

Clinical Effect of *Bifidobacterium* Triple Viable Bacteria Combined with Cetirizine in the Treatment of Eczema in Children and its Effect on Immunoglobulin Levels

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Abstract: *Objective:* To analyze the clinical effect of *Bifidobacterium* triple viable bacteria combined with cetirizine in the treatment of eczema in children and its impact on the immunoglobulin levels of the children. *Methods:* 50 children with eczema who received treatment in our hospital from January 2021 to December 2022 were selected as research subjects and divided into 25 cases in a group using the computer randomization method. In addition to basic treatment for both groups, patients in the control group were treated with cetirizine, while the observation group was treated with *Bifidobacterium* triple viable bacteria and cetirizine. The immunoglobulin levels, inflammatory factor levels, intestinal flora numbers, treatment effects, and recurrence rates within six months were compared between the two groups before and after treatment. *Results:* Before treatment, there was little difference in the indicators between the two groups of children ($P > 0.05$). After treatment, various immunoglobulins (IgM and IgG), inflammatory factors (interleukin-4 and interleukin-10), and the number of intestinal flora (including *Escherichia coli*, *Lactobacillus*, and *Bifidobacterium*) in the observation group was better than that of the control group, the total effective rate of treatment was higher than that of the control group, and the recurrence rate within six months was lower than that of the control group ($P < 0.05$). *Conclusion:* *Bifidobacterium* triple viable bacteria combined with cetirizine can actively regulate immunoglobulin levels and the number of intestinal flora, control inflammatory reactions, and have high treatment effectiveness and low recurrence rates in the treatment of pediatric eczema.

Keywords: Pediatric eczema; *Bifidobacterium* triple viable; Cetirizine; Immunoglobulin

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1. Introduction

Eczema is a common allergic skin condition in infants and young children. It manifests as skin rashes and varying degrees of itching. Timely intervention is required or it may cause infection and recurring symptoms, affect sleep, and even impair children's growth. Currently, the main clinical treatment for pediatric eczema

is anti-allergic medication and keeping the skin dry ^[1], but the effect is average. Research has found that the occurrence and development of eczema in children are related to many factors, including intestinal flora imbalance ^[2]. Therefore, this disease can be treated by regulating intestinal flora. *Bifidobacterium* triple viable bacteria serve as intestinal flora regulators that can maintain the balance of intestinal flora, control inflammatory reactions, enhance immune function ^[3], and improve disease symptoms. This study aims to analyze the effect of *Bifidobacterium* triple viable bacteria combined with cetirizine (a commonly used anti-allergic drug in children) in treating eczema in children and its impact on immunoglobulin levels.

2. Materials and methods

2.1. Materials

50 children with eczema who received treatment in our hospital from January 2021 to December 2022 were selected as the subjects of this study. They were divided into 25 cases in a group through computer randomization.

The control group had 14 males and 11 females, aged 4 months to 4 years and 5 months, with a mean of 2.32 ± 0.64 years; the disease duration was 1 to 5 weeks, with an average of 2.10 ± 0.53 weeks. The observation group had 15 males and 10 females, aged 5 months to 4 years and 5 months, with a mean of 2.40 ± 0.60 years; the disease duration was 1 to 5 weeks, with an average of 2.19 ± 0.50 weeks. Statistical analysis was performed on the data of the two groups ($P > 0.05$).

Inclusion criteria included patients who meet the disease diagnostic criteria; the skin lesion area is within 30% of the body surface area; patients who meet the medication indications; and patients who have complete clinical data and informed consent.

Exclusion criteria were patients who have other skin diseases, infectious diseases, and immune diseases; patients who have other severe diseases; patients who recently received relevant treatment; and patients with an allergic constitution.

2.2. Methods

Basic treatment was given to both groups: After washing the eczema area with 3% boric acid solution, an appropriate amount of zinc oxide ointment was applied evenly thrice daily. The affected area should be kept dry and away from allergens.

In addition to basic treatment, the control group was treated with cetirizine (cetirizine hydrochloride oral drops). It was taken 1 ml each time, once a day, for four consecutive weeks.

Based on the control group's treatment plan, the observation group was additionally treated with *Bifidobacterium* triple viable bacteria. *Bifidobacterium* triple viable bacteria powder was taken orally three times daily, one pack each time, for four consecutive weeks. The medicine can be taken with water. Patients should note their daily diet and sleeping environment.

2.3. Observation indicators

- (1) Immunoglobulin levels: The spectrophotometer detection method was implemented, measuring the levels of IgM and IgG.
- (2) Levels of inflammatory factors: Levels of IL-4 (interleukin-4) and IL-10 (interleukin-10) were detected by the dextran method and ELISpot kit.
- (3) Number of intestinal flora: *Escherichia coli*, *Lactobacillus*, and *Bifidobacterium* were detected using the American ABI StepOne real-time fluorescence PCR (polymerase chain reaction) instrument.

- (4) Treatment effectiveness: The area of skin lesions subsided > 70% indicated markedly effective; the area of skin lesions subsided between 30 and 70% indicated effective; the area of skin lesions subsided < 30% or increased indicated ineffective. Total effective rate = Markedly effective + Effective [4].
- (5) Recurrence rate: The recurrence rate was calculated after following-up for six months.

2.4. Statistical methods

SPSS25.0 was used for statistical analysis, mean \pm standard deviation (SD) was used to represent measurement data (in line with normal distribution), and [n (%)] was used to represent counting data. Independent sample *t* test and χ^2 test was carried out. $P < 0.05$ indicated statistically significant difference.

3. Results

3.1. Immunoglobulin levels

As shown in **Table 1**, there was little difference in immunoglobulin levels between the two groups of children before treatment, $P > 0.05$. After treatment, the IgM and IgG levels in the observation group were lower than those in the control group, $P < 0.05$.

Table 1. Immunoglobulin levels (mean \pm SD)

Group	Number of cases (n)	IgM (g/L)		IgG (g/L)	
		Before treatment	After treatment	Before treatment	After treatment
Control group	25	2.55 \pm 0.41	1.81 \pm 0.29	18.20 \pm 2.31	14.31 \pm 2.13
Observation group	25	2.59 \pm 0.38	1.59 \pm 0.22	18.15 \pm 2.23	12.50 \pm 2.24
<i>t</i>	-	0.358	3.022	0.078	2.928
<i>P</i>	-	0.722	0.004	0.938	0.005

3.2. Levels of inflammatory factors

As presented in **Table 2**, the levels of inflammatory factors in the two groups of children with eczema were higher before treatment, $P < 0.05$. After treatment, the levels of IL-4 and IL-10 in the observation group were lower than those in the control group, $P < 0.05$.

Table 2. Inflammatory factor levels (mean \pm SD)

Group	Number of cases (n)	IL-4 (ng/L)		IL-10 (ng/L)	
		Before treatment	After treatment	Before treatment	After treatment
Control group	25	68.20 \pm 4.15	47.52 \pm 3.36	12.62 \pm 2.14	9.31 \pm 2.10
Observation group	25	68.11 \pm 4.29	36.21 \pm 3.01	12.57 \pm 2.23	7.59 \pm 1.14
<i>t</i>	-	0.075	12.536	0.081	3.599
<i>P</i>	-	0.940	0.000	0.936	0.001

3.3. Number of intestinal flora

As demonstrated in **Table 3**, the difference in the number of intestinal flora between the two groups of children with eczema before treatment was insignificant, $P > 0.05$. After treatment, the number of *Escherichia coli* in the observation group was lower than that in the control group, while the number of *Lactobacillus* and *Bifidobacterium* was higher than that in the control group, $P < 0.05$.

Table 3. Number of intestinal flora (mean \pm SD)

Group	Number of cases (n)	Escherichia coli (lg CFU/g)		Lactobacillus (lg CFU/g)		Bifidobacterium (lg CFU/g)	
		Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Control group	25	7.55 \pm 0.68	7.39 \pm 0.75	7.20 \pm 0.78	7.21 \pm 0.85	7.55 \pm 0.63	7.61 \pm 1.13
Observation group	25	7.57 \pm 0.59	6.83 \pm 0.71	7.15 \pm 0.82	8.15 \pm 1.10	7.51 \pm 0.58	8.31 \pm 1.10
<i>t</i>	-	0.111	2.711	0.221	3.381	0.234	2.219
<i>P</i>	-	0.912	0.009	0.826	0.001	0.816	0.031

Abbreviation: lg CFU, logarithms of colony-forming unit

3.4. Treatment effectiveness and recurrence rate

As shown in **Table 4**, the total effective rate of treatment in the observation group was higher than that in the control group, and the recurrence rate within six months was lower than that of the control group, $P < 0.05$.

Table 4. Treatment effectiveness and recurrence rate [n (%)]

Group	Number of cases (n)	Markedly effective	Effective	Ineffective	Total effective rate	Recurrence rate
Control group	25	10 (40.00)	7 (28.00)	8 (32.00)	17 (75.00)	6 (35.29)
Observation group	25	15 (60.00)	8 (32.00)	2 (8.00)	23 (92.00)	2 (8.70)
χ^2	-	-	-	-	4.500	4.322
<i>P</i>	-	-	-	-	0.034	0.038

4. Discussion

Eczema is a relatively common skin condition in infants and young children. Some newborns develop eczema just a few days after birth. The pathogenesis is currently unknown, it may be related to living environment, diet, and recurring skin injuries. Itching symptoms affect children's daily emotional state, sleep quality, and healthy growth, thus it is essential to reduce the symptoms of eczema. The clinical treatment must also reduce the recurrence rate while relieving the symptoms [5]. Certain children continue to experience symptoms despite ongoing anti-allergic treatment. There is visible relief but limited overall effect, hence there is an urgent need to explore more ideal treatment options. Several factors need to be considered in the clinical use of medication for infants and young children, such as the child's age, allergic history, and other accompanying conditions. In addition to the drug efficacy, the safety of the drug must also be considered.

The antibodies provided by the mother gradually decrease after birth. At the same time, the autoimmune and the intestinal functions are not fully developed. Intestinal flora imbalance will reduce intestinal function and subsequently affect immune function. As infants and young children grow, they commonly experience allergies, constipation, diarrhea, etc., these are mostly related to the status of gastrointestinal function. Intestinal flora imbalance can cause immune dysfunction [6,7], thus increasing the incidence of allergic diseases. The occurrence and development of eczema in children are also related to intestinal flora imbalance. Probiotics can change the host microbiota through a sufficient number of live microorganisms, which can induce intestinal immunity and stimulate the development of immune organs, such as the spleen, thymus, etc. [8]. Additionally, it can induce macrophages and lymphocytes to produce cytokines and simultaneously enhance immune function. Therefore, applying probiotics can regulate intestinal function, thereby strengthening immune function and reducing the incidence of eczema [9,10]. Cetirizine is an anti-allergic drug commonly used in children. It is often

used to treat skin diseases such as urticaria and itchy skin, but the treatment effectiveness of cetirizine alone in treating eczema in children is average. The main components of *Bifidobacterium* triple viable bacteria are three probiotics, *Enterococcus faecium*, *Bifidobacterium longum*, and *Lactobacillus acidophilus*, which can regulate intestinal flora, supplement normal physiological bacteria, and exert an immunomodulatory effect^[11,12].

This study selected 50 children with eczema as research subjects and divided them into two groups. The control group used cetirizine alone for treatment while the observation group adopted treatment of cetirizine and *Bifidobacterium* triple viable bacteria. The results showed that the levels of immunoglobulins and inflammatory factors in the observation group were lower than those in the control group, the number of *Escherichia coli* in the intestinal flora was lower than that of the control group, and the number of *Lactobacillus* and *Bifidobacterium* was higher than that of the control group. These indicate that the *Bifidobacterium* triple viable bacteria effectively regulates intestinal flora and controls inflammatory response, providing ideal enhancement of immune function. The pathogenesis of eczema involves destruction of the Th1/Th2 (Type 1 T helper/Type 2 T helper) balance and increased release of inflammatory factors from Th2 cells^[13-15]. The aggravated inflammatory reaction and the disordered immune function lead to allergic reactions. Combined treatment options can regulate intestinal flora, improve immune function, and increase the anti-allergic effect^[16,17]. The total effective rate of treatment in the observation group (92.00%) was higher than that of the control group (75.00%), further proving the effectiveness of the combined treatment plan. Pediatric eczema is a skin disease with a high recurrence rate. After following-up for six months, the results showed that the recurrence rate of the observation group was 8.70%, which was lower than that of the control group, 35.29%. It can be seen that the long-term effect of the combined treatment plan is optimal and ideal, as it can reduce disease recurrence and exert a strong curative effect.

5. Conclusion

All in all, eczema is a high-incidence disease in infants and young children that bothers many parents. Uncomfortable symptoms such as itching can lead to constant crying in children and a reduction in sleep quality. This should be carefully monitored, as it may cause infections, lead to adverse consequences, and even induce other diseases, increasing the treatment difficulty. The current method of treating eczema in children is anti-allergic drugs. This study found that the combined treatment of cetirizine and *Bifidobacterium* triple viable bacteria in pediatric eczema has a significant effect and is worthy of promotion.

Disclosure statement

The author declares no conflict of interest.

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