

**Original article:**

## **Effect of xylitol chewing gum and probiotic capsule in managing pharyngitis symptoms: an observational study**

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### **ABSTRACT:**

**BACKGROUND:** Antibiotics are generally used for treatment of pharyngitis and various other infections. Increased use of antibiotics has led to problems like antibiotic resistance. An alternative for the treatment of upper respiratory infections can help to minimize or prevent the resistance caused due to antibiotics.

**AIM:** We aimed to study the effect of Effect of xylitol chewing gum and probiotic capsule in managing pharyngitis symptoms in paediatric patients.

**MATERIAL AND METHOD:** A total of 250 patients aged 3 years and above with the complaint of pharyngitis were included in the study. Patients were divided in different groups based on type of chewing of chewing provided i.e. no chewing gum, xylitol-based chewing gum and sorbitol gum. Half of each group received either probiotic capsules or placebo. Severity of sore throat and difficulty swallowing (scale 0–6) in the first 2 days were observed and recorded.

**RESULTS:** Probiotics were not effective in reducing the severity of symptoms: mean severity scores 2.64 with no probiotic and 2.72 with probiotic . Chewing gum was also found ineffective: mean severity scores 2.69 without gum, 2.72 with sorbitol gum and 2.74 with xylitol gum.

**CONCLUSION:** Either probiotics or xylitol gums were not found to be effective in minimizing the symptoms of sore throat in patients. Within the limitations of our study we don't recommend use of probiotics or xylitol as an alternative to antibiotic.

**KEYWORDS:** Pharyngitis, xylitol, chewing gums, probiotics

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### **INTRODUCTION:**

Pharyngitis or sore throat is one of the most common diseases encountered worldwide. 11 million patients in US emergency departments and other outpatients are diagnosed as pharyngitis.<sup>1</sup> According to researchers group A streptococcal form is identified in 20–37% of children with pharyngitis.<sup>2,3</sup> Majority cases of pharyngitis are viral, however some cases are caused by pathogenic streptococci.<sup>4</sup> Sore throat is a more common during winters. Common symptoms of pharyngitis include fever, sore throat, red tonsils and enlarged lymph nodes. Transmissions occur primarily by large droplets from respiratory secretions from an infected person.

Antibiotics have been used for decades for the treatment of pharyngitis. The risk of antibiotic resistance has increases over years and especially with the use of broader-spectrum antibiotics, like penicillin V.<sup>4</sup> Excess use of antibiotics can cause various complications which is a matter of concern for both doctors as well as patients. There comes the need of alternative treatment for pharyngitis. Xylitol is a 5-carbon polyol, i.e. a sugar alcohol sweetener;

it is used in chewing gums in particular. Xylitol is equal in sweetness to sucrose.<sup>6</sup> Many authors have proved its role as an anticariogenic and its effect on *Streptococcus mutans* as well as *Streptococcus pneumoniae*.<sup>7-9</sup>

So we aimed to study the effect of xylitol chewing gum and probiotic capsule in managing pharyngitis symptoms.

#### **MATERIAL AND METHOD:**

A total of 250 patients were selected for the study. The age group selected for the study included patients above 3 years of age. Simple random sampling technique was used for the selection of sample. Ethical committee clearance was obtained. A written informed consent was obtained from the patient and guardians before any procedure.

#### **Inclusion criteria:**

1. Patients aged above 3 years
2. Patients suffering from sore throat

#### **Exclusion criteria:**

1. Patients with history of peritonsillar abscess,
2. Patients with rheumatic fever
3. Patients with known allergies to gum, antibiotics.

All the patients were examined and three kinds of material were used and patients were instructed regarding the use of chewing gums. Patients were divided into different groups based on material used.

Group 1- no chewing gum,

Group 2- advice to use xylitol-based chewing gum

Group 3- sorbitol-based chewing gum.

The patients in each group were assigned to receive either probiotic capsules or placebo probiotic capsules. As patients could not be blinded for the use of chewing gums, we blinded patients for the use of probiotics. Later on patients were examined for the symptoms i.e. within 2-3 days.

#### **Results:**

250 patients who participated in the study were divided into different groups based on the treatment provided. Group 1 i.e. no probiotic group consisted of 50 patients, Group 2 i.e. probiotic group n= 50/250, Group 3 no gum group consisted of 50 patients. Group 4 xylitol group and group 5 sorbitol group consisted of 50 patients each (Table-1). Baseline clinical characteristics showed that in Group 1 i.e. no probiotic group 8% samples reported of past tonsillectomy, 26/50 (52%) had cough, pharyngeal inflammation was found in 64% patients, 9% reported with fever, 56% has enlarged cervical lymph nodes and 20% patients reported illness of more than 7 days.

In Group 2 i.e. probiotic group 9% samples reported of past tonsillectomy, 28/50 (56%) had cough, pharyngeal inflammation was found in 34/50 i.e. 68% patients, 5% reported with fever, 58% has enlarged cervical lymph nodes and 24% patients reported illness of more than 7 days. In Group 3 i.e. no gum group 11% samples reported of past tonsillectomy, 27/50 (54%) had cough, pharyngeal inflammation was found in 31/50 62% patients, 6% reported with fever, 57% has enlarged cervical lymph nodes and 25% patients reported illness of more than 7 days. In Group 4 i.e. xylitol group 8% samples reported of past tonsillectomy, 28.5/50 (57%) had cough, pharyngeal inflammation was found in 34.5/50 69% patients, 5% reported with fever, 70% has enlarged cervical lymph nodes and 22% patients

reported illness of more than 7 days. In Group 5 i.e. sorbitol group 10% samples reported of past tonsillectomy, 26.5/50 (53%) had cough, pharyngeal inflammation was found in 36.5/50 73% patients, 6% reported with fever, 57% has enlarged cervical lymph nodes and 24% patients reported illness of more than 7 days (Table 2). The mean symptom score for different groups showed no evidence of an interaction between xylitol and probiotics for the primary outcome, the mean score for sore throat days 2–3 after the consultation was found to be  $2.69 \pm 1.52$  for probiotic group, probiotic group  $2.71 \pm 1.61$  (Table 3). Graph 1 show the time of resolution of symptoms. Reduction in score of symptoms of throat pain was evident in xylitol group however there was no significant difference.

**Discussion:**

Pharyngitis is common in children as well as adults. Throat pain, fever, enlarged lymph nodes are some of the common clinical characteristics of pharyngitis. Antibiotics are the most preferred treatment for pharyngitis. Excess use of antibiotic treatments had led to the inability to distinguish a bacterial from a viral cause of the disease despite the availability of rapid diagnostic test, too rarely done in children with pharyngitis. In present study we made an attempt to find an alternative to antibiotic for the treatment of pharyngitis.

Xylitol is an artificial sweetener that causes local “bacterial interference”. The expected mechanism behind is that it inhibits bacterial growth and adherence to the pharyngeal wall, which should reduce the inflammation and the severity of symptoms caused by bacterial infections.<sup>10,11</sup> Uhari M et al in their study reported that, xylitol has been identified as effective in preventing AOM.<sup>12,13</sup> In regards to use of xylitol and probiotics as an alternative to antibiotics in patients suffering from sore throat very few data is available. In present study 250 patients were included and divided in 5 different groups based on the treatment. Out of 250 patients 46% reported with a history of past tonsillectomy. 52% participants reported with recurrent infections, having had 2 or more episodes of sore throat before the treatment. In our study no evidence of an interaction between xylitol and probiotics for the primary outcome and the mean score for sore throat was found. In present study we didn’t find any effectiveness of sorbitol or xylitol in correction of sore throat. Reduction in score of symptoms of throat pain was evident in xylitol group however the difference was not significant. Azarpazhooh A et al suggested that probiotics and xylitol may prevent recurrence, however any such relation was not found in our study.<sup>14</sup>

**Conclusion:**

Within the limits of our study we don’t recommend use of probiotics and xylitol chewing gums as an alternative for antibiotics in treatment of pharyngitis. No adverse effect was noted in the study group. xylitol and its various advantages had been known for long so we suggest to conduct a study with long follow up period to achieve an accurate conclusion.

**Tables:**

**Table 1: distribution of groups**

<b>Group 1</b>	No probiotic	50
<b>Group 2</b>	Probiotic	50
<b>Group 3</b>	No gum	50
<b>Group 4</b>	xylitol gum	50
<b>Group 5</b>	sorbitol gum	50

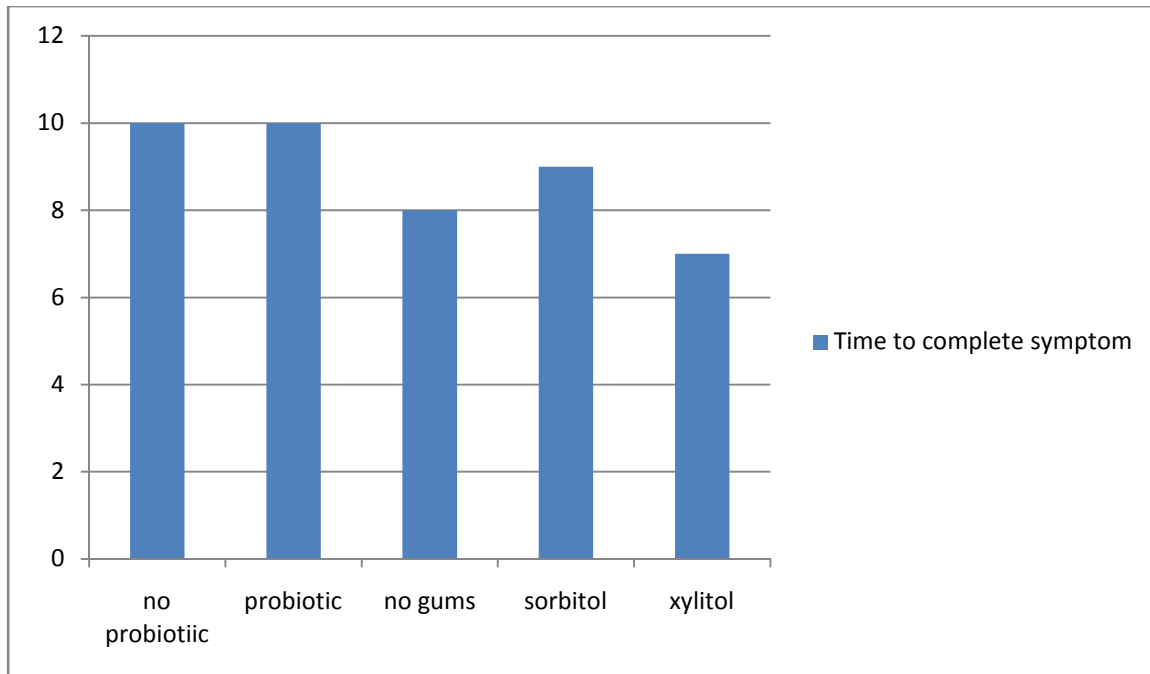
**Table 2: clinical characteristic of patients**

Characteristic	No probiotic	Probiotic	No gum	xylitol gum	sorbitol gum
Past tonsillectomy	4/50 (8%)	4.5/50 (9%)	5.5/50 (11%)	3.5/50 (8%)	5/50 (10%)
Cough	26/50 (52%)	28/50 (56%)	27/50 (54%)	28.5/50 (57%)	26.5/50 (53%)
Pharyngeal inflammation	32/50 (64%)	34/50 (68%)	31/50 (62%)	34.5/50 (69%)	36.5/50 (73%)
Fever	4.5/50 (9%)	2.5/50 (5%)	3/50 (6%)	2.5/50 (5%)	3/50 (6%)
Cervical nodes	28/50 (56%)	29/50 (58%)	28.5/50 (57%)	35/50 (70%)	28.5/50 (57%)
Duration of illness > 7 d (before consultation)	10/50 (20%)	12/50 (24%)	12.5/50 (25%)	11/50 (22%)	12/50 (24%)

**Table 3: mean symptom score**

Treatment	Symptom score
<b>Probiotic comparison</b>	
No probiotic	2.69 ± 1.52
Probiotic	2.71 ± 1.61
<b>Gum comparison</b>	
No chewing gum	2.71 ± 1.47
Xylitol gum	2.73 ± 1.43
<b>Xylitol comparison</b>	
No xylitol	2.75 ± 1.49
Xylitol	2.74 ± 1.61

**Graph 1: resolution of symptom in different groups**



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