Mustafa Kemal Üniversitesi Tarım Bilimleri Dergisi, 29 (1), 250-264
Mustafa Kemal University Journal of Agricultural Sciences, 29 (1), 250-264
https://dergipark.org.tr/tr/pub/mkutbd
e-ISSN: 2667-7733

ARAŞTIRMA MAKALESİ **RESEARCH ARTICLE**

Consumers' attitudes toward probiotic dairy products in the post-Covid-19 normalization process

Covid-19 sonrası normalleşmede tüketicilerin probiyotik süt ürünlerine yönelik tutumları

Berrak DELİKANLI KIYAK[1], İlkay YILMAZ[2]

[1]*Bursa Uludag University, Vocational School of Iznik, Deparment of Food Processing, Bursa, Türkiye.*
[2]*Baskent University, Faculty of Fine Arts, Design and Architecture, Department of Gastronomy and Culinary Arts, Ankara, Türkiye.*

ARTICLE INFO

Article history:
Recieved / Geliş: 29.09.2023
Accepted / Kabul: 21.01.2024

Keywords:
Covid-19
Health
Probiotics
Probiotic dairy products

Anahtar Kelimeler:
Covid-19
Sağlık
Probiyotik
Probiyotik süt ürünleri

Corresponding author/Sorumlu yazar:
Berrak DELİKANLI KIYAK
bdelikanli@uludag.edu.tr

ABSTRACT

Current studies conducted during the Covid-19 pandemic reported that contracting Covid-19 and related deaths was higher in undernourished and immunocompromised societies than in societies with a well-balanced diet. The consumption of various foods, beverages, nutritional supplements, and foods that support the immune system against Covid-19 was also recommended during this process. Probiotics are among the recommended foods to be consumed. This study aimed to determine the consumption tendencies of individuals toward probiotic dairy products in the post-Covid-19 normalization process. Data were collected through a survey from 315 adults residing in Ankara, Turkey, between September-November 2022 to identify their awareness of probiotic dairy products and their desire to consume them. Participants were selected through convenience sampling. Findings were analyzed through IBM SPSS 25 statistics software using independent samples t-test and one-way analysis of variance (ANOVA). No significant correlation was found between consumers' socio-demographic characteristics and their knowledge or awareness levels about probiotic dairy products. However, female consumers and those with higher education levels were found to have an increased awareness of probiotic dairy products and purchasing likelihood. Additionally, those who contracted Covid-19 tended to consume these products to live healthier. The study emphasized awareness-raising consumers of the possibility of a healthier life by consuming probiotic dairy products.

ÖZET

Covid-19 salgını sırasında yapılan güncel araştırmalar, yetersiz beslenen ve bağışıklığı baskılanmış toplumlarda, dengeli beslenen toplumlara göre Covid-19'a yakalanma ve buna bağlı ölümlerin daha yüksek olduğunu bildirmektedir. Ayrıca bu süreçte Covid-19'a karşı bağışıklık sistemini destekleyen çeşitli yiyecek, içecek, besin takviyesi ve gıdaların tüketilmesi de önerilmektedir. Probiyotikler tüketilmesi önerilen besinler arasında yer almaktadır. Bu çalışmada, Covid-19 sonrası normalleşme sürecinde bireylerin probiyotik süt ürünlerine yönelik tüketim eğilimlerinin belirlenmesini amaçlamıştır. Probiyotik süt ürünleri konusundaki farkındalıklarını ve bunları tüketme isteklerini belirlemek amacıyla Eylül-Kasım 2022 tarihleri arasında Ankara, Türkiye'de ikamet eden 315 yetişkinden anket yoluyla veriler toplanmıştır. Katılımcılar kolayda örnekleme yoluyla belirlenmiştir. Bulgular, bağımsız örnekler t-testi ve tek yönlü varyans analizi (ANOVA) kullanılarak IBM SPSS 25 istatistik yazılımı aracılığıyla analiz edilmiştir. Tüketicilerin sosyo-demografik özellikleri ile probiyotik süt ürünlerine ilişkin bilgi ve farkındalık düzeyleri arasında anlamlı bir ilişki bulunamamıştır. Ancak kadın tüketicilerin ve eğitim düzeyi yüksek olanların probiyotik süt ürünleri konusunda farkındalıklarının ve satın alma olasılıklarının arttığı belirlenmiştir. Ayrıca Covid-19'a yakalananlar daha sağlıklı yaşamak için bu ürünleri tüketme eğilimi göstermektedir. Bu çalışma ile, probiyotik süt ürünleri tüketerek daha sağlıklı bir yaşam mümkün olabileceği konusunda tüketicilerin bilinçlendirilmesi vurgulanmaktadır.

Cite/Atıf Delikanlı Kıyak, B., & Yılmaz, İ. (2024). Consumers' attitudes toward probiotic dairy products in the post-Covid-19 normalization process. *Mustafa Kemal Üniversitesi Tarım Bilimleri Dergisi, 29* (1), 250-264. https://doi.org/10.37908/mkutbd.1368850

INTRODUCTION

World Health Organization (WHO) announced the coronavirus disease 2019 (Covid-19) outbreak as a public health emergency of global concern in March 2020 because of its worldwide spread from China. Covid-19 is delineated as an illness leading to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), a subspecies of the family (Gorbalenya et al., 2020; Park, 2020; WHO, 2020a; WHO, 2020b). Coronaviruses are known to affect the respiratory and gastrointestinal systems of birds, mammals, and humans and, by settling in the lower respiratory tract, cause death due to acute respiratory distress caused by pneumonia (Chen et al., 2022). They are also considered a disease of animal origin (zoonosis), but they can mutate and infect humans, thus causing epidemics. The present situation shows that no method directly prevents or treats Covid-19 (Das et al., 2020; Jayawardena et al., 2020; Gasmi et al., 2020; Zhang and Liu, 2020). Besides, it is known that in people whose immune system is weak are more likely to get caught to Covid-19 and as a result of this it is stated that diesase and death rates related to COVID-19 in these people are quite high. Therefore each individual needs to have a strong immune system in order to develop resistance against covid-19 and live in a healty way (Calder, 2020; Rishi et al., 2020). For this purpose it is advised that individuals should consume food which supports the immune system in order to prevent getting caught to covid-19 (Alkhatib, 2020; Akar-Sahingoz & Yalcin, 2022). In this context, probiotic foods are recommended as an alternative treatment among prophylactic and therapeutic measures, as they strengthen the immune system, help repair deformed tissues and organs, and affect the gut-lung axis (Baud et al., 2020; Synodinou et al., 2022).

Probiotic foods are “foods that contain sufficient active probiotic bacteria during shelf life” in this context, lactic acid bacteria, especially *Bifidobacteria* and *Lactobacilli*, are among the best-known probiotics as live microbial food additives (Zucko et al., 2020; Munir et al., 2022). Studies are carried out intensively on foods with secondary protective effects for increasing people’s demands for a healthy life. For this purpose, many food products such as yogurt, cheese, chocolate, and fruit juices have been developed to deliver probiotics to people for their consumption alongside food. Dairy products such as yogurt, cultured liquid milk, kefir, and cheese are known to be the main sources of probiotic microorganisms.

Probiotic dairy products have been the content of many studies in recent years because of their high functional values. Scientific research about the specific positive function of probiotics on human health has revealed that probiotics prevent or treat many diseases, including gastrointestinal infections, anti-microbial activity, betterment in lactose metabolism, decrease in serum cholesterol, stimulating the immunity, anti-mutagenic, anti-carcinogenic, anti-diarrheal features, betterment in inflammatory intestine disease, elimination of *Helicobacter pylori* bacteria, allergic disorders, obesity, Type-2 diabetes, insulin resistance syndrome, protection of intestinal microbiota against pathogens, infant diarrhea, urinary tract inflammation, osteoporosis, and hypercholesterolemia (Roobab et al., 2020; Pulido et al., 2021, Hamad et al., 2022; Kuçukgoz & Trzaskowska, 2022; de Miranda, 2023; Rusch et al., 2023; Vera-Santander et al., 2023). To this end, this study aimed to determine the level of awareness of consumers living in Ankara about probiotic dairy products and their consumption habits in the post-Covid-19 normalization process. It also attempted to determine consumers’ knowledge, the reasons for consumption, and opinions about probiotic dairy products. In this regard, the study intended to serve as a reference material that will shed light on consumers and the sector by determining the current situation.

MATERIALS and METHODS

This study intended to identify consumers’ awareness of probiotic dairy products and their desire to consume these in the post-Covid-19 normalization process. For this purpose, 315 adult individuals, 109 men and 206 women, aged between 14-72 years, residing in Ankara, Turkey, participated voluntarily in the study between September-November 2022. Data were collected through the survey developed by Balkis (2011). Participants were selected

through the convenience sampling method. The survey was accordingly delivered to people who could be easily reached from the existing and immediate environment and were willing to participate in the survey. The convenience sampling method requires researchers to access people who are close and easy to reach, and the survey continues until the number of people reaches the desired sample size (Yildirim & Simsek, 2016).

The research utilized a survey model which is a research approach pointing to define a past or present condition as it exist, because that the size of sample is completely linked to data attribute and survey rightness, taking into account a precision degree of D = 0.05, a confidence interval 95% and a ratio of 50%, the eventual size of sample measured was n = 315 contributors applying the typical fault formula (Yilmaz-Ersan et al., 2020):

$$n = \frac{N * t^2 * pq}{d^2(N-1)} + t^2 * pq$$

Prior to data collection, the ethics committee approval was obtained from the Ethics Committee of Baskent Social and Human Sciences and Art Research and Publication with the decision numbered E-62318886-605.99-157603 dated 08/09/2022.

Research data were collected using a survey form, the main frame of which was determined, via Google Documents, in line with the information obtained by examining the relevant literature and expert opinions (Akar Sahingoz & Yalcin, 2022). The first part of the survey, which was prepared to explore participants' consumption of probiotic dairy products, included questions to determine general background information, demographics, and knowledge about the Covid-19 disease. On the other hand, the second part contained items on dietary habits, consumption of probiotic-added foods, factors affecting their consumption, diseases cured by probiotics, and reasons for not consuming them and their frequency. The last part, however, comprised a table displaying the items about participants' knowledge levels about probiotics. These items were rated on a 5-point Likert scale from "strongly agree" to "strongly disagree" Participants were informed that their responses would be strictly confidential and be used only for scientific purposes. It was also assumed that participants gave honest and unbiased responses.

The raw data obtained were first processed into data coding tables. Necessary statistical analyses were then performed through IBM SPSS 25 statistics software. Frequency distributions of demographics were calculated. Chi-square tests were conducted to compare participants' opinions and consumptions about probiotic foods with their gender, nutrition course attendance, and Covid-19 histories. Participants' demographics and Covid-19 histories, as well as their knowledge of probiotic foods and dietary habits, were examined using an independent sample t-test and one-way analysis of variance (ANOVA).

RESULTS and DISCUSSIONS

Table 1 presents some personal information of the participants: gender, education level, diagnosed health problem related to nutrition, Covid-19 history. According to Table 1, 34.6% of the 315 participants were male, and 65.4% were female. The high female participation rate in the study was due to women's increased interest in nutrition studies (Payci, 2009; Tamel, 2010). Participants were between 14 and 72 years old, with a mean age of 35.30 ± 11.95. While 30.2% of the participants held a Master's or a Ph.D. degree, the others were university (58.7%) and high school (9.8%) graduates. 15.6% of the participants were found to have a health problem related to their eating habits, and 54.9% contracted Covid-19 (Table 1). It was concluded that participants' higher education levels stemmed from residing in central regions, and the low rates of nutritional diseases resulted from their young average age.

Table 1. Distribution of the participants' gender, education level, diagnosed health problem related to nutrition, Covid-19 history information (n = 315)

Çizelge 1. Katılımcıların cinsiyet, eğitim düzeyi, beslenmeyle ilgili teşhis edilen sağlık sorunu, Covid-19 geçmişi bilgilerinin dağılımı (n = 315)

	Variables	f	%
Gender	Male	109	34.6
	Female	206	65.4
	Total	315	100.0
Education level	Illiterate	1	0.3
	Primary School	1	0.3
	Secondary School	2	0.6
	High School	31	9.8
	University	185	58.7
	Master's/doctoral degree	95	30.2
	Total	315	100.0
Diagnosed health problem related to nutrition	Yes	49	15.6
	No	266	84.4
	Total	315	100.0
Covid-19 history	Yes	173	54.9
	No	142	45.1
	Total	315	100.0

Post-Covid-19 normalization process mandates the creation of a strong immunity for implementing a healthy nutrition plan. In this context, individuals are required to be more knowledgeable about nutrition. Relevant studies revealed that women were more conscious than men about nutrition because they are food deciders and buyers (Flagg et al., 2013; Carlson et al., 2018; Singh et al., 2020; McKenzie et al., 2022). It was also established that food knowledge while consuming a particular food affected its consumption. Gender studies examining consumers' perceptions and attitudes toward probiotic foods demonstrated that women consumed probiotic foods more (Bouge et al., 2003; Yabanci & Simsek, 2007; Zeren, 2015; Horasan et al., 2021). A comparison of this study with other studies examining the opinions of consumers toward probiotic foods revealed that gender did not affect distinguishing between probiotic foods ($p>0.05$). It was also determined that gender did not affect participants' consumption of probiotic foods, thoughts on their benefits, and whether they read the labels or recommended them to their circles ($p>0.05$). In addition, the reasons for not consuming probiotic foods, the foods they wanted to contain additional probiotics, and whether probiotic foods were beneficial to health did not vary according to gender ($p>0.05$). On the other hand, the reasons for probiotic food consumption differed significantly between men and women ($X^2 = 14.094$, $p<0.05$) (Table 2). While 73.2% of those using probiotic foods to strengthen the immune system were women, 80% of those using probiotic foods to avoid circulatory system problems were men (Table 2). In a different study, 71.8% of the participants in study stated that the reason for consuming probiotics the most was disease prevention (Yucecan et al., 2006). In another study, 47.6% of the participants stated that probiotic products helped regulate the gastrointestinal system (Aydin et al., 2010). Another similar study determined that the most common reason for probiotic consumption was their effects on the digestive system (Betz et al., 2015). Kagan et al. (2019) found in their study that 63% of adults impacted the activation of their immune systems due to regular probiotic food consumption.

The participants' opinions on probiotic foods were compared to their Covid-19 histories (Table 2). The only difference was found in distinguishing probiotic foods ($X^2 = 11.003$, $p<0.01$) (Table 2). People with no Covid-19 history referred to probiotic foods as "the general term for foods that contain all the proteins the body requires" more than those with Covid-19. Results also revealed no statistically significant difference in the other opinions for

probiotic foods based on contracting Covid-19 (p>0.05). In this context, studies emphasized that people should attend to their diets to prevent and control Covid-19 (Ashby, 2020; Mehta, 2020; Indumathi & Sharma, 2022; Kaushal et al., 2022). It was also found that probiotic products strengthened the immune system by fighting pathogens when consumed in sufficient quantities (Akpinar & Kaplan-Turkoz, 2019; Topuz, 2020).

Table 2. Distribution of the opinions on probiotic foods by gender and having Covid-19 history
Çizelge 2. Probiyotik gıdalara ilişkin görüşlerin cinsiyete ve Covid-19 geçmişine göre dağılımı

Opinions on probiotic foods	Gender	Having Covid-19 history
Characterization of probiotic foods	0.314	0.001*
The name for the foods that help to maintain microbiological balance in the intestines		
The general term for foods that contain all the proteins the body requires		
Consumption of probiotic foods	0.301	0.468
Yes		
No		
Benefited from probiotic foods	0.603	0.465
Yes		
No		
Reading labels on probiotic foods	0.077	0.161
Yes		
No		
Recommendation of probiotic foods consumption	0.164	0.182
Yes		
No		
Reasons for consuming probiotic foods	0.003*	0.842
To strengthen the immune system		
To avoid gastrointestinal problems		
To avoid circulatory system problems		
Other reasons (lose weight, skin, eye problems, etc.)		
Reasons for not consuming probiotic foods	0.329	0.688
Lack of knowledge		
Having no need		
Tasteless		
Unnatural		
Expensive		
Other (habits, lack of time, etc.)		
Foods requiring the addition of probiotics	0.414	0.350
Cookies, confectioneries, and chocolates		
Beverages		
Pasta, pastries		
Other (vegetables, fruits, soups, flour, etc.)		
P**robiotic foods are beneficial for health**	0.194	0.250
Yes		
No		

(*) indicates that it is statistically significant at p<0.05.

In recent years, the increasing interest in the concept of healthy nutrition has led individuals to functional foods and food supplements. Probiotic foods are defined as products greatly preferred by consumers, with a central place among functional products (Kose et al., 2019). Research on determining the level of awareness of the concept of probiotics showed variations (Chukwu et al., 2015; Eser, 2017; Kagan et al., 2019; Ozgul et al., 2020). In this study, individuals' probiotic food consumption habits and their awareness levels regarding the concept of probiotics were

evaluated. Findings in Figure 1 showed that attending a nutrition course impacted the reasons for probiotic food consumption (X^2 = 22.373, p<0.05). A high rate of 90.9% who consume probiotic foods has attended nutrition courses because they have knowledge about probiotic foods. In a similar study conducted in Lagos, Nigeria, 57.3 % of medical students reported they never heard of the concept of probiotics before (Chukwu et al., 2015). A study in Turkey about probiotic knowledge levels determined that 38.5% of university students did not know the concept of probiotics (Yurttas & Yilmaz, 2017). Another similar study conducted in Turkey found that the awareness rate of probiotic foods was 64.5% (Kagan et al., 2019). An increase in probiotic knowledge levels was proportionate to an increase in using probiotic foods and products. When consumption rates of probiotic dairy products were examined as per nutrition course attendance, the kefir consumption habits of those who took the nutrition course were significantly higher (X^2 = 11.121, p<0.05) (Figure 1). It was found that those who did not attend a nutrition course consumed less or no kefir than those who did attend. The results of many studies showed that the most consumed probiotic food, similar to our study, was probiotic yogurt (Balkis, 2011; Betz et al., 2015; Eser, 2017; Ozgul et al., 2020). The finding of Hacioglu & Kurt (2012) study showed that kefir was the most consumed probiotic food, which differed from the others, followed by yogurt and probiotic milk. Easy accessibility was the reason for probiotic yogurt to be the most consumed probiotic food. Today, although significant contributions are made to developing healthy nutrition awareness through written and visual media, more permanent and sustainable contributions can be made, especially if awareness-raising training is systematically given in formal education during the basic education-training periods.

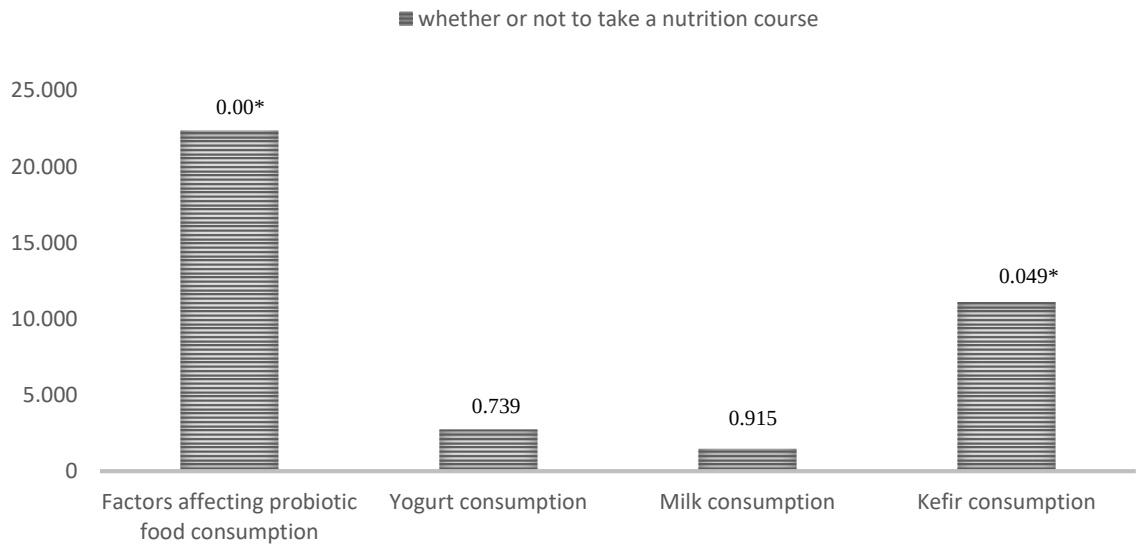

Figure 1. Frequency of probiotic food consumption based on attendance to a nutrition class
(*) indicates that it is statistically significant at p<0.05
Şekil 1. Beslenme dersine katılıma göre probiyotik gıda tüketim sıklığı
(*) p<0.05 istatistiksel olarak anlamlı

Many factors, such as gender, age, and education level, are considered to impact probiotic awareness. Therefore, although probiotic awareness is constantly increasing, the study results for determining knowledge levels about the meaning of probiotics have varied. In this study, an independent sample t-test and one-way analysis of variance (ANOVA) method were used to determine the effect of gender, education level and Covid-19 history on probiotic awareness in order to reveal the difference (Table 3). Table 3 shows the probiotic food knowledge scores according to gender. Female participants scored significantly higher than males in the statements “Probiotic foods can make us feel good”, “Probiotic foods help to strengthen the immune system”, “Yogurt contributes to the regulation of

the digestive system", "Probiotic foods help to prevent diseases", "Probiotic foods are resistant to antibiotics" ($p<0.05$), "Probiotic foods help to prevent cancers", "Probiotic foods contribute to eye health" and "Probiotic foods have a positive effect on skin health" ($p<0.01$). This finding might be justified by the higher health and nutrition awareness of females than males. Unlike our study, a similar study found that 49.3% of women had never heard of the concept of probiotics (Sahin, 2018). A study by Kucuk & Yilbar (2021) revealed that the concept of probiotics was not known by 33.3% of women. Such variations might be due to different male and female populations in the regions where the studies were conducted.

The increase in education levels leads to many behavioral changes in food purchasing behaviors, such as healthy eating, openness toward new products, and a tendency to consume ready-made food. A comparison between probiotic food awareness and education levels suggested that participants with high education levels usually had more accurate information about probiotic foods (Table 3). Participants holding a Master's or a Ph.D. degree agreed significantly more than those who a had university, high school or lower degrees on the following statements, "Probiotic foods are rich in nutrients", "Probiotic foods help to strengthen the immune system", "Yogurt contributes to the regulation of the digestive system", "Probiotic foods contain high numbers of microorganisms", "Probiotic foods are generally produced by natural methods" and "Probiotics help prevent the growth of disease-causing microorganisms" ($p<0.05$). On the other hand, participants with a university, high school or lower degrees agreed to the statements "Probiotic foods can cause diarrhea", "Probiotic foods are produced without fermentation" and "Probiotic foods decrease the need for vitamins and minerals" significantly more than those with a graduate degree ($p<0.05$). Babajimopoulos et al. (2004) found that those with higher education levels had a better level of knowledge about probiotics. Al-Muammar et al. (2013) also determined that those with a higher education degree such as a Master's degree, had significantly higher mean values in their knowledge of probiotics than other groups. Similar findings were reported in other studies on probiotic consumption and awareness (Gulec, 2015; Yurttas & Yilmaz, 2017; Pehlivan & Nutrt, 2020).

Due to the Covid-19 disease that has impacted the whole world, eating and drinking habits, at the heart of daily routine, have also been changed, acquiring a dimension aimed at health protection. Although Covid-19 is seen as a virus that mainly impacts the lungs, it also causes symptoms related to the gastrointestinal system (e.g., diarrhea, emesis, abdominal pains, etc.). For this reason, it is emphasized that probiotics positively impact fighting the disease (Kuru-Yasar & Ustun-Aytekin, 2021). In this context, using probiotics is a cheap and safe way to eat healthily and protect against microbial infections. Table 3 compares participants' knowledge about probiotic foods and their Covid-19 histories. The results revealed that participants who contracted Covid-19 significantly agreed more to with statements "Probiotic foods can make us feel good", "Probiotic foods are rich in nutrients", "Yogurt contributes to the regulation of the digestive system", "Probiotic foods are generally produced by natural methods" and "Probiotics help prevent the growth of disease-causing microorganisms" than those who did not ($p<0.05$). Chinese studies suggested that a dramatic decrease in probiotics, such as Lactobacillus and Bifidobacterium, in the gastrointestinal systems of Covid-19 patients caused the intestinal microecological balance to deteriorate. In addition, it was suggested that these patients may need prebiotic and probiotic supplements to regulate their gastrointestinal flora balance by reducing the current infection risk (Xu et al., 2020).

Table 3. Scores for knowledge on probiotic food in terms of gender, education level and Covid-19 history
Çizelge 3. Cinsiyet, eğitim düzeyi ve Covid-19 geçmişine göre probiyotik gıdalara ilişkin bilgi skorları

Knowledge of probiotic foods	**Gender**	**Education level**	**Covid-19 history**
Probiotic foods can make us feel good	0.034*	0.076	0.042*
Probiotic foods are rich in nutrients	0.129	0.015*	0.046*
Probiotic foods help to strengthen the immune system	0.045*	0.008*	0.054

Table 3 (devamı). Scores for knowledge on probiotic food in terms of gender, education level and Covid-19 history
Çizelge 3 (continued). Cinsiyet, eğitim düzeyi ve Covid-19 geçmişine göre probiyotik gıdalara ilişkin bilgi skorları

Yogurt contributes to the regulation of the digestive system	0.039*	0.009*	0.023*
Probiotic foods contain high numbers of microorganisms	0.184	0.010*	0.131
Probiotic foods help to prevent diseases	0.025*	0.070	0.101
Probiotic foods increase the risk of contracting cancers	0.739	0.165	0.991
Microorganisms in probiotic foods always retain their activity	0.213	0.102	0.167
Probiotic foods have therapeutic effects	0.176	0.622	0.063
Probiotic foods can cause diarrhea	0.440	0.000*	0.586
Probiotic foods help to prevent cancers	0.007*	0.082	0.146
Probiotic foods help to prevent the reproduction of pathogen	0.097	0.264	0.180
Probiotic foods are resistant to antibiotics	0.022*	0.082	0.825
Probiotic foods contribute to eye health	0.000*	0.211	0.700
Probiotic foods have a positive effect on skin health	0.000*	0.352	0.161
Probiotic foods help to lose weight	0.248	0.452	0.142
Probiotic foods increase the appetite	0.481	0.522	0.684
Probiotic foods are produced without fermentation	0.314	0.005*	0.403
Probiotic foods decrease the need for vitamins and minerals	0.963	0.021*	0.108
Probiotic foods are generally produced by natural methods	0.625	0.015*	0.008*
Probiotics help prevent the growth of disease-causing bacteria	0.152	0.006*	0.045*

(*) indicates that it is statistically significant at $p<0.05$.

As in many infectious diseases, individuals might be less affected by the complications of the Covid-19 through a healthy diet and thus protected against the disease (Ongan et al., 2020). In addition, when studies are evaluated in this context, gender is stressed as one of the significant factors. Findings regarding the differentiation of eating habits according to gender are displayed in Table 4. While evaluating the data, those who answered “Yes” to the statements were coded as 1, and those who answered “No” were coded as 2. Therefore, a low score on the relevant statement indicates that the participant agreed more to that statement. According to the results, female participants agreed to the statements “Do you regularly eat fresh or cooked vegetables once a day?” and “Do you eat cereals or cereals (bread) for breakfast?” more statistically significantly than male participants ($p<0.05$). Also, it was found that male participants agreed with the statement “Do you go to fast-food (hamburger, etc.) restaurants more than once a week?”, “Do you eat rice or pasta more than 5 times a week?” and “Do you consume milk and dairy products (milk, yogurt, etc.) for breakfast?” significantly more than females ($p<0.05$). A similar gender study determined that the rate of those who stated that many things would change in their lifestyles when the pandemic was over was higher in female participants than males. In addition, females and males asserted that they prepared different foods than usual during the pandemic (Akar-Sahingoz & Ozturk, 2021). Akyol & Çelik (2020) found in their study that although there was no valuable difference by gender, women made more changes in their diets than men during the pandemic. This difference might have stemmed from the high health awareness of women because they were more knowledgeable about nutrition than men (Wardle et al., 2004; Ek, 2015).

The health status of each individual in a country determines the general health structure of that society. Therefore, a healthy society is possible by protecting and improving each individual’s health because the deterioration of health is not limited to the individual but gradually affects the family, the environment, and the entire society. Individual nutritional behavior varies according to genetic characteristics, age, gender, degree of physical activity, habits (e.g., smoking, alcohol), social and environmental state, education level, stress, working conditions, etc. (Hacihasanoglu et al., 2011). Participants’ dietary habits are compared with their education levels in Table 4. It was found that participants with a Master’s or a Ph.D. degree used significantly more olive oil at home than those with

high school or lower degrees ($p<0.05$). Also, participants with high school or lower degrees consumed more ready-made pastries (e.g., bread, etc.) or cake for breakfast than those with graduate degrees ($p<0.05$). Other studies on this subject in Turkey found that individuals lacked information about adequate and balanced nutrition and that the level of knowledge was parallel to education levels. An increase in education levels results in a rise in the knowledge about healthy and balanced nutrition and a decrease in erroneous practices (Koruk & Sahin, 2005; Oran et al., 2017; Akarsu, 2018).

Nutrition is a process that is essential for the continuation of life, which is the basis of physiological needs. How to perform this action has become even more significant, particularly in the Covid-19 pandemic. For this purpose, adequate and balanced nutrition is essential to an optimal immune balance (Iddir et al., 2020). A healthy nutrition plan has been recommended by WHO and the Spanish Academy of Nutrition & Dietetics (2020) to prevent the disease or follow a milder course in the treatment process (Lana et al., 2020). Whether Covid-19 impacts eating habits is shown in Table 4. Participants with a Covid-19 history were found to use significantly more olive oil at home and consume significantly more yogurt and/or cheese per day than those with no Covid-19 history ($p<0.05$). Similarly, Akar-Sahingoz & Ozturk (2021) emphasized in their study that individuals used more food supplements than before the pandemic and that they would heed healthy nutrition in the post-pandemic. Akyol & Celik (2020) study investigating the nutritional habits of university students found that students attached more importance to their diet during the pandemic than before. Two separate studies conducted in Italy (Scarmozzino & Visioli, 2020; Sidor & Rzymski, 2020) concluded that people whose alcohol and cigarette consumption decreased during the pandemic period tried to maintain a healthy diet to protect their natural body defense systems. Additionally, Ceylan et al. (2020) determined that individuals attached importance to healthy nutrition during the Covid-19 pandemic, and the most consumed product was yogurt. It was determined that the consumption of fermented products such as pickles, probiotic products (e.g., probiotic-ready foods, supplements), and kefir increased following yogurt. Topuz (2020) recommended that probiotics in fermented milk products be consumed regularly to support immunity during the Covid-19 outbreak.

A well-balanced diet is described as the intake of essential foods most economically, without losing their nutritional value and harming health, using them in the body for growth and development, sustaining the existence, and optimally performing activities (Baysal, 2007). Individuals who make up society need to be fed in an adequate and balanced way to have a healthy, productive, and talented human potential (Mabuabum, 2015). Although dietary habits differ according to culture, similar studies emphasized age as a salient factor that has a decisive effect on research results (Chen et al., 2018; Sorensen et al., 2021). This impact was considered to result from an increase in health problems with advancing age, and thus the need for more awareness about the protection of health (Ozenoglu et al., 2018). Table 4 presents comparisons of participants' dietary habits and age. Age-wise, participants expressed different opinions on the statements about their eating habits in the survey. With the results obtained in this regard, age effects on item ratings were determined. Accordingly, those who agreed to the following statements "Do you regularly eat fresh or cooked vegetables once a day?", "Do you regularly eat fish at least 2-3 times a week?", "Do you like legumes and eat more than once a week?", "Do you use olive oil at home?" and "Do you consume 2 servings/ bowl of yogurt and/or cheese (40 g) a day?" were significantly older ($p<0.05$). Conversely, younger participants agreed significantly more with the statement "Do you go to fast-food (hamburger, etc.) restaurants more than once a week?", "Do you eat rice or pasta more than 5 times a week?", "Do you skip breakfast?", "Do you eat ready-made pastries (bread, etc.) or cake for breakfast?" and "Do you eat sweets and sweets/confectionery several times a day?" ($p<0.05$). These results suggested that older people had healthier eating habits. Factors associated with advanced age and nutritional chronic diseases are important in the severity of Covid-19 infection and course and are associated with high mortality (Kaya-Peksoy & Kaplan, 2020). For this reason, providing individuals with effective and continuous nutrition training at all education levels from an early age might also help prevent health problems that may occur at later ages.

Table 4. Scores for nutrition habits in terms of gender, education level, Covid-19 and age
Çizelge 4. Cinsiyet, eğitim düzeyi, Covid-19 ve yaşa göre beslenme alışkanlıkları skorları

Nutrition habits	Gender	Education level	Covid-19	Age
Do you eat fruit or drink juice every day?	0.762	0.868	0.261	0.156
Do you eat a second fruit every day?	0.825	0.056	0.489	0.193
Do you regularly eat fresh or cooked vegetables once a day?	0.000*	0.554	0.946	0.001*
Do you regularly eat fish at least 2-3 times a week?	0.360	0.115	0.334	0.016*
Do you go to fast-food restaurants more than once a week?	0.046*	0.064	0.695	0.000*
Do you like legumes and eat more than once a week?	0.101	0.425	0.118	0.039*
Do you eat rice or pasta more than 5 times a week?	0.009*	0.234	0.133	0.004*
Do you eat cereals or cereals (bread) for breakfast?	0.004*	0.052	0.308	0.065
Do you eat oil seeds (like nuts, peanuts) at least 2-3 times a week?	0.970	0.578	0.063	0.202
Do you use olive oil at home?	0.916	0.012*	0.024*	0.000*
Do you skip breakfast?	0.583	0.504	0.966	0.002*
Do you consume milk and dairy products for breakfast?	0.008*	0.688	0.985	0.388
Do you eat ready-made pastries (bread, etc.) or cake for breakfast?	0.127	0.033*	0.187	0.005*
Do you consume 2 servings of yogurt and/or cheese (40 g) a day?	0.480	0.233	0.004*	0.000*
Do you eat sweets and sweets/confectionery several times a day?	0.198	0.125	0.266	0.000*

(*) indicates that it is statistically significant at $p<0.05$.

In conclusion, a lifestyle called the “new normal” has been developed with government-imposed restrictions, social distance rules, and isolation applied by individuals due to the uncontrolled increase in the propagation of the Covid-19 disease. In addition, preventive medicine is of great importance in terms of economic and workforce losses compared to curative medicine in the rapidly increasing world population. For this reason, studies are carried out intensively on foods that have secondary protective effects on human health, such as probiotics. It is also known that functional food products containing probiotic microorganisms, which have been scientifically proven to prevent or reduce the risk of disease, have long been offered for consumption in the markets. Although the development of such products containing probiotic microorganisms has continued rapidly, research on the consumption of these products by society has remained very limited.

STATEMENT OF CONFLICT OF INTEREST

The authors stated that they did not have any actual, potential or perceived conflict of interest.

AUTHOR’S CONTRIBUTIONS

The authors declare that they have contributed equally to the work.

STATEMENT OF ETHICS CONSENT

This study was performed with the permission of the Ethics Committee of Baskent Social and Human Sciences and Art Research and Publication with the decision numbered E-62318886-605.99-157603 dated 08/09/2022.

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