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The Mechanism and Clinical Application of Zedan in the Treatment of Pressure Ulcers in Stroke Patients

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Abstract: Pressure ulcers are one of the common complications among stroke patients, associated with factors such as prolonged bed rest, localized pressure, and blood circulation disorders, severely affecting patients' health and quality of life. Bai ethnic medicine, as a vital component of traditional Chinese medicine, has a long history and a unique theoretical system. Zedan, a commonly used herb in Bai medicine, has effects such as clearing heat and cooling blood, activating blood and detoxifying, and resolving rashes and spots, demonstrating significant effectiveness in treating pressure ulcers among stroke patients. This article aims to explore the mechanism and clinical application of Zedan in treating pressure ulcers in stroke patients, hoping to provide new ideas and methods for the treatment of pressure ulcers.

1. Introduction

Pressure ulcers occur due to prolonged pressure on local tissues, leading to blood circulation disorders and resulting in soft tissue necrosis due to sustained ischemia, hypoxia, and malnutrition [1]. Stroke patients, due to prolonged bed rest and limited mobility, are a high-risk group for pressure ulcers. Pressure ulcers not only cause great suffering to patients but also increase the risk of infection, severely impacting their quality of life. Currently, the treatment of pressure ulcers mainly includes local cleaning, dressing changes, nutritional support, and physical therapy, but the treatment outcomes are not ideal. Bai ethnic medicine, as an important part of ethnic medicine in China, has a long history and a rich cultural background. The Bai people have accumulated extensive medical knowledge through long-term practical experience, forming a unique treatment system, and their medical theories and practices are widely applied in the prevention and treatment of various diseases. Zedan plays an important role in Bai medicine, and its medicinal value and therapeutic effects have gradually gained recognition in recent years. Zedan is believed to have good effects in improving the symptoms of stroke pressure ulcers and promoting healing, with mechanisms that may include its anti-inflammatory properties, promotion of blood circulation, and tissue repair capabilities. Therefore, exploring the application of Zedan in the treatment of stroke

pressure ulcers not only helps enrich the theoretical system of Bai medicine but also provides new treatment ideas for clinical practice.

2. Overview of Bai Ethnic Medicine

Bai ethnic medicine is a unique medical system formed by the Bai people in their long struggle against diseases, marked by a rich history and deep cultural heritage. Bai medicine originated in the Neolithic era, with ancient Bai ancestors engaging in medical and health activities. During the Bronze Age, Bai medicine gradually developed, forming an early medical model that combined primitive religion and shamanism. During the Nanzhao Dali Kingdom period, influenced by the Tang and Song Dynasties and the development of local medicine, the introduction of traditional Chinese medicine impacted Indian Buddhist medicine, and exchanges between Bai medicine and medicine became increasingly frequent, Buddhism having a profound influence on Bai medicine. During the Ming and Qing Dynasties, traditional Chinese medicine spread and developed in Yunnan, further advancing and perfecting Bai medicine [2]. To date, an independent theoretical system for Bai medicine has not been discovered, but its unique diagnostic and therapeutic methods and medicinal effects have been widely applied and passed down in folk traditions [3].

3. Pharmacological Effects and Clinical Applications of Zedan

Zedan, or Dianzi Cao, is a commonly used herb in Bai medicine. Zedan is cold in nature, sweet and salty in taste, and enters the heart and liver meridians. It has effects such as clearing heat and cooling blood, activating blood and detoxifying, and resolving rashes and spots [4]. Modern pharmacological studies have shown that Zedan contains various active components, such as lithospermic acid and acetyl-lithospermic acid, which have effects including anti-pathogenic microorganisms, anti-inflammatory and anti-allergic properties, antipyretic, anti-tumor, liver protection, hemostasis, blood sugar reduction, sedation, and modulation of immune function [5].

3.1 Antibacterial Effects

The active components in Zedan have inhibitory effects on various bacteria, including Staphylococcus aureus, Staphylococcus epidermidis, Streptococcus, and Escherichia coli. Lithospermic acid can damage the bacterial cell wall and membrane, inhibiting bacterial growth and reproduction, thereby exerting antibacterial effects. This mechanism provides Zedan with a notable advantage in treating pressure ulcers and other infections.

3.2 Anti-inflammatory Effects

The active components in Zedan also possess anti-inflammatory properties, capable of inhibiting the occurrence and development of inflammatory responses [6]. Lithospermic acid can inhibit the release of inflammatory mediators, alleviating tissue damage and pain caused by inflammation. This mechanism makes Zedan significantly effective in treating pressure ulcers and other inflammatory diseases.

3.3 Antioxidant Effects

The active components in Zedan also exhibit antioxidant effects, capable of scavenging free radicals and protecting cells from oxidative damage. Lithospermic acid can inhibit lipid peroxidation reactions, reducing the production and accumulation of free radicals, thereby

protecting the integrity and stability of cell membranes. This mechanism indicates that Zedan has potential value in treating pressure ulcers and other oxidative stress-related diseases.

3.4 Anti-tumor Effects

Additionally, the active components in Zedan have anti-tumor effects, capable of inhibiting the growth and reproduction of tumor cells. Lithospermic acid can inhibit DNA synthesis and cell division in tumor cells, thereby exerting anti-tumor effects. This mechanism suggests that Zedan has broad prospects in treating malignant tumors and other diseases.

4. Mechanism of Zedan in Treating Stroke Pressure Ulcers

The formation of stroke pressure ulcers is related to prolonged bed rest, localized pressure, and blood circulation disorders. Zedan, as a commonly used herb in Bai medicine, shows significant effects in treating stroke pressure ulcers. Its mechanisms mainly include the following aspects:

4.1 Improving Local Blood Circulation

A key mechanism by which Zedan treats stroke pressure ulcers is by improving local blood circulation. By promoting blood flow, Zedan can enhance blood supply to the affected area, thereby improving local nutrient supply and the clearance of metabolic waste. Improved blood circulation not only provides sufficient oxygen and nutrients to cells but also promotes the elimination of metabolic byproducts, reducing local ischemia and hypoxia, which in turn aids in the healing of pressure ulcers.

Physiologically, Zedan achieves this effect by regulating vascular dilation and improving blood rheology. Improving local blood circulation can directly promote wound healing and also modulate local immune responses, reducing inflammation and facilitating the repair process, creating a conducive healing environment.

4.2 Anti-inflammatory and Immune Regulation

Inhibiting the release of inflammatory factors is one of the important strategies in traditional Chinese medicine for anti-inflammatory treatment. The active components in Zedan have anti-inflammatory effects, capable of inhibiting the occurrence and development of inflammatory responses. Studies have shown that Zedan can inhibit the release of inflammatory mediators, alleviating tissue damage and pain caused by inflammation. This mechanism gives Zedan a significant advantage in treating stroke pressure ulcers, as it can reduce the inflammatory response at the wound site and promote healing [7].

4.3 Promoting Tissue Repair and Regeneration

The active components in Zedan promote cell regeneration and repair. Research indicates that Zedan can stimulate the proliferation and differentiation of skin cells, facilitating wound healing and tissue repair. This mechanism makes Zedan particularly effective for stroke pressure ulcers, accelerating the healing process and reducing scar formation.

The physiological processes involved in accelerating wound healing encompass multiple stages, including hemostasis, inflammation, proliferation, and remodeling. After injury, the body quickly initiates hemostatic mechanisms, followed by the inflammatory response phase, which encourages inflammatory cells to gather at the wound site, laying the foundation for subsequent repair

processes. During the proliferation phase, processes such as fibroblast proliferation, collagen synthesis, and angiogenesis occur sequentially, collectively promoting the formation of new tissue. Therefore, in-depth research on the mechanisms of cell proliferation and regeneration, as well as the physiological processes that accelerate wound healing, is of great significance for the application of traditional Chinese medicine in tissue repair and regeneration. Polysaccharide components in traditional Chinese medicine have also been confirmed to play a role in promoting the repair of chronic difficult-to-heal wounds. These components can regulate inflammatory responses, promote cell proliferation, and matrix remodeling, thereby accelerating the wound healing process. In the process of wound healing, the inflammatory response is an important regulatory factor, involving interactions among various cells and cytokines, such as the activation of platelets, macrophages, and fibroblasts, as well as the secretion of growth factors.

4.4 Antibacterial Effects

The active components in Zedan have inhibitory effects on various bacteria, reducing the risk of infection at the wound site. Studies have shown that Zedan can damage the bacterial cell wall and membrane, inhibiting bacterial growth and reproduction. This mechanism gives Zedan a significant advantage in treating stroke pressure ulcers, as it can reduce the risk of infection at the wound site and promote healing.

5. Clinical Application of Zedan in Treating Stroke Pressure Ulcers

Zedan, as a commonly used herb in Bai medicine, shows significant efficacy in treating stroke pressure ulcers. Its clinical applications mainly include the following aspects:

5.1 Local External Use

Zedan can be prepared into ointments or oils and directly applied to the pressure ulcer wound. Ointments or oils can be applied directly to the wound, delivering their medicinal benefits. Studies have shown that Zedan ointments or oils can improve local tissue blood circulation, inhibit inflammatory responses, promote cell regeneration and repair, thereby accelerating the healing process of the wound. Additionally, Zedan ointments or oils also possess antibacterial properties, reducing the risk of infection at the wound site.

5.2 Internal Administration for Conditioning

In addition to local external use, Zedan can also be prepared into decoctions for internal administration. Internal administration of Zedan decoctions can regulate the body's qi and blood balance, improve microcirculation, and provide sufficient nutrition and energy for wound healing. Research indicates that internal administration of Zedan decoctions can enhance the body's immune response, promoting wound healing and tissue repair.

5.3 Comprehensive Treatment

In treating stroke pressure ulcers, in addition to using Zedan, other treatment methods can be combined for comprehensive treatment, such as local cleaning, dressing changes, nutritional support, and physical therapy. These treatment methods can work synergistically to enhance treatment efficacy. Studies have shown that comprehensive treatment can accelerate the healing process of wounds, reduce scar formation, and improve patients' quality of life.

6. Case Analysis

The following is a case of using Zedan to treat stroke pressure ulcers, to further demonstrate the effectiveness and value of Zedan in treating stroke pressure ulcers.

Patient: Male, 72 years old, suffered from a stroke leading to prolonged bed rest, resulting in a pressure ulcer on the sacrococcygeal region. The wound was round, approximately 5 cm in diameter, with purulent discharge and surrounding skin redness and swelling. The patient experienced severe pain, significantly affecting his quality of life. The tongue was pale red, with a thin white coating, and the pulse was thin and wiry. A local treatment was conducted using a hospital-prepared lithospermic oil (main component: Zedan) from the Dali Bai Autonomous Prefecture Traditional Chinese Medicine Hospital, combined with internal decoctions, acupuncture, and massage as traditional Chinese medicine treatments. After one month of treatment, the wound significantly shrank, purulent discharge decreased, and surrounding skin redness and swelling subsided. The patient's pain was alleviated, and his quality of life improved. After continuing treatment for two more months, the wound completely healed without significant scarring.

7. Discussion

Zedan, as a commonly used herb in Bai medicine, shows significant efficacy in treating stroke pressure ulcers. Its mechanisms mainly include improving local blood circulation, inhibiting inflammatory responses, promoting cell regeneration and repair, and exhibiting antibacterial effects. Through comprehensive treatment methods such as local external use and internal administration, the healing process of wounds can be accelerated, scar formation reduced, and patients' quality of life improved. However, current research on Zedan's treatment of stroke pressure ulcers is still relatively limited, and its mechanisms and clinical applications require further in-depth study. In the future, research on the pharmacological effects and clinical applications of Zedan should be strengthened to provide more scientific evidence and effective methods for the treatment of pressure ulcers.

8. Conclusion

Zedan in Bai ethnic medicine shows significant efficacy in treating stroke pressure ulcers. Its mechanisms mainly include improving local blood circulation, inhibiting inflammatory responses, promoting cell regeneration and repair, and exhibiting antibacterial effects. Through comprehensive treatment methods such as local external use and internal administration, the healing process of wounds can be accelerated, scar formation reduced, and patients' quality of life improved. In the future, research on the pharmacological effects and clinical applications of Zedan should be strengthened to provide more scientific evidence and effective methods for the treatment of pressure ulcers. Additionally, efforts should be made to preserve and protect Bai medicine, promoting its integration and development with modern medicine, making a greater contribution to human health.

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