

Patients Awareness of Probiotics and their Impact on Oral Health

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ABSTRACT: With the rapid development of dentistry, an increasing number of new methods for treating and preventing oral diseases are emerging, probiotics are no exception. However, studies investigating public attitudes toward the use of probiotics have revealed a lack of awareness in this area. The study of patients' awareness about probiotics and their impact on oral health revealed that there is a lack of sufficient information on this topic in our society. The data obtained during the study indicated that older respondents more often viewed probiotic-containing products negatively. Respondents who used oral probiotics most often did so for halitosis, gingival inflammation, dental caries, or prophylactic purposes.

KEYWORDS: Oral probiotics, awareness, oral health, probiotics.

I. INTRODUCTION

The human body constantly hosts a multitude of microorganisms that are necessary for human health and do not cause any harm to their host - in fact, quite the opposite - they help the body function properly. Rapid advancements in biotechnology and medicine allow us not only to cultivate but also to thoroughly study bacteria that possess potential health-promoting properties [1]. According to the World Health Organization (WHO) and the Food and Agriculture Organization of the United Nations (FAO), probiotics are live microorganisms which, when administered in adequate amounts, confer a health benefit on the host [2].

The term “probiotic” was first mentioned in 1965. The most commonly known groups are *Lactobacillus* and *Bifidobacterium*, although there are many other types of probiotic bacteria [3]. While we already know that probiotics are beneficial for the gut, there is a growing and increasingly vocal discussion about the benefits of probiotics for oral health. According to Chugh et al., 2020, these microorganisms are becoming a powerful preventive tool in oral care, exhibiting an inhibitory effect on pathogenic bacteria [4]. Most dental diseases—including tooth decay, periodontal disease, and halitosis—are caused by an imbalance in the oral microbiota. Therefore, replacing pathogenic bacteria with beneficial ones is one of the measures to prevent these conditions. This can be achieved through various probiotic-containing products [5]. Current research shows that maintaining a balance between beneficial and pathogenic bacteria is essential for preserving oral health, and the use of probiotic products is an expanding field in dentistry [6].

Oral probiotics are safe, positively affect the oral microbiota, and benefit the oral ecosystem in cases of periodontal disease, halitosis, and even in the treatment of oral cancer [7]. Our society remains poorly informed about the use of oral probiotics in the context of dental and gum diseases. People tend to consume probiotics for other health reasons, while their benefits for oral health receive little attention. Therefore, there is a significant need to discuss this topic.

As dentistry continues to advance rapidly, more and more new methods for the treatment and prevention of oral diseases are emerging. Probiotics are no exception—they can contribute to improved oral health in patients. When exploring public attitudes toward the use of probiotics, it was observed that society lacks knowledge in this area, and even dentists or oral care professionals are often reluctant to discuss this topic widely with their patients [5].

Research aim: examine patients' awareness of probiotics and their impact on oral health.

Research objectives:

1. Compare patients' awareness of probiotics and their impact on oral health based on demographic indicators;
2. Assess patients' awareness of probiotics and their impact on oral health;
3. Identify the reasons why patients use or have used oral probiotics.

II. MATERIAL AND METHODS

The participants of the study were patients of Clinic X who visited the clinic during the entire research period and verbally agreed to participate in the study. The study focused on evaluating patients' awareness of probiotics and their impact on oral health. Paper-based questionnaires were distributed to the respondents. A total of 110 questionnaires were printed, out of which 103 were

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considered valid and included in the analysis. Therefore, the study sample consisted of $n = 103$ respondents. The remaining questionnaires were deemed invalid due to being damaged, incompletely filled out, or not completed according to the instructions. A non-probability convenience sampling method was used, as the study participants were patients of the clinic. A mixed-method approach - quantitative and qualitative - was chosen in order to explore the selected topic as thoroughly as possible. During the study, it was found that only 10 respondents had used oral probiotics. This number was too small to analyse the data using quantitative methods, so the results related to this group were described using a qualitative research approach. Written surveys were used for data collection. As noted by Kardelis (2017), written surveys are the most popular method in sociological research [8]. A 24-question questionnaire was developed, focusing on probiotics and their impact on oral health. Permission to conduct the study in the dental clinic was obtained in writing from the clinic's manager.

Microsoft Excel was used for data collection and analysis. The responses from each participant were manually entered into Microsoft Excel.

III. RESULTS AND DISCUSSION

The study involved $n = 103$ respondents: 62 women, representing 60.2%, and 41 men, accounting for 39.8%. The respondents' ages were evenly distributed and divided into five age groups: group 1 – individuals under 29 years of age, group 2 – individuals aged 30 to 39, group 3 – individuals aged 40 to 49, group 4 – individuals aged 50 to 59, group 5 – individuals aged 60 and over.

Respondents were further classified according to place of residence: those living in urban areas and those living in rural areas. Based on educational background, the study included participants with secondary education, higher non-university education, and higher university education. The distribution of respondents according to demographic characteristics is presented in Table 1.

Table 1. Distribution of Respondents According to Demographic Characteristics (percent)

Demographic characteristics		n	%
Age groups	Up to 29 years	15	14,5
	30 – 39 years	23	22,3
	40 – 49 years	25	24,3
	50 – 59 years	21	20,4
	60 years and older	19	18,5
Gender	Woman	62	60,2
	Man	41	39,8
Residence	Urban	62	60,2
	Rural	41	39,8
Education	Average	28	27,2
	Higher non-university	43	41,8
	Higher university	32	31

Oral health is very important for overall health and well-being; however, over the past 20 years, there has been little improvement in public oral health. Tooth decay and gum diseases remain widespread globally, accounting for 50% to 90% of all oral cavity diseases. In an effort to combat these conditions, alternative methods of treatment and prevention are being explored—one such method is the use of probiotics [9]. The word “probiotics”, according to the World Health Organization (WHO) definition, refers to live microorganisms which, when administered in adequate amounts, confer a health benefit on the host [2]. The growing interest in probiotics as an alternative and complementary measure for the prevention of periodontitis and dental caries has attracted the attention of the scientific community, with promising research results [10]. As knowledge about the oral microbiota expands, researchers have increasingly begun to investigate the benefits of probiotics for oral health. The most commonly studied probiotic strains belong to the genera *Lactobacillus* and *Bifidobacterium* [11].

Saiz, Taveira, and Alves (2021) note that there are many types of oral probiotics, each used for different issues. In dentistry, probiotics can help address several conditions such as the treatment of periodontitis, gum inflammation, prevention of peri-implantitis, treatment of halitosis, prevention of dental caries, and maintenance of a healthy oral microbiota [7]. Mahasneh S. and Mahasneh A. (2017) discuss the interaction of probiotics with oral epithelium, and research results show that probiotic bacteria can strengthen the epithelial barrier function as well as modulate both innate and adaptive immune responses. Respondents in the study were asked whether they had heard about oral probiotics [12]. Since, as stated by D'Agostino et al. (2024), interest in probiotics and their potential applications has been increasing recently, it was important to find out how many participants were aware of oral probiotics [10]. The results are presented in Figure 1.

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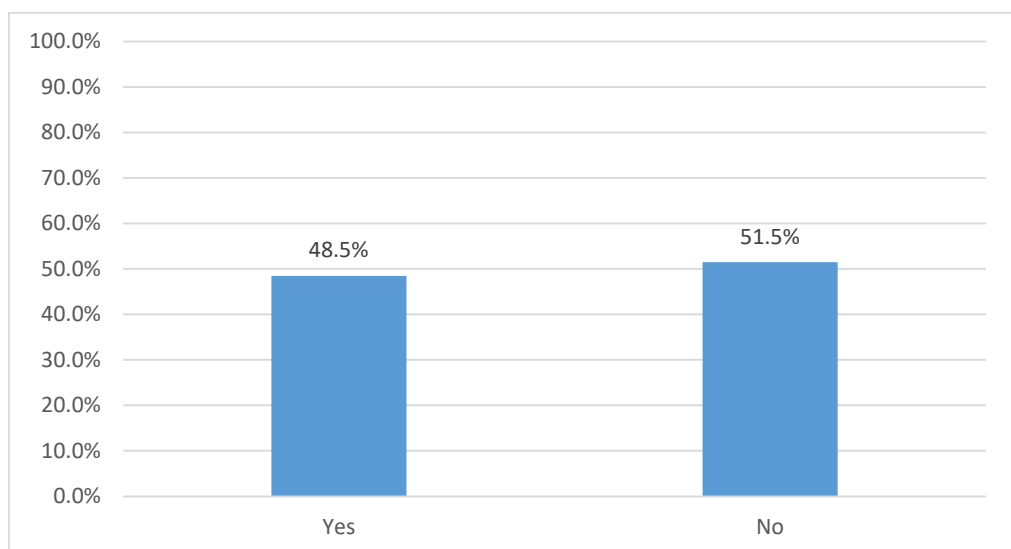


Figure 1. Distribution of Respondents Based on Whether They Have Heard About Oral Probiotics (percent)

Based on the collected data, we can see that the respondents' answers were almost evenly distributed: 48.5% of respondents have heard about oral probiotics, while slightly more than half (51.5%) have not heard of them. Next, the distribution of respondents who have or have not heard about oral probiotics is analysed according to demographic indicators (Table 2).

Table 2. Respondents' Awareness of Oral Probiotics According to Demographic Indicators (percent)

Demographic characteristics		Have you heard about oral probiotics (percent)	
		Taıp	Ne
Gender	Woman	56,3	32,5
	Man	43,8	67,5
Age group	Up to 29 years	5,8	4
	30 – 39 years	23	8
	40 – 49 years	23,7	23,9
	50 – 59 years	25,9	27,3
	60 years and older	21,6	36,9
Residence	Urban	37	49,3
	Rural	63	50,7
Education	Average	14	21,8
	Higher non-university	40,1	42,3
	Higher university	45,9	35,9

The obtained data show that more women (56.3%) have heard about oral probiotics. By age group, the highest awareness was among individuals aged 50 to 59 years (25.9%). Regarding place of residence, most respondents who had heard about probiotics lived in rural areas (63%), while according to education level, the majority were respondents with higher university education (45.9%). From the data presented in the table, we can see that the lowest awareness of oral probiotics was among respondents aged 60 years and older (36.9%).

Yurdabakan and Eren (2023) conducted a study in Turkey aiming to determine patients' awareness of probiotics. The study results showed that patients had greater knowledge about oral probiotics; 509 respondents participated, of whom 67.5% knew what oral probiotics are. The distribution by age groups showed that respondents aged 51–60 years were more knowledgeable about oral probiotics and had heard more about them (24.7%). In terms of gender, women had heard about oral probiotics more often (67.5%). Additionally, individuals with higher university education had greater awareness of oral probiotics (48.1%). Comparing these studies, both the current study and the one by Yurdabakan and Eren indicate that awareness of oral probiotics is highest among people aged 50 to 59 years [13].

In the course of this study, further questions were asked only to those respondents who had heard about oral probiotics, totalling 50 respondents (48.5%); 53 respondents were excluded from this part of the data analysis. These questions aimed to find out whether respondents received information about oral probiotics from their dentists and dental hygienists. The results are presented in Figure 2.

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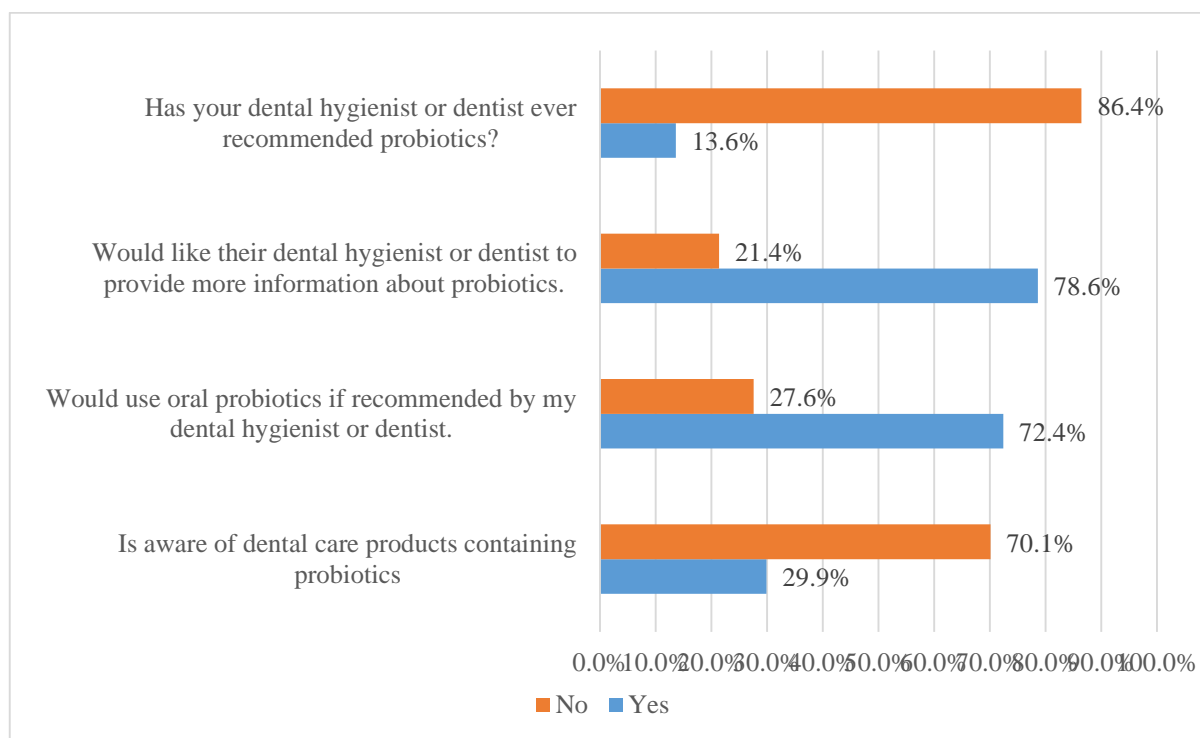


Figure 2. Provision of Information About Oral Probiotics to Respondents by Dental Hygienists/Dentists (percent)

The study results show that the majority of respondents (86.4%) answered that their dental hygienist or dentist had never recommended oral probiotics to them. Only 13.6% of respondents reported having heard recommendations about using oral probiotics from their healthcare professionals. A large portion of respondents (78.6%) said they would not mind receiving more information about oral probiotics from their treating dentists and dental hygienists. Furthermore, 72.4% of respondents would trust the specialists' recommendations and use oral probiotics if recommended. From the presented results, we see that the majority of respondents (70.1%) indicated they do not know about oral care products containing probiotics.

Based on this data, we can hypothesize that dental hygienists or dentists in our country may not recommend oral probiotics to patients because they themselves may lack sufficient knowledge and competence on the subject. A study conducted by Santhanam, Aravindam, Suganya, et al. (2022) in India showed that the knowledge of probiotics among Indian dentists is relatively high, with 77.4% of dentists recommending oral probiotics to their patients [14].

The study aimed to assess patients' knowledge about oral probiotics and their impact on oral health. Participants were asked their opinion on which problems oral probiotics could address. This part of the analysis includes responses from the 50 participants who reported knowing about oral probiotics. Respondents were allowed to select multiple answers. The results are presented in Figure 3.

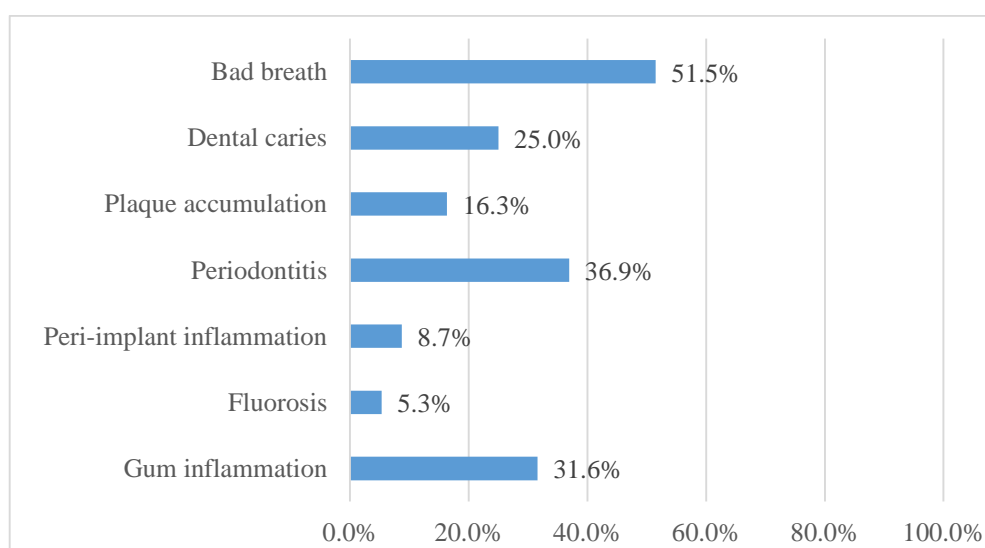


Figure 3. Respondents' Opinions on the Problems Addressed by Oral Probiotics (percent)

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The results show that the respondents most commonly associate oral probiotics with bad breath, as this answer was chosen by 51.5% of respondents. Baker et al. (2024), Chugh et al. (2020), and Sedghi et al. (2021) indicate that oral probiotics can help with bad breath, prevention of dental caries, treatment of periodontal diseases, and management of dental plaque. Therefore, all answer options were correct except for fluorosis, since probiotic use does not affect the development of fluorosis. It is evident that respondents are not sufficiently informed about the benefits of oral probiotics, as other correct answer options make up only a small portion of the results. For example, options such as “inflammation around dental implants,” “plaque accumulation,” and “dental caries” were selected by the lowest percentage of respondents, even though oral probiotics effectively address these issues as well [4; 15; 16].

Next, the study analysed respondents’ opinions on the proper use of oral probiotics. Table 3 presents the study results analysing respondents’ awareness of oral probiotic use according to demographic indicators.

Table 3. Respondents’ Awareness of Oral Probiotic Usage According to Demographic Characteristics (percent)

Demographic characteristics		How long should oral probiotics be taken.				From what age can oral probiotics be taken.		
		2 weeks	1 months	2 months	3 months	From 3 years	From 6 years	From 18 years
Gender	Woman	38,5	58,3	57,1	69,2	53,8	61,9	53,3
	Man	61,5	41,7	42,9	30,8	46,2	38,1	46,7
Age group	Up to 29 years	4	3,5	13	5,9	8,3	12,5	1,3
	30 – 39 years	24	17,5	43,5	17,6	33,3	25	18,7
	40 – 49 years	24	31,6	26,1	8,8	25	30	20
	50 – 59 years	48	21,1	17,4	23,5	33,3	20	26,7
	60 years and older	-	26,3	-	44,1	-	12,5	33,3
Residence	Urban	50	31	37,5	37,5	66,7	25,9	35,3
	Rural	50	69	62,5	62,5	33,3	74,1	64,7
Education	Average	22,2	10,2	17,1	11,1	13,3	7,1	19,7
	Higher non-university	33,3	55,9	25,7	33,3	60	42,9	29,6
	Higher university	44,4	33,9	57,1	55,6	26,7	50	50

Analysing the data presented in Table 3, we see that respondents selected different answers to the question about the duration of probiotic use according to demographic indicators. Women (69.2%) most often chose the answer option “3 months,” while men (61.5%) chose “2 weeks.” Since the literature mentions that oral probiotics should be used for at least 3 months to have a positive effect on the oral cavity, the answer “3 months” was most commonly selected by respondents aged 60 and older (44.1%) and those with higher university education (55.6%). Regarding the age from which probiotics can be used, no respondents chose the options “from birth” or “from 1 year.” According to place of residence, city dwellers (66.7%) most often chose “from 3 years,” while respondents living in rural areas (74.1%) chose “from 6 years.” Oral probiotics are a relatively new concept, so to integrate them into patients’ oral care, both patients and oral health professionals first need to have knowledge about their use. The more the effects of probiotics on oral health are discussed, the more people will discover them [17]. During the study, respondents were asked to assess their knowledge about oral probiotics on a scale from 0 to 10 (0 meaning no knowledge and 10 meaning excellent knowledge). Respondents’ knowledge is illustrated in Figure 4. As many as 64 percent of respondents rate their knowledge at 5 or lower, while only 4 percent of respondents consider their knowledge good or excellent.

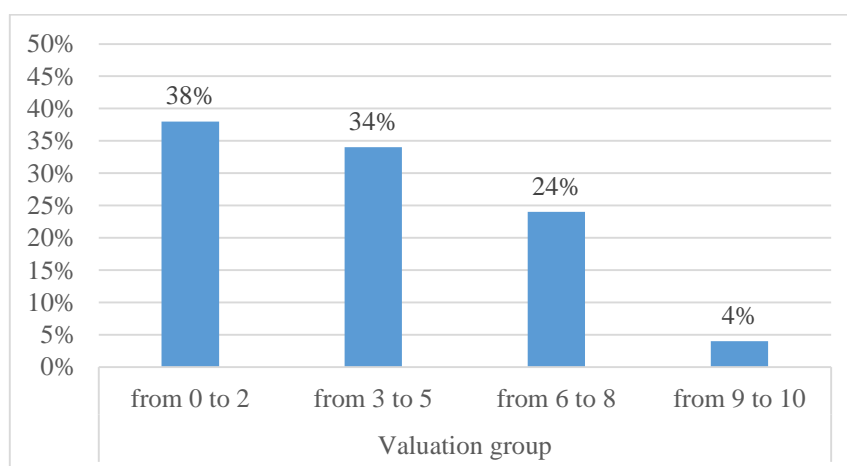


Figure 4. Respondents' knowledge of oral probiotics, in their own opinion (%)

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The study also asked respondents for their opinions about the effectiveness and impact of probiotic oral care products on oral and dental health. The majority of patients were unsure whether probiotic oral care products are effective. The highest positive opinion about probiotic oral care products was found in the 30–39 years age group (34.6%) compared to other groups. Negative opinions were most common among respondents aged 50–59 years (61.5%). Respondents were also asked to indicate reasons why they believe probiotic oral care products are ineffective. These reasons are shown in Table 4.

Table 4. Respondents stated reasons for believing that probiotic oral care products are ineffective (percent)

Reasons	Results (%)
Lack of information	63,6
Do not trust these products	12,1
Other	24,2

The majority of respondents (63.6%) indicated that a lack of information about oral care products with probiotics leads them to believe these products are ineffective. Additionally, 12.1% of respondents expressed a complete lack of trust in these products, while 24.2% cited other reasons. Among these, only a few patients wrote their own answers, mentioning that these products are merely commercial, doubting their effectiveness, and not wanting to use yet another product. Based on the respondents' data, we can conclude that most people avoid using such products primarily due to insufficient information.

IV. CONCLUSIONS

The study of patients' awareness about probiotics and their impact on oral health revealed that there is a lack of sufficient information on this topic in our society. Analysis of patients' knowledge showed that women are more informed about probiotics than men. When evaluated by age groups, older patients (from 40 to 69 years and older) had heard less about oral probiotics compared to younger respondents (under 40 years). It was also found that respondents with higher education better understand from what age and for how long oral probiotics should be used. The data obtained during the study indicated that older respondents more often viewed probiotic-containing products negatively.

Respondents who used oral probiotics most often did so for halitosis, gingival inflammation, dental caries, or prophylactic purposes. However, the analysis of the results showed that those who used oral probiotics did not experience a significant impact on oral health or felt only a slight effect.

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