion and play key roles in its therapeutic mechanisms [29].

TRPV1 is widely expressed in the peripheral nervous system and can be activated by temperatures above 43°C, leading to sensations of pain and itching. Kwan et al. found that TRPV1 mediates pain perception, and mice lacking TRPV1 exhibit reduced pain responses. In this context, warm stimuli, such as those from moxibustion, inhibit TRPV1 activity, thereby alleviating pain [30,31].

TRPV2 is activated at higher temperatures, above 53°C. With repeated thermal stimulation or in pathological conditions, the activation threshold of TRPV2 decreases, allowing it to respond at temperatures as low as 40°C. Defects in TRPV2 signaling in macrophages can contribute to chronic inflammation and infection. Moxibustion-induced thermal stimulation can activate TRPV2, thereby enhancing macrophage function and promoting anti-inflammatory and anti-infective effects. Additionally, TRPV2 has been shown to facilitate axonal growth. This makes it particularly relevant for conditions like nerve damage and neuropathic pain, commonly seen in inflammatory skin diseases, where moxibustion can aid in both pain relief and nerve repair [32].

4.3 Regulating the Expression of Neurotransmitters

Homocysteine (Hcy) is positively correlated with depression and can be converted into S-adenosylmethionine (SAM) in the body. SAM plays a key role in promoting the synthesis and metabolism of neurotransmitters such as serotonin (5-HT) and norepinephrine (NE), which are crucial in regulating mood. Studies have shown that moxibustion can enhance the levels of neurotransmitters like dopamine (DA) and NE, while also reducing serum Hcy levels. These effects contribute to a reduction in subjective pain perception and help regulate negative emotions in patients [33,34].

5. Discussion

Itching is often caused by the accumulation of dampness, heat, fire toxins, or blood deficiency, leading to a loss of nourishment, while pain results from the buildup of cold, fire, dampness, or other factors obstructing the meridians. When qi and blood are blocked, pain arises. Blood stasis, meridian obstruction, or prolonged illness that depletes qi and blood can make nourishment difficult, leading to pain. From a modern medical perspective, both itching and pain are responses to harmful stimuli, with signals transmitted to the central nervous system via pathways like nerve C-fibers, TRPV1, TRPA, and pro-inflammatory mediators such as 5-HT, ET-1, and prostaglandins. Chronic pain can activate brain regions such as the amygdala, hippocampus, and hypothalamus, intensifying pain perception and contributing to negative emotions and lower quality of life. Current treatments for skin diseases with itching and pain, such as glucocorticoids, antihistamines, opioids, and antidepressants, are effective but come with side effects like fatigue, dizziness, drug dependence, and recurrence. In contrast, cotton-covered moxibustion enhances local circulation, promotes the metabolism of pain- and itch-inducing factors, boosts cellular energy and repair, and provides local pain and itch relief. It also regulates systemic functions, such as the HPA axis and pineal gland MT, or modulates neurotransmitters like 5-HT and DA, offering both local and overall therapeutic benefits.

The sensation and intensity of moxibustion are two critical factors influencing its therapeutic effectiveness. Modern research has shown that different temperatures during moxibustion can activate specific channels. For example, TRPV8 is activated below 28°C, producing a cooling sensation that helps with pain relief and itch reduction. A temperature range of 34°C to 38°C primarily produces a warm sensation and activates TRPV3, which helps inhibit itching. At higher temperatures, such as 45°C, a burning sensation is experienced, which activates TRPV1 and may promote inflammation, leading to itching.

The warm sensation, one of the key sensations in moxibustion, is directly related to the therapeutic effect. Both the amount and the intensity of moxibustion play a role in its efficacy. Prolonged exposure to 45°C burning stimulation can desensitize TRPV1, calming the skin nerves and alleviating itching. Long-term thermal stimulation at around 40°C can lower the threshold for TRPV2 activation, enhancing its analgesic and anti-itch properties.

By studying the dose-response relationship between moxibustion sensations and dosage, we can better control its therapeutic effects and optimize its clinical applications.

Currently, there are operational standards for cotton moxibustion, but variations in the cotton manufacturing process, particularly in the production of cotton chips, highlight the need for further standardization. In terms of research, most studies on cotton moxibustion have focused on clinical applications. However, there is still a lack of high-quality, large-scale, multicenter clinical trials, as well as research into its dose-response relationship and underlying mechanisms.

Given that the mechanism of action of cotton moxibustion may involve factors such as thermal stimulation, photothermal radiation, and chemical stimulation, future research should aim to explore these areas in greater depth. This will help clarify the principles governing its use and further elucidate its therapeutic mechanisms.

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Author Profile



Yao Lu is currently a graduate student at Shaanxi University of Chinese Medicine, where she has been pursuing his professional master's degree since 2022. Her main research focus is on acupuncture treatment for dermatological diseases.