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Original Article

Impact of Prebiotic and Probiotic Knowledge and Consumption on Oral Health in Adults Attending Dental Clinics

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Abstract

Objectives: Studies on specific probiotics and oral health are insufficient, and studies on prebiotics are very few in the literature. Therefore, this study investigated whether there is a relationship between prebiotic and probiotic food consumption and oral health.

Methods: The study was conducted with 151 adult individuals. Data on sociodemographic characteristics, prebiotic and probiotic knowledge and consumption frequency were obtained through an online questionnaire. Dental health levels of the individuals were determined by calculating the DMFT (Decayed, Missing, Filled Tooth) index after a dental examination. The data obtained were statistically analyzed using SPSS package program version 29.0.2.0.

Results: Most of the participants mentioned that they were familiar with the concept of probiotics, while they had heard of the concept of prebiotics before but did not know it completely. When the frequency of probiotic food consumption and oral health of the participants were analyzed, it was observed that individuals with a higher frequency of yogurt, buttermilk, pickles and olives consumption had better oral and dental health markers and this difference was statistically significant ($p<0.05$). When the same situation was analyzed for prebiotic foods, it was observed that individuals with higher consumption frequency of whole grains, oats, onions and garlic, tomatoes, bananas, honey, cruciferous vegetables (cauliflower, broccoli, etc.), legumes, asparagus, soybeans, oil seeds (nuts) and red fruits (blackberries, rose hips, etc.) had better oral and dental health markers and this difference was statistically significant ($p<0.05$).

Conclusion: Especially the level of knowledge about the prebiotic concept was found to be insufficient. Consumption of probiotic and prebiotic foods was significantly associated with improved oral health indicators in this population.

Keywords: Oral health, nutrition, prebiotic, probiotic.

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Oral health consists of the mouth, teeth and orofacial structures that enable individuals to perform basic functions such as eating, breathing and speaking, and encompasses psychosocial conditions such as self-confidence, well-being and the ability to socialize and work without pain, discomfort and embarrassment. Oral health varies throughout life, from early life to old age, and is an inseparable part of overall health. It supports individuals to participate in society and realize their potential.[1] Diet and nutrition have important impacts on oral health. It can influence the development and progression of oral diseases and conditions such as dental caries, periodontal disease, erosion and others. The relationship between diet and nutrition and oral health is bidirectional, as impaired integrity of the oral cavity can also affect an individual's ability to eat.[2]

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Probiotics are defined as live microorganisms that, when administered in sufficient quantities, provide health benefits to the host. A prebiotic is defined as a selectively fermented compound that induces specific changes in the composition and/or activity of the gastrointestinal microbiota and provides host health benefits.[3] Usually, probiotics have been associated with gut health and mostly focused on the prevention or treatment of gastrointestinal infections and diseases; however, in the last decade, some authors have suggested that probiotic bacteria originally intended for gut health may also be beneficial for oral health.[4] Although there are no controlled studies investigating the effect of prebiotics in oral health, it is thought that prebiotics may also be effective in oral health due to the known health effects of prebiotics.[5]

Studies have shown that individuals who have adopted healthy living strategies to their lives and have a higher level of education are more familiar with the concepts of probiotics, prebiotics and microbiota and have a higher level of knowledge about these issues. Therefore, it is thought that it is important for health professionals to use these terms more and for them to become commonly used expressions in society in order to improve public health.[6,7]

Objective of the Study

According to all this information, when the literature was examined, the knowledge levels of probiotic and prebiotic concepts were supported by studies on a regional basis. The number of studies on oral and dental health with probiotic consumption is small and mostly conducted on children. There is no controlled study on the effect of prebiotics on oral health and the information available is limited. Therefore, this study is a cross-sectional study designed to measure the level of probiotic and prebiotic knowledge in a specific region, to contribute to the interpretation of the level of knowledge on the subject in more global environments, and to establish a relationship between probiotic and prebiotic consumption frequencies and oral and dental health of adults.

Materials and Methods

Study Procedures

This study was conducted in Sakarya Private Ofis Dent Oral and Dental Health Clinic between August and December 2023. The research population consists of individuals who are residents of Sakarya and attend Private Ofis Dent Oral and Dental Health Clinic, who meet the inclusion criteria and volunteer. Ethics committee approval was obtained from Istanbul Bahçeşehir University, Scientific Research and Publication Ethics Committee on 18.10.2023, meeting numbered 2023/08. Individuals who were adults over the age of 18, who did not have a chronic disease that would affect oral and dental health (uncontrolled diabetes and uncontrolled hypertension), who were not in the gestation or lactation period, and who did not use all prostheses were included in the study. The sample size of the study was calculated using the power analysis program G*Power 3.1.9.7.[8] Sample size calculations showed that at least 124 individuals should be included with a 95% confidence level (alpha=0.05) and 80% power in line with a similar study and are presented in the appendix.[9] Considering possible losses during the study, the sample size was targeted as 150. The sample of the study consisted of 151 volunteer participants in total and the required number was achieved. This study was conducted in accordance with the Helsinki Declaration.

Collection of Data

Questionnaire form

The questionnaire consists of 25 questions and 3 sections and is presented in the appendix. The questionnaire form was created via Google Surveys, and the participants were asked to fill it in online. In the first part of the questionnaire form, demographic characteristics of the individuals (gender, age, educational status, etc.), in the second part, their level of knowledge about microbiota, probiotic and prebiotic concepts, and in the third part, the frequency of consumption of probiotic and prebiotic foods was asked. Some questions were designed and specified so that more than one answer could be given. The questionnaire form consisted of open-ended and multiple-choice questions. It takes an average of 10 minutes to complete a questionnaire form.

Calculation of the DMFT index

The DMFT (Number of Decayed, Filled and Missing Permanent Teeth) index will be used to assess the oral health of individuals in the study. This index measures the number of caries in a population and therefore provides data on oral health. The DMFT index is an index for assessing oral health recommended by the World Health Organization (WHO). The letters in the index are the initials of some abbreviations. DT represents the number of decayed teeth, MT the number of missing teeth and FT the number of filled teeth. The index is expressed as the sum of the number of decayed, missing and filled teeth. This sum can be divided by the number of people participating in the study and used as a parameter in epidemiologic studies.[10,11] The DMFT index

was calculated by Yasin Burak SÜTLÜ, a dentist working in Sakarya Private Ofis Dent Oral and Dental Health Clinic. Ofis Dent Oral and Dental Health Clinic is a private health institution in Sakarya province where dental treatments are provided. No invasive intervention was performed to calculate this index; the index was calculated by dental examination alone. In this context, approval was obtained from this clinic for the dental examinations of the people included in the study by accepting the informed consent form and is presented in the appendix.

Analysis of Data

SPSS (Statistical Package for Social Sciences) version 29.0.2.0 (Armonk, NY: IBM Corp.) was used for statistical analysis of the data collected for the study. The level of significance in the study was accepted at α=0.05. Descriptive statistical calculations (arithmetic mean, frequency, minimum, and maximum) were used to evaluate the study data. When comparing quantitative data, continuous data were first subjected to a normality test. As a result of the normality test, it was seen that the continuous data were not normally distributed. Therefore, nonparametric tests were used when comparing the data. While the Mann-Whitney U test was used when comparing two groups, the Kruskal-Wallis test was used when comparing three or more groups.

Results

A total of 151 adults, 52 males (34.4%) and 99 females (65.6%), voluntarily participated in the study. Adults between the ages of 18–50 years, with an average age of 29±7.96 years, who applied to oral and dental health care participated in the study, and most of the participants were between the ages of 26–35 years. It was observed that most of the participants were undergraduate graduates (41.1%). This was followed by associates' and high school graduates, respectively. 54.3% of the participants were single (82 individuals), 42.4% were married (64 individuals) and 3.3% (5 individuals) were divorced.

39.7% (60 individuals) of the participants mentioned that they did not know the concept of microbiota, 34.4% (52 individuals) mentioned that they had heard it before but did not know exactly what it was and 25.8% (39 individuals) mentioned that they knew it. 60.9% (92 individuals) of the participants mentioned that they knew the concept of probiotics, 28.5% (43 individuals) had heard of it but did not know exactly what it was and 10.6% (16 individuals) did not know the concept of probiotics. When the participants were asked whether some probiotic foods are probiotic, 87.4% (132 individuals) mentioned that kefir is probiotic, 86.1% (130 individuals) mentioned that yogurt is probiotic, and 68.2% (103 individuals) mentioned that probiotic yogurt is probiotic. According to the answers of the participants, the least probiotic foods were determined as pickled olives, turnip juice and boza, respectively.

35.8% (54 individuals) of the participants mentioned that they knew the concept of prebiotics, 39.7% (60 individuals) mentioned that they had heard of it but did not know exactly what it was and 37% (37 individuals) did not know the concept of prebiotics. When the participants were asked whether some prebiotic foods are prebiotic foods, 55.3% (83 individuals) mentioned that oats, breakfast cereals are prebiotic, 54.7% (82 individuals) mentioned that whole grain, mixed grain breads are prebiotic, 34.7% (52 individuals) mentioned that onions, garlic are prebiotic foods and 34.7% (52 individuals) mentioned that red fruits are prebiotic foods. The least prebiotic foods were tomatoes, grape seeds and honey, in order.

The frequency of food consumption among individuals was examined in seven categories in the Table 1 and 2, but the two categories with the highest level of significance among these food consumption frequencies were compared.

The mean DT value of the individuals who consumed yogurt every day was 2.23, while the mean DT value of the individuals who consumed yogurt once a week was 5.34, and this difference was statistically significant ($p<0.05$). The mean DMFT index of the participants who consumed yogurt once a week was 7.51, while the mean DMFT index of the individuals who consumed yogurt every day was 4.06 and this difference was statistically significant ($p<0.05$). The mean DMFT index of the participants who consumed ayran 1–3 times a month was 8.03, while the mean DMFT index of the participants who consumed ayran 4–5 times a week was 3.79 and a statistically significant difference was found ($p<0.05$). The mean DMFT index of the non-working individuals who consumed pickles less than once a month was 7.83, while the mean DMFT index of those who consumed pickles 4–5 times a week was 2.90 and this difference was found to be statistically significant ($p<0.05$). Among the individuals who participated in the study, the mean DT values of those who consumed pickled olives once a week were 5.42, while those who consumed them every day were 2.53 and this difference was statistically significant ($p<0.05$). The mean MT value of those who consumed brined olives less than once a month was calculated as 1.78, while that of those who consumed them every day was calculated as 0.25 and the difference was statistically significant ($p<0.05$). The mean DMFT index of those who never consumed pickled

Table 1. Comparison of frequency of consumption of probiotic foods and DMFT indices of participants

Frequency of probiotic consumption	DT (Decayed tooth)			MT (Missing tooth)			FT (Filling tooth)			DMFT		
	Mean	p	Min-Max	Mean	p	Min-Max	Mean	p	Min-Max	Mean	p	Min-Max
Yogurt												
Once a week	5.34	**0.002**	0.00–13.00	0.23	0.124	0.00–2.00	1.94	0.570	0.00–5.00	7.51	**0.013**	2.00–16.00
Every day	2.23		0.00–10.00	0.35		0.00–5.00	1.48		0.00–6.00	4.06		0.00–17.00
Kefir												
Never	4.56	0.052	0.00–12.00	0.47	0.120	0.00–5.00	2.14	0.929	0.00–10.00	7.17	0.192	0.00–20.00
Every day	0.00		0.00–0.00	0.00		0.00–0.00	2.00		2.00–2.00	2.00		2.00–2.00
Ayran												
1–3 times a month	5.06	0.075	0.00–11.00	0.94	0.150	0.00–5.00	2.03	0.153	0.00–10.00	8.03	**0.045**	2.00–20.00
4–5 times a week	2.36		0.00–7.00	0.14		0.00–1.00	1.29		0.00–4.00	3.79		2.00–8.00
Boza												
Never	4.19	0.275	0.00–13.00	0.51	0.066	0.00–5.00	2.15	0.655	0.00–14.00	6.86	0.505	0.00–20.00
2–3 times a week	8.00		8.00–8.00	1.00		1.00–1.00	1.00		1.00–1.00	10.00		10.00–10.00
Tarhana												
Never	5.25	0.430	0.00–12.00	0.94	0.470	0.00–5.00	2.56	0.175	0.00–6.00	8.75	0.220	0.00–17.00
Every day	3.00		1.00–5.00	0.00		0.00–0.00	2.00		0.00–4.00	5.00		1.00–9.00
Pickle												
Less than 1 per month	4.83	0.084	0.00–12.00	0.57	0.638	0.00–5.00	2.43	0.182	0.00–10.00	7.83	**0.049**	0.00–20.00
4–5 times a week	1.70		0.00–7.00	0.10		0.00–1.00	1.10		0.00–3.00	2.90		0.00–8.00
Turnip juice												
Never	3.86	0.635	0.00–12.00	0.57	0.363	0.00–5.00	2.30	0.841	0.00–14.00	6.72	0.495	0.00–20.00
2–3 times a week	7.00		2.00–10.00	0.00		0.00–0.00	2.00		1.00–3.00	9.00		3.00–12.00
Pickled olives												
Never	4.86			0.48			2.90	0.382	0.00–10.00	8.24*	**0.038**	1.00–20.00
Less than 1 per month	5.33			1.78*	**0.029**	0.00–5.00	1.67			8.78		
Once a week	5.42*	**0.032**	0.00–13.00	0.25			1.62			7.29		
Every day	2.53*		0.00–10.00	0.25*		0.00–3.00	1.75		0.00–6.00	4.53*		0.00–16.00
Probiotic yogurt												
Never	4.34	0.314	0.00–13.00	0.55	0.624	0.00–5.00	2.07	0.720	0.00–14.00	6.96	0.095	0.00–20.00
Once a week	3.19		0.00–9.00	0.13		0.00–1.00	2.31		0.00–4.00	5.63		0.00–15.00
Probiotic milk												
Never	4.13	0.123	0.00–12.00	0.52	0.476	0.00–5.00	2.28	0.720	0.00–15.00	6.93	0.095	0.00–20.00
Once a week	2.64		0.00–8.00	0.09		0.00–1.00	2.18		0.00–4.00	4.91		0.00–13.00
Probiotic kefir												
Never	4.07	0.348	0.00–12.00	0.44	0.170	0.00–5.00	2.23	0.843	0.00–15.00	6.74	0.224	0.00–20.00
4–5 times a week	4.00		0.00–7.00	1.67		0.00–5.00	2.00		0.00–3.00	7.67		0.00–13.00

*: The mean values in each marked column indicate which two parameters were compared. Kruskal Wallis Test. DMFT: Number of Decayed, Filled and Missing Permanent Teeth, Mean: Average of the numbers, Min-max: Minimum and maximum values.

olives was 8.24, while the mean DMFT index of those who consumed them every day was 4.53 and this difference was statistically significant ($p<0.05$).

The mean DMFT values of the participants who never consumed whole grain, mixed grain bread were 9.30, while the mean DMFT values of those who consumed it every day were 4.48, and this difference was statistically significant ($p<0.05$). The mean DMFT values of the individuals who never consumed oat cereals were 8.04, while the mean DMFT values of those who consumed oat cereals every day were 2.50, and this difference was statistically significant ($p<0.05$). The mean DMFT values of the participants who consumed onion and garlic less than once a month were 11.13, while the mean DMFT values of those who

Table 2. Comparison of prebiotic food consumption frequency and DMFT indices of participants

Frequency of prebiotic consumption	DT (Decayed tooth)			MT (Missing tooth)			FT (Filling tooth)			DMFT		
	Mean	p	Min-Max	Mean	p	Min-Max	Mean	p	Min-Max	Mean	p	Min-Max
Whole grain												
Never	5.79	**0.001**	0.00–13.00	0.88	**0.007**	0.00–5.00	2.64	0.569	0.00–10.00	9.30	**0.003**	2.00–20.00
Every day	2.36		0.00–9.00	0.20		0.00–3.00	1.92		0.00–15.00	4.48		0.00–15.00
Oats												
Never	5.06	**0.037**	0.00–13.00	0.74	0.096	0.00–5.00	2.24	0.662	0.00–14.00	8.04	**0.004**	0.00–20.00
Every day	1.00		0.00–3.00	0.00		0.00–0.00	1.50		0.00–6.00	2.50		2.00–3.00
Onion, garlic												
Less than 1 per month	6.94	**0.001**	2.00–11.00	1.00	**0.004**	0.00–5.00	3.19	0.075	0.00–10.00	11.13	**0.001**	2.00–20.00
Every day	2.00		0.00–7.00	0.16		0.00–3.00	1.77		0.00–15.00	3.94		0.00–15.00
Tomato												
1–3 times a month	6.05	**0.001**	1.00–13.00	0.76	**0.073**	0.00–5.00	2.62	**0.268**	0.00–10.00	9.43	**0.001**	3.00–20.00
Every day	2.43		0.00–7.00	0.27		0.00–3.00	1.78		0.00–15.00	4.49		0.00–15.00
Jerusalem artichoke												
Never	4.11	0.383	0.00–13.00	0.51	0.328	0.00–5.00	2.03	0.132	0.00–10.00	6.64	0.258	0.00–20.00
2–3 times a week	2.13		0.00–5.00	1.25		0.00–5.00	1.75		0.00–4.00	5.13		0.00–13.00
Banana												
Never	6.80			1.80*	**0.020**	0.00–5.00	2.80	0.203	0.00–6.00	11.40		
Less than 1 per month	7.00*	**0.001**	2.00–13.00	0.80			2.96			10.76*	**0.001**	0.00–17.00
2–3 times a week	2.69			0.14*		0.00–2.00	1.86		0.00–4.00	4.69		
4–5 times a week	0.89*		0.00–3.00	0.00			2.67			3.56		
Every day	1.89			0.56			0.89			3.33*		0.00–13.00
Honey												
Less than 1 per month	5.61	**0.021**	1.00–13.00	0.42		0.00–3.00	2.74		0.00–14.00	8.77	**0.026**	2.00–18.00
4–5 times a week	2.43		0.00–9.00	0.07		0.00–1.00	1.93		0.00–15.00	4.43		0.00–15.00
Cruciferous vegetables												
Less than 1 per month	5.79*	**0.001**	0.00–13.00	0.69	0.157	0.00–5.00	2.36	**0.039**		8.85*	**0.004**	2.00–18.00
1–3 times a month	3.74			0.54			3.03*		0.00–15.00	7.31		
Once a week	3.07			0.29			1.29*		0.00–4.00	4.64		
2–3 times a week	2.11*		0.00–7.00	0.32		0.00–5.00	1.89			4.32*		0.00–13.00
Legumes												
Less than 1 per month	6.81*	**<0.001**	1.00–13.00	0.70	0.168	0.00–5.00	2.37	0.195	0.00–14.00	9.89*	**0.002**	2.00–20.00
2–3 times a week	2.45*		0.00–9.00	0.26		0.00–3.00	1.65		0.00–4.00	4.35		
Every day	1.20			0.00			0.40			1.60*		0.00–3.00
Asparagus												
Less than 1 per month	5.81*	**0.043**	0.00–13.00	0.48	0.319	0.00–5.00	3.19	0.334	0.00–15.00	9.48*	**0.022**	1.00–20.00
1–3 times a month	2.42			0.08			1.58			4.08*		0.00–10.00
2–3 times a week	0.67*		0.00–2.00	1.00		0.00–3.00	2.67		1.00–4.00	4.33		
Soybeans												
Less than 1 per month	5.42	0.126	0.00–13.00	1.05	0.370	0.00–5.00	2.42	0.567	0.00–15.00	8.89	**0.043**	3.00–18.00
Once a week	1.50		1.00–2.00	0.00		0.00–0.00	.50		0.00–1.00	2.00		2.00–2.00
Nuts												
Never	7.40	**0.003**	1.00–13.00	1.20	**0.020**	0.00–5.00	2.90	0.567	0.00–6.00	11.50	**0.001**	2.00–18.00
Every day	1.67		0.00–6.00	0.00		0.00–0.00	1.53		0.00–4.00	3.20		1.00–8.00
Red berries												
Less than 1 per month	5.60	**0.004**	0.00–13.00	1.00	**0.019**	0.00–5.00	2.68	0.524	0.00–14.00	9.28	**0.001**	0.00–20.00
2–3 times a week	2.44		0.00–8.00	0.12		0.00–1.00	1.64		0.00–4.00	4.20		0.00–10.00

*: The mean values in each marked column indicate which two parameters were compared. DMFT: Number of Decayed, Filled and Missing Permanent Teeth, Kruskal Wallis Test. Mean: Average of the numbers, Min-Max: Minimum and maximum values.

consumed onion and garlic every day were 3.94, and this difference was statistically significant ($p<0.05$). The mean DMFT values of the individuals who consumed tomatoes 1–3 times a month were 9.43, while the mean DMFT values of those who consumed tomatoes every day were 4.49 and this difference was statistically significant ($p<0.05$). The mean DMFT values of the individuals who consumed less than 1 banana per month were 10.76, while the mean DMFT values of those who consumed less than 1 banana per month were 3.33, and this difference was found to be statistically significant ($p<0.05$). Among the participants, the mean DMFT values of those who consumed honey less than once a month were 8.77, while the mean DMFT values of those who consumed it 4–5 times a week were 4.43, and this difference was found to be statistically significant ($p<0.05$). Among the participants, the mean DMFT values of those who consumed cruciferous vegetables less than once a month was 8.85, while the mean DMFT values of those who consumed them 2–3 times a week was 4.32, and this difference was found to be statistically significant ($p<0.05$). The mean DMFT values of the participants who consumed dried legumes less than once a month were 9.89, while the mean DMFT values of those who consumed them every day were 1.60 and this difference was found to be statistically significant ($p<0.05$). The mean DMFT values of the participants who consumed asparagus less than once a month was 9.48, while the mean DMFT values of those who consumed asparagus 1–3 times a month was 4.08 and this difference was found to be statistically significant ($p<0.05$). Among the individuals who participated in the study, the mean DMFT index of those who consumed soybeans less than once a month was 8.89, while the mean DMFT index of those who consumed soybeans once a week was 2.00 and this difference was statistically significant ($p<0.05$). The mean DMFT values of the participants who never consumed oilseeds were 11.50, while the mean DMFT values of those who consumed them every day were 3.20 and this difference was statistically significant ($p<0.05$). The mean DMFT values of the participants who consumed less than 1 red fruit per month were 9.28, while the mean DMFT values of those who consumed 2–3 times a week was 4.20 and this difference was found to be statistically significant ($p<0.05$).

Discussion

99 female and 52 male adults participated in our study. The number of dental caries and the number of filled teeth were significantly higher in men than in women. The DMFT index, which provides information about general oral and dental health, was higher in men than in women, thus women had a higher oral and dental health score and this result is significant. According to the Türkiye-wide oral and dental health profile research report initiated by the Ministry of Health of the Republic of Türkiye in 2018 and published in 2021, among adults aged 35–44 years, the DMFT scores of women were found to be higher than the DMFT scores of men, that is, the oral and dental health parameters of adult women were found to be worse than men.[12] As a result, it is supported by the literature that gender is a factor on oral and dental health.

In our study, the frequency of probiotic food consumption and DMFT and sub-indices were examined and compared. Individuals who consumed yogurt more frequently had a lower number of dental caries and DMFT index. Those who consumed buttermilk and pickles more frequently had a lower DMFT index. Those who consumed pickled olives more frequently had a lower number of dental caries, number of missing teeth and DMFT index. All of these differences were significant. Apart from that, no significant difference was observed between the frequency of consumption of kefir, boza, tarhana, turnip juice, probiotic yogurt, probiotic milk and probiotic kefir among probiotic foods and DMFT and subgroup indices. In a study by Kantorowicz et al.[13] food consumption frequencies of 20 women and 20 men aged 19–21 years were taken and DMFT indices were analyzed. Women and men were divided into two different groups and evaluated. While no significant difference was found between the frequency of milk and dairy consumption and DMFT indices in women, the DMFT index of individuals who consumed less than 3 milk and dairy products per week in men was found to be lower than those who consumed almost every day. A study of 6885 children aged 2–17 years showed that high yogurt and low cheese intake was associated with a reduced risk of dental caries in American children and adolescents.[14] In another study, 405 female participants aged 13–18 years were included in the study. The results showed that high yogurt consumption may reduce plaque formation in adolescents. However, milk and cheese consumption had no significant effect on dental caries.[15] Another study showed that L. plantarum K41 isolated from traditional Sichuan pickles had an inhibitory effect on the biofilm formation of S. mutans. Thus, it offers a potential alternative for the control of oral biofilm/dental plaque and dental caries.[16] Studies on probiotic products such as tarhana, boza, turnip juice were not found in the literature, but in conclusion, the importance of probiotics for oral health is supported by the studies in the literature in parallel with the results of our study.

In our study, the frequency of consumption of foods known as prebiotics was compared with oral and dental health parameters, and those who consumed more whole

grains, oats, onions and garlic, tomatoes, bananas, honey, cruciferous vegetables (cauliflower, broccoli, etc.), legumes, asparagus, soybeans, oil seeds (nuts) and red fruits (blackberries, rose hips, etc.) had better oral and dental health findings. In a study conducted in China, in parallel with our research, increasing the frequency of whole grain consumption may reduce the risk of dental caries in adolescents.[17] Another study conducted on 204 adults aged 18–64 years showed that the increase in DMFT index decreased as cereal consumption increased, thus showing that it is a protective factor in increasing the DMFT index. [18] In a meta-analysis, it was stated that studies showed that the level of S. mutans, known as the caries agent, in saliva decreased with the consumption of garlic extract, but it was said that more studies should be done to support this situation.[19] A study conducted on children in Egypt showed a positive correlation between legume consumption and DMFT score. Thus, it is stated that the DMFT index increases as legume consumption increases.[20] In another study conducted in 380 school-age children, eating habits and the DMFT index were compared. As a result, an inverse correlation was found between vegetable consumption and DMFT score. Thus, they showed that the DMFT index decreased as vegetable consumption increased.[21]

Strengths

In the literature, findings related to general oral and dental health parameters and dental caries are most commonly discussed in studies conducted on children. Our study is a cross-sectional study on adults. Studies comparing the frequency of consumption of probiotic foods and the DMFT index are limited in the literature. There are no studies comparing the frequency of consumption of prebiotic foods with the DMFT index and discussing prebiotic mechanisms.

Limitations

Our study is a cross-sectional study. It is not an experimental study. Therefore, conducting this study as an intervention study may provide healthier results. While comparing probiotic and prebiotic consumption frequencies with the DMFT index in our study, it should be kept in mind that many factors affect oral and dental health. At the same time, expanding the sample may give healthier results.

Conclusion

In our study, in which we examined the frequency of probiotic and prebiotic food consumption and oral and dental health status of adult individuals, it was observed that those with higher consumption frequency of most probiotic and prebiotic foods had better oral and dental health status. In particular, it was revealed that individuals with a higher consumption frequency of probiotic foods such as yogurt, ayran, pickles and olives; prebiotic foods such as whole grains, oats, onions and garlic, tomatoes, bananas, honey, cruciferous vegetables (cauliflower, broccoli, etc.), legumes, asparagus, soybeans, nuts and red berries (blackberries, rose hips, etc.) had better DMFT scores indicating oral and dental health. Although the main factors affecting the oral and dental health of individuals are factors such as genetic structure, oral care, and nutrition, it is recommended according to the results of this study to add the expression of a diet rich in probiotic and prebiotic foods as well as recommendations such as healthy eating, reducing simple sugar consumption, and a diet rich in anticariogenic foods to the recommendations given for oral health. However, more studies (especially intervention studies) are recommended in order to be more precise on the subject. In addition, the increase in consumption of probiotic and prebiotic foods may encourage the use of probiotic and prebiotic ingredients in oral and dental health products, but more research is needed in this area.

Disclosures

Ethics Committee Approval: The study was approved by the Istanbul Bahçeşehir University, Scientific Research and Publication Ethics Committee (no: E-85646034-604.02.02-67073, date: 18/10/2023).

Informed Consent: Informed consent was obtained from all participants.

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