

REVIEW

Research progress in traditional Chinese medicine for the prevention and treatment of lower limb lymphedema after cervical cancer surgery/radiotherapy

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Abstract

Lower limb lymphedema is a prevalent complication following gynecologic malignancies. Due to its chronic and progressive nature, failure to address it promptly and effectively can lead to severe conditions such as elephantiasis, which significantly affects patients' mental well-being. While physiological surgeries for lymphedema are well-established, some studies report unfavorable outcomes. This paper examines the management of lower limb lymphedema after cervical cancer surgery/radiotherapy, focusing on Traditional Chinese Medicine (TCM) approaches. It explores TCM treatments, including herbal remedies, acupuncture and Tuina, and compares these with Western strategies, such as comprehensive decongestive therapy (CDT) and surgical interventions. Furthermore, the paper discusses how these approaches can be integrated for optimal management, emphasizing preventive measures alongside treatment options. We also analyze the current clinical evidence and propose a holistic, multidisciplinary framework for effectively managing this condition.

Keywords

Lower limb lymphedema; Cervical cancer; Traditional Chinese medicine; Comprehensive decongestive therapy (CDT); Radiotherapy

1. Introduction

Cervical cancer ranks as the fourth most prevalent cancer and a leading cause of cancer-related mortality among women [1], with approximately 604,000 new cases in 2020 [2]. Despite advancements in treatment and screening, there has been a notable improvement in survival rates, shifting the focus towards enhancing post-treatment quality of life. For early-stage cervical cancer, surgery, including pelvic lymphadenectomy, serves as the primary treatment. In later stages, radiotherapy and chemotherapy are standard approaches; however, these treatments can disrupt lymphatic drainage and may lead to lower extremity lymphedema [3].

Lymphedema is a lymphatic system dysfunction that can be diagnosed through subjective or objective assessments. It is characterized by excess protein-rich fluid accumulation in tissues, leading to limb swelling. Symptoms commonly include swelling, heaviness, pain, itching, numbness, skin changes, and infections, all of which can significantly impact daily activities and diminish quality of life [4].

In developed countries, lymphedema is often linked to treatments for cervical cancer [5]. In the U.S., approximately 5–6 million individuals are affected by lymphedema, with a high incidence rate of one in six solid tumor patients. Most cases arise months after lymphatic injury, indicating that inflammatory processes such as fibrosis, where scar tissue replaces

parenchyma, contribute to its pathophysiology [6]. Emerging approaches, including anti-inflammatory therapies targeting Th2-inflammatory responses, are gaining traction in lymphedema therapy. Research on secondary lymphedema has demonstrated that vascular endothelial growth factor (VEGF) C can stimulate lymph angiogenesis, potentially alleviating tissue edema [7]. Furthermore, investigations have been into the possibility of converting stem cells into lymphatic endothelial cells. However, the clinical application of these therapies raises concerns regarding the potential risk of cancer metastasis.

Lymphedema surgery has evolved by adopting physiological methods that enhance lymphatic function and continuity. Key techniques include lymphovenous bypass (LVB), which connects a lymphatic vessel to a nearby vein to address early-stage lymphedema, and vascularized lymph node transplantation (VLNT), which involves transplanting healthy lymph nodes to stimulate spontaneous lymphangiogenesis [8]. Despite the growing acceptance of these physiological surgical methods for lymphedema treatment, some studies report inconsistent outcomes. This highlights the urgent need for methods to enhance the effectiveness of lymphedema surgery, prompting investigations into the combined application of LVB and VLNT techniques [9]. In addition, some researchers, drawing on the well-understood immunological aspects of lymphedema pathophysiology, have hypothesized that targeted therapies

could optimize surgical outcomes.

Post-gynecologic malignancy lymphedema of the lower limbs is a common complication, with reported incidence rates ranging from 5% to 58%. Given its chronic and progressive nature, early and effective intervention is crucial; without it, the condition can exacerbate severe issues like elephantiasis, profoundly affecting patients' physical and mental well-being [10]. Although domestic and international researchers have examined postoperative lower limb lymphedema, a systematic organization of the various treatment approaches is lacking. Consequently, this paper aims to review treatment options for this condition from a traditional Chinese medicine perspective, providing insights into effective treatment strategies for lymphedema patients. Lymphedema is a slowly progressive and irreversible condition classified into two types: primary and secondary lymphedema. Secondary lymphedema results from obstruction, destruction, or depletion of lymphatic vessels or lymph nodes caused by radiotherapy, surgery, or infection, leading to impaired lymphatic fluid drainage and subsequent edema [11].

While advancements in treatments have greatly enhanced survival rates, they can also give rise to complications, one of which is lower limb lymphedema. This condition, characterized by disrupted lymphatic drainage, often occurs as a result of pelvic lymphadenectomy or radiation therapy. Lower limb lymphedema after cervical cancer treatment presents significant challenges, including reduced mobility, pain, and a diminished quality of life, necessitating effective management strategies to enhance patient outcomes.

In recent years, researchers around the globe have explored the etiology of secondary lymphedema, investigating various theories, including lymphatic obstruction, inflammatory responses, tissue interstitial pressure imbalance, and the widely recognized lymphatic pump failure hypothesis.

2. Western medical interventions

2.1 Physiotherapy techniques for postoperative lymphedema

Postoperative lower limb lymphedema is frequently addressed through Western medical interventions designed to enhance lymphatic and blood circulation while simultaneously inhibiting the growth of fibrous tissue [12]. These interventions encompass various physiotherapy techniques, such as comprehensive decongestive therapy (CDT), thermal therapy, and low-frequency electrical stimulation [13, 14]. CDT is a widely recognized clinical approach recognized for its safety and efficacy in managing early to moderate lymphedema. It entails a combination of manual lymphatic drainage, compression bandaging, and physical exercises. Cheng Qun *et al.* [15] observed a significant reduction in limb circumference and tissue fluid among 89 patients [15]. Furthermore, Huang Lemei *et al.* [16] demonstrated that the combination of enhanced negative pressure drainage and CDT therapy was more effective than traditional methods, resulting in improved efficiency, reduced time and costs, and better clinical outcomes [16]. In summary, these physiotherapy

methods, mainly CDT, have proven effective in managing lymphedema and improving patient outcomes.

2.2 Thermal and electrical therapies

Far-infrared radiation substantially alleviates pain and swelling and enhances limb function [17]. This finding was corroborated by Wang Xiaodu *et al.* [17], who demonstrated that the combination of far-infrared radiation with bandaging was more effective in reducing lymphedema and improving patient symptoms. Their research indicated good patient tolerance and minimal side effects based on clinical and *in vitro* studies [17]. This study conducted a controlled trial investigating the impact of low-frequency neuromuscular electrical stimulation on post-cervical cancer surgery or radiotherapy lymphedema [17]. Their results suggested that this treatment improved lymphatic flow and alleviated symptoms. CO₂ laser therapy, digital subtraction angiography (DSA)-guided lumbar sympathetic nerve block, and microwave combination therapy have shown potential in enhancing limb lymphatic circulation. These treatments not only help alleviate swelling but also reduce psychological stress and anxiety. In summary, thermal and electrical therapies effectively relieve symptoms and improve lymphatic circulation in managing lymphedema.

2.3 Pharmacological and surgical interventions

Regarding pharmacological treatment, Western medicine primarily utilizes diuretics, vascular-active drugs, interferons, and antibiotics. For instance, hepatic side sodium, heparin sodium, and bacitracin can effectively inhibit limb complications without adverse outcomes within a short timeframe [18, 19]. Additionally, preserving the exterior iliac terminal lymph nodes and injecting *Pseudomonas aeruginosa* into the pelvis can significantly inhibit lower limb lymphedema and pelvic lymphoid cysts. A study involving four creams tested on patients with lower limb lymphedema revealed that condylone gel cream provides rapid relief from itching without considerable side effects, effectively alleviating skin symptoms [4]. Pharmacological and surgical interventions have shown significant improvements in managing lymphedema, particularly in reducing swelling and enhancing functionality.

Recent developments in surgical treatments for lymphedema have greatly improved patient outcomes [20]. LVB, which connects lymphatic vessels directly to veins, has shown promise in enhancing lymphatic drainage and reducing limb swelling in patients with early-stage lymphedema [21]. Similarly, VLNT, involving transplanting healthy lymph nodes into the affected area, has demonstrated potential in promoting spontaneous lymphangiogenesis and improving long-term outcomes.

3. Traditional Chinese medicine (TCM)

While there is no specific medication for treating lymphedema, it can be effectively used alongside other methods to alleviate symptoms [22, 23]. Postoperative lower limb lymphedema following gynecologic cancer can be categorized in TCM as “skin water”, “pulse paralysis”, “edema” or “foot odor”. The primary underlying cause is a deficiency in the body’s qi and blood resulting from surgery or radiotherapy, which damages vessels and tendons. This condition causes internal accumulation of water and dampness, as well as the obstruction of phlegm and blood, ultimately resulting in edema [24]. TCM practitioners have diverse perspectives on the treatment of edema. According to the “Su Wen-Tang Liquid Mash Li Theory” states, treatment should aim for a harmonious balance, addressing root causes while eliminating pathogenic factors, thereby opening pathways to expel the evil spirits and cleanse the body. In “The Essentials of the Golden Horoscope”, Zhang Zhongjing illustrates that “blood can become water when it is stagnant”, advocating for a treatment strategy that enhances the body’s defenses while removing pathogens and regulating blood and water. In “Yan’s Jisheng Fang-Edema Gate”, the treatment principle first emphasizes strengthening the spleen and earth. Various therapeutic approaches are employed in clinical practice, including oral TCM intake, topical applications, herbal fumigation, and acupuncture and moxibustion treatments [25, 26].

3.1 Oral administration of TCM

The development of lymphedema is closely linked to various factors, like ulcers, toxins, individual constitution, and the presence of pathogenic influences, all of which can vary from person to person. Consequently, TCM treatment strategies are specifically tailored to address each patient’s unique symptoms and conditions, adhering to the principles of syndrome differentiation and targeted intervention.

According to Professor Cui Gongjian, Damp-Heat Obstruction Syndrome is primarily caused by a deficiency in spleen qi, which impairs the spleen’s functions of transformation and transportation. The invasion of wind-damp-heat evils may further exacerbate this deficiency [27]. The resulting imbalance leads to the accumulation of dampness and heat, giving rise to symptoms such as swelling, heaviness, and stagnation, often observed in cases of lower limb lymphedema [28].

Wu Jianping utilized Professor Cui’s therapeutic method to eliminate dampness and stasis, integrating it with complementary techniques, like baking and bandaging, to treat lower limb lymphedema [29]. This approach proved highly effective, leading to significant reductions in limb swelling and improvements in lymphatic flow. Furthermore, Li Jin *et al.* [30] conducted a clinical study investigating the efficacy of a combination of diosmin and Dioscorea pills in patients with lower limb lymphedema induced by damp heat [30]. The findings indicated that this combination had a markedly higher efficacy rate (86.67%) compared to the control group, highlighting the therapeutic potential of these herbal remedies

in tackling the underlying pathogenic factors associated with damp-heat and improving patient outcomes [31, 32]. Professor Wu Qiansheng emphasized the intricate relationship between “qi, blood, dampness and heat” in this condition, advocating for formulas that address damp-heat stasis during the acute phase and promote qi and blood during the recovery phase to consolidate the foundation.

Li Nan *et al.* [29] identified the Phlegm-Coagulation and Blood Stasis Syndrome, which results from the internal accumulation of blood stasis and phlegm dampness. The application of a self-formulated Knee Red Soup, along with a cream designed for anti-swelling and pain relief, resulted in a treatment probability of 86.7% [29].

Professor He Fengjie Yang reported the Deficiency and Dampness Obstruction Syndrome, indicating that this condition often results from a spleen yang deficiency and dampness obstruction. Consequently, effective treatment should prioritize enhancing the spleen function, dispelling dampness, and clearing collaterals. In alignment with Professor He’s approach, Wang Haijing and colleagues demonstrated that a combination treatment involving the Wu Ling San and Wu Pi Drink formulas, alongside Tuina massage and topical applications, led to significant reductions in leg circumference and decreased recurrence rates during a one-year follow-up [33]. Research by Ding Yanyan and others revealed that adding Wu Ling San to the treatment regimen for lower limb lymphedema proved more effective than relying on diuretics alone, achieving a treatment efficiency of up to 83.3%. Furthermore, combining manual drainage with Fangji Fu Ling Tang yielded better results when paired with Diosmin tablets, suggesting that the multicomponent, multitarget and multi-pathway properties of Fangji Fu Ling Tang enhanced overall efficacy [34].

Professor Xiong Jibai highlighted the importance of improving qi, invigorating blood, and enhancing circulation to alleviate swelling in lymphedema treatment [34]. For cases characterized by qi deficiency and blood stasis, he recommended using Yang-nourishing and Five-returning Soup in conjunction with Fangji Fu Ling Tang to promote water elimination and reduce swelling while simultaneously strengthening qi, thereby achieving a balance between elimination and tonification [35]. Professor Liu Longmin regarded postoperative lower limb lymphedema as stemming from qi injury and blood depletion due to prolonged illness and surgical trauma. He advocated for the use of Si Miao Yong An Tang, a formula designed to tonify qi, invigorate blood, and facilitate the removal of water and stasis, thereby addressing the underlying causes of swelling and promoting recovery [35].

3.2 External application of Chinese medicine

The topical application of Chinese medicine entails the transdermal absorption of herbal remedies via acupuncture points, skin, and various bodily orifices [36]. This technique enables the therapeutic properties of the herbs to penetrate directly into the affected areas, allowing for targeted treatment [37]. Bypassing the digestive system provides a localized thera-

peutic effect that is particularly advantageous for conditions like lymphedema, where swelling and poor circulation are concentrated in specific regions [29, 38]. Acupuncture points act as pathways to enhance the delivery of medicinal properties, thereby improving the flow of qi and blood circulation. Herbs with anti-inflammatory, diuretic, and decongestant effects can effectively address fluid accumulation and help reduce swelling [39]. Furthermore, this approach is non-invasive and can be integrated with other treatment modalities, making it a versatile and complementary option in managing post-operative lymphedema and other related conditions [40, 41]. During the Qing Dynasty, Wu Shiji's "Li Bo Era" encapsulated the essence of external therapies, stating that "The principles of external treatment mirror those of internal treatment; the medicines used externally are also used internally" [42]. The "Yellow Emperor's Classic of Internal Medicine" outlines "18 external treatment methods". Standard practices include the application of heat to open the pores, which facilitates the absorption of drug ions through the mucous membrane barrier of the skin. This process aids in reducing inflammation, alleviating pain, promoting blood circulation, and resolving blood stasis [39].

In TCM, lower limb lymphedema following surgery in patients with gynecological malignancies is classified as "edema" [43]. The "Nei Jing" states that "all diseases characterized by soreness, pain, swelling and shock are attributed to fire", and modern practitioners have discovered that treating "heat with edema" can be highly effective [44]. Sha Rui *et al.* [45] applied Bingli powder to take advantage of the cooling properties of borneol, effectively dissipating heat and alleviating pain while serving as a "guide" to enhance membrane permeability and promote drug absorption [45]. On the other hand, Mirabilite penetrates the skin's mucosal barrier in the form of sulfate ions, which works synergistically to reduce edema and relieve pain [30]. For early-stage lymphedema, Zheng Tongli employed a mixture of mannitol and ice chips (100:1) for topical application, harnessing the transdermal capacity of ice to rapidly absorb the medication and reduce heat and swelling [40]. Ye Min *et al.* [46] employed Ruyi Jinhuang Paste, which combines the heat-clearing and swelling-reducing effects of smallpox powder, along with the blood-activating properties of turmeric, dahurica and tiannanxing to relieve pus drainage and swelling [46]. Mixing with vinegar further helps dredge the meridians and directly targets the affected area, synergistically reducing edema and alleviating patient symptoms [45].

Postoperative damage, along with prolonged depletion of qi and blood due to illness, can allow pathogenic toxins to infiltrate the body. This invasion may damage blood vessels and collaterals, obstructing the flow of blood, qi and bodily fluids and resulting in an internal stasis of blood and dampness [34, 47]. The "Treatise on Blood Evidence" asserts that "long-term blood stasis can also transform into stagnant water". In light of this concept, Professor Cao Jianchun advocates for addressing stasis before dampness, recommending the use of herbs such as peach kernels and safflowers to stimulate blood circulation, promote movement through the collaterals, and alleviate pain [48]. A formula incorporating herbs like dagger belly peel, donggua peel, and diaphanous peel is employed to cleanse the affected limbs. This method effectively activates

blood flow, dispel dampness, and induces the movement of water [49]. The "Jin Kui Yao Yao" emphasizes that "blood impedes water", highlighting the significance of harmonizing blood and water in treatment. In a clinical study, patients suffering from unilateral lower lymphedema were randomly assigned into two groups [41]. One group received blood-activating lotion through fumigation, whereas the control group was treated with magnesium sulfate wet compresses and oral medications such as Mai Zhi Ling.

3.3 Acupuncture treatment

The "Ling Shu-Meridian Vessels" states that "the meridians are pivotal in determining life and death, managing all diseases, and balancing excess and deficiency; they must remain unobstructed". Their roles are crucial in disease onset, progression, and resolution [48]. "The Spiritual Pivot-Nine Needles and Twelve Originals" mentions that "fine needles should be employed to traverse the meridians, regulate the flow of blood and energy, and ensure the smooth movement within and without at the joint points". This indicates that stimulating acupuncture points can modulate the flow of qi and blood, effectively unblocking the meridians to treat various ailments. Zheng Shuo *et al.* [50] utilized fire acupuncture at points such as Houxi, Taiyuan, Sun and Yinlingquan, combined with a comprehensive method to reduce swelling. This approach was designed to activate the meridians, warm the flow of qi and blood, expel pathogens, and enhance local microcirculation [50, 51]. As a result, it effectively alleviated limb soreness and weakness in patients, achieving a reported effectiveness rate of 93.9%, surpassing that of the control group [27]. Additionally, Lv Hongyan described a case in which a combination of warm acupuncture and pulse electrotherapy was employed for patients with water offense, yang deficiency, and cold-induced blood stasis [52]. By stimulating acupuncture points such as Blood Sea, Yinlingquan, Foot Sanli and A-Yi points, this method accelerated the circulation of lymphatic and blood fluids, enhanced metabolism, significantly reduced local swelling, and boosted the body's immune function, ultimately achieving the therapeutic goals of supporting health and dispelling pathogenic factors [53].

In a comparative study assessing the efficacy of conventional treatments, Dong Dexi discovered that the use of suspended moxibustion at acupuncture points, in conjunction with intramuscular paste, significantly reduces the incidence of lower limb lymphedema [44]. Liu Yunjing attributed the onset of lymphedema to damage within pulse channels, resulting in localized swelling and numbness. The accumulated lymphatic fluid can be redirected along the acupuncture channels, thereby alleviating swelling in the injured limbs [54].

Acupuncture techniques, including fire acupuncture, warm acupuncture, and suspended moxibustion, have demonstrated considerable effectiveness in promoting circulation, reducing swelling, and enhancing immune function in patients with lymphedema [32]. By stimulating specific acupuncture points, these methods help clear blockages in the meridians, regulate the flow of qi and blood, and address underlying factors like blood stasis and the accumulation of dampness [54].

3.4 Tuina guidance

The management of “foot qi”, as described in the “Treatise on the Origin of Diseases”, is fundamentally based on enhancing qi circulation. Tuina, a traditional Chinese therapeutic technique, works on the body’s surface by utilizing specific maneuvers to press and manipulate relevant acupuncture points. This practice aims to clear blockages in meridians, stimulate the flow of qi and blood, nourish tendons and bones, and balance qi circulation, ultimately helping to reduce swelling [55]. In managing lower limb lymphedema after cervical cancer surgery, Lei Shaohua *et al.* [56] applied meridian massage techniques that concentrated on the acupuncture sites of the foot’s three yin meridians [56].

Traditional Chinese medicine provides various strategies for treating lymphedema. The “Medical Heart Formula” suggests that treatments for “foot odor” should be aligned with the seasons. In the spring and autumn, treatment approaches should balance strengthening and purgation, while in summer, the focus should be on promoting sweating and detoxification [53, 57]. According to the “Treatise on the Origin of Diseases”, “all foot diseases are believed to arise from wind and toxins”, underscoring the importance of treatments that expel these pathogens to maintain health. Contemporary lymphedema treatments emphasize addressing “deficiency”, following the principle that “all swelling and dampness pertain to the spleen”. Additionally, addressing “excess” through the elimination of dampness, blood stasis, and phlegm condensation enhances lymphatic and blood fluid circulation with the aid of medicinal herbs, thereby diminishing limb swelling [58, 59].

4. Prevention of lower limb lymphedema following cervical cancer surgery and radiotherapy

To prevent lower limb lymphedema following cervical cancer surgery and/or radiotherapy, early intervention and proactive management are essential. Preventive strategies primarily aim to minimize the risk of lymphedema development while promoting optimal lymphatic function [47]. In Traditional Chinese Medicine (TCM), preventive approaches include herbal remedies that strengthen the spleen and enhance the circulation of qi and blood. Notable examples are Chen Pi (Citrus reticulata peel) and Dang Gui (Angelica sinensis), which are believed to improve lymphatic flow and reduce stagnation [44]. Additionally, acupuncture and Tuina (Chinese therapeutic massage) are employed as preventivemeasures, focusing on meridian points that facilitate lymphatic drainage and enhance overall circulation, particularly in the lower limbs [60].

Western preventive strategies prioritize patient education, early monitoring, and lifestyle modifications. For patients at risk, compression garments are frequently recommended to enhance lymphatic drainage and prevent fluid accumulation [37]. Furthermore, physical therapy, which incorporates exercises that promote lymphatic circulation, plays a vital role in the initial stages post-surgery and/or radiotherapy [31]. Regular follow-up care is essential for detecting early

signs of lymphedema, allowing prompt intervention before the condition progresses [61]. By integrating both TCM and Western approaches, a thorough preventive strategy can be established to reduce the risk of lower limb lymphedema in cervical cancer survivors.

5. Conclusions

As the incidence of lower limb lymphedema following gynecological cancer surgery continues to rise, there is an urgent demand for more effective and personalized treatment strategies. Future research should aim to identify biomarkers that can predict which patients are at higher risk for developing lymphedema, facilitating earlier intervention. Furthermore, investigating the integration of TCM with Western medical practices could yield valuable insights into the synergy between these two approaches. By refining treatment protocols and improving patient management, it may be possible to reduce decrease the prevalence of this debilitating condition.

Recent studies have investigated targeted therapies, such as VEGF-C to promote lymphangiogenesis and gene therapy aimed at improving lymphatic function. These innovative approaches show promise in preclinical models and early-phase trials, presenting more precise alternatives to conventional treatments like acupuncture. However, their clinical application remains limited, necessitating additional research to evaluate safety, efficacy, and long-term outcomes.

Looking ahead, there is great potential to advance the management of postoperative lower limb lymphedema, especially with the emergence of innovative therapies such as targeted drug delivery systems, gene therapy and advances in regenerative medicine. The ongoing exploration of individualized treatment approaches, tailored to the severity and underlying mechanisms of lymphedema, promises to enhance patient outcomes. Moreover, the integration of new diagnostic technologies and biomarkers could facilitate earlier detection and more precise interventions, ultimately improving the effectiveness of both preventive and therapeutic measures. As research evolves, adopting a more personalized and multidisciplinary approach will be key to optimizing care and improving the quality of life for patients.

A range of treatment options are available for managing postoperative lower limb lymphedema resulting from tumors, with CDT recognized as the standard for early to moderate stages. For patients experiencing later stages, surgical interventions can alleviate swelling symptoms and improve overall quality of life.

The application of TCM in treating this condition adheres to the principle of syndrome-based treatment, allowing for a customized approach that takes into account the patient’s overall health, constitution, and progression of the disease. TCM facilitates the selection of targeted, personalized treatment strategies tailored to the individual needs of the patient. For instance, practitioners may evaluate a patient’s unique constitution, symptoms and lifestyle when formulating a treatment plan. In the case of lymphedema, some patients may present with varying levels of damp-heat accumulation, while others may demonstrate blood stasis or qi deficiency. Accordingly,

TCM might prescribe different herbal formulas such as Sanzi Yangqin Tang for patients with qi deficiency or Long Dan Xie Gan Tang for those experiencing damp-heat. Additionally, acupuncture points might be selected based on the patient's symptoms, such as Spleen 9 (SP9) to resolve dampness or Stomach 36 (ST36) for strengthening qi.

The limitation of this study is the lack of recent clinical research results on related drugs. In the future, we will focus on the latest clinical research results of related drugs, especially the impact of TCM's key components on disease. At the same time, the in-depth molecular mechanism is not discussed in this review, which is the direction of further research on TCM in the future.

In summary, an integrated approach that merges both Chinese and Western medical treatments can harness the strengths of each system. By employing a discerning treatment strategy in the future, we can select the most appropriate therapeutic methods based on the distinct phases and specific symptoms exhibited by the patient. This personalized approach seeks to slow the progression of lymphedema and optimize the quality of life for patients.

AVAILABILITY OF DATA AND MATERIALS

The authors declare that all data supporting the findings of this study are available within the paper and any raw data can be obtained from the corresponding author upon request.

AUTHOR CONTRIBUTIONS

XYF, JFC, XW—conceptualization; writing-original draft; investigation; analysis; resources; writing-review and editing. XYF, JFC—conceptualization; writing-review and editing. All authors read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This article does not contain any studies with human participants or animals performed by any of the authors.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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