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Clinical Efficacy of Spleen-strengthening and Dampness-removing Traditional Chinese Medicine Combined with Calcineurin Inhibitors in the Treatment of Moderate to Severe Atopic Dermatitis in Children and its Impact on Skin Barrier Function

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Abstract: *Objective:* To explore the clinical effect of traditional Chinese medicine for strengthening the spleen and removing dampness combined with calcineurin inhibitors in the treatment of moderate to severe atopic dermatitis in children, and the impact of this combined regimen on the skin barrier function of children. *Methods:* 60 children with moderate to severe atopic dermatitis admitted to our hospital from January 2025 to February 2026 were selected and divided into two groups using the random number table method, with 30 cases in each group. The control group was treated with calcineurin inhibitors alone, while the observation group was treated with traditional Chinese medicine for strengthening the spleen and removing dampness combined with calcineurin inhibitors. The total clinical treatment effectiveness, skin barrier function-related indicators before and after treatment, and the occurrence of adverse reactions were compared between the two groups of children. *Results:* The total effective rate of treatment in the observation group was higher than that in the control group, and the improvement in skin barrier function indicators after treatment was better than that in the control group ($p < 0.05$). There was no significant difference in the incidence of adverse reactions between the two groups ($p > 0.05$). *Conclusion:* Traditional Chinese medicine for strengthening the spleen and removing dampness combined with calcineurin inhibitors can effectively improve the clinical treatment effect and improve the skin barrier function of children with moderate to severe atopic dermatitis in children, and the safety of the treatment can be guaranteed.

Keywords: Children's atopic dermatitis; Moderate to severe; traditional Chinese medicine for strengthening the spleen and removing dampness; Calcineurin inhibitor; Skin barrier function

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1. Introduction

Atopic dermatitis in children is a very common chronic inflammatory skin disease in clinical pediatrics. This type of disease has the basic characteristics of repeated attacks and protracted course. Children with moderate to severe symptoms will have symptoms such as obvious skin itching, erythema, and desquamation. It will not only affect the children's skin health, but also interfere with the children's daily sleep, growth and development, and bring greater psychological pressure and economic burden to the children's families. At present, Western medicine treatments for this disease are mostly based on topical drugs such as calcineurin inhibitors. These drugs can quickly relieve skin inflammation and itching symptoms. However, the long-term efficacy of the drug alone is not ideal. Some children are prone to relapse after stopping the drug, and long-term single drug use cannot fundamentally regulate the body condition of the child [1]. Traditional Chinese medicine theory believes that the core pathogenesis of atopic dermatitis in children is weakness of the spleen and stomach, endogenous moisture, and lack of nourishment of the skin. Children's organs are delicate, and the transportation and transformation functions of the spleen and stomach are not yet fully developed. Abnormal water and moisture metabolism will cause dampness to penetrate the skin and cause skin lesions. Therefore, strengthening the spleen and removing dampness is the core principle of traditional Chinese medicine in treating this disease [2,3]. At present, clinical research on the combination of traditional Chinese and Western medicine in the treatment of moderate to severe atopic dermatitis in children is gradually increasing. The purpose of this study is to explore the clinical value of traditional Chinese medicine for strengthening the spleen and removing dampness combined with calcineurin inhibitors in the treatment of moderate to severe atopic dermatitis in children and its intervention effect on skin barrier function.

2. Materials and methods

2.1. General information

60 children with moderate to severe atopic dermatitis admitted to our hospital from January 2025 to February 2026 were selected as the research subjects, and were divided into a control group and an observation group using the random number table method, with 30 cases in each group. There were 16 males and 14 females in the control group, with an age of 3 to 12 (6.85 ± 2.14) years and a disease duration of 1 to 5 (2.63 ± 1.02) years. There were 15 males and 15 females in the observation group, with an age of 3 to 13 (7.12 ± 2.08) years and a disease duration of 1 to 6 (2.71 ± 1.05) years. The two sets of data are comparable, $p > 0.05$. Inclusion criteria: (1) Meet the clinical diagnostic criteria for moderate to severe atopic dermatitis in children; (2) Aged 3 to 13 years old; (3) Family members of the children are informed and agree to participate in this study. Exclusion criteria: (1) Children with severe liver and kidney damage, cardiopulmonary disease; (2) Children who have used glucocorticoids, immunomodulators and other related therapeutic drugs in the past month; (3) Children with allergic reactions to the drugs used in this study.

2.2. Method

Children in the control group were treated with calcineurin inhibitors alone and topical 0.03% tacrolimus ointment, which was applied evenly after cleansing and drying the affected skin, twice a day, for 8 consecutive weeks. The observation group was treated with traditional Chinese medicine for strengthening the spleen and removing dampness on the basis of the treatment plan of the control group. The basic Chinese medicine formula was 10 g of *Poria cocos*, 8 g of *Atractylodes macrocephala*, 10 g of coix seed, 6 g of

tangerine peel, 10 g of Chinese yam, and 10 g of white lentil. g. 8 g of *Kochia chinensis*, 8 g of Kochia bark, and 3 g of licorice. Adjust the dose appropriately according to the age and symptoms of the child. Take 1 dose per day. After boiling in water, take 200 mL of the solution and take it warmly twice in the morning and evening. The treatment lasts for 8 weeks.

2.3. Observation indicators

2.3.1. Compare the total clinical treatment effectiveness of the two groups of children

Markedly effective means that the child's skin erythema, itching, desquamation and other symptoms have completely subsided, and the skin condition has returned to normal; effective means that the child's clinical symptoms have been significantly relieved, and the skin lesion area has been reduced by more than 50%; ineffective means that the child's clinical symptoms have not improved or even worsened, and the skin lesion area has not reduced or expanded.

2.3.2. Compare the skin barrier function indicators of the two groups of children before and after treatment

Including skin moisture content, transepidermal water loss, and skin oil content, professional skin testers are used to detect the skin at the same location on the affected skin of the child, and record the values of various indicators.

2.3.3. Compare the occurrence of adverse reactions between the two groups of children during treatment

Mainly observe adverse reactions such as local skin burning, redness, dryness, stinging, and gastrointestinal discomfort in children, and calculate the total incidence rate.

2.4. Statistical methods

Use SPSS22.0 to process data. Measurement data are expressed as mean plus or minus standard deviation, and t test is performed; count data are expressed as percentage, and χ^2 test is performed. $p < 0.05$ represents significant difference.

3. Results

3.1. Comparison of the total effective rate of clinical treatment between the two groups of children

The total effective rate of the observation group was higher than that of the control group ($p < 0.05$), **Table 1**.

Table 1. Comparison of efficacy between two groups [n (%)]

Group	Effective	Valid	Invalid	Always efficient
Control group (n = 30)	10 (33.33)	12 (40.00)	8 (26.67)	22 (73.33)
Observation group (n = 30)	16 (53.33)	12 (40.00)	2 (6.67)	28 (93.33)
χ^2				4.320
p				0.038

3.2. Comparison of skin barrier function indicators between the two groups of children before and after treatment

There was no significant difference in skin moisture content, transepidermal water loss, and skin oil content between the two groups of children before treatment ($p > 0.05$). After treatment, the improvement effect of various skin barrier function indicators in the observation group was better than that in the control group ($p < 0.05$). **Table 2**.

Table 2. Comparison of skin barrier function indicators between the two groups ($\bar{x} \pm s$)

Group	n	Skin moisture content before treatment (%)	Skin moisture content after treatment (%)	Transepidermal water loss before treatment (g/(m²·h))	Transepidermal water loss after treatment (g/(m²·h))	Skin oil content before treatment (μg/cm²)	Skin oil content after treatment (μg/cm²)
control group	30	32.15 ± 4.26	45.36 ± 5.12	18.65 ± 3.21	12.32 ± 2.15	8.26 ± 1.53	11.35 ± 1.86
observation group	30	31.98 ± 4.31	52.68 ± 5.34	18.59 ± 3.18	8.65 ± 1.92	8.31 ± 1.49	14.62 ± 2.03
t value		0.154	5.420	0.073	6.974	0.128	6.505
p value		0.878	< 0.001	0.942	< 0.001	0.899	< 0.001

3.3. Comparison of the incidence of adverse reactions in children between the two groups

There was no significant difference in the incidence of adverse reactions between the two groups of children during treatment ($p > 0.05$). **Table 3**.

Table 3. Comparison of adverse reactions between the two groups [n (%)]

Group	Burning of skin	Reddened skin	Gastrointestinal discomfort	Overall incidence
Control group (n = 30)	2 (6.67)	1 (3.33)	0 (0.00)	3 (10.00)
Observation group (n = 30)	1 (3.33)	1 (3.33)	1 (3.33)	3 (10.00)
χ^2				0.185
p				0.667

4. Discussions

The pathogenesis of moderate-to-severe atopic dermatitis in children is not yet completely clear clinically. Modern medical research shows that the occurrence and development of the disease are related to various factors such as impaired skin barrier function, immune disorders, genetic factors, environmental stimulation, etc. Among them, damage to the skin barrier function is the core cause of the onset and recurrence of the disease. The skin barrier can lock skin moisture and resist the invasion of various external irritants and allergens. When the barrier function is damaged, the skin will lose a lot of water, and the transepidermal water loss will increase significantly. The dryness and sensitivity of the skin will continue to worsen, thereby inducing inflammatory reactions and itching symptoms, forming a vicious cycle [4]. Calcineurin inhibitors used in Western medicine can reduce the inflammatory infiltration of the skin and quickly relieve the symptoms of skin lesions in children by inhibiting the release of local skin inflammatory factors. However,

these external drugs can only act on the local surface layer of the skin and cannot regulate the internal immune status and organ functions of the children. Therefore, the overall efficacy of single use is limited, and it is difficult to completely repair the damaged skin barrier. Children have a higher probability of recurrence after stopping the drug [5]. The theory of traditional Chinese medicine has a complete system for understanding atopic dermatitis in children. Weak spleen and stomach function in children is the fundamental internal cause of the disease. Children are full of vitality but have delicate organs. The transportation and transformation functions of the spleen and stomach are not yet mature. Improper daily diet or weak constitution will lead to abnormal transportation and transformation of the spleen and stomach, and water dampness. Unable to be metabolized and discharged normally, dampness evil is endogenous and infiltrates the skin, causing depression and heat, eventually causing skin erythema, itching, exudation and other lesions. Therefore, clinical treatment needs to be based on the core principles of strengthening the spleen, removing dampness, consolidating the body and strengthening the body, to improve the child's physical condition from the root cause, and block the inherent pathogenesis of the disease [6].

The results of this study show that the total clinical treatment effectiveness of children in the observation group is significantly higher than that of the control group. This result can illustrate that the combined traditional Chinese and Western medicine treatment plan of spleen-strengthening and dampness-removing traditional Chinese medicine combined with calcineurin inhibitors can better improve the treatment effect of moderate to severe atopic dermatitis in children than single Western medicine treatment. Analyzing the specific reasons, it can be found that the topical application of calcineurin inhibitors can quickly control the inflammatory reaction on the skin surface, relieve the symptoms of itching, erythema and other discomforts in children in the acute phase, and create basic conditions for skin repair. In the self-made traditional Chinese medicine prescription for strengthening the spleen and removing dampness, *Atractylodes macrocephala*, *Poria cocos*, yam, white lentil and other medicinal materials can strengthen the spleen, replenish Qi, and replenish the spleen and stomach. It can effectively improve the basic constitution of children with weak spleen and stomach, enhance the ability of the spleen and stomach to transport water and dampness, and prevent the generation of dampness evil in the body from the root. Coix seed and tangerine peel can diuretic and dampness, regulate Qi and strengthen the spleen. They can accelerate the metabolism and discharge of accumulated water and dampness in the body, and clear the skin of latent dampness pathogenic factors. Kochia bark and white bark are commonly used medicinal materials in the clinical treatment of skin eczema and dermatitis. They have the effects of clearing away heat and dampness, dispelling wind and relieving itching. They can directly act on the pathogenesis of skin lesions and help relieve skin itching and inflammatory reactions. Licorice can harmonize various medicines, alleviate their properties, and adapt to the delicate constitution of children. The combined use of a variety of medicinal materials can achieve both symptomatic and symptomatic relief, while relieving symptoms on the surface of the skin while regulating organ functions and the internal environment of the body, making up for the shortcomings of a single Western medicine treatment that only treats the symptoms but not the root cause [7].

The data of this study show that after treatment, various skin barrier function indicators of the two groups of children have improved to a certain extent, but the improvement of the children in the observation group is more significant, which can confirm that the combined treatment of traditional Chinese and Western medicine has a better repair effect on the damaged skin barrier of children. The single use of calcineurin inhibitors can only inhibit the skin's inflammatory response, and cannot effectively improve the water-locking

and moisturizing ability of the skin's stratum corneum, nor can it regulate the skin's oil secretion status, so the repair effect on the skin barrier is relatively limited. Traditional Chinese medicine that strengthens the spleen and removes dampness can improve the body's water metabolism by regulating the spleen and stomach functions of children's bodies, so that the skin can be adequately nourished by body fluids, thereby increasing the moisture content and oil secretion level of the skin's stratum corneum, and repairing the structure of the skin's stratum corneum. At the same time, the overall conditioning effect of traditional Chinese medicine prescriptions can stabilize the immune function of children, reduce the sustained release of inflammatory factors, avoid secondary damage to the skin barrier caused by repeated inflammation, thereby effectively reducing transepidermal water loss, gradually restoring the integrity of the skin barrier and normal physiological functions, breaking the vicious cycle of repeated skin damage and inflammation, and providing long-term guarantee for the healthy recovery of children's skin [8].

The total incidence of adverse reactions in the two groups remained consistent this time, which shows that the treatment plan has high clinical safety. The traditional Chinese medicine prescriptions used this time to strengthen the spleen and remove dampness are commonly used Chinese medicinal materials with mild medicinal properties. The dosage of the medicine is adjusted according to the age and constitution of the child. The medicinal properties are mild and the side effects are very low. It will not cause obvious stimulation to the liver, kidney and gastrointestinal functions of the children. A small number of children in the observation group experienced mild gastrointestinal discomfort, and the symptoms were relatively mild and could be relieved without special treatment and would not affect the treatment process. A small amount of skin burning and redness symptoms in the control group were minor local irritation reactions caused by external application of calcineurin inhibitors. They are common temporary adverse reactions in clinical practice and will subside on their own as the skin adapts as treatment progresses.

5. Conclusion

Based on the results of this study, it can be seen that when carrying out clinical treatment for children with moderate to severe atopic dermatitis, on the basis of conventional Western medicine treatment with calcineurin inhibitors, adding spleen-strengthening and dampness-removing traditional Chinese medicine for systemic conditioning can achieve a therapeutic effect of both internal and external treatment. This treatment plan is in line with the onset characteristics of moderate to severe atopic dermatitis in children, which is characterized by deficiency in origin and excess in excess. It has more obvious application advantages than single Western medicine treatment, and is suitable for promotion and use in the clinical treatment of pediatric dermatology.

About the author

Zhou Jiwen (1983-), female, Han nationality, native of Suzhou, Jiangsu, with a bachelor's degree, currently holds the title of deputy chief physician, and is a dermatologist at the Wujiang District Children's Hospital in Suzhou. Her research direction is the treatment of common skin diseases in children by integrating traditional Chinese and Western medicine.

Disclosure statement

The author declares no conflict of interest.

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