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Knowledge, attitude and practice of using probiotics among dental students in Patna, Bihar: A cross-sectional study

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Abstract:
Probiotics are defined as "those supplements of food which contain microbial flora that has the capacity to effect human health in a beneficial way". Therefore, it is of interest to assess the knowledge, attitude and practice of probiotics for oral health amongst dental students and also to assess any relation if exists between educational status of dental students and knowledge, attitude and practice of probiotics for oral health. A descriptive cross-sectional study was conducted among 143 dental students in Patna, Bihar, statistical test was computed using SPSS version 20, and p-value was kept at <0.05 for significance. Out of 143 students, 121 students participated in this questionnaire study giving a response rate of 84.6% in which 68.6% were females and 31.4% were males. Qualification distribution revealed 69.4% interns and 30.6% postgraduates. Thus, a good level of knowledge was observed among dental students.

Keywords: Knowledge, attitude, practice, probiotics

Background:
The term "probiotics" is derived from Greek, meaning "for life," and refers to substances produced by microorganisms that stimulate growth **[1].** In the oral cavity, a diverse population has been estimated to include more than 700-1000 bacterial species spread on the tongue, teeth, gum, inner cheeks, palate and tonsils. *Streptococci* form about 20% of these bacteria, in addition to viruses, fungi and some archaea **[2].** The indiscriminate and reckless use of antibiotics has led to the emergence of multi-resistant strains of bacteria **[3].** This unfortunate development has led scientists to seek alternate means of combating infectious diseases. In 2001, at an expert consultation of an international scientist working on behalf of the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO), the definition of probiotics was accepted **[4].** The definition was given as, "Live microorganisms, when administered in adequate amounts; confer a health benefit on the host". Probiotic microorganisms are available in a variety of foods such as dairy products, chocolate, cereals, beverages, fruits and vegetable products, dietary supplements and drugs. Among these foods, fermented dairy products like yogurt, cheese, beverages and desserts are the most preferred delivery vehicles for probiotics due to their specific nutritional, physio-chemical properties and higher buffering capacity to acidic conditions in the stomach which allows probiotic bacteria to reach the gut in sufficient numbers (6-8 log CFU/gram or mL) to exert their therapeutic effects **[5].** The most commonly used bacterial strains for probiotic preparations belong to the genera *Lactobacillus, Bifid bacterium and Streptococcus*. The commonly used *Lactobacillus* as probiotic products are *Lactobacillus acidophilus, L. Casei, L. Paracasei, L. rhamnosus, L. delbrueckii subsp. Bulgaricus, L. Brevis, L. Johnsonian, L. plantarum* and *L. fermentum.* The genus Bifidobacterium includes various Gram positive *non-* motile anaerobic bacteria. *Bifidobacterium infantis, B. Adolescentis, B. Animalis subsp animalis, B. Animalis subsp lactis, B. Bifidum, B. Longum and B. breves* are several strains used as probiotics. Other strains from bacterial species (*e.g.*, *Pediococcus acidilactici*, *Lactococcus lactis*, *Leuconostoc mesenteroides, Bacillus subtilis, Enterococcus faecium, Streptococcus thermophilus,* and *certain yeasts* (*e.g., Saccharomyces boulardii*) also qualify as probiotics **[6]**. 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. There are also previous studies that have identified probiotic properties found in several Indonesian foods, namely Indonesian pickles, tapai and shrimp paste **[7]**. Several dental pathological conditions necessitate the use of either short term or long term antibiotics **[8].** Supplemental probiotics along with necessary antibiotics could reduce the adverse effects and stimulate oral health promoting flora, and suppress the pathologic colonization and disease spread. Probiotics are delivered in four basic forms: beverage or food (fruit juice), prebiotic fibers, milk-based products, dried cell packages such as powder, capsule, gelatin tablets (Caglar, 2009) **[9].** Probiotics play a role in creating better oral health through its direct and indirect interactions. Through its direct interactions, probiotics interfere with biofilm formation, compete with oral microorganisms for available substance and produce chemicals to inhibit oral harmful bacteria that damage the oral hygiene. Through indirect interactions, probiotics play role in removing harmful bacteria and stabilizing normal conditions, modulating systemic immune function on local community as well as non-immunologic defence mechanisms **[10].** 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 **[11].** Therefore, it is of interest to evaluate the awareness and knowledge is warranted among the dental students, which will pave a good platform to carry forward their future good dental practice.

Methodology:
Study design:
Descriptive cross-sectional study

Source of data:
Data was obtained from dental students studying in dental institution, Patna, Bihar.

Study group:
Interns (undergraduates) and post-graduates studying in dental institution in Patna, Bihar.

Sample size:

A total of 143 participants were selected.

Sampling technique:
Consecutive Sampling

Duration of the study:
The duration of the study was for 3 months (August 2022 to October 2022).

Inclusion criteria:
Participants who were present on the day of survey and willing to participate in the study

Exclusion criteria:
[1] Participants who did not completely fill the questionnaire.
[2] Participants who did not give written informed consent to participate.

Ethical consideration:
The proposed study was reviewed by the Ethical Committee of Buddha Institute of Dental Sciences and Hospital-Patna, Bihar and clearance was obtained (Ref no.103)

Informed consent:
Informed consent was obtained from each participant involved in the study.

Probiotics has envisaged roles in oral cavity and can be extensively used in dentistry for following purposes **[1]**:-
[1] Modulate oral biofilm functions.
[2] Modulate plaque ecology.
[3] Effects on caries, gingivitis, periodontal disease, oral mucosal lesions, oro-pharyngeal
[4] Cancers, halitosis management, reduction in the levels of *Candida albicans* (Caglar, 2005).
[5] Interaction with oral epithelium.
[6] Enhancing barrier functions.
[7] Enhancing host immune responses (IgA, Defensins).
[8] Inhibit pathogen induced cytokines resulting in reduction of inflammation and tissue
[9] Lower the salivary pH and produce antioxidants which utilize the free electrons required for mineralization of plaque thereby inhibits plaque formation.

Method of collection of data:
[1] A structured, close-ended questionnaire consisting of 28 questions was developed to assess Knowledge, Attitude and Practice of using Probiotics for oral Health amongst dental students.
[2] The purpose of the study and the procedure to fill the form was explained to the participants.
[3] Questionnaires were distributed in the respective departments to the students **(Figure 1).**
[4] All the students were given sufficient time to read and fill the questionnaire.
[5] All the questionnaires were collected after filling from the respective departments.
[6] Completely filled questionnaires from the participants were entered in Microsoft Excel for further statistical analysis.

The Questionnaire consisted of 4-major groups:
[1] Socio-demographic factors
[2] Knowledge about probiotics
[3] Attitude towards probiotics
[4] Practice of using probiotics for oral health.

Statistical analysis:
Data was collected and statistically analysed by using Microsoft Excel Sheet and chi-square test was applied using statistical analysis SPSS software version 21.0. The categorical data was summarized as frequency with percentage and quantitative data were summarized as mean with standard deviation. A p-value ≤ 0.05 was considered to be statistically significant.

Results:
The present study shows that among 121(100%) study subjects, 38(31.4%) were males followed by 83(68.6%) females. Majority of them were interns *i.e.* 84(69.4%) and 37(30.6%) were postgraduates **(Table 1).** Regarding the knowledge of study subjects in obtaining information about Probiotics, it was found that 10(11.90%) interns and 2(5.40%) postgraduates have obtained information via Relatives/Friends, 9(10.71%) interns and 10(27.02%) postgraduates have obtained information via Books, 2(2.38%) interns and 2(5.40%) postgraduates have obtained information via Television, 18(21.42%) interns and 3(8.10%) postgraduates have obtained information via Social media/Internet, 12(14.28%) interns and 4(10.81%) postgraduates have obtained information via Doctors. When responses of the above question was statistically analyzed it was found to be statistically significant (p=0.03). Regarding the knowledge about Probiotics improving their oral health, it was found that 76(90.5%) interns and 37(100.0%) postgraduates believed that Probiotics improve their oral health and this was found to be statistically significant (p=0.050). Regarding the knowledge about the benefits of using Probiotics in oral health has been confirmed by scientific research, it was found that 65(77.4%) interns and all the postgraduates 37(100.0%) believed That benefits of using Probiotics in oral health has been confirmed by scientific research and this was found to be statistically significant (p=0.007) **(Figure 2).** It was found that 81(96.4%) interns and the entire postgraduates 37 (100.0%) think that probiotics are safe and this was found to be statistically not significant (p=0.331). It was found that 74(88.1%) interns and all the postgraduates 37(100.0%) would try a Probiotic product, if it will be recommended by health professional and this was found to be statistically no Significant (p=0.187). It was found that 79(94.0%) interns and 34(91.9%) postgraduates want to learn more about Probiotics, and this was found to be statistically not significant(p=0.660) (**Figure 3).** It was found that 65(77.4%) interns and 33(89.2%) postgraduates consumed food products with Probiotics and this was found to be statistically not significant (p=0.127). It was found that 71(84.5%) interns and 28(75.7%) postgraduates have recommended Probiotics to their family/close relatives/patients and this was found to be statistically not significant (0.245). It was found that 25(65.8%) interns and 61(73.5%)

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postgraduates have searched for additional informational regarding Probiotics from various sources and this was found to be statistically not significant (p=0.386).

Table 1: Distribution of knowledge of study subjects regarding probiotics; according to their level of education

Source of information	Intern (N=84)		Post-graduate (N=37)		p-value
	N	%	N	%	
Relatives/Friends	10	11.9	2	5.41	0.03* (S)
Books	9	10.7	10	27	
Newspapers/Magazines/Articles	4	4.76	0	0	
Television	2	2.38	2	5.41	
Social media/Internet	18	21.4	3	8.11	
Any other (specify)	0	0	2	5.41	
If 2 or more responses marked	29	34.5	13	35.1	



Figure 1: Illustrates the distribution of questionnaire to students

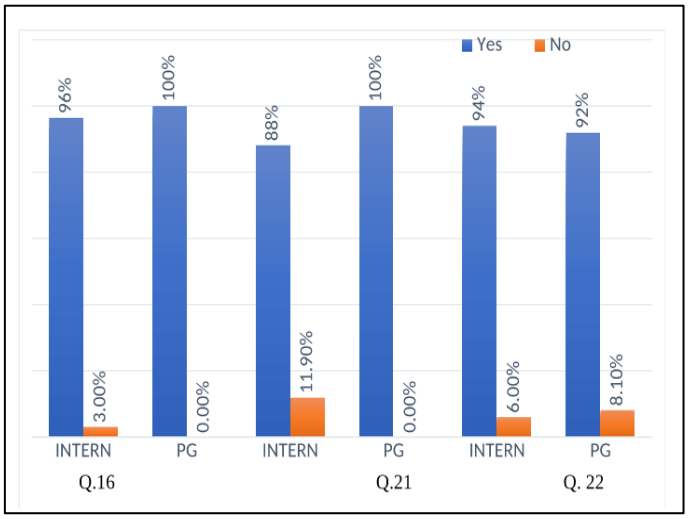


Figure 2: (Q16, Q21, Q22) Distribution of attitude of study subjects regarding Probiotics; according to their Level of Education. Q16. Do you think Probiotics are safe? Q21. Would you try a Probiotic product, if it were recommended by health professional? Q22. Do you want to learn more about Probiotics?

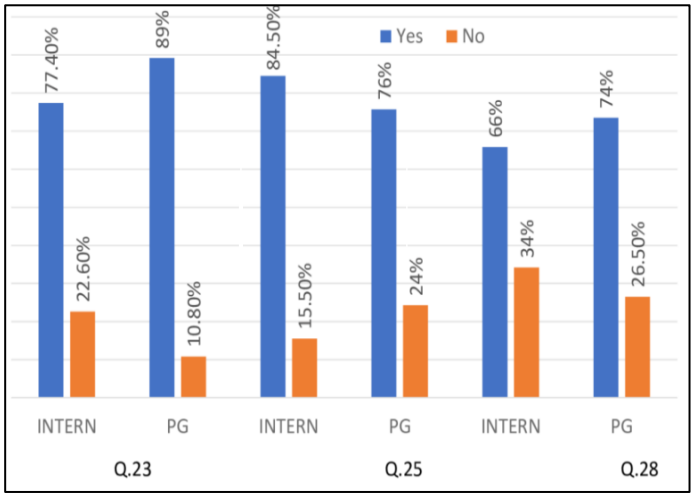


Figure 3: (Q23, Q25, Q28) Distribution of practice of study subjects regarding probiotics; according to their Level of Education. Q23. Do you consume food products with Probiotics? Q25. Have you recommended Probiotics to your family/close relatives/patient? Q28. Have you searched for additional information regarding Probiotics from various sources?

Discussion:

There has been a spiralling interest in utilizing natural remedies to treat or avert human ailments. Probiotics are live microbes available commonly in the form of food supplements that benefit the host defence of the body by improving its intestinal balance. Since, dental students are the upcoming peer group, they are in a key position to help their patients reduce the burden of oral diseases and attain positive oral health behaviour. Hence, keeping in mind the expected role played by the dental students, the present study was conducted to evaluate the knowledge, attitude and practice of using Probiotics for oral health amongst dental students in Patna, Bihar. In the present study, comparatively interns (69.4%) were more than the postgraduates (30.6%). This is in contrast with the study conducted by Muchhal *et al.* **[3]** in which 20.1% was undergraduates and 21.4% postgraduates. In the present study, regarding the knowledge of study subjects towards probiotics according to their level of education, it was found that majority of interns (21.42%) have obtained information about probiotics from Internet. Probable reason was the internet websites are a resource for patient seeking information about probiotics **[21].** Contradictory result shown in study conducted by Patait *et al.*, **[4]** on the Dental Post-graduate Students. 44.1% of them got information from their physicians or other healthcare professionals. However, most of the postgraduates (27.02%) have obtained information about probiotics from books. The reason for this might be because postgraduates are more exposed to reading books/articles. They participate in seminars, attend conferences and CDE programmes and do research work. The result was found to be statistically significant (p=0.03), which is similar to a study conducted by Muchhal *et al.* **[3]** and Babina *et al.* **[20]** However, the result is in contrast with the study conducted by Krishnan *et al.* **[8]**, where maximum

number of participants obtained information through the academic curriculum. When the study subjects were asked, "Do you think probiotics improve your oral health?"majority of the interns(90.5%) and all the postgraduates(100%) believed that probiotics improved their oral health which included prevention of halitosis, prevention of dental caries, prevention of gingival inflammation and prevention of periodontal disease and it was found to be statistically significant(p=0.050). In the present study, all the postgraduates (100.0%) and 77.4% interns believed that the benefits of using probiotics in oral health has been confirmed by scientific research and it was found to be statistically significant (p=0.007). In the present study, regarding the attitude of study subjects towards probiotics according to their level of education, all the postgraduates (100.0%) and 96.4% interns thought that probiotics are safe. This result is similar to study conducted by Muchhal *et al.* **[3],** Sahib *et al.* **[12]** and Agarwal *et al* **[13].** However; the result is in contrast with the study conducted by Faden *et al.* **[14]** When the study subjects were asked "Would you try a probiotic product, if it were recommended by health professional?" all the postgraduates (100.0%) and 88.1% interns were willing to try probiotic product if it was recommended by health professional. This shows that the participants are willing to try something new on recommendation from their physician **[15].** The result is similar with the study conducted by Muchhal *et al.* **[3],** Krishnan *et al.* **[8].** In the present study, when the study subjects were asked "Do you want to learn more about probiotics?" 91.9% postgraduates and 94.0% interns showed keen interest which is similar to a study conducted by Fijan *et al.* **[16]**, Poorni *et al.* **[19]** and Rahmah *et al.* **[6].** In the present study, regarding the practice of study subjects towards probiotics according to their level of education, 77.4% interns and 89.2% postgraduates had consumed food products with probiotics. This is because due to their good level of knowledge about probiotics which they have utilized in practice. This result is similar to a study conducted by Fijan *et al.* **[16]** and Rahmah *et al.* **[6],** Santhanam *et al.* **[20].** In the present study, when the study subjects were asked if they had ever advised their family/close relatives/patient to use probiotics, majority of the interns (84.5%) and postgraduates (75.7%) answered affirmatively which is in line with the study conducted by Fijan *et al.* **[16]** and Salari *et al* **[17],** Krishnan *et al.* **[9]** including children and pregnant woman. This is in contrast with the study by Babina *et al.* **[21].** In the present study, when the study subjects were asked if they had ever advised their family/close relatives/patient to use probiotics, majority of the interns (84.5%) and postgraduates (75.7%) answered affirmatively which is in line with the study conducted by Fijan *et al.* **[16]** and Salari *et al* **[17],** Krishnan *et al.* **[9]** including children and pregnant woman.

Conclusion:

We show that the participants were well aware of the term probiotics and its role in improving the oral health. It was also revealed in the present study that consumption of probiotic food products was mainly for gastrointestinal conditions. Therefore, further studies are needed to be carried out regarding the barriers of usage of probiotics in their daily practice.

Recommendations:

[1] The emphasis on use of Probiotics for oral health should be increased in the current dental curriculum, so that these students in their future play a greater role in oral health related activities.

[2] Educational strategies such as nutrition education, media campaign and awareness should be carried out to address the correctness of information about probiotic products as well as to promote the increase of probiotic consumption.

[3] The regulatory status of probiotics as a component in food should be established on an international level.

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