

Original Research Article

Knowledge and attitude of probiotics and its health benefits among dental postgraduates and compulsory rotatory residential internship students of coastal Karnataka

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Abstract

Background: Probiotics have been commonly used for the maintenance of gastrointestinal health and evidence suggests that it may also be beneficial for dental health. However, due to a lack of knowledge and doubts about their safety and efficacy, health professionals are reluctant to recommend probiotics to their patients. Hence, this study aims to understand the knowledge and attitude of dental professionals towards probiotics.

Materials and Methods: A pre-validated 15-item closed-ended questionnaire was used to assess knowledge and attitudes about probiotics among 250 dental postgraduates and CRRI students from various dental institutions in coastal Karnataka.

Results: The study found that postgraduates, though not significant, had better awareness of probiotics and their ability to inhibit pathogen growth on dental plaque compared to CRRI. Postgraduates also recognized the limited use of probiotics in dentistry. Conversely, CRRI emphasized the importance of educating healthcare professionals about probiotics.

Conclusion: Dental postgraduates have a solid understanding of probiotics, while undergraduates or CRRI would benefit from comprehensive education on their applications in dental care.

Keywords: Probiotics, Oral health, Knowledge, Survey.

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1. Introduction

Humans coexist closely with a multitude of microorganisms inhabiting their skin, oral cavity, and gastrointestinal system. More than 500 distinct bacterial species are found within the human body, with several playing crucial roles in promoting health. These functions encompass bolstering the immune system, shielding the host from pathogenic bacteria and viruses, and facilitating the digestive process.¹ The balance of this ecosystem can be interrupted by exposure to antibiotics, and immunosuppressive therapy with other medical interventions.^{2,3} Antibiotic resistance, characterized by the rise of numerous resistant strains, poses a significant global challenge.⁴ This phenomenon results in the depletion of beneficial bacteria, leaving behind resistant and potentially harmful pathogens. Acknowledging this concern, healthcare

practitioners are increasingly investigating alternative therapeutic methods. An example of such an alternative approach involves using probiotics, which are beneficial bacteria that stimulate the growth of beneficial native flora and aid in reversing these harmful alterations.³ The term “probiotic” originates from the Greek language, meaning “for life.” Coined by Lilly and Stillwell in 1965, the term is described as “substances produced by one microorganism that promote the growth of another”.⁵ According to the WHO, probiotics are “live microorganisms that, when administered in adequate amounts, confer a health benefit on the host”.⁶ Probiotics are typically incorporated into products by adding a culture concentrate to beverages or foods, such as fruit juice, inoculating them into prebiotic fibers, introducing them as inoculants into milk-based foods, and providing them as

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concentrated and dried cells packaged as dietary supplements.⁷

Research suggests probiotics, commonly used for gastrointestinal health, may also benefit dental health by reducing cariogenic pathogens and protecting against periodontal diseases, halitosis, mucositis, and peri-implantitis.⁸ However, their utilization in dentistry is limited due to a lack of knowledge among dentists. Despite evidence of safety and effectiveness, conflicting reports may hinder health professionals from recommending probiotics to patients, highlighting the need for comprehensive education among dentists.⁹

The lack of probiotic understanding among dentists in coastal Karnataka necessitates enhanced education. No studies have assessed probiotic knowledge among CRRI and post-graduates in this region. Such an assessment could inform curriculum development for future dental practitioners and enhance existing professionals understanding through specialized training. This study aims to evaluate knowledge and attitude of probiotics and its health benefits among dental postgraduate and CRRI students of coastal Karnataka.

2. Materials and Methods

This is a cross-sectional pre-validated questionnaire study with 15 closed-ended questions carried out to assess the knowledge and attitude towards probiotics among dental postgraduates and CRRI. The information was collected directly from the participants. Before the start of the study consent was obtained from the participants and the study nature was explained. Ethical clearance was obtained from the Institutional Ethical Committee (Ref.No.ETHICS/ABSMIDS/411/2024).

The sample size was calculated using the following formula:

$$N = \frac{(Z_{\alpha/2})^2 pq}{d^2}$$

where,

N= Sample Size

$Z_{\alpha/2}$ = standard normal variate, at 5% type I error (p-value < 0.05), it is 1.96.

P = Prevalence = 17.6% [those who had not consumed food with probiotics]

d= Absolute error = 5%

So,

$$N = \frac{(1.96)^2 \times 0.145}{(0.05)^2}$$

N= 222.72 [a 10% non-response rate]

N = 247.4 Σ 247

The minimum sample size required for the study is 247 patients.¹⁰

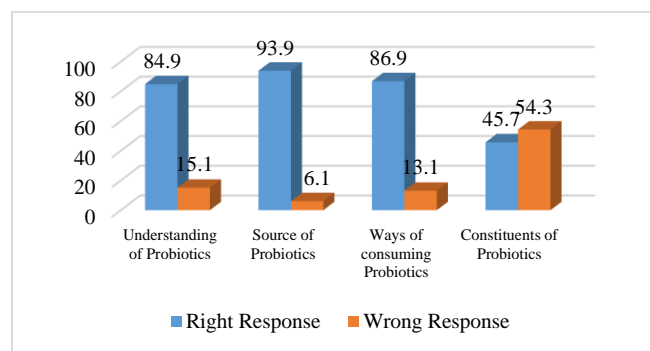
The study's total consisted of 250 dental postgraduates and CRRI from various dental colleges in coastal Karnataka. A total of 20 questions which is divided into three sections personal details/demographic data (5 questions) Section-1 Knowledge (9 questions) Section-2 Attitude (6 questions). The questionnaire was distributed and collected on the same day from the participants.

2.1. Statistical analysis

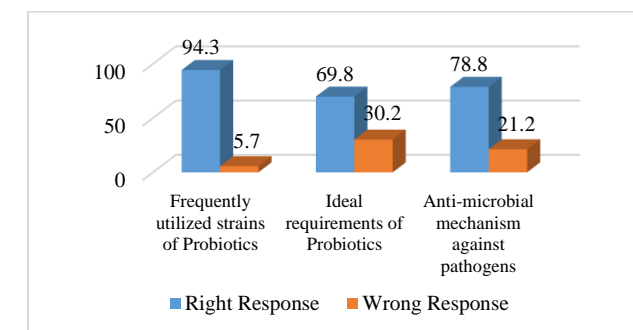
The data analysis was conducted using IBM SPSS (Statistical Package for Social Sciences), version 22.0, software from IBM Corporation, based in Armonk, NY, USA. Descriptive statistics were utilized, and categorical data were assessed using the chi-square test. The findings were visually presented through graphs and tables. Statistical significance was determined at a threshold of P-value<0.005.

3. Results

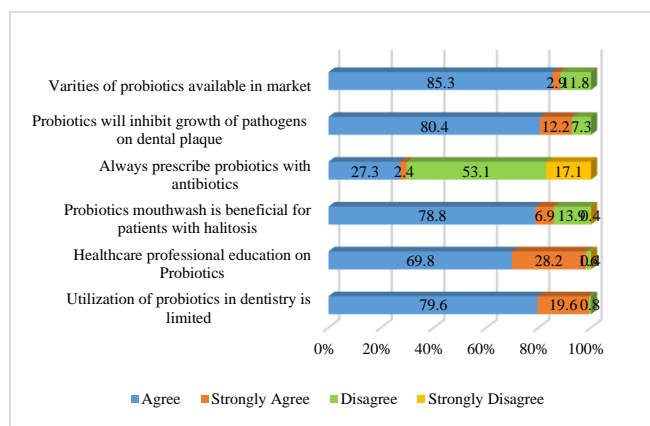
Out of 250 participants, 43.7% were males and 56.3% were females. Regarding their year of study, 47.8% were MDS students, and 52.2% were CRRI. A majority (55.5%) acquired information about probiotics from the internet/visual media. Over 80% of participants had an understanding of probiotics and knew various sources of probiotics and ways to consume them. Only 45.7% of participants knew the constituent of probiotics (**Graph 1**). 94.3% of participants knew the most frequently utilized probiotics, 69.8% knew the ideal requirement of probiotics and 78.8% of participants knew the antimicrobial mechanism of probiotics against pathogens (**Graph 2**).



Graph 1: Distribution of participants based on right responses related to probiotics



Graph 2: Distribution of participants based on right responses related to probiotics



Graph 3: Participants attitude towards probiotics

The majority of participants were aware of various varieties of probiotics, most of them believed that probiotics will inhibit the growth of pathogens on dental plaque, and they believed that probiotic mouthwash will benefit patients

with halitosis, but most of the participants mentioned that there is a need to educate healthcare professional on probiotics and their utilization in dentistry is limited. Only 27.3% of participants reported that they prescribed probiotics with antibiotics and 53.1% did not prescribe probiotics with antibiotics (**Graph 3**).

A nearly equivalent proportion of postgraduates and CRRI obtained information about probiotics from the internet or visual media. This distribution was determined to be statistically significant ($P=0.027$). Postgraduate students had a statistically significant understanding of probiotics than CRRI ($P = 0.027$), and more postgraduates than CRRI knew the constituents of probiotics ($P = 0.001$). (**Table 1**) The study revealed that the majority of postgraduate than CRRI refrained from prescribing probiotics with antibiotics, which was statistically significant ($P=0.008$). (**Table 2**)

Table 1: Distribution of knowledge on probiotics according to year of study

		Post-graduates N (%)	CRRI N (%)	Total N	Chi-Square	P value
Source of Information	Books	16 (13.6)	8 (6.3)	24	9.15	$P = 0.027^*$
	Internet/Visual Media	69 (58.5)	67 (52.8)	136		
	Professional Colleagues	33 (28)	48 (37.8)	81		
	Not Applicable	0	4 (3.1)	4		
Understanding of Probiotics	Right Answer	109 (92.4)	99 (78)	208	9.9	$P = 0.002^{**}$
	Wrong Answer	9 (7.6)	28 (22)	37		
Optimal Source of Probiotics from Diet	Right Answer	112 (94.9)	118 (92.9)	230	0.426	$P = 0.6$
	Wrong Answer	6 (5.1)	9 (7.1)	15		
Consumption of Probiotics	Right Answer	106 (89.8)	107 (84.3)	213	1.67	$P = 0.25$
	Wrong Answer	12 (10.2)	20 (15.7)	32		
Constituents of Probiotics	Right Answer	71 (60.2)	41 (32.3)	112	19.1	$P = 0.001^{**}$
	Wrong Answer	47 (39.8)	86 (67.7)	133		
Frequently utilized strain	Right Answer	114 (96.6)	117 (92.1)	231	2.28	$P = 0.171$
	Wrong Answer	4 (3.4)	10 (7.9)	14		
Ideal requirements	Right Answer	84 (71.2)	87 (68.5)	171	0.209	$P = 0.67$
	Wrong Answer	34 (28.8)	40 (31.5)	74		
Anti-microbial mechanism	Right Answer	98 (83.1)	95 (74.8)	193	2.49	$P = 0.121$
	Wrong Answer	20 (16.9)	32 (25.2)	52		

N-number; %-percentage; NS-not significant and statistically significant at $*P < 0.05$ and $**P < 0.01$ using Chi-square test

Table 2: Distribution of responses on attitude to probiotics according to year of study

		Post-graduates N (%)	CRRI N (%)	Total N	Chi-Square	P value
Varieties of Probiotics in the Market	Agree	103 (87.3)	106 (83.5)	209	1.54	$P = 0.46$
	Strongly Agree	4 (3.4)	3 (2.4)	7		
	Disagree	11 (9.3)	18 (14.2)	29		
	Strongly Disagree	0	0	0		
Inhibit the growth of pathogens on dental plaque	Agree	99 (83.9)	98 (77.2)	197	3.36	$P = 0.186$
	Strongly Agree	14 (11.9)	16 (12.6)	30		
	Disagree	5 (4.2)	13 (10.2)	18		
	Strongly Disagree	0	0	0		
Always prescribe probiotics with antibiotics	Agree	30 (25.4)	37 (29.1)	67	11.9	$P = 0.008^{**}$
	Strongly Agree	5 (4.2)	1 (0.8)	6		
	Disagree	71 (60.2)	59 (46.5)	130		
	Strongly Disagree	12 (10.2)	30 (23.6)	42		

Probiotic mouthwash is beneficial for patients with halitosis	Agree	93 (78.8)	100 (78.7)	193	4.28	P = 0.233
	Strongly Agree	11 (9.3)	6 (4.7)	17		NS
	Disagree	13 (11)	21 (16.5)	34		
	Strongly Disagree	1 (0.8)	0	1		
Need for education on Probiotics for health professionals	Agree	80 (67.8)	91 (71.7)	171	1.393	P = 0.7
	Strongly Agree	35 (29.7)	34 (26.8)	69		NS
	Disagree	2 (1.7)	2 (1.6)	4		
	Strongly Disagree	1 (0.8)	0	1		
Utilization of Probiotics in dentistry is limited	Agree	95 (80.5)	100 (78.7)	195	0.131	P = 0.937
	Strongly Agree	22 (18.6)	26 (20.5)	48		NS
	Disagree	1 (0.8)	1 (0.8)	2		
	Strongly Disagree	0	0	0		

N-number; %-percentage; NS-not significant and statistically significant at *P < 0.05 and **P < 0.01 using Chi-square test

4. Discussion

Maintaining the equilibrium between beneficial and pathogenic microorganisms is essential for oral health. Imbalances, known as “dysbiosis”, can lead to the onset of oral and systemic illnesses.⁹ The probiotics play a role in enhancing the body’s immune response by promoting intestinal balance. While there is a growing body of research on the impact of probiotics on oral health, they are not effectively harnessed to address oral issues due to insufficient understanding and limited awareness about the benefits of probiotics products among dental professionals.¹⁰ Therefore, dental professionals should possess an understanding of probiotic applications in dentistry and their potential for preventing and treating oral diseases. This study aims to evaluate the awareness and perspective on probiotics and their health benefits among dental postgraduate and CRRI students in coastal Karnataka.

The majority of participants, approximately 55.5% obtained information about probiotics from the internet or social media, while only 33.1% received information from professional colleagues. These findings are in contrast with a study conducted by Krishnan L et al. where 40% of subjects cited academics as their source of probiotics information.¹¹

Around 45.7% of participants have mentioned live microorganisms and yeast are the constituents of probiotics, this result is consistent with the study conducted by Gowder et al., where 54.9% of participants answered live microorganisms are used in probiotics.¹² The study conducted by Gayathri Rajeev et al., also mentioned that 82.2% of interns and 79.9% of final year students were able to accurately identify live microorganisms as the source of probiotics.¹³

94.3% of participants knew that *Lactobacillus* and *Bifidobacterium* are the most commonly used strains in probiotics, this result was similar to the study conducted by Babina et al., where they mentioned most recognized bacterial species used in probiotics are *Lactobacillus* and *Bifidobacterium*.⁹

Approximately 78.8% of the surveyed individuals are familiar with the antimicrobial mechanisms of probiotics,

such as their ability to modulate the host immune response, enhance intestinal barriers, and competitively exclude pathogens. These findings support Silva et al., review article which discusses these antimicrobial mechanisms.¹⁴

In our present study, 80.4% of participants demonstrated confidence in the probiotic's capability to inhibit pathogen growth on dental plaque, while 78.8% believed in its potential to benefit individuals suffering from halitosis. These findings closely resemble those reported in a study led by Patit et al., where 56.9% of respondents believed that probiotic treatment involving *Lactobacillus salivarius* could improve both plaque index and probing depth among smokers.¹⁰ Probiotics ability to lower inflammation and restore the balance of oral bacteria was highlighted by Stamatova and Meruman, who emphasised its use in periodontal therapy.¹⁵ Teughels et al., conducted a clinical study in beagle dogs, which revealed that some probiotic strains administered after scaling and root planning, improved the clinical outcomes.¹⁶

According to a study by Aragon et al., dental healthcare providers who prescribe antibacterial medications should have considerable knowledge about the gut dysbiosis linked to these drugs and utilize the opportunity to treat their patients accordingly. Incorporating probiotics into treatment regimens can mitigate the risk of developing gut dysbiosis associated with antibiotic use, thereby reducing the likelihood of various systemic diseases related to dysbiosis.¹⁷ The present study revealed that a very small proportion of participants were prescribing probiotics alongside antibiotics, which contrasts with the findings of the above-mentioned study. A study conducted by Al Hossan AA et al., indicated that approximately 43.8% of participants were of the opinion that probiotics could help to reduce the antibiotic side effects.¹⁸ Additionally, according to a study by Shrestha P et al., 22.2% of general practitioners believe that probiotics can replace antibiotics.¹⁹

Furthermore, though not significant, the study revealed that postgraduate students exhibited greater awareness of the various probiotic varieties available in the market compared to CRRI. Postgraduate students were also more knowledgeable about the inhibitory effects of probiotics on pathogen growth on dental plaque and were more likely to

agree on the limited utilization of probiotics in dentistry. Conversely, CRRI showed a higher agreement than postgraduate students regarding the necessity for education on probiotics among healthcare professionals. According to the study by Ankur Jethlia et al., all participating dental professionals felt that a lecture course explaining the use of probiotics in dentistry was necessary.²⁰

The limitation of the study is that the sample is restricted to dental institutions in coastal Karnataka, potentially limiting the generalizability of the findings to other regions. Additionally, the use of a closed ended questionnaire limit the depth and scope of responses, potentially restricting the participants' ability to fully express.

5. Conclusion

The results of the present study inferred that dental postgraduates have good knowledge of probiotics in general. However, undergraduates or CRRI require comprehensive education regarding the diverse applications of probiotics in dental practice.

6. Source of Funding

None.

7. Conflict of Interest

None.

8. Acknowledgements

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9. Appendix

1. CRRI- Compulsory Rotatory Residential Internship
2. MDS- Master of Dental Surgery

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