

Table 3: Probiotics in the Management of Respiratory Tract Infections

Population	Strain	Study Type	Outcomes Compared to Placebo	Reference
Children	<i>Lactobacillus rhamnosus</i> GG	Systematic review and meta-analysis of 4 randomized clinical trials (RCT)	Reduced incidence of acute otitis media (RR 0.76), a reduced risk of upper respiratory infections (RR 0.62), and reduction in antibiotic treatments (RR 0.80) Subgroup analysis of two studies on children older than 1 year showed significant reduction in the risk of overall RTIs (RR 0.73) No serious adverse events were reported	Liu S et al. ¹³
Children (age 3 months–7 years, in daycare)	<i>Lactobacillus rhamnosus</i> GG	Systematic review and meta-analysis of 12 RCT	Significant reduction in duration of RTIs (mean difference: 0.78 days)	Laursen RP et al. ¹⁴
Elementary schoolchildren	<i>Lactobacillus brevis</i> KB290	Open-label pilot study	Incidence of influenza in Groups A (no treatment) and B (provided the test drink) were 23.9 and 15.7%, respectively.	Waki N et al. ¹⁵
Children 1–6 years old (attending daycare)	<i>Lactobacillus paracasei</i> 8700:2 + <i>Lactobacillus plantarum</i> HEAL9	Randomized, double-blind, placebo-controlled	Probiotics given over a period of 3 months significantly reduced the severity of the symptom "nasal congestion/runny nose" with a mean severity score for the whole study period of 7.5 ± 9.7 in the probiotic group and 13.9 ± 15.2 in the placebo (p < 0.05); treatment group also experienced significantly less concomitant medication use, reduced absence from day care (p < 0.05), reduced mean total severity per day in the reported episodes (p < 0.05), and reduced severity of the symptom "crying more than usual" (p < 0.05)	Lazou AI et al. ¹⁶

<p>Children</p>	<p><i>Lactobacillus acidophilus</i> NCFM® + <i>Bifidobacterium lactis</i> Bi-07®</p>	<p>Randomized, double-blind, placebo controlled</p>	<p>NCFM® alone reduced:</p> <ul style="list-style-type: none"> Fever incidence by 53% (P = .0085) Coughing incidence 41.4% (P = .027) Rhinorrhea incidence by 28.2% (P = .68) <p>Combination of NCFM® + Bi-07® reduced:</p> <ul style="list-style-type: none"> Fever incidence by 72.7% (P = .0009) Coughing incidence (P = .005) Rhinorrhea incidence by 58.8% (P = .03) <p>Significant reductions in antibiotic use incidence and in days absent from daycare were seen in both single and combination groups compared to placebo</p>	<p>Leyer GJ et al.¹⁷</p>
<p>Adults</p>	<p><i>Lactobacillus paracasei</i> 8700:2 + <i>Lactobacillus plantarum</i> HEAL9</p>	<p>Randomized, double-blind, placebo-controlled</p>	<ul style="list-style-type: none"> Reduced common incidence from 67% to 55% (p < 0.05) Number of days with symptoms reduced from 8.6 days to 6.2 over 12-week period The total symptom score was reduced from a mean of 44.4 to 33.6 Probiotic demonstrated significant reduction in pharyngeal symptoms (p < 0.05) 	<p>Berggren A et al.¹⁸</p>

Healthy physically active adults	<i>Bifidobacterium lactis</i> BI-04	Randomized, double-blind placebo-controlled	Risk of an upper respiratory illness episode was significantly lower in the BI-04 group (hazard ratio 0.73; 95% confidence interval 0.55-0.95; P = 0.022)	West NP et al. ¹⁹
Healthy adults	<i>Bifidobacterium lactis</i> BI-04	Randomized, double-blind, placebo-controlled	Despite a lack of influence on respiratory inflammation and infection rate, probiotic supplementation produced a reduction in nasal lavage virus titre and the proportion of subjects shedding virus in nasal secretions (76% vs 91%, P=0.04)	Turner RB et al. ²⁰
Elderly Japanese (65+)	<i>Bifidobacterium longum</i> BB536	Randomized, double-blind, placebo-controlled	Incidence of influenza was significantly lower (p=0:041) in treatment group	Namba K et al. ²¹
Nursing home residents aged 65 and older	<i>Lactobacillus rhamnosus</i> GG	Randomized, double-blind, placebo-controlled pilot	A reduction in laboratory-confirmed respiratory viral infections (15.0% vs 23%; hazard ratio = 0.65, 95% confidence interval = 0.32-1.31)	Wang B et al. ²²