

Probiotic Effectiveness in Children Less than Five Years Old with Perennial Allergic Rhinitis: A Randomized Controlled Trial

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ABSTRACT

Objective: The purpose of this study was to evaluate the effectiveness of probiotics in treating perennial allergic rhinitis in children younger than five and to compare them to cetirizine.

Study Design: A randomized controlled trial

Place and Duration: This study was conducted at Mohtarma Benazir Bhutto Shaheed Medical College Mirpur & Child specialist New City Teaching Hospital Mirpur AJK in the duration from July, 2022 to December, 2022.

Methods: There were 160 children with allergic rhinitis had age 3-60 months were included in this study. After getting informed written consent from the parents of children detailed demographics were recorded. Symptoms of presented cases were recorded. Patients were equally divided in two groups. Group I received cetirizine in 80 cases and in group II 60 cases received probiotics LP-33 for 5-weeks. Post treatment efficacy and adverse events among both groups were compared. SPSS 23.0 was used to analyze all data.

Results: Mean age of the cases was 27.6±8.53 months with mean weight 12.6±11.81 kg. among 160 children, 94 (58.8%) cases were males and 66 (41.2%) children were females. Majority 82 (51.3%) cases had nasal blocking, sneezing in 80 (50%) cases, coughing in 75 (46.9%) cases, sleeping difficulties in 72 (45%) and feeding difficulties in 69 (43.1%) cases. After 5 weeks, in group I efficacy found in 72 (90%) cases and in group II 69 (86.3%) cases showed improvement, difference was insignificant ($p>0.05P$). Post treatment adverse outcomes in group I was 2 (2.5%) and in group II there was no any side effect found.

Conclusion: In this study, we found that probiotic (LP-33) was just as effective as cetirizine in treating perennial allergic rhinitis in children less than five years old. The study found that unlike conventional treatments, probiotics had no negative effects on children with allergic rhinitis.

Keywords: Allergic Rhinitis, Probiotic, Cetirizine, Perennial, Rhinorrhea

INTRODUCTION

The nasal sensitivity inflammation known as allergic rhinitis (AR) is thought to afflict anywhere from 10–40% of the global population at this point [1]. Nasal congestion, sneezing, and itching are among common symptoms of AR. Eyes that are watery, itchy, or red are signs of allergic rhinoconjunctivitis, which affects certain people. Extreme AR can have negative effects on one's daily life, including sleep and productivity. [1]

Strachan reported in 1989 that the incidence of hay fever among children in the UK was negatively correlated with the number of siblings a person had. Later he put up the "Hygiene theory" [2], which states that the absence of exposure to infectious sources, parasites, and symbiotic bacteria alters the composition of one's intestinal microbiota and hence one's immune system's maturation. The "Hygiene theory" includes the "Old Friends hypothesis" and the "Microflora hypothesis" [3]. The "Microflora hypothesis" proposes that the presence of abnormal or dysfunctional gut microbiota, known as dysbiosis, contributes to the emergence of immunological illnesses including allergy diseases in otherwise healthy hosts [4]. The symbiotic relationship between hosts and microorganisms is vital to immune system function and general well-being. Among the most telling signs of allergic illnesses [5] are shifts in the microflora of the digestive tract. Probiotics, often known as "friendly bacteria," are defined as "living bacteria that colonize the gastrointestinal system and, when provided in suitable proportions, provide health benefits to the host" [6]. Probiotics have been proposed as modulators of the allergic response and advocated as therapeutic and preventative interventions for allergic disease due to recent studies showing that they can increase the production of systemic IFN, IL10, and IL12, improve the pre-Th1 immune response, and reduce Th2 cytokines.[7,8]

Oral quasi 2nd H1 receptor nasal decongestant (AH) meds are preferred over a first generation H1-antagonist, which is linked to more adverse effects like sedation, excessive mucosal drying,

and impaired motor coordination, when it comes to treating intermittent mild or intermittent AR. In contrast, daily use of an intranasal corticosteroids (INCS) or an intranasal antihistamines (INAH) is the therapy of choice for persistent moderate to severe symptoms of seasonal rhino-conjunctivitis [9]. The addition of an INAH would be the most reasonable second line of defense if an INCS, the initial therapy of choice for SAR or PAR, is unable to manage symptoms. Nasal blockage is an inflammatory occurrence that can be managed with intranasal corticosteroids rather than antihistamines. In order to alleviate AR nasal symptoms, a combination product of fluticasone propionate and azelastine HCl has been shown to be more effective than either medicine alone [10]. Mometasone furoate inhaler is one of the most researched and widely used topical corticosteroids (MFNS). There is substantial evidence that MFSN is effective, and it also has a fantastic safety profile. The specific finding was that MFNS considerably reduced allergic inflammation after allergen exposure [11]. In addition to nasal corticosteroids, the LTD4 (leukotriene D) antagonist montelukast may be used as a treatment option for some individuals with AR. The effectiveness of montelukast for treating moderate or severe AR is lower than that of oral antihistamines [12], despite its outstanding safety and tolerability. To far, allergen immunotherapy (AIT) is the only disease-modifying treatment for AR [13]. Individuals with moderate to severe AR, particularly those with cross-linked allergy problems, who do not find relief from their symptoms with medical treatment may be suitable candidates for AIT. In individuals with AR, AIT improves quality of life by decreasing the need for medication and alleviating symptoms. Sublingually (subcutaneously, SCIT) and subcutaneously (SLIT) are the most common routes of administration (subcutaneous delivery, SCIT). Several randomized controlled trials showed that SLIT was just as effective as SCIT, but with a far more favorable safety profile [14]. Negative responses are uncommon, and when they do occur, they often manifest locally as symptoms like itching and swelling. The most

significant contraindications to AIT are uncontrolled asthma, a history of severe systemic response to immunotherapy, and eosinophilic esophagitis.

Yet, there are potential drawbacks of taking medications to treat AR (e.g., dry mouth, drowsiness, dizziness related to anti-H1 drugs). There has been a worldwide uptick in the usage of probiotics as a second line of defense. Probiotics have been shown to improve immunological function, mitigate inflammation's negative effects, and reestablish a healthy gut flora in people with rheumatoid arthritis (AR). The microbiota in the gut has been linked to immune regulation, acting as a physical barrier, and providing protection against infection [15].

The purpose of the current study was to examine the effects of probiotics to the conventional therapy of anti-histamines for allergic rhinitis in children younger than five years of age (Cetirizine).

MATERIAL AND METHODS

This randomized controlled trial was conducted at Mohtarma Benazir Bhutto Shaheed Medical College Mirpur & Child specialist New City Teaching Hospital Mirpur AJK in the duration from July, 2022 to December, 2022 and comprised of 160 children. Clinically diagnosed cases of allergic rhinitis in children aged 3 months to 5 years old (with symptoms such as nasal congestion, itchy eyes, runny nose, a persistent cough, and trouble eating and sleeping) were included in the study. After describing the goals of the experiment to the parents, they gave their assent voluntarily.

Patients were equally divided in two groups. Children in Group I received a 5mg (children aged 2–5) or a 2.5mg (children aged <2 years) cetirizine pill once a day for 5 weeks. Manufacturer-supplied alphanumeric codes were placed on bottles of tablets to eliminate potential for user or researcher bias. Group II received a chewable tablet containing 2×10^9 CFU (two billion) of *Lactobacillus Paracasei* (LP-33) on a daily basis for five weeks.

Parents of all research participants were asked to monitor their children's use of the offered tablets to verify they were being used as intended. Study children's demographic and clinical data on allergic rhinitis were collected by the attending paediatrician using a pre-designed questionnaire during the initial appointment. Excluded from the research were children who had comorbidities such as pneumonia, asthma, renal impairment, recent immunotherapy, hypersensitivity to study medicines, or who had used antihistamines or nasal decongestants during the previous 3-10 days. Each kid in the research returned for a second visit six weeks after their initial appointment, and again two weeks later. During subsequent checkups, the same questionnaire was used to note whether or not the children in each group had shown any progress as a result of the intervention.

Statistical analysis and data entry were performed in SPSS 23.0 (Statistical Program for the Social Sciences). Descriptive statistics of the type often employed were applied to the data. After the second and sixth weeks of treatment, the two groups' performance on the outcome variable of reduced allergic rhinitis symptoms was compared using Pearson's Chi-square test. When the probability level was less than 0.05, it was considered significant.

RESULTS

Mean age of the cases was 27.6 ± 8.53 months with mean weight 12.6 ± 11.81 kg. among 160 children, 94 (58.8%) cases were males and 66 (41.2%) children were females. Majority 82 (51.3%) cases had nasal blocking, sneezing in 80 (50%) cases, coughing in 75 (46.9%) cases, sleeping difficulties in 72 (45%) and feeding difficulties in 69 (43.1%) cases.(table 1)

After 5 weeks, in group I efficacy found in 72 (90%) cases and in group II 69 (86.3%) cases showed improvement, difference was insignificant ($p > 0.05P$).(figure 1)

Post treatment adverse outcomes in group I was 2 (2.5%) and in group II there was no any side effect found.(table 2)

Table-1: Patients included detailed demographics

Variables	Frequency (160)	Percentage
Mean age (months)	27.6 ± 8.53	
Mean Weight (kg)	12.6 ± 11.81	
Gender		
Male	94	58.8
Female	66	41.2
Nasal Blocking		
Yes	82	51.3
No	78	48.7
Sneezing		
Yes	80	50
No	80	50
Coughing		
Yes	75	46.9
No	85	53.1
Sleeping difficulties		
Yes	72	45
No		88 55
Feeding difficulties		
Yes	69	43.1
No	91	56.9

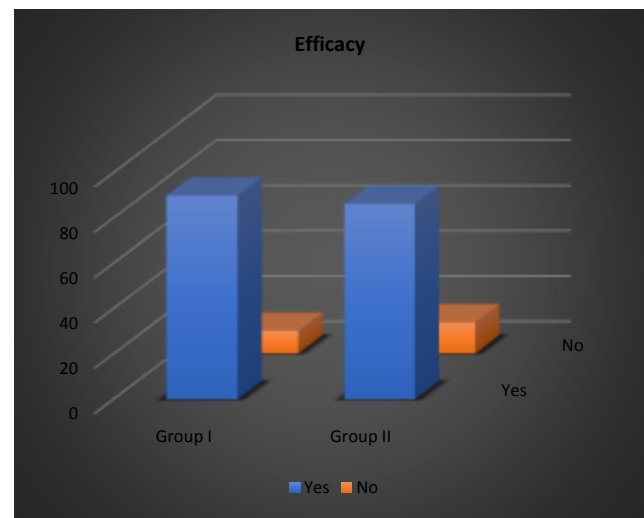


Figure-1: After 5 weeks, comparison of efficacy among both groups

Table 2: Association of adverse outcomes among both groups

Variables	Group I (80)	Group II (80)
Adverse outcomes		
Yes	2 (2.5%)	0
No	78 (77.5%)	80 (100%)

DISCUSSION

Allergic rhinitis can be caused by an immunological response to inhaled allergens and certain IgE antibodies in the body. Inflammatory chemicals, such as histamine, released by mast cells (immune cells) in the body produce swelling of the nasal mucosa. Allergic rhinitis is characterized by sneezing, nasal congestion, and a runny nose. If allergic rhinitis symptoms are not managed well, they can impair a person's ability to breathe, sleep, learn, and focus. [16,17]

Several randomized clinical trials and reviews/meta-analyses have examined the effects of probiotics on allergic rhinitis. [18,19] Research on the use of probiotics as a first line of allergy defense has progressed. The bacterium *L. paracasei* can be found in the guts of healthy people and animals. Evidence from the past suggests that *L. paracasei* can help mitigate allergic reactions by rebalancing the Th1/Th2 axis of the immune response. [20] The majority of participants in the current study reported a reduction in symptoms of allergic rhinitis after five weeks of treatment with a combination of probiotic (LP-33) and cetirizine. Probiotics (LP-33) considerably improved the quality of life of research individuals

with persistent allergic rhinitis, as were similar results from a study[21] involving 425 participants. [21] Twelve randomized controlled trials (RCTs) were reviewed by Vliagofti H et al.[22], and nine of these studies assessed clinical outcomes of probiotics in allergic rhinitis, finding that probiotic-treated individuals had lower symptom severity and reduced relief drug use compared to placebo. According to the findings of Zuccotti et al systematic review and meta-analysis, [23]

Probiotics have been shown to have positive therapeutic benefits on allergic response, as shown in improvements in symptom ratings and quality of life, according to a recent review paper on the role of probiotic supplementation in patients with allergic rhinitis by Vilà-Nadal et al.[24]. Clinical studies have demonstrated that probiotic medication can reduce allergic rhinitis symptoms and their impact on quality of life. Pro-biotics may be able to modify the illnesses, but the exact mechanism by which they do so has to be determined. Probiotics may boost T helper 1 (Th1) immunity and dampen T helper 2 (Th2) responses in animal models. [25] Additional data shows that probiotics may shift the balance of gut bacteria toward more regulatory T cells. [26] Further translational research is needed to better understand the function of probiotics in the human immune response.

In our study, post treatment adverse outcomes in cetirizine group was 2 (2.5%) and in probiotics group there was no any side effect found. The use of probiotics to treat allergic rhinitis in children has not been associated with any serious adverse effects, according to previous research.[27,28] Children less than five years old who suffer from chronic allergic rhinitis have two therapy options: either probiotics or cetirizine, as shown by the current study. Also, there are no major negative effects associated with utilizing probiotics to treat allergic rhinitis in kids. Further controlled studies with specific probiotic strains are needed to prove their efficacy and pave the way for evidence-based recommendations.

CONCLUSION

In this study, we found that probiotic (LP-33) was just as effective as cetirizine in treating perennial allergic rhinitis in children less than five years old. The study found that unlike conventional treatments, probiotics had no negative effects on children with allergic rhinitis.

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