

## Original Research Article

# A survey of the knowledge, attitude, and practice of using probiotics for oral health among dental students in Kerala

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## ABSTRACT

**Background:** Widespread prevalence of dental caries, particularly in developing countries, poses a major public health challenge. Traditional approaches using fillings and remineralizing agents have limitations. Probiotics offer a potentially self-administered, multifaceted alternative for both preventing and managing caries, with additional health benefits beyond oral health.

**Methods:** A cross-sectional study with a validated questionnaire was conducted among 308 final-year students and 292 interns from dental colleges in Kerala. Data were analyzed using descriptive and inferential statistics.

**Results:** Over 74% of interns and final-year students recognized probiotic benefits. Awareness about prebiotics was limited in both groups (59.7% and 62.3%, respectively). Notably, 65.6% of students and 72.6% of interns demonstrated knowledge about the probiotic potential of streptococcus strains. Almost 43% of students and 55% of interns reported current or past probiotic use and recommendations. A substantial majority in both groups (over 87%) expressed willingness to try recommended probiotic products. Notably, 47.4% of final-year students and 44.5% of interns had not used probiotics therapeutically, with gastrointestinal issues being the primary indication for those who did.

**Conclusions:** High awareness of probiotics with knowledge gaps in certain areas (e.g., prebiotics) was observed. The majority showed a willingness to utilize probiotics in their practice. Educational interventions focused on these areas could equip dental professionals to provide informed advice and recommendations about probiotics to their patients.

**Keywords:** Probiotics, Oral health, Dental students, Knowledge, Attitude, Practice

## INTRODUCTION

The high prevalence and incidence of dental caries in developing countries, primarily due to limited access to dental care and poor oral hygiene, create a major public health challenge. An increase in dental caries in developing countries, including India, places a more significant burden on the limited resources available for oral health.<sup>1-3</sup>

Conventionally, dental caries management and prevention involves using several restorative materials along or with remineralization agents. However, this typical strategy has the twin drawbacks of loss of tooth materials and the absence of affected person compliance in dental caries prevention. However, several remineralization agents need a professional utility, which increases the cost. In this context, probiotics have emerged as an alternative for caries prevention and management, as the former can be

self-applied and can also provide numerous fitness benefits along with the prevention of dental caries.<sup>4,5</sup>

Probiotics refer to living microorganisms that offer health advantages to the host when ingested in sufficient quantities.<sup>6</sup>

Probiotics, as per the World Health Organization, are living microorganisms that, when provided in sufficient amounts, confer health benefits on the host.<sup>7</sup> These microorganisms belong to the natural human flora to survive in the acid environment during transit to the intestines.<sup>8,9</sup>

Probiotics stimulate health-promoting microflora and suppress colonization of pathogenic microbes, consequently stopping the spread of ailment. It helps discount in caries development, in accomplishing periodontal health, and reducing oral malodour.<sup>10,11</sup> Because *Streptococcus mutans* can create highly branched, water-insoluble glucan, mutan, it is the primary causal organism in the formation of caries and promotes the growth of oral biofilm. Because sucrose, fructose, and glucose are quickly metabolized, these biofilms are extremely stable bacterial communities that can withstand low pH.<sup>12</sup> Acidogenic species, such as *Actinomyces*, *Atopobium*, *Bifidobacteria*, nonmutans *Streptococci*, *Propionibacterium* species, and *Veillonella* species, increase in low pH environments. *Streptococci* are repositories for supragingival and subgingival plaque and thrive well on the buccal epithelial cells of the tongue's dorsum. Low pH levels can also cause dental enamel to demineralize, which can erode it.<sup>13</sup>

Disturbances in homeostasis or oral dysbiosis prompted by overgrowth of one or more pathogenic bacterial species lead to the establishment of oral infections. Strengthening of oral homeostatic mechanisms through probiotics is one way to minimize oral infection. They are usually consumed as fermented food such as yogurt, tablets, capsules, granules and liquids.<sup>14</sup>

Traditionally gut-focused, probiotics now show potential for wider health benefits like immune support, infection prevention, and allergy management.<sup>8-10</sup>

This study aimed to assess the knowledge, attitude, and practice of using probiotics for oral health among dental students in Kerala.

## METHODS

### Study setting

The study began after obtaining approval from the institutional review board of the Noorul Islam Institute of

Medical Sciences and Research Foundation. This cross-sectional study was conducted over five months, from November 2022 to March 2023, at Noorul Islam College of Dental Sciences. A validated questionnaire consisting of 10 questions will be used to obtain information to assess the knowledge, attitude, and practice of dental students in various dental colleges of Kerala in using probiotics for oral health. It was distributed using Google forms.

$$\text{Sample size estimation} = \frac{\frac{z^2 \times p(1-p)}{e^2}}{1 + \left( \frac{z^2 \times p(1-p)}{e^2 N} \right)}$$

Here, N=population size (450), e=margin of error (absolute precision (d) =5% (0.05), p=percentage value (expected proportion of respondents) -30%, and  $Z_{\alpha}$  at 95% CI=1.96

The estimated sample size is equal to 300.

### Inclusion criteria

The study included dental students, final-year dental students, and interns of dental colleges in Kerala in the study, after obtaining their consent to participate.

### Statistical analysis

Data will be entered into Microsoft excel sheets. Data will be analyzed using the statistical package for the social sciences (SPSS) 22.0 (SPSS Inc., Chicago, IL), and the level of significance will be set at  $p < 0.05$ . Descriptive statistics will be performed to assess the mean and standard deviation of the respective groups. The normality of the data will be evaluated using the Wilcoxon test. Inferential statistics will be used to determine the association between variables using the student-t test, and Chi-square test.

## RESULTS

A high degree of awareness was found with over 74% of both interns and final-year students recognized probiotic benefits. While most identified live organisms as constituents, some confused them with natural products or drugs. Supplements were the preferred form, with interns slightly favoring them over students. Over 59% of both groups lacked knowledge about prebiotics. Notably, 65% and 72% of students and interns demonstrated awareness of the probiotic potential of streptococcus strains. Almost 43% of students and 55% of interns reported current or past probiotic use and recommendations. A substantial majority in both groups (over 87%) expressed willingness to try recommended probiotic products. Over 45% in both groups had not used probiotics therapeutically, with gastrointestinal issues being the primary indication for those who did.

**Table 1: Distribution of responses to questions related to knowledge, attitude and practice of use probiotics.**

Questions	Final years (%)	Interns (%)	P value
Do you know the advantages of probiotics?			
Yes	75.3	74.7	0.894
No	24.7	25.3	
What do you think are the constituents of probiotics?			
Chemicals in food	0.1	1.4	0.274
Don't know	8.4	7.5	
Live organisms	79.9	82.2	
Natural plant products	7.1	3.4	
Synthetic drugs	4.5	5.5	
Consumption of probiotics is better from			
Don't know	16.2	12.3	0.615
Food and drinks	38.3	39.0	
Supplements	45.5	48.6	
Are you aware of prebiotics and how do they differ from probiotics?			
No	59.7	62.3	0.646
Yes	40.3	37.7	
Prebiotics are			
Specialized plant fiber that act as a food for good bacteria	16.9	13.0	0.732
Stimulate growth among preexisting good bacteria	21.4	24.7	
Both	20.1	18.5	
Don't know	41.6	43.8	
Do you know <i>Streptococcus</i> strains benefit oral health when used as probiotics?			
No	34.4	27.4	0.188
Yes	65.6	72.6	
Do you think the consumption of probiotics helps to improve oral health?			
No	11.0	11.6	0.869
Yes	89.0	88.4	
Have you consumed or recommended probiotics to your patients?			
No	57.1	45.2	0.038*
Yes	42.9	54.8	
Would you try a probiotic product if recommended?			
No	10.4	12.3	0.596
Yes	89.6	87.7	
Have you used probiotics as a therapeutic drug for which of the following conditions?			
Autoimmune	3.9	4.1	0.959
Cardiac	1.3	2.1	
Gastrointestinal	22.1	26.0	
Never used	47.4	44.5	
Oral health	17.5	15.8	
Respiratory	7.8	7.5	

## DISCUSSION

Supplements containing live microorganisms (probiotics) play a key role in immune system modulation by maintaining a healthy gut microbiome. The insufficient use of probiotics in oral health by dental professionals due to inadequate awareness provides a critical intervention point. Hence, it is imperative to disseminate comprehensive probiotic knowledge to dental practitioners.

A study conducted by Zaheer et al revealed that 66% agree that the constituents of probiotics were live organisms. In another study by Patait et al it was found 94.1% of respondents who were postgraduates correctly answered that constituents of probiotics are live microorganisms similar to our study where as in our study, 79.9% of final-year students and 82.2% of interns correctly identified live organisms.<sup>15-17</sup> In a study conducted by Bridgeman et al it was found that 87% responded that it contained live organisations.<sup>18</sup>

In a study conducted by Krishnan, it was found that most of the respondents (27.8%) had advised the use of probiotics to improve gastric health followed by oral health, similar to the findings of our study, where 27% of interns had recommended the same for gastric issues.<sup>1</sup> In comparison, 22% of final students had suggested the same.

In our study, the majority answered that consumption of probiotics was better from supplements 45.5% among final year students and 48% among interns which was in contrast to the findings of the study by Gowdar et al where the majority preferred the use of milk and dairy products as sources of probiotics.<sup>18</sup>

In Fijan et al study, 79% of healthcare professionals were observed advising patients on probiotics. Our investigation uncovered that 42.9% of final-year dental students and 54.8% of interns actively integrated probiotics into their personal or professional spheres.<sup>19</sup>

Sahib's study underscored a 60.5% familiarity rate with probiotics, with 36.8% incorporating them into their regimen. In concordance, our investigation revealed that 75.3% of final-year dental students were aware of the advantages of probiotics, and 72.6% of interns recognized the benefits of the streptococcus strain in promoting oral health.<sup>20</sup>

When asked about the benefits of probiotics in dentistry, the majority answered in favor of the same, which was similar to the findings of the study by Muchhal.<sup>13,21</sup>

This study was one the few studies conducted among the dental student population of Kerala regarding the usage of probiotics in oral health. The study conducted followed a cross sectional nature. Further analytical studies should be done with effective samples so that more information can be obtained and used for effective use of the same in clinical practice.

## CONCLUSION

The interns and final-year students were inclined to prescribe probiotics in their dental practice, encouraging further studies. In most questions, the knowledge of final-year students and interns seemed to be par with more interns willing to prescribe more probiotics to their patients. Probiotics, live microorganisms in supplements, enhance the body's immune defenses by maintaining a healthy balance of gut microbes. Oral health relies on equilibrium in the oral microbiome, and dysbiosis disruptions can lead to diseases. Despite expanding research on probiotics' impact on oral health, a lack of awareness among dental professionals hinders their adoption. To capitalize on the potential benefits of probiotics for oral health, it is crucial to educate dental practitioners. Learning programs to educate dental students on probiotics can increase their awareness, helping them provide scientifically proven advice to their patients.

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