

Assessment of Knowledge, Awareness and Practice regarding the use of Probiotics in dentists of Gujarat state – A web based cross-sectional study

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Abstract

Aim: To assess the knowledge, awareness and practice regarding the use of probiotics in dentists of Gujarat state in their routine dental practice.

Materials and Method: The participants were evaluated by a web-based questionnaire formulated in English language. Total of 159 participants were included randomly through E-mail. The informed consent form and the participant information sheet were sent with the Google form link. Once the questionnaire was filled and submitted successfully, the data was entered in an Excel sheet and subjected for statistical analysis.

Results: Total 159 participants were included in the study of which 88(55.3%) were MDS and 71(44.7%) were BDS. 154(96.9%) participants were aware about the term probiotics of which 136 (85.5%) participants were aware about the health benefits of probiotics but only 75(47.2%) participants prescribed probiotics to their patients. 55% of the dentists had knowledge that Dairy products and fermented foods are the sources of probiotics. 61% of the dentists are aware that both diet and supplements are best method of probiotics consumption. 24.5% of the dentists were not aware of contraindications of probiotics. 47 (62.7%) participants from the 75 participants reported a positive result of

probiotics on oral health adjunct to their dental treatment.

Conclusion: Although the dentists of Gujarat state are aware about the health benefits of probiotics, the practice of Probiotics is significantly less. So efforts should be made to increase the use of probiotics along with dental treatment. More CDE programs can be conducted in order to spread awareness regarding the benefits of the use of probiotics in dentistry. Advertisements are also another effective mode of spreading the awareness regarding the benefits of adjunctive use of probiotics to dental treatment.

Keywords: Probiotics, Lactobacillus, Periodontitis, Halitosis, Antibiotics

Introduction

The human body lives in a heavily contaminated environment which is associated with millions of microorganisms some of which can cause disease in the host [1]. Dental caries and periodontal disorders, according to the World Health Organization (WHO), are two of the world's most serious oral health problems.[2] Periodontal diseases are defined as inflammatory diseases which are caused by pathogenic micro flora organised in biofilms surrounding the teeth, while dental caries is a multifactorial disease that results in demineralization of the hard tissue and destruction of soft tissue by production of acid from bacterial fermentation of the food debris which often leads to cavitation on the tooth surface.

Various preventive strategies are recommended to control these risk factors like dietary changes, administering antibacterial agents, enhancing host resistance etc. But by these methods complete elimination is difficult or almost impossible. One of the novel self-administered strategies is by manipulation of resident microorganisms by the ingestion of probiotic

organism [1]. It is also known as bacteriotherapy or replacement therapy [3].

Probiotic comes from the Latin preposition "pro," which means "for," and the Greek word "bios," which means "life." It was first described by Lily and Stillwell in 1965 and they described probiotics as "substances secreted by one microorganism which stimulates the growth of another" and thus was contrasted with the term antibiotic [4]. Probiotics are "live microorganisms that provide a health benefit on the host when administered in suitable concentrations," according to the World Health Organization (FAO- Food and Agriculture Organization, 2002) [5]. Currently probiotics are the subject of intense and widespread research in food and nutritional science. A probiotic might be a single bacterial strain or a group of bacteria. It can be in powder, liquid, gel, paste, in the form of granules or available in the form of capsules, sachets, etc. [6] Species of Bifidobacterium, Lactobacillus and Streptococcus are commonly used microorganisms for the preparation of probiotics [7]. Probiotics are delivered in four basic forms: beverage or food (fruit juice), prebiotic fibres, milk-based products, dried cell packages such as powder, capsule, gelatin tablets [8]. An ideal probiotic preparation should have the following characteristics [9]

- They should have high resistance to low pH and acids and have high cell viability
- Even if the probiotic strain cannot colonize in the gut it should possess the ability to persist in the intestine
- In order to avoid the flushing effects of peristalsis they should be able to adhere to the gut epithelium
- They should be able to communicate with one another in order to transmit messages to the gut's immune cells.
- Must be of human origin
- Non-pathogenic in nature
- Be resistant to processing

- The ability to impact local metabolic activity.

Probiotics work by competing with pathogenic bacteria for attachment sites on the target tissue. Once adhered, they secrete antimicrobial substances such as bacteriocins, hydrogen peroxide and organic acids, which can modify the pH and the oxidation-reduction potential aiding the elimination of pathogenic microorganisms. They can stimulate the non-specific immunity and modulate the cellular and humoral immune response. They can be used in various oral diseases like caries, periodontal disease, oral mucosal lesions, oro-pharyngeal cancers, halitosis and reduction in the levels of *Candida albicans* [8].

Probiotics could be a viable area of study for periodontitis treatment. They decrease the pH of the oral cavity so that plaque bacteria cannot form dental plaque and calculus [10]. They also make excellent maintenance product because they produce antioxidants, which prevent plaque formation by neutralizing the free electrons that are needed for the mineral formation. Also, they are able to breakdown volatile sulfur compounds and changing them to gases needed for metabolism, hence helping in treating halitosis. Acidogenic and acid-tolerating species like mutans streptococci and lactobacilli are more prevalent in caries. The use of probiotics and molecular genetics to replace and displace cariogenic bacteria with non-cariogenic bacteria has shown promising results [8].

Progressive interest in probiotics globally has been observed for the past years for the potential impact of probiotic food products on human health [9]. Addition of probiotics in diet improves the host's gastrointestinal mucosa and immune system [11] and numerous trials have warranted its beneficial effects.

Several dental pathological conditions necessitates either short term or long-term use of antibiotics. So

supplemental probiotics along with the necessary antibiotics could reduce the adverse effects of the latter stimulating oral health promoting flora, and suppress the pathologic colonization and disease spread [12].

Thus the aim of this study was to assess the knowledge, awareness and practice regarding the use of probiotics in Dentists of Gujarat State.

Materials and methods

This was a web based cross section questionnaire study which was carried out at the Department of Periodontology, K M Shah Dental College and Hospital, Sumandeep Vidyapeeth. The study was started after IEC approval on the 29th June 2021 and the study ended 3 months from the date of approval from ethics committee. The study included the Dentists of Gujarat state of 25 years and above. The participants who were not willing to participate and undergraduate students were excluded from the study. The sample size of the present study was estimated to be 151.

Questionnaire

Participants were evaluated by a web-based questionnaire. The questionnaire was formulated in English language. After the questionnaire was formulated, it was validated by 5 subject experts following which the final questionnaire was prepared. The questionnaire consists of 15 questions of which 2 questions assessed demographic component, 6 questions assessed knowledge component, 3 questions assessed awareness component and 4 questions assessed practice component. All the participants were selected according to the defined inclusion criteria.

The participants were included randomly through E-mail. A link, which was generated online, was forwarded to the participants, so that they could fill the questionnaire. The informed consent form and the participant information sheet were sent with the Google

form link. Once questionnaire was filled by all the participants data was entered in an Excel sheet and was subjected to statistical analysis.

Sample population

The sample of public was selected randomly through email. Each participant residing in Gujarat State was contacted individually. Snowball sampling (the participants were asked to forward the questionnaire to their colleagues and other practitioners) was used so that maximal participation could be ensured from different areas. A close-ended web-based questionnaire was designed using a template provided by the Google Forms (Google Inc., USA).

Statistical analysis

The data was first transferred to Microsoft Excel and results were statistically analyzed using SPSS package version 21.0 (IBM) in terms of percentages. For other descriptive statistics, Chi-square test was used to test significance of association between two factors, $p < 0.05$ was selected to denote statistical significance.

Results

This study comprised of 159 participants above 25 years of age out of which 71 (44.7%) participants were BDS graduates and 88 (55.3%) were MDS graduates. The demographic data also included the affiliation of the participants, based on which 66 (41.5%) participants were practitioners, 35 (22%) were academicians and 58 (36.5%) were post graduate students.

It was a web-based questionnaire study which consisted of 15 questions. The first two questions comprising the demographic component like education and affiliation of the participant were then compared to the rest of the 13 questions to assess the knowledge awareness and practice regarding the use of probiotics in dentists of Gujarat state.

The results showed that 154 (96.9%) of the participants were familiar with term probiotics out of which 88 were MDS ($p < 0.05$) and 66 were BDS graduates.

141 (88%) participants agreed that live microorganisms are the primary constituents of probiotics out of which 81 participants were MDS and 60 were BDS. From these 58 dentists were practitioners, 30 were academicians and 53 were post graduate students.

On comparison of educational qualification to the Sources of Probiotics 55% of the dentists identifies Dairy products and Fermented foods as the primary sources of probiotics ($p < 0.05$) Whereas 61 % of the dentists agreed that both Diet and Supplements are the most effective way of consumption of probiotics.

115 (72%) of the dentists were aware that the Lactobacillus species are most commonly used as probiotics out of which 70 (79.5%) participants were MDS and 45 (63.4%) participants were BDS. From these 49 participants were practitioners, 22 were academicians and 44 were post graduate students.

136 (85.5%) dentists agreed that health benefits were obtained from consuming probiotics, whereas 15 participants were unaware about the health benefits of probiotics. Also 24.5% of the dentists were not aware about the contraindications of probiotics.

Both immune and digestive system was agreed upon to be the most affected system on consumption of probiotics. All the participants were aware about the mechanism of action of probiotics.

Out of the 159 participants, only 75 (47.2%) dentists prescribed probiotics to their patients, from which 49 (55.7%) were MDS graduates ($p < 0.05$) and 26 (36.6%) were BDS graduates

For 32 (41.3%) patients probiotics were prescribed along with antibiotics alone and for 17 (22.7%) patients probiotics were prescribed along with antibiotics and for

periodontal disease prevention or Supportive periodontal therapy.

Capsules were the most commonly prescribed form of probiotics 44 (58.7 %).

Out of the 75 dentists that prescribed probiotics to their patients, 47 dentists had clinical improvement in their patients, 8 dentists did not have clinical improvement whereas 20 dentists did not know if any clinical improvements were seen.

Discussion

There has been a spiralling interest in utilizing natural remedies to treat or avert human ailments. The popularity of probiotic products has exploded in the developed world. Many clinical trials have supported the evidence of probiotics' potential benefits, including colon cancer prevention, lowering cholesterol, lowering blood pressure, managing lactose intolerance and *Helicobacter pylori*, improving immune function, preventing infections and antibiotic-associated diarrhoea, reducing inflammation, halitosis, reduction of dental caries, HIV patients, and patients with multiple drug resistance.

This study was aimed at assessing the knowledge, awareness and practice of use of probiotics in dentists of Gujarat state. Both BDS and MDS graduates were included in this study who were either Practitioners, Academicians or Post graduate students.

The study revealed that 96.9 % of the dentists of Gujarat state were familiar with the term probiotics which were similar to the results of studies carried out by Chukwu E et al [18] , Soni R et al [16] and Saheer A et al [15]. On comparison of the familiarity to the term probiotics and educational qualification the study showed that MDS graduates were more aware ($p<0.05$) of the term probiotics as compared to BDS graduates. Similarly in a study conducted among the dental students of Chennai

by Thirunavakarasu R et al [19], 80.5% of the participants were aware of the term probiotics. Hence when responses were analysed according to education degree it was revealed that dentists with higher level education and more experience were significantly more knowledgeable than their less practiced peers.

Regarding the constituents of probiotics 88% of the dentists chose live microorganisms as the main constituent of probiotics. The results were similar to a study done by Saheer A et al [15] among dental students in which 67% of the dental students chose live microorganisms as the main constituent of probiotics. Another study done by Prasad S et al [13] showed that 78% of the participants were aware about the constituents of probiotics.

55% of the dentists identified Dairy products and Fermented foods as the main sources of probiotics ($p<0.05$) whereas 61% of the dentists agreed that both Diet and Supplements are the most effective way of consumption of probiotics. A study by Soni R et al [16] among health professionals in Ahmedabad showed that most of the healthcare professionals identified yogurt and fermented dairy products as a source of probiotics and little less than 50 per cent preferred probiotic yogurt, suggesting that probiotics would be better accepted if incorporated in food. Similarly, Anukam et al [20] reported 45.1% of the clinicians indicated a preference for yogurt as a form of probiotic, while 37% and 12.9% preferred oral and vaginal capsules, respectively, in Nigeria.

This study showed that more than 50% of the dentists were aware about the use of probiotics and its health benefits but 24.5 % of the dentists were unaware about the contraindications of probiotics. Hence the dentists of Gujarat state had adequate knowledge and awareness regarding the health benefits of probiotics but further

education is needed about the conditions in which probiotics are contraindicated.

Out of the 159 participants only 47.2% of the dentists prescribed probiotics to their patients. Hence although the dentists of Gujarat state are aware about the health benefits of probiotics, the practice of probiotics was less than 50%. From the dentists that prescribed probiotics to their patients 55.7% were MDS graduates ($p < 0.05$) and 36.6% were BDS graduates. This showed that the percentage of dentists prescribing probiotics to their patients was significantly higher with higher level education and more experience. Till date no studies have been carried out that compare level of education and practice of prescribing probiotics in daily dental practice. From these 47.2% participants that prescribed probiotics to their patients, 41.3% prescribed probiotics just along with antibiotics, whereas 22.7% dentists prescribed probiotics along with antibiotics as well as for periodontal disease prevention or supportive periodontal therapy in the form of capsules. This shows that the dentists that do prescribe probiotics to their patients are only aware of one or two uses of probiotics. Probiotics have shown to have beneficial effects in Caries prevention and in patients with Halitosis but very less percentage of dentists are aware about these other uses of probiotics.

After prescribing probiotics as an adjunct to dental treatment 47 dentists saw clinical improvement in their patients, 8 dentists did not see any clinical improvement whereas 20 dentists did not know if any clinical improvements were seen due to lack of follow-up.

This research was limited to dentists in Gujarat state. It is not known whether trends found reflect only the local attitudes or are more widespread. Therefore further studies involving larger sample size, over a wider

geographic area can be carried out to facilitate the generalizability of the findings

Tables and figures

Sr. No	Questions	Response no	Response %
1	Education		
	a. BDS b. MDS	71 88	44.7% 55.3%
2	Affiliation		
	a. Practitioner b. Academicians c. Post graduate students	66 35 58	41.5% 22% 36.5%
3	Are you familiar with the term probiotics?		
	a. Yes b. No	154 5	96.9% 3.1%
4	Do you know what probiotics are made up of?		
	a. Live microorganisms b. Synthesized drugs c. Chemical found in food d. Natural plant products e. Don't know	141 3 8 1 6	88.7% 1.9% 5% 0.6% 3.8%
5	What are the sources of probiotics?		
	a. Dairy products b. Fermented food c. Meat sources d. Cereals/Wheat e. Fruits and Vegetables f. Sweets g. Don't know	140 129 20 23 34 10 9	88.1% 81.1% 12.6% 14.5% 21.4% 6.3% 5.7%
6	Are you aware of the most effective way to consume probiotics?		
	a. Diet b. Supplements c. Don't know	113 94 13	71.1% 59.1% 8.2%

7	Which bacteria are commonly used as probiotics? a. Lactobacillus species b. Streptococcus species c. Enterococcus species d. Bifidobacterium species e. Don't know	115 10 5 18 11	72.3% 6.3% 3.1% 11.3% 6.9%
8	Is there any health benefits obtained from consuming probiotics? a. Yes b. No c. Don't know	136 8 15	85.5% 5% 9.4%
9	If yes, which system/ condition is affected by its use? a. Circulatory b. Endocrine c. Immune d. Digestive e. Don't know	20 23 96 123 18	12.7% 14.6% 61.1% 78.3% 11.5%
10	Which of the following are contraindications for using probiotics? a. Critically ill b. Immunocompromised patients c. Short bowel syndrome d. Lactose intolerance e. Yeast allergy f. Don't know	31 42 45 98 70 41	19.5% 26.4% 28.3% 61.6% 44% 25.8%
11	How do probiotics help against periodontal diseases? a. By decreasing pH of oral cavity b. By producing anti-oxidants c. By suppressing recolonization of some bacteria	71 84 92	44.7% 52.8% 57.9%
12	Do you prescribe probiotics to your patient? If yes, answer question number 13, 14 and 15 a. Yes b. No	75 84	47.2% 52.8%
13	In which scenario do you prescribe probiotics to your patients? a. Along with antibiotics b. For periodontal disease prevention or supportive periodontal therapy c. For caries prevention d. For halitosis	55 39 11 8	73.3% 52% 14.7% 10.7%
14	What form of probiotics do you normally prescribe to your patients? a. Powder and Sachets b. Liquid and Gels c. Granules d. Capsules	20 14 3 55	26.7% 18.7% 4% 73.3%
15	Did the adjunctive use of probiotics improve the clinical outcome after dental treatment? a. Yes b. No c. Don't know	47 8 20	62.7% 10.7% 26.7%

Table 1: It shows Knowledge, Awareness and Practice of Probiotics in Dentists of Gujarat state (n=159)

4. Do you know what probiotics are made up of?

159 responses

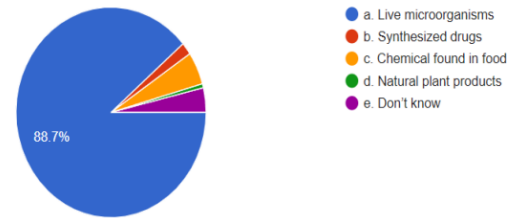


Figure 1: It shows Pie Chart depicting the Knowledge about the main constituent of Probiotics.

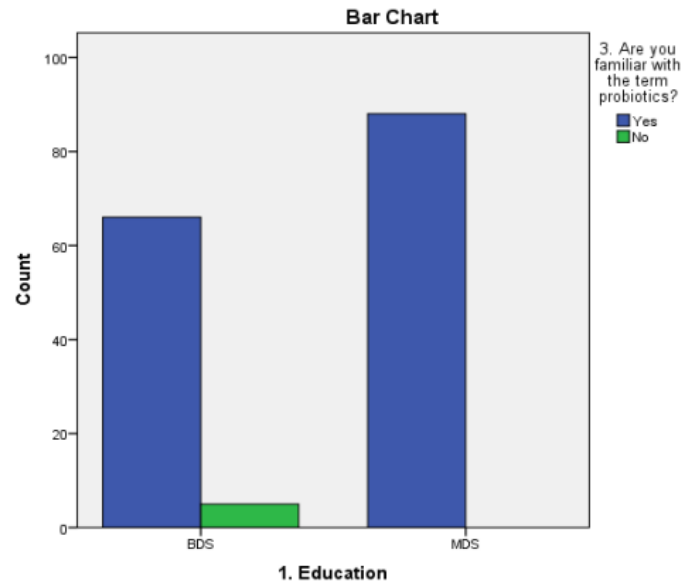


Figure 2: It shows Bar graph showing the comparison between familiarity to the term probiotics and Education (P<0.05)

12. Do you prescribe probiotics to your patient?

159 responses

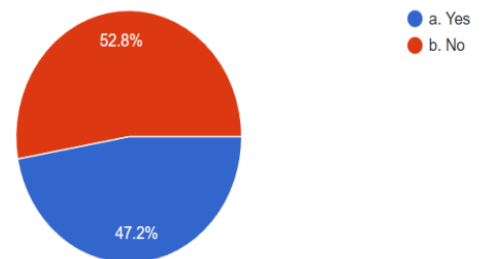


Figure 3: It shows Pie Chart showing percentage of dentist's prescribing probiotics to their patient's (P<0.05)

Conclusion

Dentists of Gujarat state are aware of the concept of probiotics. Even though majority of them are familiar with the benefits of probiotics, their usage is limited due to the lack of adequate pharmacological knowledge of probiotics. Appropriate education, training and updates with the help of conferences, seminars, workshops and journal club about probiotics will help in increasing the prescription of probiotics, thereby benefiting the patient and may go a long way to improve the awareness and knowledge of probiotic use.

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