İnönü Üniversitesi Sağlık Hizmetleri Meslek Yüksekokulu Dergisi
ISSN: 2147-7892, Cilt 12, Sayı 2 (2024) 449-464
doi: 10.33715/inonusaglik.1386237

Journal of Inonu University Health Services Vocational School
ISSN: 2147-7892, Volume 12, Issue 2 (2024) 449-464
doi: 10.33715/inonusaglik.1386237

Original Article / Araştırma Makalesi

EVALUATION OF UNIVERSITY STUDENTS' ATTITUDES AND BEHAVIORS REGARDING PROBIOTICS AND PREBIOTICS

Üniversite Öğrencilerinin Probiyotik ve Prebiyotiklere İlişkin Tutum ve Davranışlarının Değerlendirilmesi

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Geliş Tarihi / Received: *05.11.2023* ***Kabul Tarihi / Accepted:*** *30.01.2024*

ABSTRACT

This study was planned and conducted to comprehensively evaluate the attitudes and behaviors of university students regarding probiotic/prebiotic sources and supplements. A three-part questionnaire form was developed to assess the attitudes and behaviors of participants regarding probiotics/prebiotics. The probiotic sources mostly consumed every day were cheese types, yogurt, and buttermilk. In contrast, 95.2% of the participants had never consumed boza and 61.6% had never consumed kefir. As for the consumed prebiotic sources were analyzed, 15.2% of the participants consumed whole-grain/whole-wheat bread, 7.9% dried fruits, and 5.8% banana every day. The prebiotic sources that consumed rarely were asparagus, soybean, and artichoke. The rates of probiotic and prebiotic consumption for a specific reason were 18.3% and 16.2%, respectively. When asked about the specific reasons for consuming probiotic/prebiotic sources, the most common response was to strengthen immunity. The rate of participants who used probiotic supplements was 4.5%, whereas none of the participants reported using prebiotic supplements. The reason for using probiotic supplements was mostly to strengthen immunity. Brief information on probiotics and prebiotics provided in written and visual media may not be sufficient. It is important that information and awareness-raising activities are planned by the relevant authorities for the conscious choice of these sources and supplements.

Keywords: Prebiotic, Probiotic, Supplement, University students.

ÖZ

Bu çalışma üniversite öğrencileri özelinde probiyotik/prebiyotik kaynakları ve takviyelerine ilişkin tutum ve davranışların kapsamlı bir şekilde değerlendirilmesi amacıyla planlanıp yürütülmüştür. Katılımcıların demografik özelliklerinin ve probiyotik ve prebiyotikler ile ilgili tutum ve davranışlarının değerlendirilmesi için üç bölümlü genel bir anket formu geliştirilmiştir. Katılımcıların %36.9'u peynir türlerini, %18.4'ü yoğurdu, %5.9'u ise ayranı son bir ay içinde her gün tükettiğini bildirmiştir. Buna karşın, katılımcıların %95.2'si bozayı ve %61.6'sı kefiri hiç tüketmemiştir. Prebiyotik kaynakları incelendiğinde ise katılımcıların %15.2'si kepekli/tam tahıl ekmeğini, %7.9'u kuru meyveleri, %5.8'i muzu her gün tüketmiştir. Çoğunlukla hiç tüketilmeyen prebiyotik kaynakları ise kuşkonmaz, soya fasulyesi ve enginardır. Probiyotik ve prebiyotik kaynaklarının spesifik bir nedenle tüketim oranları sırasıyla %18.3 ve %16.2 olarak saptanmıştır. Söz konusu katılımcılara probiyotik/prebiyotik kaynaklarını tüketmelerinin spesifik nedenleri sorulduğunda immüniteyi güçlendirmek en yaygın verilen yanıt olmuştur. Katılımcıların %4.5'i probiyotik takviyesi kullandığını, buna karşın hiçbir katılımcı prebiyotik takviyesi kullanmadığını belirtmiştir. Probiyotik takviyesi kullanım nedeni olarak çoğunlukla immünitenin güçlendirilmesi öne sürülmüştür. Probiyotik ve prebiyotiklere ilişkin yazılı ve görsel medyada sunulan kısa bilgilendirmeler yeterli olmayabilir. Söz konusu kaynakların ve takviyelerin bilinçli tercih edilmesi hususunda ilgili otoritelerce bilgilendirme ve farkındalık çalışmalarının planlanması önemlidir.

Anahtar kelimeler: Prebiyotik, Probiyotik, Takviye, Üniversite öğrencileri.

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Bu makaleye atıf yapmak için (How to cite this article): Adıgüzel, E., Bertan, H., Akgün, N. M., Kaya, D., Oprukçu, D. R. & Fidan, E. (2024). *Evaluation of university students' attitudes and behaviors regarding probiotics and prebiotics*. İnönü Üniversitesi Sağlık Hizmetleri Meslek Yüksekokulu Dergisi, 12(2), 449-464. doi: 10.33715/inonusaglik.1386237

INTRODUCTION

Probiotic, which derives from the Latin "pro" and Greek "bios" and means "for life", is defined as "living microorganisms that have health benefits for the host when taken into the body in sufficient quantities" by the United Nations World Health Organization (WHO) and Food and Agriculture Organization (FAO) (Mack, 2005; Gasbarrini, Bonvicini & Gramenzi, 2016). The term prebiotic is defined as substrates that are fermented by microorganisms in the host body, promoting them to multiply selectively (ISAPP, 2021a). Microorganisms defined as probiotics are expected to have certain characteristics. Some of these characteristics include the ability to survive throughout the digestive tract, resistance to digestive enzymes as well as digestive system components such as gastric acid and bile salts, the ability to colonize by attaching to the intestinal epithelium and having health benefits (Çomak-Göçer, Ergin & Küçükçetin, 2016). Ingredients defined as prebiotics should be selectively fermentable and thus provide health benefits by influencing gut microbial composition (Köse, Aydın, Özdemir & Yeşil, 2019).

Probiotic source foods are defined as fermented foods containing probiotic microorganisms with or without strain-specific evidence. Foods containing live microorganisms such as kefir, yogurt, buttermilk, cheese, pickles, turnip juice, boza, miso, natto, and tempeh. Fermented products such as bread, heat-treated meat products, vinegar, soy sauce, alcoholic beverages, coffee and cocoa beans, where probiotic microorganisms are alive during the production phase but lose their viability during the consumption phase, are not probiotic source foods (Türkiye Dietary Guideline, 2022). The non-starch polysaccharides β-glucans, oligosaccharides and inulin-type fructans reach the colon and act as prebiotics for probiotic bacteria (Salvatore et al., 2023). It is quite difficult to assess the consumption of prebiotics because they are found in various food groups and even supplements. However, some foods contain a higher concentration of prebiotic fibers, especially inulin. Oats, wheat, banana, Jerusalem artichoke, chickpeas, dried bean, lentil, onion, garlic, leek, asparagus, and soybean are the main sources of prebiotics (Carlson, Erickson, Lloyd & Slavin, 2018; Salvatore et al., 2023).

The use of probiotics and prebiotics as food supplements has become widespread in recent years. Consumers consciously prefer food supplements containing probiotic bacteria and prebiotic components (Cardoso, Amorim, Silverio & Rodrigues, 2021). Dysbiosis following the use of antibiotics has greatly encouraged the use of probiotics therapeutically (Kothari, Patel & Kim, 2018). The Dietary Supplement Health and Education Act of 1994 (1994), implemented

by the US Food and Drug Administration (USFDA), allowed flexible sales of probiotic supplements, thus placing these supplements at the top of the supplement market (Kothari, Patel & Kim, 2018). Probiotic supplements usually contain different strains belonging to genera such as *Lactobacillus*, *Bifidobacterium*, *Enterococcus* and *Streptococcus* (Zheng, Zhang, Tian, Zhou, Pan & Wong, 2017). Although not yet as widely preferred as probiotic supplements, prebiotic supplements have also recently attracted attention. The demand for prebiotic supplements containing functional food ingredients has also increased in recent years (Cardoso et al., 2021).

Probiotics and prebiotics appear promising for both healthy and unhealthy individuals in terms of achieving better health by modulating the gut microbiota. Known effects of probiotic microorganisms include aiding digestion, improving immunity, synthesizing certain nutrients such as vitamins and short-chain fatty acids and controlling the growth of pathogenic microorganisms by competing with them for nutrients. There is evidence that probiotics are effective in alleviating and improving many symptoms such as antibiotic-induced diarrhea, mild to moderate irritable bowel syndrome, lactose intolerance, common infections including respiratory, intestinal and vaginal tract infections, and colic in infants (ISAPP, 2021b). Although the scientific community has mostly focused on probiotics for microbiome-mediated immune system improvement, the number of studies on prebiotics has also increased recently. Prebiotics are known to positively promote the metabolic activity of resident gut flora. The main health benefits of prebiotics include increased bacterial fermentation, improved calcium absorption and blood sugar regulation, and protective effects against diabetes, osteoporosis and colorectal cancer. The mitigating and healing role of prebiotics in irritable bowel syndrome and inflammatory bowel diseases such as ulcerative colitis and Crohn's disease is also being investigated (ISAPP 2021a).

The recent increase in awareness of healthy nutrition among consumers has led to an increase in demand for functional foods (Hacıoğlu & Kurt, 2012). Similar to Eastern European countries, fermented dairy products, which are the main sources of probiotics, are the most demanded functional foods in the Turkish market (Çelik, Sarıoğlu & Dağıstan, 2022). Indeed, there is a growing interest in microbial modulation methods based on probiotic microorganism intake. Their effectiveness in the treatment and prevention of obesity, which is a public health problem, and psychiatric problems such as depression and anxiety, which are becoming increasingly common in society, is the main reason for this growing interest. Probiotic and prebiotic-mediated microbial modulation plays a role in hunger and appetite control. Thus, it helps to control body weight (Baboota et al., 2013). In addition, mechanisms that form the gut-

brain axis point to the effectiveness of microbial modulation on neuropsychiatric disorders (Cenit, Sanz & Codoñer-Franch, 2017).

In general, the university years, which correspond to the end of adolescence and the beginning of young adulthood, can be considered as the milestone of a new lifestyle for individuals. Especially with the separation from the family, individuals who become more open to environmental factors make their own choices. During this period, changes in nutritional behaviors become inevitable. Foods with high energy density and low nutritional value are often preferred. The widespread habit of eating out of home due to the desire for socialization and acceptance is one of the most important reasons for this situation. On the other hand, the role of healthy nutrition, which is a part of holistic health, in academic motivation and success cannot be denied (Boschloo et al., 2012; Esteban-Cornejo et al., 2016; Burrows, Goldman, Pursey & Lim, 2017). Therefore, this study was planned to examine the attitudes and behaviors of university students towards probiotics and prebiotics, which are important elements of a healthy diet.

MATERIAL AND METHOD

This study was carried out with students studying at associate, undergraduate and graduate levels at Karamanoğlu Mehmetbey University. No power analysis was conducted for sample size determination. Before starting the study, the number of students enrolled in all programs at Karamanoğlu Mehmetbey University was reported as 20656 (KMU in numbers, 2022). All faculties and schools were visited and announcements were made to all departments by the researchers about participation in the study. The study was conducted with the participation of 1417 students between December 2022 and February 2023. Eighty-three participants with incomplete or inconsistent data were excluded from the study and the data of 1334 participants were finally analyzed within the scope of the study. Detailed written and verbal information was provided to the participants and their consent was obtained according to the World Medical Association Declaration of Helsinki. The face-to-face interview method was used for data collection.

The study focused on the evaluation of attitudes and behaviors, not knowledge levels, regarding probiotics and prebiotics. For this reason, just before starting the questionnaire, the terms probiotic and prebiotic were defined and a brief information was given about which foods are probiotic and prebiotic sources. There are no exclusion criteria within the scope of the study. The study was conducted with students who voluntarily agreed to participate.

Data Collection Tool

A general questionnaire form was used to obtain demographic information of the participants and to assess their attitudes and behaviors regarding probiotics and prebiotics. This form consisted of three sections: "demographic characteristics", "consumption status of probiotic/prebiotic sources" and "probiotic/prebiotic supplement intake status". Within the demographic characteristics section, gender, age, level of department and field of department were questioned. In order to assess the probiotic and prebiotic consumption status, a food frequency questionnaire on commonly consumed probiotic and prebiotic sources (kefir, yogurt, cheese types, buttermilk, pickles/pickle juice, turnip juice, raw tarhana, boza, probiotic yogurt, oats, breakfast cereals, banana, local mango, whole grain bread/whole wheat bread, whole grain/whole wheat pasta, dried fruits, chickpea, dried bean, lentil, onion, garlic, leek, celery, artichoke, asparagus, and soybean) was applied. Within the scope of the food frequency questionnaire, the frequency of consumption of probiotic and prebiotic sources in the last one-month period was examined with the options of "every day", "5-6 times a week", "3 times a week (every other day)", "1-2 times a week", "1-2 times a month", and "never" (Yalçın-Tercan, 2019; Kardeş, 2020). In addition to the frequency of food consumption, the specifically consumed probiotics/prebiotics sources and the specific reasons for consumption of these sources were also questioned in this section (Horasan, Sevinç and Çelikyürek, 2021; Aydın, 2022). Finally, in the last section, the use of probiotic/prebiotic supplements, the frequency and reasons for the use of these supplements, and the major factors affecting the use of supplements were analyzed (Altundiş, 2018; Aydın, 2022; Cevahir, 2020; Horasan, Sevinç & Çelikyürek, 2021; Köse et al., 2019).

Statistical Analysis

SPSS v. 25.0 statistical package program was used for data analysis. Age (years), one of the descriptive variables, was expressed as "Mean ± Standard Deviation ($\bar{x}$±SS)" and all other variables were expressed as "number (percentage) (n (%))". Since only categorical variables were analyzed, Pearson's chi-square test was used to evaluate statistical differences. For type I error, 95% confidence interval ($p<0.05$) was considered.

Ethical Approval

Prior to the study, ethical approval was obtained from Karamanoğlu Mehmetbey University Faculty of Medicine Clinical Research Ethics Committee on December 15, 2022 with decision number 11-2022/07.

RESULTS

The mean age of the individuals participating in the study was 20.9±2.2 years and the rate of female participants was 63.8%. According to the department/program levels, the majority of the participants were undergraduate students (67.8%). On the other hand, when the fields of study are taken into consideration, participants studying in health sciences (55.8%) and social sciences (34.6%) constitute the majority (Table 1).

Table 1. General Characteristics of the Participants

Age (years)	**$\bar{x}$±SD**		
	20.9±2.2		
Gender	**Male n (%)**		**Female n (%)**
	483 (36.2)		851 (63.8)
Level of department/program	**Associate n (%)**	**Undergraduate n (%)**	**Graduate n (%)**
	401 (30.1)	905 (67.8)	28 (2.1)
Field of department	**Social Sciences n (%)**	**Sciences n (%)**	**Health Sciences n (%)**
	462 (34.6)	128 (9.6)	744 (55.8)

$\bar{x}$: mean; SD: standard deviation

Consumption frequencies of some commonly consumed probiotic and prebiotic sources are analyzed in Table 2. The most preferred probiotic sources consumed every day in the last month were cheese types (36.9%), yogurt (18.4%), and buttermilk (5.9%). The rate of individuals who consumed kefir every day was 3.0%. On the other hand, participants had never consumed boza, probiotic yogurt, raw tarhana and kefir with the percentages of 95.2%, 88.9%, 83.6%, and 61.6%, respectively. Some of the prebiotic sources consumed every day in the time period in question were whole grain/whole wheat bread (15.2%), dried fruits (7.9%), banana (5.8%), onion (4.6%), breakfast cereal (4.4%), and oat (3.9%). The prebiotic sources that are mostly never consumed were asparagus (97.8%), soybean (97.6%), artichoke (97.0%), celery (94.8%), and whole grain/whole wheat pasta (87.5%).

Table 2. Food Consumption Frequencies of Some Probiotic and Prebiotic Sources

	Every day		5-6 times a week		3 times a week (every other day)		1-2 times a week		1-2 times a month		Never	
	n	%	n	%	n	%	n	%	n	%	n	%
Probiotic sources												
Kefir	40	3.0	45	3.4	105	7.9	139	10.4	183	13.7	822	61.6
Yogurt	245	18.4	225	16.9	270	20.2	378	28.3	148	11.1	68	5.1
Cheese types	492	36.9	274	20.5	271	20.3	180	13.5	40	3.0	77	5.8
Buttermilk	79	5.9	184	13.8	372	27.9	434	32.5	149	11.2	116	8.7
Pickles/Pickle juice	-	-	91	6.8	224	16.8	267	20.0	336	25.2	416	31.2
Turnip juice	24	1.8	43	3.2	97	7.3	173	13.0	291	21.8	706	52.9
Tarhana (raw)	-	-	-	-	24	1.8	72	5.4	123	9.2	1115	83.6
Boza	-	-	-	-	-	-	-	-	64	4.8	1270	95.2
Probiotic yogurt	20	1.5	20	1.5	37	2.8	32	2.4	39	2.9	1186	88.9
Prebiotic sources												
Oats	52	3.9	51	3.8	108	8.1	123	9.2	161	12.1	839	62.9
Breakfast cereals	59	4.4	57	4.3	124	9.3	173	13.0	252	18.9	669	50.1
Banana	77	5.8	116	8.7	227	17.0	398	29.8	401	30.1	115	8.6
Jerusalem artichoke	-	-	-	-	101	7.6	182	13.6	216	16.2	835	62.6
Whole grain/whole wheat bread	203	15.2	113	8.5	143	10.7	175	13.1	203	15.2	497	37.3
Whole grain/whole wheat pasta	-	-	-	-	-	-	48	3.6	119	8.9	1167	87.5
Dried fruits	105	7.9	111	8.3	199	14.9	239	17.9	320	24.0	360	27.0
Chickpea	-	-	13	1.0	64	4.8	216	16.2	702	52.6	339	25.4
Dry bean	-	-	20	1.5	120	9.0	384	28.8	609	45.6	201	15.1
Lentil	22	1.7	47	3.5	139	10.4	504	37.8	459	34.4	163	12.2
Onion	61	4.6	116	8.7	234	17.5	350	26.2	305	22.9	268	20.1
Garlic	13	1.0	71	5.3	168	12.6	311	23.3	346	25.9	425	31.9
Leek	-	-	-	-	55	4.1	181	13.6	384	28.8	714	53.5
Celery	-	-	-	-	-	-	-	-	69	5.2	1265	94.8
Artichoke	-	-	-	-	-	-	-	-	40	3.0	1294	97.0
Asparagus	-	-	-	-	-	-	-	-	29	2.2	1305	97.8
Soybean	-	-	-	-	-	-	-	-	32	2.4	1302	97.6

Probiotic source consumption status of participants for specific reason, the most commonly consumed probiotic sources for specific reasons and the specific reasons for consumption are presented in Table 3. The rate of individuals consuming probiotic foods for a specific reason was 18.3%. There was no significant difference between genders in terms of probiotic food consumption for a specific reason ($p>0.05$). The most commonly consumed probiotic sources due to specific reasons were yogurt (71.7%), kefir (52.9%), buttermilk (52.9%), cheese types (47.1%), and probiotic yogurt (34.8%), respectively. The rates of cheese consumption for specific reasons were 58.6% for males and 41.4% for females, and the statistical difference between the groups was found to be significant ($p<0.05$). No significant difference was found between genders in terms of consumption rates of other probiotic sources for specific reasons ($p>0.05$). As for the specific reasons for consumption of probiotic sources, 27.9% of the participants stated that they used to strengthen immunity, 23.0% stated that they preferred to protect intestinal health, 16.8% stated that they used to relieve constipation and 14.8% stated that they wanted to loss or control of weight. No significant difference was found between genders in terms of specific reasons of probiotic consumption ($p>0.05$).

Table 3. Specific Reasons for Probiotic Source Consumption and Most Commonly Probiotic Sources Consumed for Specific Reasons

	Male (n=483)		**Female (n=851)**		**Total (n=1334)**		χ^2	**p**
	n	**%**	**n**	**%**	**n**	**%**		
For specific reasons								
Yes	78	16.1	166	19.5	244	18.3	1.342	0.511
No	405	83.9	685	80.5	1090	81.7		
	Male (n=78)		**Female (n=166)**		**Total (n=244)**		χ^2	**p**
	n	**%**	**n**	**%**	**n**	**%**		
Commonly consumed probiotic sources for specific reasons*								
Yogurt	59	76.2	116	69.6	175	71.7	0.709	0.400
Kefir	41	52.4	88	52.8	129	52.9	0.002	0.962
Buttermilk	45	57.1	84	50.9	129	52.9	0.515	0.473
Cheese types	46	58.6	69	41.4	115	47.1	3.114	**0.038**
Probiotic yogurt	28	35.7	57	34.2	85	34.8	0.036	0.850
Specific reasons for probiotic source consumption**								
For strengthen immunity	19	23.8	49	29.7	68	27.9	2.822	0.420
For bowel health (as a preventative)	17	21.4	39	23.2	56	23.0		
Constipation	9	11.9	32	19.4	41	16.8		
Weight loss/control	8	9.7	28	16.7	36	14.8		

* More than one option was selected; therefore, each option was analyzed separately using Pearson's chi-square test.
** The most common four responses are presented.

Table 4 shows the most commonly consumed prebiotic sources for specific reasons and the specific reasons for consumption of these prebiotic sources. The rate of prebiotic source

consumption due to specific reasons was 16.2% and no significant difference was found between genders ($p>0.05$). The most preferred prebiotic sources for specific reasons were banana (66.2%), oats (51.4%), dried fruits (45.8%), onions (38.9%), and whole grain/whole wheat bread (36.6%). The rate of oat consumption for specific reasons was significantly higher in females than in males ($p<0.05$). There was no significant difference between genders in terms of consumption rates of other prebiotic sources for specific reasons ($p>0.05$). As for the specific reasons for consumption of prebiotic sources, the most common responses were "for strengthen immunity" (29.2%), "weight loss/control" (22.2%), "for bowel health (as a preventative)" (19.0%), and "constipation" (13.0%). There was no significant difference between genders in terms of specific reasons for consumption ($p>0.05$).

Table 4. Specific Reasons for Prebiotic Source Consumption and Most Commonly Prebiotic Sources Consumed For Specific Reasons

	Male (n=483)		**Female (n=851)**		**Total (n=1334)**		χ^2	**p**
	n	**%**	**n**	**%**	**n**	**%**		
For specific reasons								
Yes	63	13.0	153	18.0	216	16.2	3.100	0.212
No	420	87.0	698	82.0	1118	83.8		
	Male (n=63)		**Female (n=153)**		**Total (n=216)**		χ^2	**p**
	n	**%**	**n**	**%**	**n**	**%**		
Commonly consumed prebiotic sources for specific reasons*								
Banana	48	76.5	95	62.3	143	66.2	2.424	0.119
Oat	21	34.0	90	58.9	111	51.4	4.192	**0.029**
Dried fruits	27	43.2	72	47.1	99	45.8	0.171	0.679
Onion	30	47.1	54	35.6	84	38.9	1.536	0.215
Whole grain/whole wheat bread	22	35.3	57	37.0	79	36.6	0.034	0.854
Specific reasons for prebiotic source consumption**								
For strengthen immunity	18	28.1	45	29.4	63	29.2	1.438	0.697
Weight loss/control	12	19.2	36	23.5	48	22.2		
For bowel health (as a preventative)	9	14.7	32	21.2	41	19.0		
Constipation	6	8.8	22	14.4	28	13.0		

* More than one option was selected; therefore, each option was analyzed separately using Pearson's chi-square test.
** The most common four responses are presented.

Another issue examined within the scope of the study is the use of probiotic and prebiotic supplements (Table 5). The rate of participants who used probiotic supplements was 4.5%, whereas none of the participants reported using prebiotic supplements. Use of probiotic supplements was found to be significantly higher in females than in males ($p<0.05$). Among the participants using probiotic supplements, 16.7% reported using probiotic supplements every day and 31.7% reported using them rarely. Male participants reported using probiotic supplements mostly 1-2 times a month (45.4%) and female participants reported using them

mostly 1-2 times a week (38.3%) ($p<0.05$). As for the reasons for using probiotic supplements, 28.3% of the participants cited to strengthen immunity. In addition, 15.0% of the participants stated that they used them for constipation, 13.3% used them for weight loss/control, and 13.3% used them for diarrhea. There was no significant difference between male and female participants in terms of reasons for probiotic supplement use ($p>0.05$). Finally, 83.3% of the participants stated that they began to use probiotic supplements on the recommendation of a specialist, while 16.7% stated that they began to use them on the recommendation of friends, acquaintances, etc. There was also no significant difference between genders in terms of the factor for beginning probiotic supplementation ($p>0.05$).

Table 5. Some Features of the Use 0f Probiotic/Prebiotic Supplements

	Male (n=483)		**Female (n=851)**		**Total (n=1334)**		χ^2	**p**
	n	**%**	**n**	**%**	**n**	**%**		
Use of probiotic supplement								
Yes	11	2.2	49	5.8	60	4.5	8.396	**0.004**
No	472	97.8	802	94.2	1274	95.5		
Use of prebiotic supplement								
Yes	-	-	-	-	-	-	-	-
No	483	100.0	851	100.0	1334	100.0		
	Male (n=11)		**Female (n=49)**		**Total (n=60)**		χ^2	**p**
	n	**%**	**n**	**%**	**n**	**%**		
Frequency of probiotic supplement use								
Every day	2	18.2	8	16.3	10	16.7	8.049	**0.045**
1-2 times a week	2	18.2	21	42.9	23	38.3		
1-2 times a month	5	45.4	3	6.1	8	13.3		
Rarely	2	18.2	17	34.7	19	31.7		
Reason to use probiotic supplements								
For strengthen immunity	1	9.1	16	31.6	17	28.3	2.305	0.511
Weight loss/control	2	18.2	6	10.5	8	13.3		
Constipation	1	9.1	8	15.8	9	15.0		
Diarrhea	2	18.2	6	10.5	8	13.3		
The factor for beginning probiotic supplementation								
Expert advice (doctor, dietitian, pharmacist, biologist)	9	81.8	41	83.7	50	83.3	0.117	0.732
Friend, acquaintance, etc. recommendation	2	18.2	8	16.3	10	16.7		

DISCUSSION

As a result of the development of communication technology, easier access to information has affected all aspects of an individual's lifestyle, including eating habits. Mass media plays a major role in raising awareness about healthy nutrition. This undoubtedly has a share in the recent increase in interest in functional foods. Probiotics and prebiotics are among these functional foods.

The findings of the present study show that foods such as cheese types, yogurt and buttermilk were probiotic sources commonly consumed by university students. In addition, kefir, which is an important probiotic source, was consumed every day by 3.0% of the participants and at least once a month by 24.7% of participants. On the other hand, the majority of the participants did not consume boza (95.2%), probiotic yogurt (88.9%), and raw tarhana (83.6%). It can be stated that the current findings are similar to the literature data. Arpa-Zemzemoğlu, Uludağ and Uzun (2019) reported that 3.3% of university students consumed kefir every day and 86.4% did not consume boza. Kuyumcu and Yıldız (2020) emphasized that 19.3% of university students consume kefir at least once a month. In the same study, it was reported that 93.6% of the participants had never consumed boza and 71.5% had never consumed turnip juice. In another study conducted by Kaya-Cebioğlu and Önal (2019) on adults living in İstanbul, it was found that 29.9% of the participants consumed yogurt every day, whereas 92.3% did not consume probiotic yogurt. In a study conducted by Çelik, Sarıoğlu and Dağıstan (2022) on the attitudes and behaviors of consumers living in TR63 region (statistical sub-region covering the provinces of Hatay, Kahramanmaraş, and Osmaniye in the Mediterranean Region) towards probiotics, it was reported that 4.8% of the participants consumed cheese types, 4.1% yogurt, 4.0% buttermilk, and 1.5% kefir every day. On the other hand, it was stated that 85.2% of the participants had never consumed boza and 63.5% had never consumed kefir. As for the prebiotic sources commonly consumed within the scope of the current study were examined, it was observed that breads made from unrefined flours (whole grain/whole wheat), dried fruits, banana, and onion were the most commonly consumed sources, but important prebiotic sources such as asparagus, soybean, artichoke, and celery were largely not preferred. Similar findings have been reported in different studies. Kuyumcu and Yıldız (2020) found that 8.6% of university students consumed banana every day. Yücel-Şengün, Kırmızıgül, Özaydın and Yarım (2019) reported that the most commonly consumed prebiotic sources in a sample of adults were legumes, onion/garlic, banana and cereals (wheat and oat), respectively. İnce-Palamutoğlu, Bilgi, Horzum, Kılıç and Karaca (2023) also reported that 7.6% of adults consumed banana every day. Considering the results of different studies, it can be thought that university students and different segments of the society are similar in terms of the frequency of consumption of commonly consumed and non-preferred probiotic and prebiotic sources. In addition, considering the seasonal factor, it is possible that the probiotic and prebiotic sources that are not consumed at all or consumed very frequently may vary.

As for the consumption status for specific reasons was analyzed, it was observed that 18.3% and 16.2% of the participants consumed probiotic and prebiotic sources for a specific

reason, respectively, and the most commonly consumed probiotic sources for specific reason were yogurt, kefir, buttermilk, cheese types, and probiotic yogurt; while prebiotic sources were banana, oats, dried fruits, onion, and whole grain/whole wheat bread. As for the reasons for consumption of probiotic and prebiotic sources were questioned among individuals who consumed probiotic and prebiotic sources for specific reasons, to strengthen immunity, bowel health, relief of constipation, and weight loss/control were the most common responses. Different studies also support these findings. Kılıç-Kanak, Öztürk-Yılmaz, Özacar, Uflas, Bilek and Yılmaz (2022) stated that 70.2% of university students who regularly consumed probiotic sources aimed to strengthen immunity, 8.1% for flavor and 7.4% for weight loss. Horasan, Sevinç and Çelikyürek (2021) reported that 73.8% of university students consume probiotic sources because of their health effects on the digestive system, 70.6% because they strengthen immunity and 52.2% because they are delicious. In a study conducted on healthcare professionals, Köse et al. (2019) reported that the rate of probiotic consumption to strengthen immunity was 40.0% and the rate of consumption for flavor was 22.3%. In the study conducted by Yücel-Şengün et al. (2019) the reasons for consumption of probiotic and prebiotic sources were stated as the benefits on the digestive system (63.9%), to strengthen immunity (49.1%), and flavor (49.1%). The findings of many studies also provide insight into the rising popularity of probiotic sources because of their immune-boosting properties. These studies also cited the palatability of probiotic and prebiotic sources as a justification for consumption. However, no choice such as "taste/palatability/favor" was included in the current study because only health conditions were asked about as specific reasons for consumption.

The prevalence of probiotic supplement use was 4.5% in this study. On the other hand, all of the participants did not use prebiotics supplements. When asked how often participants who use probiotic supplement took supplements, 16.7% of them took it every day. On the other hand, 31.7% of them stated that they took supplements rarely. When asked the reasons for using probiotic supplements, the most common answers were to strengthen immunity, weight loss/control, constipation, and diarrhea. There is limited literature data on the use of probiotic supplements. İnce-Palamutoğlu et al. (2023) reported that 2.8% of university students used daily probiotic supplements. They also specified that 4.7% of participants who use probiotic supplement preferred supplements to support digestive system health and 30.9% preferred them to strengthen immunity. Kobayashi, Sato, Umegaki and Chiba (2017) reported the prevalence of probiotic supplement use in university students living in Japan as 2.3%. On the other hand, Vidović, Đuričić, Odalović, Milošević-Georgiev and Tadić (2022) found a slightly higher prevalence of probiotic supplement use in university students living in Serbia (9.7%). It can be

seen that the outcomes of these studies and the results of the current study do not significantly differ from one another. It can also be stated that the specific reasons for using probiotic supplements and the specific reasons for consuming probiotic sources overlap to a great extent. Last but not least, when the factors for the use of probiotic supplements were examined in the current study, the participants influenced by an expert (doctor, dietitian, pharmacist or biologist) advice or by a friends/acquaintances etc. recommendation. The effectiveness of communication technologies like social media and other media channels has also been highlighted by several studies (Köse et al., 2019; Önay-Derin & Keskin, 2013; Sharma, Gupta, Gupta and Kushwaha, 2019). However, within the scope of the current study, information shared via social media by health professionals such as doctors, dietitians, pharmacists, and biologists were referred to as "expert advice".

CONCLUSION

Probiotic and prebiotic sources have an important place in Turkish cuisine and nutrition culture. Recently, there has been an increasing interest in the consumption of these foods, especially with the influence of mass media. However, because probiotics and prebiotics are such a vast topic, the scant information that is presented in various written and visual media, particularly social media, might not be enough for healthy and correct consumption. It is also evident that different probiotic supplements available on the market do not all contain the same ingredients, and that products chosen for preventive/therapeutic purposes should be used with caution. Young adult university students who care about their appearance and health are more likely to be influenced by scant information about these products presented in written and visual media. Therefore, it is important to carry out periodic information and awareness activities in educational institutions, especially in universities, on the correct consumption of probiotic and prebiotic sources in order to consume these foods consciously.

Limitations

Although all faculties and schools were visited during data collection, it was planned to repeat the visits to faculties and schools until the end of the spring semester of the 2022-2023 academic year to ensure a wider participation. However, due to the earthquakes centered in Kahramanmaraş-Gaziantep on February 6, 2023, distance education was started in the spring semester. Therefore, the previously planned repeated visits could not be realized. Findings from a larger sample would have been more strongly representative of the population.

Determining the quantities of foods consumed would have provided important data on the average daily intake of probiotic and prebiotic sources. However, it is known that the probiotic bacteria content of the same foods may vary even according to their production, preparation and storage conditions. As a matter of fact, according to the Turkish Food Codex (2017), a probiotic source must contain 1.0×10^6 cfu/g live probiotic bacteria and a prebiotic source must contain at least 3 g of prebiotic components per 100 g (or at least 1.5 g of prebiotic components per 100 kcal) in order to show health benefits. The inability to determine the amounts of probiotic bacteria and prebiotic components ingested with foods is an important limitation of the study. Likewise, the contents of probiotic and prebiotic supplements were not questioned. In further studies, it would be valuable to focus on questioning the amounts of probiotic and prebiotic sources consumed and the contents of probiotic and prebiotic supplements used and associating these findings with health and quality of life.

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