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# EFFECT OF MULTISTRAIN PROBIOTICS ON THE SEVERITY AND FREQUENCY OF UPPER RESPIRATORY TRACT INFECTIONS: A CLINICAL STUDY

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## Abstract

***Background:*** *Upper respiratory tract infections (URTIs) are a common health issue that significantly impact individuals' quality of life. Probiotic supplementation has been suggested as a potential intervention to reduce the frequency, severity, and duration of URTIs.*

***Objective:*** *This study aimed to evaluate the role of multistrain probiotics in the prevention and management of URTIs.*

***Methods:*** *This cross-sectional study was conducted at Multiple Teaching Hospitals of Punjab, Pakistan During December 2025 till February 2026. The study involved a total of 185 patients, aged between 18 and 65 years. Data collection was carried out in two phases: baseline and follow-up. At baseline, participants underwent a thorough medical examination and completed questionnaires assessing their general health and history of respiratory infections.*

***Results:*** *The treatment group experienced a significantly lower frequency of URTIs (1.14 episodes per participant) compared to the placebo group (2.03 episodes per participant, $p < 0.01$). Symptom severity, as indicated by the Jackson score, was significantly reduced in the probiotic group ($2.3 \pm 0.8$) compared to the placebo group ($3.4 \pm 1.1$, $p < 0.05$). The duration of illness was also shorter in the treatment group ($4.5 \pm 1.2$ days) compared to the placebo group ($6.2 \pm 1.5$ days, $p < 0.01$). Immune markers showed a favorable response in the probiotic group, with a reduction in IL-6 levels and an increase in IL-10.*

***Conclusions:*** *Multistrain probiotics significantly reduce the frequency, severity, and duration of URTIs. The probiotics also positively impact immune function and quality of life, with minimal side effects. These findings suggest that multistrain probiotics could be a useful adjunct in the prevention and management of URTIs, particularly in individuals prone to recurrent infections.*

## Introduction

URTIs represent common infections across the world which cause millions of annual cases particularly during winter season. These formulations contain multiple probiotic strains to supply various species that collaborate for immune regulation and infection prevention [1]. Multistrain probiotics are more effective at improving overall health outcomes than single-strain probiotics because they offer a wider range of benefits. Different strains within probiotics align together to enhance the immune responses by protecting mucosal membranes while releasing protective cytokines while building healthy germ colonies in both intestinal and airway systems [2]. Studies indicate that some types of probiotics shape the respiratory microbiome to assist in protecting the respiratory tract from dangerous colonizing pathogens. Through their interaction with the immune system probiotics increase human defense capabilities against respiratory pathogens that cause URTIs [3].

The effectiveness of multistrain probiotics for treating URTI severity and frequency is presently under evaluation through clinical trials and meta-analyses and these studies indicate positive outcomes [4]. The intake of multiple bacterial strains in probiotics leads to decrease upper respiratory tract infections in all age groups especially among elderly patients and people with respiratory diseases or those who spend time in dense viral exposure settings such as healthcare institutions [5]. Studies demonstrate that probiotics decrease both symptom intensity and illness duration of URTIs thus offering an alternative to the normal medical practice of antibiotic use despite its inferior performance towards viral pathogens. Multistrain probiotic effectiveness depends heavily on the proper time and extent of their use. In order to possibly activate their immune system during the peak URTI season, people should think about taking probiotics as a preventative measure before symptoms appear [6]. These probiotics help control the immune response of the body, allowing it to repair itself more quickly, which may result in the same benefits following an infection. Studies continue to investigate the utility of multistrain probiotics as a treatment option for URTIs but available evidence shows promise. Researchers still need to resolve key problems regarding finding the best strains and dosage amounts of probiotics while comprehending how these organisms create their effects [7].

## Objective

This study aimed to evaluate the role of multistrain probiotics in the prevention and management of URTIs

## Methodology

This cross-sectional study was conducted at Multiple Teaching Hospitals of Punjab, Pakistan During December 2025 till February 2026. The study involved a total of 185 patients, aged between 18 and 65 years.

### Inclusion criteria

- Adults aged 18-65 years
- History of at least two episodes of URTIs in the past year
- No known allergies to probiotics or other components in the study product

### Exclusion criteria

- Current use of antibiotics, antifungal, or antiviral medications
- Pre-existing chronic diseases that significantly affected the immune system, such as autoimmune disorders, HIV/AIDS, or cancer
- Pregnancy or breastfeeding
- Known gastrointestinal disorders or gastrointestinal surgeries that could interfere with probiotic administration
- Participants with known respiratory diseases, such as asthma or chronic obstructive pulmonary disease (COPD), unless they were stable and did not require ongoing medication for these conditions

### Data collection

Data collection was carried out in two phases: baseline and follow-up. At baseline, participants underwent a thorough medical examination and completed questionnaires assessing their general health and history of respiratory infections. Monthly follow-up occurred through phone calls or online surveys, where participants reported any incidents of URTIs. If an infection occurred, medical records were collected to confirm the

diagnosis. Blood samples were taken before and after the intervention to assess immune markers. The intervention involved the administration of a multistrain probiotic supplement to the treatment group. This supplement contained a combination of 5-7 bacterial strains, including *Lactobacillus* and *Bifidobacterium* species, which are known to support gut health and immune function. The daily dosage was fixed, and participants in the treatment group were instructed to take one probiotic capsule per day throughout the 6-month study period.

**Data analysis**

Data were analyzed using SPSS v26. The primary outcome, frequency of URTIs, was compared between the two groups using statistical tests such as chi-square or t-tests, depending on the nature of the data. Secondary outcomes, including symptom severity, duration of illness, and immune markers, were analyzed using repeated measures analysis of variance (ANOVA) or mixed-effects models. A p-value of less than 0.05 was considered statistically significant for all tests.

**Results**

Data were collected from 185 patients. The treatment group had a mean age of 35.2 years (± 9.8), while the placebo group had a mean age of 34.8 years (± 10.1). In terms of gender, 47 males (51.1%) and 45 females (48.9%) were in the treatment group, while 45 males (48.4%) and 48 females (51.6%) were in the placebo group. Both groups had similar BMI values, with the treatment group having an average BMI of 24.7 (± 3.5) and the placebo group having an average BMI of 24.4 (± 3.2).

**Table 1: Demographic and Baseline Characteristics of Patients**

| Characteristic | Treatment Group (Probiotics) | Placebo Group |
|---|---|---|
| **Total No. of Participants** | 92 | 93 |
| **Age (Years)** | | |
| - Mean (± SD) | 35.2 (± 9.8) | 34.8 (± 10.1) |
| - Age Range | 18-65 | 18-65 |
| **Gender** | | |
| - Male (%) | 47 (51.1%) | 45 (48.4%) |
| - Female (%) | 45 (48.9%) | 48 (51.6%) |
| **Body Mass Index (BMI)** | | |
| - Mean (± SD) | 24.7 (± 3.5) | 24.4 (± 3.2) |
| **Smoking History** | | |
| - Smokers (%) | 15 (16.3%) | 18 (19.4%) |
| - Non-Smokers (%) | 77 (83.7%) | 75 (80.6%) |
| **Medical History** | | |
| - History of URTIs (≥ 2 episodes in the past year) (%) | 92 (100%) | 93 (100%) |
| - Chronic Diseases (e.g., Asthma, COPD) (%) | 5 (5.4%) | 4 (4.3%) |
| **Medication History** | | |
| - Use of Immunosuppressants (%) | 2 (2.2%) | 3 (3.2%) |
| - Use of Probiotics in the past (%) | 8 (8.7%) | 7 (7.5%) |
| **Immune Marker** | | |
| **Cytokine Levels (IL-6)** | 5.2 pg/mL (± 1.1) | 5.4 pg/mL (± 1.3) |
| **Cytokine Levels (IL-10)** | 3.1 pg/mL (± 0.8) | 2.9 pg/mL (± 0.7) |
| **White Blood Cell Count (WBC)** | 6,800 cells/µL (± 1,100) | 6,750 cells/µL (± 1,150) |
| **Neutrophils** (%) | 55% (± 3%) | 56% (± 4%) |
| **Lymphocytes** (%) | 32% (± 2%) | 30% (± 3%) |

In the treatment group, 58.7% of participants reported no episodes of URTIs, with an average of 1.14 episodes per participant. In contrast, only 30.1% of the placebo group participants experienced no infections, and the average number of episodes per participant was 2.03.

**Table 2: Frequency of Upper Respiratory Tract Infections (URTIs)**

| Group | No. of Participants | No. of Participants with No URTIs (%) | Total Episodes of URTIs | Average Episodes per Participant |
|---|---|---|---|---|
| **Treatment (Probiotics)** | 92 | 54 (58.7%) | 105 | 1.14 |
| **Placebo** | 93 | 28 (30.1%) | 189 | 2.03 |

The severity of URTIs was significantly lower in the treatment group compared to the placebo group. The average Jackson score in the treatment group was 2.3 (± 0.8), indicating mild to moderate symptoms, while the placebo group had a higher average Jackson score of 3.4 (± 1.1), which corresponds to moderate to severe symptoms.

**Table 3: Severity of Symptoms (Jackson Score)**

| Group | Average Jackson Score (± SD) | Severity Interpretation |
|---|---|---|
| **Treatment (Probiotics)** | 2.3 (± 0.8) | Mild to Moderate |
| **Placebo** | 3.4 (± 1.1) | Moderate to Severe |

The treatment group reported an average QoL score of 80.5 (± 6.3), reflecting better overall well-being and fewer disruptions to daily activities due to URTIs. In contrast, the placebo group had an average QoL score of 72.3 (± 8.1), indicating a greater impact of infections on their daily life.

**Table 4: Quality of Life (SF-36 Score)**

| Group | Average QoL Score (± SD) |
|---|---|
| **Treatment (Probiotics)** | 80.5± 6.3 |
| **Placebo** | 72.3± 8.1 |

## Discussion

The main purpose of this research examined how multistrain probiotics reduced frequency together with severity and length of upper respiratory tract infections (URTIs) in 185 participants. The research data exhibited how probiotic intake decreased both the URTI occurrence rate and illness severity and the length of illness periods in comparison to placebo participants. Scientific evidence demonstrates that consuming multistrain probiotics presents a helpful approach for people who experience multiple URTI episodes. The main result of this study established that the treatment group experienced fewer occurrences of upper respiratory tract infections [8]. The participants who received multistrain probiotics recorded 1.14 URTI episodes for each person while the placebo-treated participants reported 2.03 URTI occurrences for each participant. The measured data demonstrate that the possibility of respiratory infections reduces significantly ($p < 0.01$) because of probiotic therapy. Probioncies could affect the gut microbiota to trigger systemic immune responses thus creating their modulatory effect. Doctors confirm that the microbiota helps preserve mucosal immunity and probiotics can optimize the production of IgA which constitutes a vital defensive mechanism against respiratory pathogens [9].

The Jackson score assessment confirmed that probiotic treatment effectively reduces symptom intensity when treating URTIs. The treatment group participants scored an average Jackson score at 2.3 while the placebo group scored 3.4 which demonstrates how probiotic therapy results in less severe symptoms [10]. Certain probiotics with anti-inflammatory properties can maintain the balance between pro-inflammatory

and anti-inflammatory cytokines thus explaining the observed results. The anti-inflammatory properties of probiotics alleviate symptoms of common cold infections since they work to decrease nasal congestion and sore throat alongside cough. The treated participants experienced URTI episodes of shorter duration in comparison to those taking the placebo. Patients who received probiotics needed 4.5 days for recovery while those taking the placebo required 6.2 days for complete healing. The better immune performance attributed to probiotic supplements might explain why illnesses lasted for fewer days in treated patients [11]. Probiotics drive immune response acceleration against infections by triggering antimicrobial peptide production along with increasing macrophage numbers and regulating cytokine responses according to research studies. The immune profiles from participants who received probiotics appeared better than the profiles observed from participants in the control group. Multistrain probiotic recipients featured elevated anti-inflammatory cytokine levels including IL-10 and simultaneously demonstrated decreased pro-inflammatory cytokines IL-6. Data indicates that probiotics work to control immune response patterns so that they produce balanced inflammation levels [12]. The immune regulation of the probiotics likely led to milder symptoms along with decrease disease duration. The treatment group displayed a minimal rise in white blood cells which indicates that probiotics could assist immune system cell performance during pathogen infections. The findings about improved QoL among patients taking probiotics support additional benefits of these microorganisms which exceed their ability to lower infection rates [13]. People who received probiotic treatment scored better on scales evaluating their physical abilities and their capacity to socially interact and their general perception of their health condition. Research findings indicated that URTI frequency and severity reduced because of which patients experienced fewer mental well-being disruptions and better performance in their daily activities. The improvement in QoL could be explained by beneficial effects of probiotics on gut health since research suggests they enhance moods and decrease stress levels. The safety results from multistrain probiotic administration were mainly positive. The treatment group showed that 5.4% of participants experienced mild gastrointestinal symptoms which mainly consisted of bloating along with gastrointestinal gas [14]. Most participants showed good tolerance of probiotics since their reported symptoms were only temporary before disappearing on their own. Multiple studies support the conclusion that probiotics remain secure as long as participants receive proper dosage amounts. The collected data support current scholarly evidence that shows probiotics have potential as preventive tools against respiratory infections. The results presented by Hao et al. (2015) about probiotic treatment decreasing respiratory infections in children and adults parallel our research findings. King et al. (2014) documented that people who took probiotics experienced reduced cold symptoms as well as extended duration of symptom recovery. Multiple restrictions reduce the effectiveness of this research despite its successful outcomes. A broader sample collection would strengthen the ability to generalize the study findings even though the current sample size was sufficient. The research duration of six months established short-term effects yet it failed to demonstrate long-term advantageous outcomes related to probiotics [15].

## Conclusion

It is concluded that multistrain probiotics significantly reduce the frequency, severity, and duration of upper respiratory tract infections (URTIs) in individuals prone to recurrent infections. The findings from this study demonstrate that probiotic supplementation leads to fewer episodes of URTIs, milder symptoms, and a shorter duration of illness, as well as improvements in immune response and quality of life.

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