



YEDITEPE UNIVERSITY
INSTITUTE OF HEALTH SCIENCES
DEPARTMENT OF NUTRITION AND DIETETICS

**THE EVALUATION OF KNOWLEDGE AND
CONSUMPTION STATUS ON PROBIOTIC
NUTRITIONS OF INDIVIDUALS PRACTICING
SPORTS**

MASTERS THESIS
SERİM TUNA KOÇ

İSTANBUL, 2020



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SUPERVISOR
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ONAY

Bu tez Yeditepe Üniversitesi Lisansüstü Eğitim-Öğretim ve Sınav Yönetmeliğinin ilgili maddeleri uyarınca yukarıdaki jüri tarafından uygun görülmüş ve Enstitü Yönetim Kurulu'nun 29/05/2020 tarih ve 2020/05-59 sayılı kararı ile onaylanmıştır.

Prof. Dr. Bayram YILMAZ
Sağlık Bilimleri Enstitüsü Müdürü



DECLARATION

I declare that this thesis is my own work, I have not exhibited any ethical behavior at any stage from its planning to its writing, I have obtained all information within academic and ethical rules, I have cited all information and interpretations which were not obtained through the thesis, stated these studies in the references section, and I have not displayed any violating behavior for patent and copyrights during the thesis work and its writing.

Serim Tuna KOÇ

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LIST OF SYMBOLS AND ABBREVIATIONS

CT	Chemotherapy
DH	Dendritic Cells
FAO	Food and Agricultural Organization
HDL	High Density Lipoprotein
IgA	Immunoglobulin A
IgM	Immunoglobulin M
ISAPP	International Scientific Association for Probiotics and Prebiotics
LAB	Lactic Acid Bacteria
LDL	Low Density Lipoprotein
RT	Radiotherapy
SPSS	Statistical Package for the Social Sciences
TNF- α	Tumor Necrosis Factor α
WHO	World Health Organization

ABSTRACT

Koc, S.T. (2020). "The evaluation of knowledge and consumption status on probiotic nutritions of individuals practicing sports". Yeditepe University, Institute of Health Sciences, Department of Nutrition and Dietetics. Master Thesis. İstanbul.

This research was planned and conducted in order to determine the knowledge levels and consumption status of 104 people between the ages of 18-55 who went to 2 private sports centers in Tekirdağ between February 2019 and April 2019. Volunteering was taken as basis in participating in the study. The research data were obtained with the help of a survey form whose main frame was determined in line with the information obtained from the previous researches and the literature review related to the subject (APPENDIX-1). In the first part of the questionnaire, general information and demographic status of the participants were questioned. In the second part of the questionnaire, information about the awareness of the concept of probiotic food, consumption status and causes, frequency and amount of consumption, what are the factors affecting probiotic food consumption, and which diseases contributed to the participants were obtained. In the last part of the questionnaire, the table containing the statements about the participants' predictions about probiotic foods was evaluated. 82.4% of the participants stated that they know the term probiotic. There is a significant relationship between educational status and knowing what the term probiotic is ($P < 0.05$). 79.80% of the participants stated that they consumed probiotic food, while 20.20% stated that they did not. The most common consumption reason for probiotics; It is stated to be beneficial to the digestive system with 28.8%. When the distribution of powder and capsule usage of the participants as probiotic supplements is examined; While 12.5% stated that they used it, 81.7% stated that they did not use it. When the levels of knowing the probiotic bacteria species were examined, yeasts took the first place with 49.0%. When the reasons of the participants not consuming probiotic foods are examined; While 30% stated that they did not know what it was, 18.0% stated that they did not find it natural, 16% did not need it, and 16% stated that they found it expensive, while 20.0% stated that they found it delicious. The most consumed probiotic foods are yoghurt, milk and kefir. When the purchase criteria of the participants were examined while purchasing probiotic food, the first place was stated as the ingredient content and brand. Recognition and ensuring the adequate level of consumption of probiotic foods -which have a significant role in protecting and developing health- are of great importance in terms of public health. We can say that there is an increase in the consumption of probiotics in parallel with the increase in number of studies showing the positive effects of probiotics on health.

Key words: Probiotic, Consumption, Level of Knowledge, Health

ÖZET

Koç, S.T. (2020). "Spor yapan bireylerin, probiyotik besinler hakkında bilgi ve tüketim durumlarının değerlendirilmesi". Yeditepe Üniversitesi, Sağlık Bilimleri Enstitüsü, Beslenme ve Diyetetik Anabilim Dalı, Yüksek Lisans Tezi. İstanbul.

Bu araştırma Şubat 2019 - Nisan 2019 tarihleri arasında Tekirdağ ilindeki 2 özel spor merkezine giden 18-55 yaş aralığında ki 104 kişinin, probiyotik besinler hakkındaki bilgi düzeyleri ve tüketim durumlarını saptamak amacı ile planlanıp yürütülmüştür. Çalışmaya katılmada gönüllülük esas alınmıştır. Araştırma verileri, araştırmacı tarafından daha önce yapılmış araştırmalardan ve konu ile ilgili literatür incelemesinden elde edilen bilgiler doğrultusunda ana çerçevesi belirlenen anket formu yardımıyla elde edilmiştir (EK-1). Anket formunun ilk kısmında katılımcılara ait genel bilgiler ve demografik durum sorgulanmıştır. Anketin ikinci kısmında probiyotik besin kavramının bilinilirliği, tüketim durumu ve nedenleri, tüketim sıklığı ve miktarı, probiyotik besin tüketimini etkileyen faktörlerin neler olduğu, katılımcıların hangi hastalıklarına fayda sağladığına dair bilgiler edinilmiştir. Anketin son bölümünde ise katılımcıların probiyotik besinlerle ilgili öngörülerine yönelik ifadelerin yer aldığı tablo değerlendirilmiştir. Katılımcıların %82.4'ü probiyotik terimini bildiğini ifade etmiştir. Öğrenim durumu ile probiyotik teriminin bilme durumu arasında anlamlı düzeyde ilişki bulunmaktadır ($P<0.05$). Katılımcıların %79.80'i probiyotik besin tükettiğini belirtirken, %20.20'si tüketmediğini belirtmiştir. Probiyotiklerin en yaygın tüketim nedeni; %28.8 ile sindirim sistemine faydalarının olması olarak belirtilmiştir. Katılımcıların probiyotik takviye olarak toz ve kapsül kullanma durumlarının dağılımı incelendiğinde; %12.5'i kullandığını belirtirken, %81.7'si kullanmadığını belirtmiştir. Probiyotik bakteri türlerinin bilinme düzeyleri incelendiğinde ise %49.0 ile mayalar ilk sırada yer almıştır. Katılımcıların probiyotik besinleri tüketmeme nedenleri incelendiğinde ise; %30'u ne olduğunu bilmediğini belirtirken, %18.0 doğal bulmadığını, %16'sı ihtiyaç duymadığını, %16'sı pahalı bulduğunu belirtirken yine %20.0'si lezzetsiz bulduğunu belirtmiştir. En çok tüketilen probiyotikli besinler sırasıyla; yoğurt, süt ve kefiridir. Katılımcıların probiyotik besin satın alırken satın alma kriterleri incelendiğinde ilk sırada besin madde içeriği ve marka olarak belirtilmiştir. Sağlığın korunması ve geliştirilmesinde önemli rolü olan probiyotik besinlerin tanınması ve yeterli düzeyde tüketiminin sağlanması toplum sağlığı açısından büyük önem taşımaktadır. Probiyotiklerin sağlık üzerine olumlu etkilerini gösteren çalışmaların her geçen gün artmasına paralel olarak; probiyotik tüketimi ve bilgi düzeyinde de artış olduğu görülmüştür.

Anahtar Kelimeler: Probiyotik, Tüketim, Bilinilirlik Düzeyi, Sağlık

1. INTRODUCTION AND PURPOSE

In recent years, investigation of the effects of nutrition on our health and finding answers to the questions about this issue has become an important topic throughout the world. Many health problems and diseases have been correlated with the structural deficiency of nutritional elements in our body due to inadequate and unbalanced nutrition (1). It is known that some nutrients increase the quality of health and prevent the occurrence of some of the common cancer types (2). In addition, it is considered that the regulation of the human intestinal flora with diet may lead to some improvements in health (3). Today, many people change their living conditions and eating habits in order to have a healthier life and be protected from diseases (4). In healthy individuals, the colon microbiota acts as a prophylactic by directly preventing the adhesion of pathogenic microorganisms, and indirectly by preventing the colonization of the pathogens via the production of chemically modified fatty acids. Due to this barrier effect, endogenous gastrointestinal bacteria may have the feature of preventing the inoculation and development of enteric pathogens (5). There is a state of balance in the host and intestinal microbial populations in the body, and the reasons disrupting this balance cause diseases (6). The prediction that this protection and maintenance of this balance will decrease the health problems will be replaced by positive experiences gained by positive results. The gastrointestinal tract microflora plays a key role in the health and nutrition of the host and the intestines are called as the second brain. The regulation of microflora has an important place in the probiotics and prebiotics. There are studies showing that probiotics increase the stool volume and fecal nitrogen excretion in humans and stimulate the growth of Bifidobacteria (7, 8). The benefits of probiotic consumption have been known for many years, but the main goal focuses on the prevention of the diseases such as colon cancer, diabetes, and obesity at the onset. Probiotics have an important place among these functional nutrients. The beneficial effects of probiotics in health promotion have been revealed in many studies. In contrast, the number of studies conducted to determine the probiotic consumption and knowledge level of individuals is limited. Within this scope, determination of the knowledge and consumption status of people regarding the beneficial effects of probiotics has become an important issue. This research is planned to determine the probiotic knowledge levels of adults caring about their health and going to gym, and to evaluate their consumption status.

2. LITERATURE REVIEW

2.1. Definition of Probiotics

The term “probiotic” is derived from the word (proviotika=προβιοτικά) that means “for life” in Greek (9). Despite the word “probiotic” was first used by Kollath in 1953, the first hypothesis that some bacteria may have beneficial effects was put forward by Élie Metchnikof and the scientific studies on this issue were started (10). The definition of probiotic has significantly changed since Metchnikoff until today and different explanations are suggested. Today, the definition that is made by the World Health Organization (WHO) in 2002 and amended by the International Scientific Association for Probiotics and Prebiotics (ISAPP) in 2013 is used in scientific and medical literature. This definition is as the “living organisms that, when taken in sufficient quantities, have positive effects on the health of the host” (11, 12).

Table 2.1. Evolution of the definition of probiotics within years (13) is adapted

Year	Explanation	Resource
1907	First hypothesis regarding the positive roles of bacteria	14
1953	First use of the word “probiotika” as organic and inorganic	15
1954	Definition of probiotics as the reverse of antibiotics	16
1955	Probiotic may be effective against the harmful effects of antibiotics	17
1965	Substances released by one microorganism can initiate the growth of another microorganism.	18
1971	Tissue extract that can promote microbial growth	19
1973	Composition that develops resistance against infection in the host but does not prevent the growth of microorganisms- (<i>in vitro</i>)	20
1974	Organisms and substances that contribute to the balance of the intestinal microbiota	21
1992	Living microbial nutritional supplements that have beneficial effects by improving the microbial balance of the host animal	22
1992	Mono or mixed living microorganisms that have positive effects by improving the microflora of the host when applied to animals or humans	23
1996	Living microbial culture or cultured daily products that have a benefit on the health and nutrition of the host	24
1996	Living microorganisms that have a benefit on the health by digesting a certain number	25
1999	Microbial cell preparation or component of microbial cells that have effects on the well-being status and health of the host	26
2001	Mixture containing the viable cells that can change the microflora when taken in sufficient quantity (via implantation or colonization)	27
2002	Living microorganisms that have benefits on the health of the host when taken in sufficient quantities	28
2014	Grammar correction by FAO/WHO: Living microorganisms that have benefits on the health of the host when taken in sufficient quantities	29

2.2. Microorganisms used as probiotics

Many microorganisms belonging to different genera are used as probiotics. Although the most common use belongs to the genus of *Lactobacillus* species, some fungi and yeast species except bacteria are used as probiotics. These microorganisms are shown in Table 2.2 (30, 31). Due to the sensitivity of bacteria to antibiotics, to produce toxins, to show pathogenicity, to show invasive properties, to be affected by the pH of the stomach, to have some species gain resistance to antibiotics later, and their potential to spread these resistance genes, new microorganisms are being sought as probiotics. Yeasts are the most suitable candidates for being used as a probiotic because they do not produce toxins, do not show pathogenicity (except *Cryptococcus* sp. and *Candida* sp.), they are not sensitive to antibiotics, they are resistant against the low pH of the stomach and high pH and temperature of the intestine, and they are 10 times larger than bacteria thus they can develop a better structural barrier than bacteria (32, 33).

Table 2.2. Microorganisms used as probiotics

Bacteria			Fungus	Yeast
Lactobacillus sp <i>L. bulgaricus</i> <i>L. rhamnosus</i> <i>L. cellebiosus</i> <i>L. delbrueckii</i> <i>L. lactis</i> <i>L. acidophilus</i> <i>L. reuteri</i> <i>L. brevis</i> <i>L. casei</i> <i>L. curvatus</i> <i>L. fermentum</i> <i>L. plantarum</i> <i>L. johsonli</i> <i>L. helveticus</i> <i>L. salivarius</i> <i>L. gasse</i> <i>L. sporogenes</i>	Bifidobacterium sp. <i>B. adolescentis</i> <i>B. bifidum</i> <i>B. breve</i> <i>B. infantis</i> <i>B. longum</i> <i>B. thermophilum</i> Propionibacterium sp. <i>P. shermanii</i> <i>P. freudenreichii</i> Bacteriodes sp. <i>B. capillus</i> <i>B. suis</i> <i>B. ruminicola</i> <i>B. amylophilus</i>	Pediococcus sp. <i>P. cerevisiae</i> <i>P. acidilactici</i> <i>P. pentosaceus</i> Streptococcus sp. <i>S. cremoris</i> <i>S. intermedius</i> <i>S. lactis</i> <i>S. diacetylactis</i> Bacillus sp. <i>B. subtilis</i> <i>B. pumilus</i> <i>B. lentus</i> <i>B. licheniformis</i> <i>B. coagulans</i> Leuconostoc sp. <i>L. mesenteroides</i>	Aspergillus sp. <i>A. niger</i> <i>A. oryzae</i>	Saccharomyces sp. <i>S. cerevisiae</i> <i>S. cerevisiae</i> var. <i>boulevardii</i> Candida sp. <i>C. torulopsis</i>

2.3. Characteristics of the microorganisms to be used as probiotics

Microorganisms to be used as probiotics:

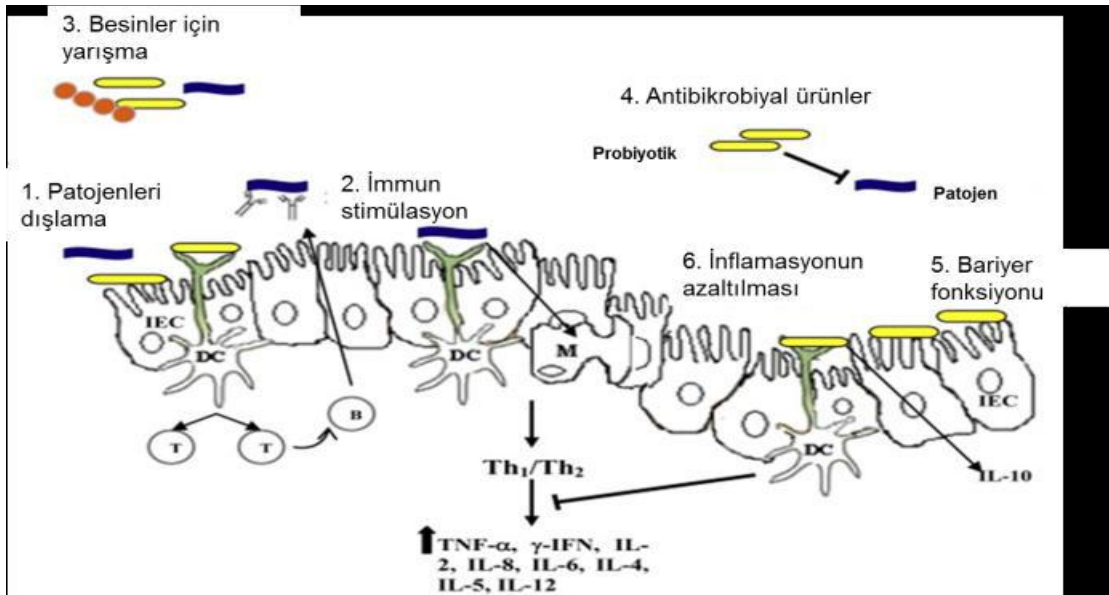
- It should be from the origin of the host to be used.
- It should be reliable and should remain stable in the gastrointestinal tract.
- It should be resistant to adverse environmental conditions such as gastric acid and bile salts.
- It should be resistant to antibiotics.
- It should be able to adhere to the intestinal epithelial cells and provide colonization.
- The host should be present in large numbers.

- It should ensure that the microflora of the digestive system is kept in balance.
- The immune system in the host should have a stimulating effect.
- It should inhibit the adherence of the pathogen bacteria,
- It should not transfer the antibacterial or antifungal resistance to pathogenic microorganisms.
- It should regulate metabolic activity.
- It should increase the degree of utilization of the consumed foods.
- It should be able to maintain the vitality and activity during the production and storage stages.
- It should not decrease the quality of the food it is added (34).

2.4. Mechanism of action of the probiotics

There are many mechanisms that try to explain how probiotics protect the host against intestinal system disorders. Possible mechanisms of action can be explained as follows:

- Inhibition of pathogen bacteria by producing antimicrobial agents,
- Blocking the adherence areas,
- Competition for nutrients,
- Destruction of toxin receptors,
- Simulation of the immune system (35).



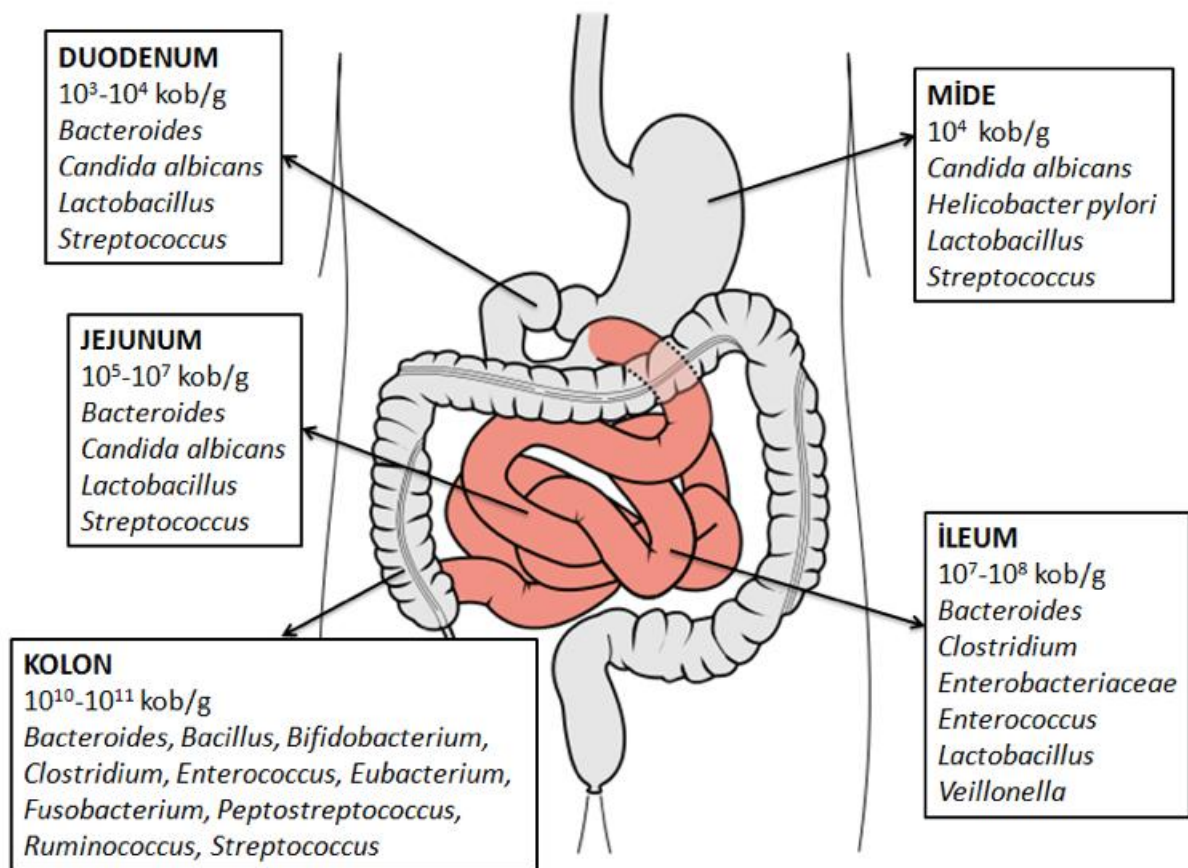
(1.Excluding pathogens, 2.Immune stimulation, 2.Competition for foods, 4.Antimicrobial products– Probiotic,Pathogen, 5.Barrier function, 6.Reducing inflammation)

Figure 2.1. Some of the mechanisms of action of the probiotics that develop beneficial responses in the host (Taken from reference no.35) The effects are mostly as follows: 1) Excluding pathogens by competing in adhesion to the epithelial cells 2) Stimulation of natural immunity, 3) Competition with pathogens for nutrients and prebiotic products, 4) Production of antibacterial agents, 5) Protection of the intestinal barrier integrity 6) Regulation of anti-inflammatory cytokines and production of pro-inflammatory cytokines inhibition. IEC: intestinal epithelial cells; DC: dendritic cells; IL: interleucin; M: intestinal M cells.

2.5. Intestinal microbial flora and its importance

Approximately 2 m² of the human body is covered with skin and 300 m² with mucosal surface. The number of bacteria living on the skin and mucosal surfaces is higher than the own cells of the person. As a result, we form a complex structure consists of approximately 10¹⁴ microorganisms and 10¹⁴ mammalian cells (36). In the intestinal system (Figure 2.2, Figure 2.3), a large number and variety of bacteria are located in the skin, urogenital system, in the mouth and nasal cavities, in short, in every part of the human body under the influence of the external environment and with favorable conditions for the survival of bacteria (37).

Microorganism communities grouped in various parts of the human body providing some benefits even without harming the organism and living with the organism are called the normal flora of the body. Microbial flora is considered in 2 groups (38).



(Duodenum, Stomach, Jejunum, Ileum, Colon)

Figure 2.2. Bacterial flora of the digestive system

1. Permanent Flora: It is a community of microorganisms that do not change, can be reformed even if they are eliminated for a short period of time, and is continuous in certain regions. Efficiencies of permanent flora are as follows:

Some of the flora members in the intestine take place in the synthesis of vitamin K and in the absorption of nutrients.

They prevent colonization of pathogenic bacteria via the "bacterial interference" mechanism on the mucosa and the skin.

They inhibit the growth of some bacteria by producing bacteriocin.

2. Temporary Flora: Besides permanent flora, it is a community of microorganisms of which most does not cause diseases, sometimes can be pathogens, and can vary from several hours to several weeks. When the members of permanent flora are eliminated, temporary flora is colonized, proliferated, and can become pathogens (39).

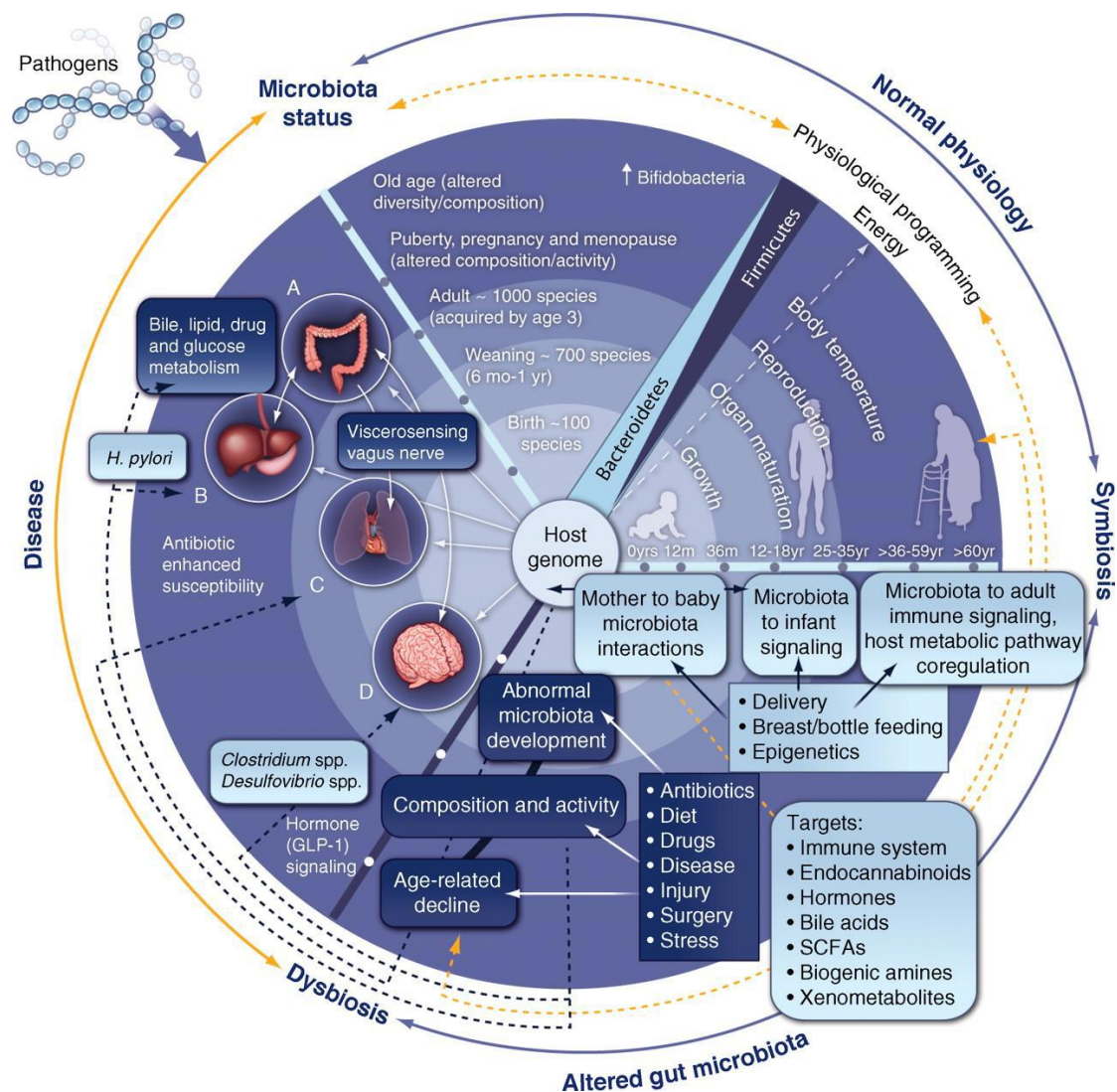


Figure 2.3. Human intestinal microbial flora

In the gastrointestinal system, as the normal flora is sterile at birth, it is acquired in the newborn period, and remains unchanged for lifetime. The source of the flora is the vaginal

and fecal flora of the mother, which is swallowed during labor. These are microorganisms that are present in people who contacts with the baby. At the 48th hour after birth, enterobacteria, staphylococci, and streptococci are present in the colon. Bifidobacteria formed on the 2nd and 5th days dominate the gait flora after the 1st week, and the number of pathogens such as *enterococcus* and *clostridium* decreases. There are many factors affecting the type and amount of bacteria that make up the flora after birth (40):

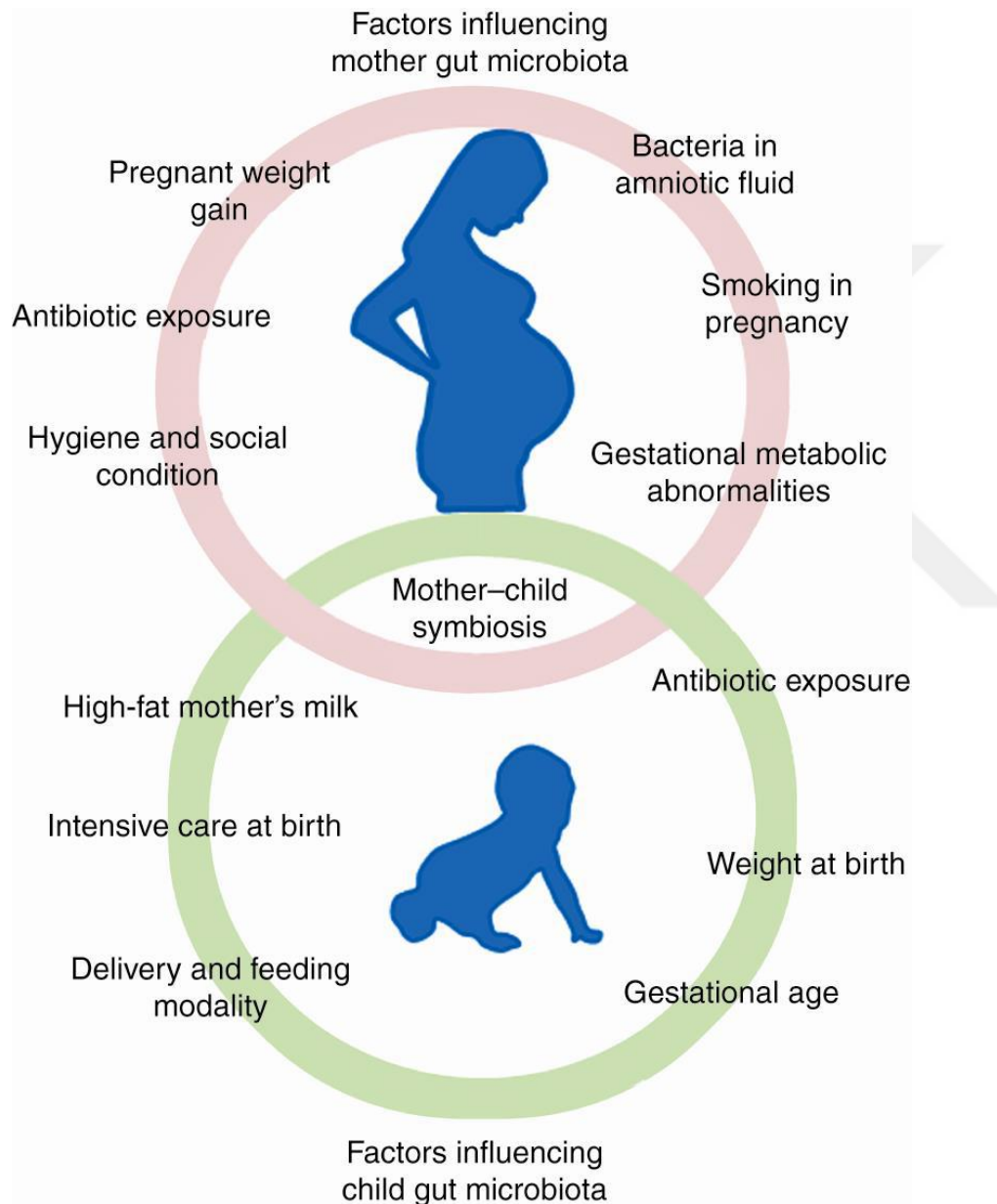


Figure 2.4. Formation of human microflora

- Nutrients taken by the mother
- Whether probiotics are taken or not
- Type of labor (vaginal or caesarean)

- Age of pregnancy
- Factors such as the nourishment of the infant (breast milk or formula) affect colonization.

Since the importance of intestinal flora in infants has been understood, formula containing probiotics and prebiotics have been produced for the nourishment of infants (Figure 2.4; 41).

2.6. Effects of probiotics on health

Medical studies conducted together with the technological development show that probiotics have direct and indirect beneficial effects for the body. The beneficial effects of probiotics proven by experimental data can be listed as follows (42).

***In the protection of intestinal epithelium**

- Increases mucus production,
- Supports the repair of epithelial cells,
- Inhibits the apoptosis of epithelial cells,
- Increases the resistance between the epithelial cells,
- Directs the epithelial glycolisation,
- It strengthens the epithelial cytoskeleton and the integrity of tight junction,
- Shows an antioxidant effect.

***In directing the immune system;**

- Increases local and total IgQ production,
- Reduces the T-cell response,
- Increase the phagocytic efficiency,
- Decreases the apoptosis of immunity cells,

***In the change of intestinal microflora;**

- Competes with the patogen and prevents its adherence to the intestinal wall,
- Increases bacteriocin production,
- Decreases the pH of the intestinal lumen by producing organic acid.

The effects of probiotics on health are shown in Table 2.3. and in Figure 2.5.

Table 2.3. Effects of probiotics on health

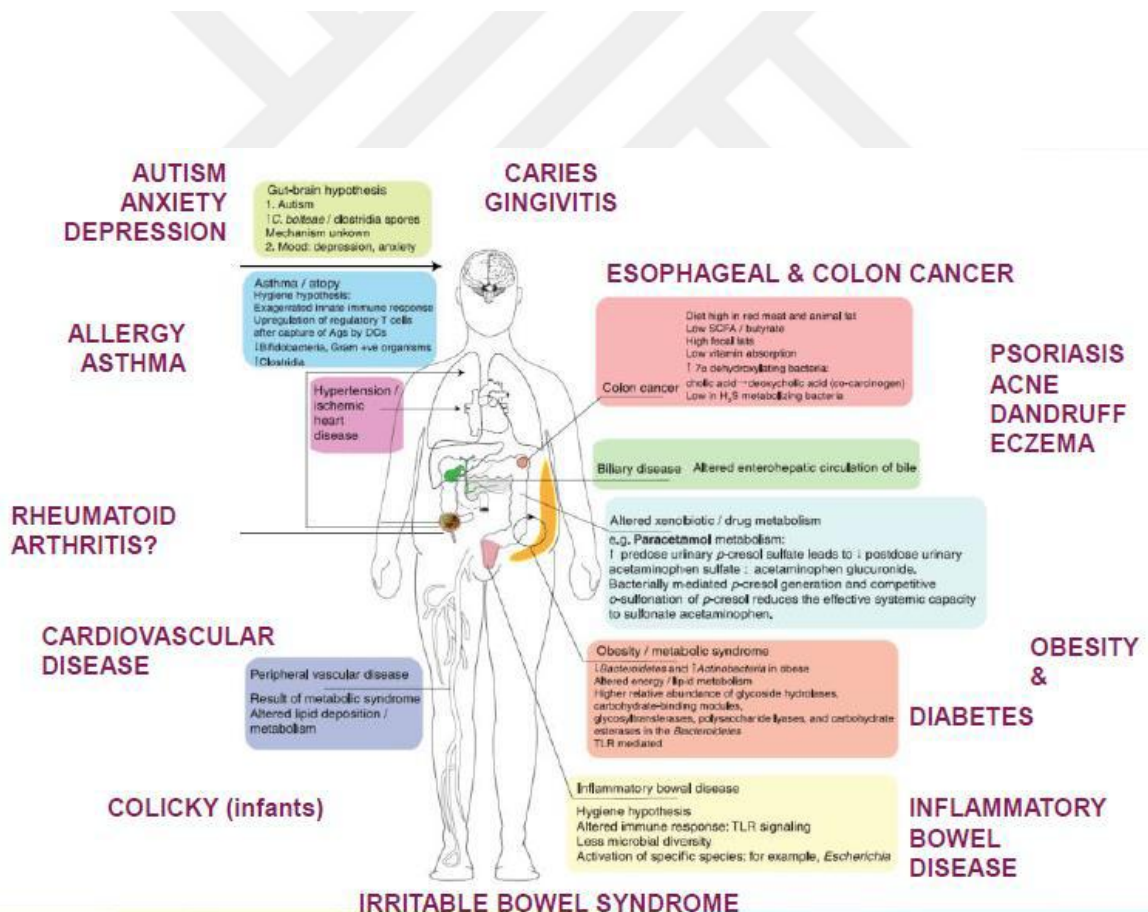
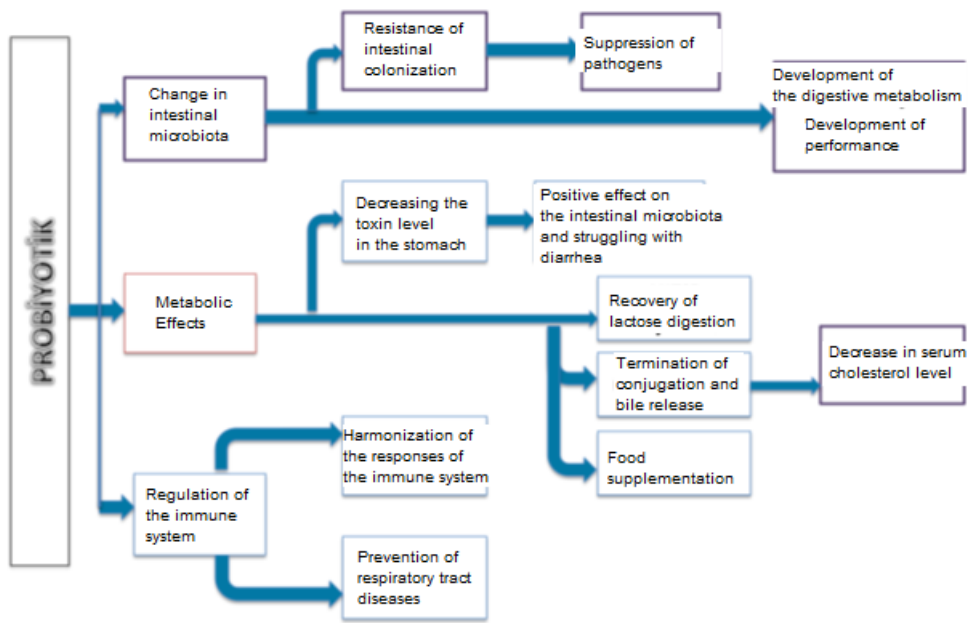


Figure 2.5. Effects of probiotics on health

2.6.1. Anti-allergic characteristics of probiotics

Allergic diseases are ever increasing in Western societies. Strict hygienic practices, elementary family structure, consumption of highly sterile foods, and providing better health services, thus less exposure to microorganisms at a young age are considered to increase allergic diseases. Allergic symptoms and findings can be controlled more quickly when formula containing *Lactobacillus rhamnosus* GG and *Bifidobacterium lactis* Bb-12 besides the standard allergy treatment are given to allergic children. Probiotics strengthen the protective mucous barrier in the intestines; thus, they inhibit the transfer of allergic substances into the blood by reducing the intestinal permeability. Milk proteins are digested by probiotic enzymes instead of trypsin and pepsin enzymes. Thus, they do not stimulate cytokin synthesis from the mononuclear cells. Probiotics decrease the alpha 1-antitrypsin and tumor-necrosing factor levels and suppress the inflammation in the intestine. Probiotics increase the mucosa immunity by increasing the secretory IgA antibody formation. Probiotics are successfully used in the prophylaxis (protection) and treatment of cow's milk allergy, atopic eczema, and other allergic diseases (43).

2.6.2. Lactose Intolerance

Lactose intolerance, in other words, the inability to digest lactose, is more common especially in Africa and Asia, and it is caused by the decrease of the lactase enzyme as a result of advanced age, digestive system diseases, or the degradation in the intestinal mucosa caused by antibiotic use (44). In the patients with lactose intolerance, the osmotic balance is degraded due to the lactose remained as undigested and thus fluid and electrolyte accumulation occur in the intestine, and the hydrogen, methane and carbon dioxide gases are released as a result of the fermentation of lactose by the bacteria in the flora. The essential symptoms of lactose intolerance are excessive gas, flatulence, nausea, and diarrhea. It is suggested that bacterial lactase is released and metabolized lactose as a result of the breakdown of probiotic bacteria under the action of bile salts in the small intestine (44, 45). In addition, it is also detected that the consumption of products containing probiotic lactobacilli has reduced the activity of fecal bacterial enzymes such as beta-glucoronidase, nitroreductase, and azonitroreductase (46). Clinical preparations of bifidobacterium and other probiotic bacteria have been shown to be decreased or eliminated in the patients with long-term administration of the said bacteria to the patients with lactose intolerance (47).

2.6.3. Use of probiotics in the infection of *Helicobacter pylori*

H. pylori is a gram-negative pathogen causing gastritis, ulcer, and gastric cancer. The effect of probiotics on *H. pylori* infections is investigated in various *in vivo* and *in vitro* studies. It is determined under *in vitro* conditions that *Lb. salivarius* has inhibited the colonization of *H. pylori* and stimulated the secretion of IL-8. Also, it is observed that *Lb. salivarius* has been shown to reduce *H. pylori* colonization in mice infected with *H. pylori* (48). In a study investigating the effects of *Lb. acidophilus* (LB) together with standard triple therapy on *H. pylori* positive patients, a significant decrease in disease was detected in the probiotic group (88%) compared to the placebo group (72%) according to urea breath test results. (49, 50). In another study, milk containing *L. casei* Shirota was tested to determine the inhibitory effect of probiotics on the development of *H. pylori* (51). It was found that urease activity decreased by 64% in the individuals, who took a probiotic drink, when compared to the control group (33%). In the study performed by giving yoghurt containing probiotic *Lactobacillus* and *Bifidobacterium* strains to the *H. pylori* positive patients, who received triple antibiotic therapy, the probiotic group was found to be more successful in the treatment of infection than the group receiving triple therapy (78-91%) (52).

2.6.4. Effect of probiotics on high cholesterol

Despite cholesterol is an essential constituent for all the body tissues, the high level of cholesterol in the blood is one of the most important risk factors for coronary heart disease. Diet, exercise, and drug therapy take place among the latest treatment methods in order to lower the cholesterol levels in the blood. It is possible to effectively reduce the high cholesterol levels with the drugs used in the treatment. However, these drugs have some side effects besides being expensive. In recent years, there have been new approaches for lowering high cholesterol levels in the blood. Among such applications, the use of probiotic bacteria also has an important place. To date, numerous *in vitro* and *in vivo* studies have been conducted on this matter, and it is shown that probiotic products containing *specific Lactobacillus* or *Bifidobacterium* species have reduced the high cholesterol levels in the blood. It has been proven that the presence of bile salts have the ability to assimilate cholesterol (53). Some clinical studies have proven that probiotics have shown a lowering effect on the blood serum levels in lowering the serum cholesterol levels. Cholesterol, synthesized in the body or taken from outside, turns into bile acids. Some of the probiotic species, ex. *L. acidophilus*, have the feature to conjugate such bile acids. Conjugated bile acids are absorbed more easily than the lipids. Thus, a decrease in the serum cholesterol levels occurs. In a study conducted on this matter, it was observed that the serum cholesterol level

decreased by 32% when *L. sporogenes* was given to hyperlipidemic patients for 3 months (54, 55).

2.6.5. Effects of probiotics on oral health

Probiotics can form a biofilm in the oral cavity as a protective layer for the oral tissues against oral diseases. This biofilm does not permit the bacterial pathogens get closer to the oral tissues (56). They compete against the growth of karyogenic bacteria and periodontal pathogens (57). Probiotic bacteria can secrete various antimicrobial agents such as organic acid, hydrogen peroxide, carbon peroxide, diacetyl, bacteriocin, and adhesion inhibitors (58, 59). Their ability to adhere to the surfaces within the mouth is important for the long-term probiotic effects of bacteria. The adherence model of different probiotic strains to oral epithelial cells and hydroxyapatite has been tested in a study and it has been shown that lactobacillus can adhere to hydroxyapatite (60). The ability of *Lactobacillus* species to combine has been reported to create an opportunity for them to prevent the colonization of other pathogenic bacteria (61, 62). Harmful substances created by *Lactobacillus* species threaten the life of such bacteria. Haukioja et al. shown that *Lactobacillus* species and *Bifidobacterium lactis* Bb12 affected the saliva combination and thus, inhibited the *Streptococcus mutans* adherence *in vitro* (63, 64). *Weissella cibaria* (gram-positive facultative anaerobic lactic acid bacteria isolated from humans) is present in fermented foods and it is a potential probiotic agent. These bacterial species have the capacity to combine with *Fusobacterium nucleatum* and adhere to epithelial cells. These properties provide to have *W. cibaria* colonized in the oral cavity and also prevents the reproduction of pathogenic bacteria (65). However, Yli-Knuutila et al. (66) reported that *L. rhamnosus* is temporarily colonized in the oral cavity and that appropriate consumption of probiotics will be required for its long-term beneficial effects. While the prevalence of bacterial resistance to antibiotics, the opinion of applying probiotic therapy for oral health has emerged. Dental caries, periodontal diseases, *Candida albicans* infections, and halitosis are oral diseases targeted in probiotic treatment (67, 68).

2.6.6. Effects of probiotics on cancer

Cancer and its treatment take place among the most important health problems of the people living at developed countries. For example, it is believed that approximately 25% of the US population will experience a diagnosis of any cancer once in their lifetime. One million new cancer patients are diagnosed worldwide every year. Less than 25% of these patients can be treated with surgery and/or radiotherapy (RT) alone. Chemotherapy (CT) is

applied to most of the remaining patients at any stage of the disease. However, despite all these developments, cancer is still the second most common cause of death after the diseases of the cardiovascular system (69).

Besides the physical disorders of cancer, it is a difficult disease to fight together with its social, material, and spiritual aspects. The burden of the cancer disease increases every passing day. According to the 2016 data of the WHO, in case cancer that got 14 million people and caused 8.2 million deaths continues in a similar course, emergence of 22 million new cases are expected in 2030 (70). When the statistics for the cause of death are analyzed in our country, cancer accounts for approximately 20% of all deaths in 2016. It has caused the death of 80.577 people between 2015 and 2016. According to the 2016 data of Turkey Statistical Institute, cancer has continued to take place on the 2nd rank after the circulatory system diseases among the causes of death (71). In addition to many positive effects of probiotics on health, it has cancer preventing, tumor suppressing, and treating effects. In the researches in which the probiotic-cancer interactions are examined; the findings obtained have shown that the anti-cancer effects of probiotics have caused by the strengthening of the immune response of the host, degradation of the structures of potential carcinogen compounds, qualitative and/or quantitative changes in intestinal flora, production of antimutagenic and anticarcinogenic compounds in the colon, modification in the metabolic activities such as the prevention of the conversion of precarcinogens into carcinogens in the intestinal microflora, prevention or delay of the toxin absorption, change in the physiochemical conditions such as the strengthened intestinal prevention mechanisms, and the positive effects on the host physiology (72).

It has been shown that yoghurt, which is used as a common source of probiotics, may have anti-carcinogenic (cancer-treating) effects. Another probiotic, kefir, prevents the formation of tumor or reduces the progression of the existing one (43). Breast cancer is the most common type of cancer seen in women. Use of fermented milk products such as yoghurt and kefir reduces breast cancer. Colon cancer is on the second or third rank among the most common tumors in developed countries. Most of the experimental and epidemiological studies show that probiotics play an important role in preventing colon cancer (43).

Probiotics

- Detoxify the carcinogens taken.
- Change the content of the intestine. Thus, they will both cause carcinogenic compounds and decrease the number of bacteria and their metabolic activity.
- Produce the metabolic products such as butyrate.

- Produce compounds that will inhibit the development of tumor cells.
- Stimulate the immune system against the proliferation of cancer cells (73).

2.6.7. Effects of probiotics on the immune system

The positive effects of probiotics on the immune system have been known for many years. There are numerous studies regarding the LABs activating the immune system. In the studies of Marteau et al. (74), they explained the effects of probiotics on the modulation of the immune system on humans. The changes are in the form of increased levels of monocyte and granulocyte and antibody secreting cells and phagocytic activity (75). The native microflora affects the structure, function of the host mucosa, and development of the entire immune system. The protective microflora prevents the pathogens from competitively adhering for the substrates and adherences, and it simultaneously produces antibacterial agents. Ensuring the early colonization of the intestine with living microorganisms increases the number of immune and epithelial cells. Probiotic microorganisms positively affect the composition of the intestinal microflora, stimulate secreted IgA production, and increase IFN- γ production. LABs eliminate the damage in the intestinal microenvironment, and also stimulate the local and systemic immune responses, and ensure the integrity of the intestinal wall (76).

Numerical and functional increase in the immune system cells adversely affect the tumor growth. IgA has an anti-inflammatory function and direct cytotoxic effects on the tumor cells. Thus, it is an important component of the immune system. Immunoglobulin A (IgA) on mucosal surfaces is an important component of specific immunity against the invasion of pathogenic microorganisms. Animal studies have revealed that some of the probiotic strains, such as lactobacilli, produce antigen-specific IgA responses on the mucosal surfaces. Probiotic therapy in humans has been shown to increase both serum and fecal IgA levels (77). *L. casei* YIT-0003 promotes specific antibody production against *Pseudomonas* antigens by increasing the immunoglobulin M (IgM) antibodies when administered as a subcutaneous vaccine. Thus, immune system becomes active. LAB may cause the formation of cytokine by two possible ways. Cytokines can be released from T lymphocytes after the antigen delivery after the confrontation with a foreign antigen. In the second case, cytokine production may occur as a result of direct interaction between LAB and the immunocompetent cells. Peptidoglycan bacterial cell wall stimulates the monocytes and provides the release of IL-1, IL-6, and Tumor Necrosis Factor α (TNF- α), which are the cytokines of the immune system (78).

Dendritic cells (DH), that are other members of the immune system, are the cells playing a central role in the regulation of the immune response, which can be modified by probiotics. It is known that DHs are responsible for the activity of NK cells. It has been shown by the animal trials that NK cells are also anti-tumor effective cells. For this reason, it is thought that DHs are modified with probiotics and subsequently become mediator cells in the direction of tumor suppression by activating NK cells (79).

The major tissue compatibility complex (MHC) delivers the antigens to the T cells, activates them, and causes a T cell-mediated immune response. They stimulate the T helper lymphocytes, activate macrophages, and adjust the immunogenicity of the vaccines. IL-1 stimulates the proliferation of T and B cells and IL-6 stimulates the differentiation of B cell into plasma cells. TNF- α has a cytotoxic effect on the tumor cells. It has been shown that it is possible to improve the NK activity with the use of *L. casei* Shirota and this activity is observed in parallel with IL-12 production (80). These studies suggest that probiotics may play an important role in increasing immunity of NK cells, thereby help the prevention of the development of malignant tumors.

According to Perdigon et al. (81), yoghurt consumption reduces the inflammatory immune response. Inflammatory immune response emerges after the anti-tumor activity. In the study, the effects of yoghurt consumption on tumor growth induced by DMH (1,2-dimethylhydrazine) in mice were investigated. It was determined that yoghurt consumption suppressed the inflammatory immune response in CD4+T lymphocytes and IgA-secreting cells. Accordingly, it was observed that there was a significant reduction in the tumour formation (34). In another study of Perdigon et al. (81), they found that there was a decrease in the inflammatory immune response and tumor growth in Balb-C mice fed with yoghurt. In CD8+T cells, it has also been shown that the increase caused by DMH suppression has suppressed and leukocyte count has increased (79). In another study, the immune modulatory effects of *L. acidophilus* are assessed. It is reported that after *L. acidophilus*, isolated from traditional home-made yoghurt and newborn gaits, is given to mice together with cyclophosphamid for 15 days, there is a significant increase in the IFN- γ , IL-4 and TGF- β production and lymphocytes in the animals treated with *L. acidophilus* (82). In another study conducted recently, the effect of the consumption of yoghurt consisting of *Lactobacillus paracasei* ssp. *paracasei*, *Bifidobacterium animalis* ssp. *lactis* and heat-processed *L. plantarum* on the immune function. A randomized, open-label, placebo-controlled study was planned on 200 non-diabetic subjects. Over a period of twelve weeks, the test group

consumed yoghurt containing probiotic, while the placebo group consumed milk every day. NK cell activity, IL -12 and IgG1 levels increased significantly than the startup group. In addition, the serum NK cell activity and IFN and IgG1 levels of the test group were significantly higher than the placebo group. As a result, daily yoghurt containing *L. paracasei*, *B. lactis* and heat-processed *L. plantarum* improved immune function by increasing NK cell function and IFN concentration (83).

Numerous studies emphasizing the effect of probiotics as inflammation and tumor inhibitors in the treatment or prevention of CRC have been conducted. As an example, genetic of *Lactococcus lactis* LL-mIL10 strain is modified to produce IL-10 that is an anti-inflammatory cytokine. It was determined that this strain reduced the inflammation by 50% as a result of providing dextrane sulphate sodium molecule to mice with colitis via gavage (81). Transforming growth factor beta (TGF- β), that is another genetically modified cytokine, has been shown to inhibit epithelial growth and promote apoptosis using the *E. coli* BM2710/pGB2Oinv-hly strain. Close monitorization of the timing of such type of treatment is required; however, once the tumor is formed, TGF-B tumor suppressive effects are reduced, thus tumor progression can accelerate via metastasis and increased invasion (83).

2.6.8. Effects of probiotics on obesity

It has been initially demonstrated by the animal studies that the bacteria in our intestines may have a correlation with the body composition. In obese mice which are genetically obese, it was determined that the compartment balance in the intestinal microbial system was degraded by decreasing the amount of *Bacteroidetes* and increasing the amount of *Firmicutes* when compared to the mice in the control group. Since both obese and weak animals are fed with a diet that is rich in the same polysaccharide, it is stated that this difference can be explained by the presence of obesity rather than feeding. In addition, a decrease in *Bifidobacteria* occurs in obese animals (84). In the studies conducted in obese humans, similar to animal studies, it is determined that bacterial diversity has decreased, and also a decrease in *Bacteroidetes* and an increase in *Firmicutes* have emerged (85-87). In studies conducted in obese children, microbial changes that are similar to the ones in adults are detected (88, 89). The emerged pathological findings return to their original state when the weight returns to normal (6, 27, 31). Although *Bifidobacteria* is not a dominant bacterial population in the human intestinal ecosystem, a decrease in the amount of *Bifidobacteria* is considered to be the most important modification in obese microflora, and it is stated that the bacterial population that should be targeted in the treatment is *Bifidobacteria* (90).

The idea that prebiotics and probiotics can be used in the treatment of obesity has emerged due to the fact that there are modifications in the intestinal flora in obese people, and many experimental and clinical studies have been conducted to investigate the effect of prebiotics and probiotic-efficient bacteria (especially *Lactobacilli* and *Bifidobacteria*) on body weight loss in recent years. It has been shown that intestinal permeability and metabolic endotoxemia have reduced in the studies conducted on mice fed with prebiotics and a fatty diet (90-91). In addition, a decrease in adiposity and insulin resistance was detected by giving prebiotic in obese animals. In a limited number of human studies, it was determined that after prebiotics were administered in different times (3-4 months), feeling of saturation increased, weight loss (varied between 1-15 kg) and body mass index decreased, and insulin and LDL-cholesterol levels reduced (92). In the studies investigating the efficiency of probiotics in the treatment of obesity, different species of bacteria (usually *Lactobacillus* and *Bifidobacter* strains) or their different combinations were used at different times and doses. In animal studies, it is observed that adipocyte cell size and body fat amount decreased via the use of *Lactobacilli* and *Bifidobacteria* (93). Also, when the VSL#3 (mixture of eight probiotic bacteria [*B. longum*, *B. infantis*, *B. breve*, *L. acidophilus*, *L. casei*, *L. bulgaricus*, *L. plantarum*, *Streptococcus thermophilus*] combination was given to mice, it was shown that nuclear factor kappa B (NF κ B) expression, that played an important role in the development of insulin resistance and that was activated as a result of excess fatty diet, was suppressed (94). Different types of probiotics have been used at different doses and at varying times (6-8 weeks) in human studies. In the present study, although there was no significant improvement in the anthropometric parameters, different levels of improvement were observed in the components of metabolic syndrome such as lipid profile and insulin resistance (95). Some of the studies indicate that longer periods of use may be effective on reducing the body mass index due to short probiotic usage times. In general, the findings obtained from various studies showed that probiotic use had shown effect via different mechanisms (decreasing mucosal permeability and endotoxemia, decreasing the tumor necrosis factor alpha level, increasing Fiaf expression, decreasing leptin and increasing adiponectin, increasing insulin susceptibility, decreasing oxidative stress, stimulating thermogenesis in the fatty tissue by increasing the sympathetic system activity and by increasing lipolysis, providing the production of conjugated linoleic acid from the linoleic acid) (96). There are also some studies regarding the use of probiotics in early childhood. Luoto et al. found that the administration of *Lactobacillus rhamnosus* to the mothers in the last month of pregnancy and to the infants after birth for 6 months prevented excessive weight gain in the first 10 years

(97). However, in order for this data to be applicable to the whole population, it should be supported by other studies.



3. MATERIAL AND METHOD

This research was planned to determine the level of knowledge and consumption status regarding probiotic nutrients of male and female individuals who went to a private gym.

3.1. Research Method and Sampling

The research was planned and conducted to determine the knowledge level and consumption status regarding probiotic nutrients of 104 people between the ages of 18 and 55, who went to 2 private sports centers in Tekirdağ between February 2019 and April 2019. Contribution to the study is based on voluntariness.

3.2. Obtaining the Research Data

The research data were obtained by the help of the questionnaire form of which the main framework was determined in accordance with the information obtained from the previous researches and the literature review related to the subject (APPENDIX-1). In the first part of the questionnaire, general information and demographic status of the participants were examined. Height and weight values were recorded via verbal notification. The second part of the questionnaire includes information about the status of recognizing the concept of probiotic food, the status of consuming it and its reasons as well as its consumption frequency and amount, the factors influencing the consumption of probiotic food, and diseases of the participants they were good for. In the last part of the questionnaire, the Figure containing the expressions about the predictions of the participants regarding probiotic foods was evaluated.

3.3. Data Assessment

SPSS 20.0 data analysis program was used for statistical analyses and statistical analyses were performed regarding the evaluation of the results of the research. While evaluating the data, descriptive statistical methods (frequency) and chi-square test were used to compare the qualitative data. Significance was assessed at $p < 0.05$ level.

3.4. Limitations of the Study

The research had some limitations. The fact that the sample covered by the research consisted of male and female individuals between the ages of 18-55 who went to private gyms in Tekirdağ province created a limitation in terms of generalizability of the research results.

4. RESULTS

When the gender distribution of the participants was examined, it was seen that 51.9% of them were male and 48.1% of them were female. According to the age groups, 44.11% of the participants were in 18-25 age group, 24.50% in 26-30 age group, 11.53% in 31-40 age group, 15.68% in 41-50 age group, and 5.88% were over 50 years old. It was seen that 11.5% of the participants were high school and below, 78.5% from high school and upper (Table 4.4).

Table 4.4. Gender, age and educational status of the participants

		n	%
Gender	Male	54	51.9
	Female	50	48.1
	Total	104	100.0
		n	%
Age range	18-25	45	44.11
	26-30	25	24.50
	31-40	12	11.53
	41-50	16	15.68
	>50	6	5.88
	Total	104	100.0
		n	%
Educational status	High school and below	12	11.5
	High school and upper	92	78.5
	Total	104	100.0

When Table 4.5 is examined, 47.6% of male and 52.4% of female specified that they knew the term “probiotic food”, while 77.8% of male and 22.2% of female did not know. There was a significant relationship between gender and the knowledge about the term “probiotic” ($P < 0.02$).

Table 4.5. Information about probiotics

	Male		Female		Total		χ^2	P
	n	%	n	%	n	%		
Knows	40	47.6	44	52.4	84	82.4	5.4112	0.02
Do not know	14	77.8	4	22.2	18	17.6		
No answer	0	0	2	0.02	2	0.02		

Table 4.6. Relationship between whether to know the term probiotic and the level of education

Educational status		Knows	Do not know	Total	χ^2	P
High school and below	n	6	6	12	17.79	0.05
	%	50	50	100.0		
High school and upper	n	78	12	90		
	%	86.66	13.33	100.0		
Total	n	84	18	102		
	%	82.4	17.6	100.0		

In Table 6, when the answers given to the question regarding whether the participant in the study knew the term “probiotic” before or not within the framework of the education level, it was determined that the level of knowledge about the probiotics increased in parallel with the educational status. There was a significant relationship between gender and the educational status about the term “probiotic” ($P < 0.05$).

Table 4.7. Where did you hear the term probiotic?

	n	%
Specialist (Doctor or dietitian)	35	33.65
Advice of friends, relatives, family etc.	28	26.92
Advertisements	32	30.76
Pharmacy and points of sales	4	4.80
Internet	4	4.80

In Table 4.7, the participants were asked to hear about the term of probiotic from which information source and 33.65% stated that it was specialist (doctor, dietitian), 26.92% recommendation of friend, acquaintance, family etc., 30.76% advertisements, 4.80% pharmacy and points of sales, and 4.80% internet.

Table 4.8. Probiotic food consumption and reasons for consumption

		n	%
Status of probiotic food consumption	Consuming	83	79.80
	Not consuming	21	20.20
	Total	104	100
		n	%
Reasons for probiotic food consumption*	Beneficial for intestinal health	91	29.8
	I think it protects against cancer	44	14.4
	I find it delicious	31	10.2
	It strengthens the immune system	73	23.9
	Beneficial for oral health	28	9.2
	Effect of advertisements	22	7.2
	Effect of friends	16	5.2
Total		305	100

*Since more than one answer can be selected, the total is more than 100%.

When the probiotic food consumption levels of the participants were analyzed, 79.80% specified that they consumed probiotic foods and 20.20% that they did not consume probiotic foods. When the reasons for consuming probiotic food are examined, the rate of those who find it beneficial for intestinal health was 29.8%, the rate of those who think it is protective against cancer was 14.4%, and the rate of those who find it delicious was 10.2%. The rate of those who think that probiotics strengthen the immune system was 23.9%, the rate of those who find it beneficial for oral health was 9.2%, the rate of those who stated that the effects of the advertisements on the consumption of probiotics was 7.2%, and the rate of those whose friends specified that it has an effect on the use of probiotics was 5.2% (Table 4.8).

Table 4.9. If you are consuming probiotic foods, do you read the packaging labels?

	Male		Female		Total		χ^2	P
	n	%	n	%	n	%		
Yes	28	47.9	33	54.1	61	82.4	0.932 ^a	0.334
No	18	56.7	13	43.3	31	17.6		
No answer	2	0.02	0	0	2	0.02		
Total	48		46		104	100.0		

In Table 4.9, the participants were asked whether or not they read package label of probiotic food, 58.7% of them gave “yes” answer to the question, 28.8% said “no” and 2 people did not answer this question. No significant correlation was found between the answers given to the question “Do you read the packaging labels of probiotic foods” (P >0.334).

Table 4.10. Do you use powder or capsules as a probiotic supplement?

		Yes	No	Total	χ^2	P
Male	n	4	50	54	2.717	0.099
	%	7.40	92.59	100.0		
Female	n	10	40	50		
	%	20.0	80.0	100.0		
Total	n	14	90	104		
	%	13.46	86.54	100.0		

When the distribution of powder and capsule use of the participants as probiotic supplements was examined, 12.5% stated that they use them, while 81.7% stated that they did not. Of the participants, 7.8% of male and 19.1% of female answered as yes. No significant correlation was found between gender and the use of powder or capsules as a probiotic supplement (Table 4.10; $P > 0.099$).

Table 4.11. Do you know which microorganisms are present in probiotic supplements?

		n	%
Do you know which microorganisms are present in probiotic supplements?	Yes	16	15.4
	No	47	45.2
	No answer	1	1.0
	Total	64	61.5

The question of “Do you know which microorganisms are present in the probiotic supplement” stated that 15.4% of the participants knew, while 45.2% stated that they did not know (Table 4.11).

Table 4.12. Which of the following take place among the microorganisms used in probiotics?

Microorganisms	Male		Female		Total	
	n	%	n	%	n	%
<i>Lactobacillus</i> species	17	54.8	14	45.2	31	29.80
<i>Bifidobacterium</i> species	16	57.1	12	42.9	28	26.92
<i>Streptococcus</i> species	12	66.7	6	33.3	18	17.30
Yeast	26	51.0	25	49.0	51	49.00
Molds	11	61.1	7	38.9	18	17.30
None	2	40.0	3	60.0	5	4.80

When the knowledge level of probiotic bacteria species was examined, *Lactobacillus* species were known by 29.80%, *Bifidobacterium* species by 26.92%, and *Streptococcus* species by 17.30%. The rate of recognizing yeasts was 49.0% and the rate of molds was 17.30%. The rate of those who do not recognize any of them was 4.80%.

Table 4.13. Do you have any idea about the shelf life of probiotic foods?

		Yes	No	Total	χ^2	P
Male	n	24	30	54	1.158	0.282
	%	44.44	55.56	100.0		
Female	n	27	23	50		
	%	54.0	46.0	100.0		
Total	n	51	53	104		
	%	48.5	51.5%	100.0		

Table 4.13 states that 48.5% of the participants had an idea about the shelf life of probiotic foods, while 51.0% reported that they had no idea. It was found that there was no significant correlation between gender and the shelf life of probiotic foods ($P > 0.282$).

Table 4.14. Where do you store the probiotic foods?

		n	%
Where do you store the probiotic foods?	Refrigerator	80	76.9
	Consume at once	9	8.7
	Room temperature	4	3.8
	No answer	11	10.6
	Total	104	100.0

In Table 4.14, 76.9% of the participants answered the question “where do you store the probiotic foods?” as in the refrigerator, 8.7% as consume at once, and 3.8% as at room temperature.

Table 4.15. Reasons for not consuming probiotic foods

	Male		Female		Total	
	n	%	n	%	n	%
I don't know what it is	10	66.7	5	33.5	15	30
I do not find it natural	2	22.2	7	77.8	9	18
I find it expensive	4	50.0	4	50.0	8	16
I do not need	3	37.5	5	62.5	8	16
I do not find it delicious	4	40.0	6	60.0	10	20

In Table 4.15, when the reasons for why the participants do not consume probiotic nutrients are examined, 30% of the participants stated that they did not know what it was, while 18.0% stated that they did not find it natural, 16% did not need it, and 16% stated that

they found it expensive, while 20.0% said it was not delicious. It was specified that 66.7% of male and 33.5% of female stated that they did not consume these products because they did not know what it was.

In Table 4.16, the correlation between the reasons of the participants who not consume probiotic foods and their educational status was evaluated. Among the reasons why the participants did not consume, the answer that they did not know the protibic foods was on the first rank with the rate of 29.41%.

Table 4.16. Relationship between educational status and reasons for not consuming probiotic foods (n=51)

Educational status	I don't know what it is	I do not find it natural	I find it expensive	I do not need	I do not find it delicious
High school and below	3 %5.88	0 %0.0	0 %0.0	0 %0.0	1 %1.6
High school and upper	12 %23.52	9 %17.64	8 %15.88	8 %15.68	9 %17.64
Total	15 %29.41	9 %17.64	8 %15.68	8 %15.68	10 %19.60

Of the participants answered the question “Do you recommend probiotic food consumption to your friends?”, 87.5% said yes, however 6.7% said no. This question was not answered by 5.8% of the participants (Table 4.17).

Table 4.17. Do you recommend probiotic food consumption to your friends?

	n	%
Yes	91	87.5
No	7	6.7
No answer	6	5.8
Total	104	100.0

Table 4.18. What do you think the consumption of probiotic food help reducing which one of your following complaints?

Subject of the complaint*	Was beneficial		Was not beneficial	
	n	%	n	%
Constipation	63	28.4	5	22.7
Diarrhea	29	13.1	14	63.6
Tympanites	57	25.7	3	13.6
Allergy	10	4.5		
Intestinal disease	38	17.1		
High cholesterol level	3	1.4		
Stomach ulcer complaints	15	6.8		
Complaints regarding tension	5	2.3		
Other (.....) please specify.	2	0.9		
	222	100.0	22	100

*Since more than one answer can be selected, the total is more than 100%.

When examining the distribution of complaints which probiotic food were thought to be good for in those consuming such food, it was found that it was good for constipation at 28.4%, diarrhea at 13.1%, flatulence and swelling at 25.7%, and allergy at 4.5%. It has been stated that it is beneficial for intestinal diseases at a rate of 17.1%, high cholesterol at a rate of 1.4%, gastric ulcer at a rate of 6.8%, blood pressure at a rate of 2.3%, and other diseases at a rate of 0.9% (Table 4.18).

Table 4.19. How long have you been consuming probiotic foods?

	n	%
Days	3	2.9
Weeks	4	3.8
Month	7	6.7
Year	63	60.58
Never consumed	27	25.96
Total	104	100.0

The answers given to the question “how long have you been consuming probiotic foods” stated that 2.9% of the participants used them for days, 3.8% for weeks, 6.7% for months, and 60.6% for years. It was specified that 25.96% of the participants did not consume them at all (Table 4.19).

Table 4.20. How often do you consume the following probiotic dairy products?

		n	%			n	%
Yoghurt	Once every day	46	44.2	Milk	Once every day	28	27.45
	2-3 times every day	17	16.3		2-3 times every day	11	10.78
	Once every week	13	12.5		Once every week	16	15.69
	2-3 times a week	19	18.3		2-3 times a week	16	15.69
	15 günde1	1	1.0		Once every 15 days	6	5.88
	Once every month	3	2.9		Once every month	0	0
	Do not consume	5	4.80		Do not consume	25	24.51
Total		104	100.0	Total		102	100.0
		n	%			n	%
Kefir	Once every day	7	6.7	Kumiss	Once every day		
	2-3 times every day	3	2.9		2-3 times every day		
	Once every week	8	7.7		Once every week		
	2-3 times a week	10	9.6		2-3 times a week		
	15 günde1	8	7.7		15 günde1		
	Once every month	13	12.5		Once every month	1	1.0
	Do not consume	55	52.88		Do not consume	103	99.03
Total		104	100.0	Total		104	100.0

When examining the frequency of probiotic food consumption in Table 4.20, it was found that the rate of those consuming yoghurt once a day was 44.2%, the rate of those it 2-3 times a day was 16.3%, the rate of those consuming it once a week was 12.5%, the rate of those consuming it 2-3 times a week was 18.3%, the rate of those consuming it once every 15 days was 1%, the rate of those consuming it once a month was 2.9%, and the rate of those stating not to consume it was 4.80%.

When examining the frequency of probiotic food consumption in Table 4.20, it was found that the rate of those consuming milk once a day was 26.9%, the rate of those it 2-3 times a day was 10.57%, the rate of those consuming it once a week was 17.30%, the rate of those consuming it 2-3 times a week was 15.4%, the rate of those consuming it once every 15 days was 5.8%, the rate of those consuming it once a month was 24.0%, and the rate of those stating not to consume it was 1.9%.

When examining the frequency of probiotic food consumption in Table 4.20, it was found that the rate of those consuming kefir once a day was 6.7%, the rate of those it 2-3 times a day was 2.9%, the rate of those consuming it once a week was 7.7%, the rate of those consuming it 2-3 times a week was 9.6%, the rate of those consuming it once every 15 days was 7.7%, the rate of those consuming it once a month was 12.5%, and the rate of those stating not to consume it was 52.88%.

When the consumption frequency of probiotic food is examined in Table 4.20, the rate of those who consume kumiss once a month is 1.0% and the rate of those who state that they do not consume is 99.03%.

Table 4.21. How much probiotic products do you consume at a time?

Amount	n	%
1/2 water glass	22	21.15
1 water glass	65	62.50
More	14	13.46
No answer	3	2.88
Total	104	100.0

Regarding the question “how much probiotic products do you consume at a time?”, 21.15% of the participants stated that they consumed 1/2 water glass, 62.50% of them consumed more than 1 water glass, and 13.46% left this question unanswered (Table 4.21).

Table 4. 22. What is the criterion or criteria that you pay attention while receiving probiotic foods?

	Male		Female		Total	
	n	%	n	%	n	%
Price	11	61.1	7	38.9	18	11.6
Brand	29	59.2	20	40.8	49	31.6
Food label	16	55.2	13	44.8	29	18.7
Content of the food substance	28	49.1	29	50.9	57	36.8
Appearance	1	50.0	1	50.0	2	1.3

When the purchase criteria of the participants for probiotics were examined, price was effective at a rate of 11.6%, the brand at a rate of 31.6%, the food label at a rate of 18.7%, the nutrient content at a rate of 36.8%, and the appearance at a rate of 1.3% (Table 4.22).

Table 4.23. Have you taken a nutritional class?

	n	%
Yes	37	35.57
No	66	63.46
No answer	1	0.96
Total	104	100.0

While 35.57% of participants answered yes to the question of whether they took a nutritional course, 63.46% said no, and 1 person did not answer this question (Table 4.23).

Table 4.24. Answer the statements below by marking only one of the options “I strongly agree”, “I agree”, “I don't know”, “I disagree”, or “I strongly disagree”.

	Strongly Agree	Agree	Do not know	Disagree	Strongly disagree
Probiotics contain live microorganisms that are beneficial for one's health when taken in sufficient quantities.	55 (52.9%)	32 (30.8%)	17 (16.3)		
Probiotic foods help to lose weight.	16 (15.4%)	42 (40.4%)	36 (34.6%)	10 (9.6%)	
Probiotic foods affect the mental health of people in a positive way.	19 (18.3%)	38 (36.5%)	42 (40.4%)	5 (4.8%)	
Probiotic foods help to prevent cancer.	16 (15.4%)	43 (41.3%)	43 (41.3%)	1 (1%)	1 (1%)
Probiotics help to decrease cholesterol.	12 (11.5%)	40 (38.5%)	51 (49.0%)	1 (1%)	
Microorganisms in probiotic foods always remain as living.	13 (12.5%)	30 (28.8%)	45 (43.3%)	11 (10.6%)	5 (4.8%)
Adequate use of probiotics contributes to the regulation of the digestive system.	46 (44.2%)	37 (35.6%)	20 (19.2%)	1 (1%)	
Probiotic foods strengthen the immune system.	43 (41.3%)	39 (37.5%)	34 (32.7%)	3 (2.9%)	
Probiotic foods contain high number of microorganisms.	28 (26.9%)	39 (37.5%)	37 (32.7%)	3 (2.9%)	
Probiotic foods help to prevent the development of pathogenic microorganisms.	25 (24.0%)	39 (37.5%)	32 (30.8%)	8 (7.7%)	
Probiotics have positive effects on various allergic diseases.	12 (11.5%)	20 (19.2%)	66 (63.5%)	5 (4.8%)	
Probiotics have therapeutic effects on diarrhea.	20 (19.2%)	36 (34.6%)	46 (44.2%)	2 (1.9%)	
Probiotics are effective in the prevention of infections that develop after surgery.	11 (10.6%)	19 (18.3%)	68 (65.4%)	6 (5.8%)	
Probiotics have an anti-hypertensive effect.	10 (9.6%)	21 (20.2%)	65 (62.5%)	8 (7.7%)	
Probiotics are effective in regulating the intestinal microflora.	44 (42.3%)	38 (36.5%)	19 (18.3%)	2 (1.9%)	1 (1.0%)
Probiotic foods are generally obtained by natural techniques.	16 (15.4%)	44 (42.3%)	34 (32.7%)	9 (8.7%)	1 (1.0%)
Probiotic foods may cause diarrhea.	2 (1.9%)	18 (17.3%)	56 (53.8%)	25 (24.0%)	3 (2.9%)
Probiotic foods are appetizing.	1 (1.0%)	20 (19.2%)	49 (47.1%)	32 (30.8%)	2 (1.9%)
Probiotic foods reduce the need for vitamins and minerals.	6 (5.8%)	16 (15.4%)	53 (51.0%)	23 (22.1%)	6 (5.8%)
Home-fermented yoghurt and kefir help to regulate the digestive system.	37 (35.6%)	36 (34.6%)	26 (25.0%)	5 (4.8%)	
Natural probiotics are more effective than commercial probiotics.	27 (26.0%)	32 (30.8%)	37 (35.6%)	8 (8.7%)	
Probiotic foods should not be used without an expert advice.	9 (8.7%)	17 (16.3%)	34 (32.7%)	38 (36.5%)	5 (4.8%)

Considering the predictions of the participants in Table 4.24, regarding the expression “Probiotics contain live microorganisms that are beneficial for one's health when taken in sufficient quantities”, the rate of the participants given the answer “strongly agree” is 52.9%,

given the answer “agree” is 30.8%, and the ratio of those who answered as “do not know” is 16.3%.

Regarding the expression “Probiotic foods help to lose weight”, the rate of the participants given the answer “strongly agree” is 15.4%, given the answer “agree” is 40.4%, and the ratio of those who answered as “do not know” is 34.6%. The rate of the participants who answered as “disagree” is 9.6%.

Regarding the expression “Probiotic foods affect the mental health of people in a positive way”, the rate of the participants given the answer “strongly agree” is 18.3%, given the answer “agree” is 36.5%, and the ratio of those who answered as “do not know” is 40.4%. The rate of the participants who answered as “disagree” is 4.8%.

Regarding the expression “Probiotics help to decrease cholesterol”, the rate of the participants given the answer “strongly agree” is 11.5%, given the answer “agree” is 38.5%, and the ratio of those who answered as “do not know” is 49.0%. The rate of the participants who answered as “disagree” is 1.0%.

Regarding the expression “Microorganisms in probiotic foods always remain as living”, the rate of the participants given the answer “strongly agree” is 12.5%, given the answer “agree” is 28.8%, and the ratio of those who answered as “do not know” is 43.3%. While the rate of the participants who answered as “disagree” is 10.6%, the rate of the ones answered as “strongly disagree” is 4.8%.

Regarding the expression “Adequate use of probiotics contributes to the regulation of the digestive system”, the rate of the participants given the answer “strongly agree” is 44.2%, given the answer “agree” is 35.6%, and the ratio of those who answered as “do not know” is 19.2%. The rate of the participants who answered as “disagree” is 1.0%.

Regarding the expression “Probiotic foods strengthen the immune system”, the rate of the participants given the answer “strongly agree” is 41.3%, given the answer “agree” is 37.5%, and the ratio of those who answered as “do not know” is 37.7%. The rate of the participants who answered as “disagree” is 2.9%.

Regarding the expression “Probiotic foods contain high number of microorganisms”, the rate of the participants given the answer “strongly agree” is 26.9%, given the answer “agree” is 37.5%, and the ratio of those who answered as “do not know” is 32.7%. The rate of the participants who answered as “disagree” is 2.9%.

Regarding the expression “Probiotic foods help to prevent the development of pathogenic microorganisms”, the rate of the participants given the answer “strongly agree” is

24.0%, given the answer “agree” is 37.5%, and the ratio of those who answered as “do not know” is 30.8%. The rate of the participants who answered as “disagree” is 7.7%.

Regarding the expression “Probiotics have positive effects on various allergic diseases”, the rate of the participants given the answer “strongly agree” is 11.5%, given the answer “agree” is 19.2%, and the ratio of those who answered as “do not know” is 3.5%. The rate of the participants who answered as “disagree” is 4.8%.

Regarding the expression “Probiotics have therapeutic effects on diarrhea”, the rate of the participants given the answer “strongly agree” is 19.2%, given the answer “agree” is 34.6%, and the ratio of those who answered as “do not know” is 44.2%. The rate of the participants who answered as “disagree” is 1.9%.

Regarding the expression “Probiotics are effective in the prevention of infections that develop after surgery”, the rate of the participants given the answer “strongly agree” is 10.6%, given the answer “agree” is 18.3%, and the ratio of those who answered as “do not know” is 65.4%. The rate of the participants who answered as “disagree” is 5.8%.

Regarding the expression “Probiotics have an anti-hypertensive effect”, the rate of the participants given the answer “strongly agree” is 9.6%, given the answer “agree” is 20.2%, and the ratio of those who answered as “do not know” is 62.5%. The rate of the participants who answered as “disagree” is 7.7%.

Regarding the expression “Probiotics are effective in regulating the intestinal microflora”, the rate of the participants given the answer “strongly agree” is 42.3%, given the answer “agree” is 36.5%, and the ratio of those who answered as “do not know” is 18.3%. While the rate of the participants who answered as “disagree” is 1.9%, the rate of the ones answered as “strongly disagree” is 1.0%.

Regarding the expression “Probiotic foods are generally obtained by natural techniques”, the rate of the participants given the answer “strongly agree” is 15.4%, given the answer “agree” is 42.3%, and the ratio of those who answered as “do not know” is 32.7%. While the rate of the participants who answered as “disagree” is 8.7%, the rate of the ones answered as “strongly disagree” is 1.0%.

Regarding the expression “Probiotic foods may cause diarrhea”, the rate of the participants given the answer “strongly agree” is 1.9%, given the answer “agree” is 17.3%, and the ratio of those who answered as “do not know” is 53.8%. While the rate of the participants who answered as “disagree” is 24.0%, the rate of the ones answered as “strongly disagree” is 2.9%.

Regarding the expression “Probiotic foods are appetizing”, the rate of the participants given the answer “strongly agree” is 1.0%, given the answer “agree” is 19.2%, and the ratio of those who answered as “do not know” is 47.1%. While the rate of the participants who answered as “disagree” is 30.8%, the rate of the ones answered as “strongly disagree” is 1.9%.

Regarding the expression “Probiotic foods reduce the need for vitamins and minerals”, the rate of the participants given the answer “strongly agree” is 5.8%, given the answer “agree” is 15.4%, and the ratio of those who answered as “do not know” is 51.0%. While the rate of the participants who answered as “disagree” is 22.1%, the rate of the ones answered as “strongly disagree” is 5.8%.

Regarding the expression “Home-fermented yoghurt and kefir help to regulate the digestive system”, the rate of the participants given the answer “strongly agree” is 35.6%, given the answer “agree” is 34.6%, and the ratio of those who answered as “do not know” is 25.0%. The rate of the participants who answered as “disagree” is 4.8%.

Regarding the expression “Natural probiotics are more effective than commercial probiotics”, the rate of the participants given the answer “strongly agree” is 26.0%, given the answer “agree” is 30.8%, and the ratio of those who answered as “do not know” is 35.6%. The rate of the participants who answered as “disagree” is 8.7%.

Regarding the expression “Probiotic foods should not be used without an expert advice”, the rate of the participants given the answer “strongly agree” is 87%, given the answer “agree” is 16.3%, and the ratio of those who answered as “do not know” is 32.7%. While the rate of the participants who answered as “disagree” is 36.5%, the rate of the ones answered as “strongly disagree” is 4.8%.

5. DISCUSSION

Probiotics is a food group with an increasing consumption rate due to its positive effects on gastrointestinal system and immune system and its significance in the protection of human health. However, according to the data obtained as a result of this public questionnaire, it has been determined that the use of probiotics is still not sufficient. In a study to evaluate the knowledge level and consumption status of women about probiotic foods, it was concluded that 64.2% of female knew the term probiotic and 35.8% did not know (98). In a study of Dokur et al. (99) conducted on 496 students at Faculty of Medicine of Marmara University regarding measuring the knowledge level about probiotics; while 83.7% of the students stated that they heard the term probiotic before, 49.6% reported that they did not know about the content of the probiotics. In the study, 47.6% of male and 52.4% of female specified that they knew the term “probiotic food”, while 77.8% of male and 22.2% of female did not know. When the same question was evaluated within the framework of the educational status, it was found that the level of knowledge of the individuals about probiotics increased in parallel with the increase in educational level. In a similar study conducted on this matter, it was reported that the knowledge of the term “probiotics” of the people with a post-graduate degree constitutes a higher average score when compared to the other educational groups (100). In the study of Agathou and Beales (101), it was found that the use of probiotic is more common in individuals continuing their education after the age of 18. Yücecan et al. (102) conducted a study on 450 individuals in Ankara, Istanbul and Samsun in order to determine the causes of consumption of the individuals consuming probiotics and prebiotic dairy products, and to evaluate their effects on their health. According to the results of the research, it has been shown that milk products containing probiotics and prebiotics are preferred by individuals with higher education levels (high school: 36.7%, university graduate 38.9%). Similar results were achieved in the present study. It was found that the level of knowledge of the individuals about probiotics increased in parallel with the increase in educational level. There was a significant relationship between gender and the educational status about the term “probiotic” ($P < 0.05$).

In a study conducted by Yurttaş and Yılmaz (103) to determine knowledge and consumption status of health school students concerning probiotic products, it was found that among information sources of the participants knowing the concept of probiotic, school was 35.5%, taking place on the top, which was followed by television (27.6%). In the study conducted by Balkış (104) with the aim of determining the nutritional habits, probiotic milk

products consumption frequencies, and the information of high school students, among the sources where probiotic foods were heard, advertisements were specified by 30.8% of the female students and friend, relative, family etc. by 43.8% of the male students. In the study, in the first rank of the sources from where the term probiotics is heard, the answer “expert” (doctor, dietitian) was given by 33.65%, “advertisement” by 30.76%, and “advice of friends, relatives, family etc.” by 26.92% (Table 4.4). In other studies, on probiotic food consumption, it is seen that the advertisements have a great effect in the first rank. Other reasons for consumption is specified as health problems, advice of an expert or friends, and other reasons (104, 105, 106, 107).

When the reasons for why the participants do not consume probiotic nutrients are examined, 30% stated that they did not know what it was, while 18.0% stated that they did not find it natural, 16% did not need it, and 16% stated that they found it expensive, while 20.0% said it was not delicious. It was specified that 66.7% of male and 33.5% of female stated that they did not consume these products because they did not know what it was (Table 4.12). In the studies conducted on this matter, the first reason for not consuming probiotics is not knowing what it is. In the study arranged by Yabancı and Şimşek (105) on the university students in order to determine the status of probiotic food consumption, concerning the reasons for not consuming probiotic products by the students, it was found that they did not consume them because of not knowing and 19.5% did not find these products natural. In another study conducted by Balkış (104), it was concluded that 31.5% of female students and 41.3% of male students did not consume probiotic foods because they did not know what a probiotic food is. A similar result was obtained when the correlation between the educational status and the reasons for not consuming probiotic foods was evaluated. Among the reasons why the participants did not consume, the answer that they did not know the probiotic foods was on the first rank with the rate of 29.41%.

In a study conducted by Balkış (104) with the purpose of determining the nutritional habits, probiotic dairy consumption rates, and knowledge of high school students, it was found that 64.3% of those who consumed probiotics recommended such foods to their surrounding while 35.7% did not. In the study conducted by Yabancı and Şimşek (105), it was found that 75.6% of students using probiotic products recommended these products to their surrounding while 24.4% did not. In the present study, similar results to previous studies were found. Of the participants answered the question “Do you recommend probiotic food consumption to your surrounding?”, 87.5% said yes, however 6.7% said no (Table 4.14).

In a study conducted by Derin and Keskin (107), 80% of the participants answered yes to the question “did you benefit from the probiotic product you consume?”, and 70.2% stated that they benefited from probiotics. When the status of benefiting from such food among those consuming such food in the present study, it was determined that the rate of “yes” answer was 79.80%.

In the study, when the reasons for consuming probiotic food of the participants were examined, the rate of those who find it beneficial for digestive system was 29.8%, the rate of those who think it is protective against cancer was 14.4%, and the rate of those who find it delicious was 10.2%. The rate of those who think that probiotics strengthen the immune system was 23.9%, the rate of those who find it beneficial for oral health was 9.2%, the rate of those who stated that the effects of the advertisements on the consumption of probiotics was 7.2%, and the rate of those whose friends specified that it has an effect on the use of probiotics was 5.2% (Table 4.5). In the research of Aydın et al. (2010), 47.6% of the students stated that probiotic products benefit the regulation of gastrointestinal system. In a study conducted to monitor and measure the changes in knowledge levels of consumers about functional food products in USA in 2007, it was determined that 80.0% of Americans used these products for heart health, 77.0% for whole health, 76.0 for physical energy and endurance, 71.0% for immune system, 70.0% for the feeling of fullness, and 65.0% for reducing the development risk of certain diseases (108). In the study, when the reasons for consuming probiotic food of the participants were examined, the rate of those who find it beneficial for intestinal health was 29.8%, the rate of those who think it is protective against cancer was 14.4%, and the rate of those who find it delicious was 10.2%. The rate of those who think that probiotics strengthen the immune system was 23.9%, the rate of those who find it beneficial for oral health was 9.2%, the rate of those who stated that the effects of the advertisements on the consumption of probiotics was 7.2%, and the rate of those whose friends specified that it has an effect on the use of probiotics was 5.2% (Table 4.5).

When Table 6 is examined, the participants were asked whether they read the package labels of the probiotic foods and 58.7% stated as yes, while 28.8% said no, and 2 people did not answer this question. No significant correlation was found between the answers given to the question “Do you read the packaging labels of probiotic foods” ($P > 0.334$). In a study conducted by Balkış (104), it was found that 67.3% of female and 59.4% of male the read package labels of probiotic products. The percentage of those who did not read the labels was 32.7% for female and 40.6% for male. In the research conducted by Yabancı and Şimşek

(105), it was determined that 61.6% of the students consuming probiotic food read the package labels of such products and 48.6% of male and 70.6% of female read the package labels of the probiotic products consumed.

In the current study, the leading criteria for purchasing probiotic food is the content of the food substance by 36.8%. It was determined that 31.6% of the participants paid attention to the brand while purchasing probiotic foods (Table 4.19). In the study, when the distribution of powder and capsule use of the participants as probiotic supplements was examined, 12.5% stated that they use them, while 81.7% stated that they did not. Of the participants, 7.8% of male and 19.1% of female answered as yes. It has been observed that the majority of those who consume probiotics benefit from the probiotic foods, not the supplements. The rate of those who use probiotic supplements know the probiotic microorganism species inside the supplement was 15.4% (Table 4.8). No significant correlation was found between gender and the use of powder or capsules as a probiotic supplement ($P > 0.099$). In a similar study conducted on this matter, it was determined that the leading criteria considered by the participants while purchasing probiotic foods was the content of the food substance with the rate of 72.8% and the second criteria is the brand with the rate of 46%. In the same study, the rate of knowing the type of probiotic microorganism in the supplement by the participants using probiotic supplements was found to be 57.1% (98).

In the study conducted by Zeren to determine knowledge levels and consumption status of 117 bank employees in the age range of 18-50 years about probiotic food, it was determined that concerning the status of recognizing probiotic bacteria species, the participants recognized mostly yeast (65.9%) and they recognized mold at the rate of 47.6%. In a similar study conducted by Öztürk (98), among the known probiotic bacterial species, the answer “yeast” was taken with a rate of 62.1%, and “molds” with a rate of 37.4%. Among the known probiotic bacterial species in the study, after the leading answer “yeast” was taken with the rate of 33.8% and then the answer “*Lactobacillus* species” with a rate of 20.5% (Table 4.9).

In the present study, the highest consumed product in the study is yoghurt with the rate of 44.2%. While milk takes the second rank among the consumed products, kumiss is at the last rank with a rate of 1% (Table 4.7). In similar studies conducted, it has been stated that the most consumed product as probiotic is yoghurt with a rate of 46.10% (110, 111). In a research of Mortaş et al. (112), stated that 34.80% of students consumed yoghurt, 78% did not

consume kefir, 74.16% of the students, who did not consume kefir, did not consume because they did not know what kefir was.

In a study conducted on the nutritional frequency of the probiotics, it was found that probiotic foods were frequently consumed once a day (104). In another study, when the consuming habits of the students consuming probiotic foods were examined, it was reported that 39.2% of female consumed once a day and 28.6% of male consumed rarely (103). In the current study, it was found that the participants consumed yoghurt once a day with a rate of 44.2%. The probiotic-supplemented milk consumption rate of the participants was determined as once a day with the rate of 26.9%. Kefir consumption was found to be once a month with a rate of 12.5% at most (Table 4.7). In the study conducted by Sevilmiş (113), it was determined that the frequency of consuming functional products was 14.8% of the participants every day, 29.5% of them twice a week, and 19.7% of them once a week. In general, it was determined that 64% of functional food consumers consumed functional products at least once a week.

In Table 4.20, it was asked to the participants whether they took a nutritional course and 35.57% of participants answered yes to the question, 63.46% said no, and 1 person did not answer this question. In a study conducted on this matter, when nutritional course was given to the students, it was determined that there were positive changes in the nutrients consumed in 72.8% of them (109).

6. CONCLUSION

Today, unhealthy nutrition is increasing every passing day and thus, it shortens the life cycle, and decreases the quality of life. In the medical field, it is thought that dietitians and nutritionists should raise the awareness of the people regarding the probiotic products that can be recommended to all age groups due to their therapeutic effects as well as their protective effects.

Although the studies showing the positive effects of probiotics on health are increasing day by day, the rate of those consuming probiotics is found to be 20.20%. Although most of the participants in the study are graduated from university, even post-graduate and doctorate programs, 30% have stated that they do not know what it is. In this sense, it is important to raise awareness of the public in this regard, and even to teach the public at a young age in the language they will understand about the awareness of healthy nutrition by introducing nutritional lessons at kindergarten and primary school levels.

Scientific terms are used on the product packagings of probiotic foods. However, it will be useful to provide information about the health problems on the label of the product in order to develop a connection between the content and health in the minds of the consumers. It will be useful to provide information about health problems on the label of the product.

The probiotic consumption rate is found to be high in the people with a high education level. Individuals with lower education levels can be trained on the benefits of probiotics, and it can be aimed to increase the consumption rates by knowing the probiotics in general.

As a result, consumers should be informed about the probiotic products and they should also be notified in a way that everyone can understand and use them. Labels should be prepared in such a way that functional information rather than the microorganism names is provided.

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8. APPENDICES

8.1. Ethical Approval



Sayı : 37068608-6100-15- 1736
Konu: Klinik Araştırmalar
Etik kurul Başvurusu hk.

19/09/2019

İlgili Makama (Serim Tuna Koç)

Yeditepe Üniversitesi Sağlık Bilimleri Beslenme ve Diyetetik Bölümü Yar. Doç. Dr. Hülya Demir'in sorumlu araştırmacı olduğu "**18-55 Yaş Spor Salonuna Giden Kadın Ve Erkek Bireylerin Probiyotik Besinler Hakkında Bilgi Düzeyi Ve Tüketim Durumlarının Değerlendirilmesi**" isimli araştırma projesine ait Klinik Araştırmalar Etik Kurulu (KAEK) Başvuru Dosyası (1717) kayıt Numaralı KAEK Başvuru Dosyası), Yeditepe Üniversitesi Klinik Araştırmalar Etik Kurulu tarafından **18.09.2019** tarihli toplantıda incelenmiştir.

Kurul tarafından yapılan inceleme sonucu, yukarıdaki isimi belirtilen çalışmanın yapılmasının etik ve bilimsel açıdan uygun olduğuna karar verilmiştir (**KAEK Karar No: 1083**).

Prof. Dr. Turgay ÇELİK

Yeditepe Üniversitesi
Klinik Araştırmalar Etik Kurulu Başkanı

No: 37068608-6100-15-1736

Concern: About the ethical committee application of clinical researches

To whom it may concern (Serim Tuna Koç)

The Clinical Researches Ethical Committee (CREC) Application File (CREC Application File with registration no. 1717) regarding the research project titled “**Evaluation of the level of knowledge and consumption status of female and male individuals between 18 and 55 years old going to the gym, about probiotic foods**” for which Assoc. Prof. Dr. Hülya Demir, Department of Nutrition and Dietetics, Institute of Health Sciences, Yeditepe University is the principal researcher, is examined at the meeting on **18.09.2019** by Yeditepe University Clinical Researches Ethical Committee.

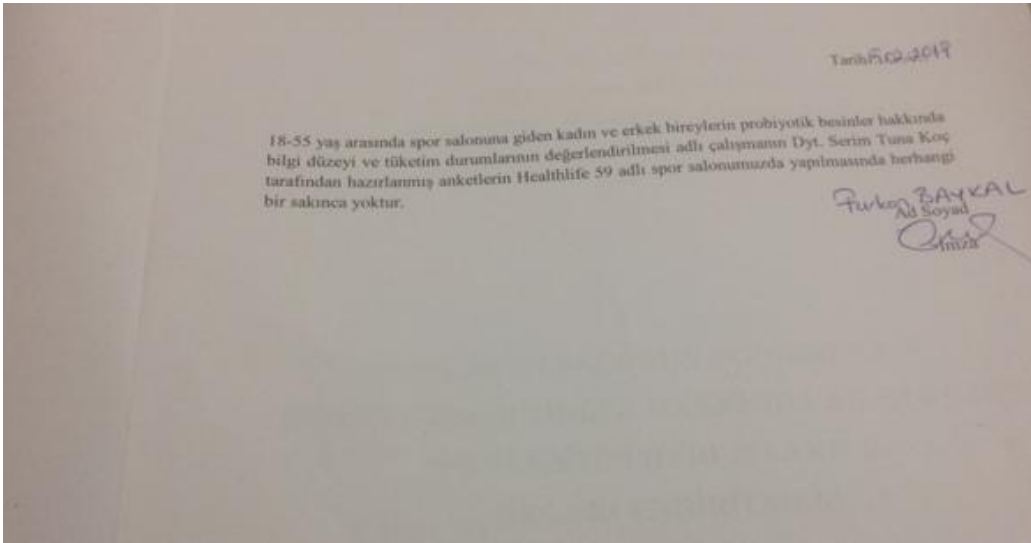
As a result of the examination conducted by the committee, it is decided that the study with the above-mentioned title is suitable in ethical and scientific terms. (CREC Decision No: 1083).

Prof. Dr. Turgay ÇELİK

Yeditepe University

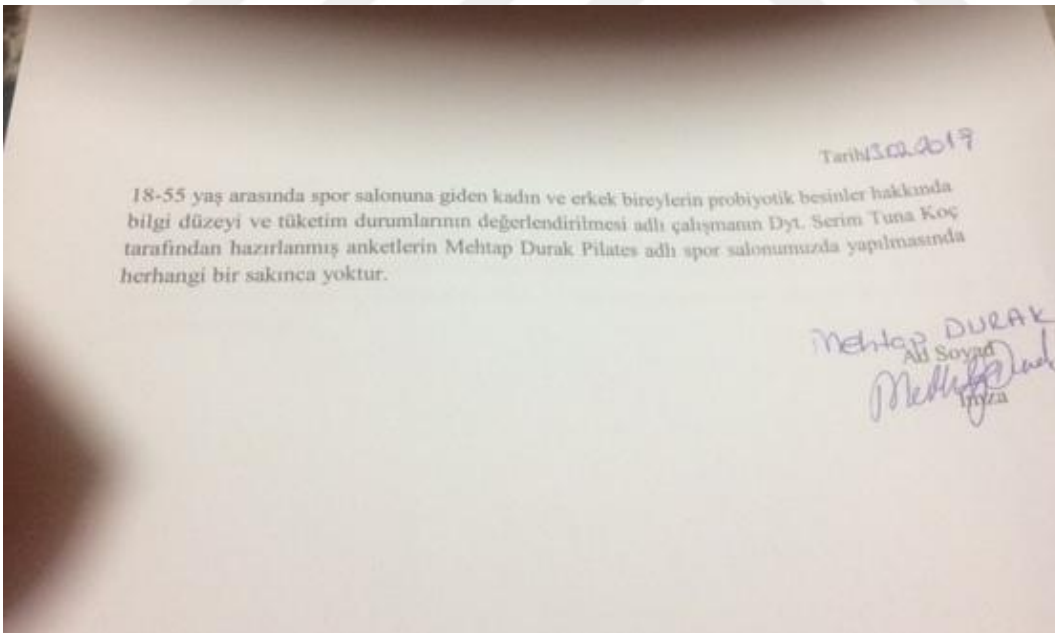
Chairman of the Clinical Researches Ethical Committee

8.2. Informed Consent Form



(There is no objection for the execution of the questionnaires prepared by Dietitian Serim Tuna KOÇ regarding the study “Evaluation of the level of knowledge and consumption status of female and male individuals between 18 and 55 years old going to the gym, about probiotic foods” at our gym, Healthlife 59.

Furkan BAYKAL
Signature)



(There is no objection for the execution of the questionnaires prepared by Dietitian Serim Tuna KOÇ regarding the study “Evaluation of the level of knowledge and consumption status of female and male individuals between 18 and 55 years old going to the gym, about probiotic foods” at our gym, Mehtap Durak Pilates.

Mehtap Durak
Signature)

8.3. Survey

Date of questionnaire:/...../.....

- 1) Height (cm): Weight (kg):
- 2) Age:
- 3) Educational status: A) Primary/secondary school B) High school C) University D) Post-graduate E). Other.....
- 4) Do you know what probiotic is? A) Yes B) No
- 5) If yes, where did you hear the term probiotic? Please mark (X)

A) Specialist (Doctor or dietitian)	
B) Advice of friends, relatives, family etc.	
C) Advertisements	
D) Health problems	
E) Pharmacy and points of sales	
F) Internet	
G) Other (please specify)	

- 6) Do you consume probiotic foods?
A) Yes B) No
- 7) If yes, do you read the package labels of the probiotic foods?
A) Yes B) No
- 8) Do you use powder or capsules as a probiotic supplement?
A) Yes B) No
- 9) If yes, do you know which microorganisms are present in probiotic supplements?
A) Yes B) No
- 10) Which of the following take place among the microorganisms used in probiotics?

A) <i>Lactobacillus</i> species	
B) <i>Bifidobacterium</i> species	
C) <i>Streptococcus</i> species	
D) Yeast	
E) Molds	
F) None	

- 11) Do you have any idea about the shelf life of probiotic foods? A) Yes B) No
- 12) Where do you store the probiotic foods?
A) Refrigerator B) Consume at once C) At room temperature
- 13) What are the reasons for consuming probiotic foods? (You can mark more than one option)

	YES
A) Beneficial for intestinal health	
B) I think it protects against cancer	
C) I find it delicious	
D) It strengthens the immune system	
E) Beneficial for oral health	
F) Advertisements had an effect on probiotic consumption	
G) My friends had an effect on probiotic consumption	

- 14) Do you recommend probiotic food consumption to your surrounding? A) Yes B) No
- 15) What are the reasons for not consuming probiotic foods? (You can mark more than one option)

	NO
A) I don't know what it is	
B) I do not find it natural	
C) I find it expensive	
D) I do not need	
E) I do not find it delicious	

- 16) What do you think the consumption of probiotic food help reducing which one of your following complaints? (You can mark more than one option)

Subject of the complaint	Was beneficial	Was not beneficial
A) Constipation		
B) Diarrhea		
C) Tympanites		
D) Allergy		
E) Intestinal disease		
F) High cholesterol level		
G) Stomach ulcer complaints		
H) Complaints regarding tension		
I) Other (.....) please specify.		

- 17) How long have you been consuming probiotic foods (?? days/weeks/months/years)? Please specify.

.....

- 18) How often do you consume the following probiotic dairy products?

Foods	Consumption frequency of probiotic foods						
	Once every day	2-3 times every day	Once every week	2-3 times a week	Once every 15 days	Once every month	Do not consume
A) Yoghurt							
B) Milk							
C) Kefir							
D) Kumiss							

- 19) How much probiotic products do you consume at a time?
A) 1/2 water glass B) 1 water glass C) More
- 20) What is the criterion/criteria that you pay attention while purchasing probiotic foods? (You can mark more than one option)
A) Price B) Brand C) Label D) Content of the food substance E) Appearance
- 21) Have you ever taken a nutritional class?
A) Yes B) No

22) Answer the statements below by marking only one of the options “I strongly agree”, “I agree”, “I don't know”, “I disagree”, or “I strongly disagree”.

	Strongly Agree	Agree	Do not know	Disagree	Strongly disagree
A) Probiotics contain live microorganisms that are beneficial for one's health when taken in sufficient quantities.					
B) Probiotic foods help to lose weight.					
C) Probiotic foods affect the mental health of people in a positive way.					
D) Probiotic foods help to prevent cancer.					
E) Probiotics help to decrease cholesterol.					
F) Microorganisms in probiotic foods always remain as living.					
G) Adequate use of probiotics contributes to the regulation of the digestive system.					
H) Probiotic foods strengthen the immune system.					
I) Probiotic foods contain high number of microorganisms.					
J) Probiotic foods help to prevent the development of pathogenic microorganisms.					
K) Probiotics have positive effects on various allergic diseases.					
L) Probiotics have therapeutic effects on diarrhea.					
M) Probiotics are effective in the prevention of infections that develop after surgery.					
N) Probiotics have an anti-hypertensive effect.					
O) Probiotics are effective in regulating the intestinal microflora.					
P) Probiotic foods are generally obtained by natural techniques.					
Q) Probiotic foods may cause diarrhea.					
R) Probiotic foods are appetizing.					
S) Probiotic foods reduce the need for vitamins and minerals.					
T) Home-fermented yoghurt and kefir help to regulate the digestive system.					
U) Natural probiotics are more effective than commercial probiotics.					
V) Probiotic foods should not be used without an expert advice.					

9. CIRRUCULUM VITAE

Personal Information

Name	Serim Tuna	Surname	KOÇ
Place of birth	TEKİRDAĞ	Birth date	14.02.1994
Nationality	TC	Nationality Number	17062978314
E-mail	stunakoc@hotmail.com	Phone Number	05368113506

Educational status

Degree	Department	School	Graduation date
Master	Nutrition and Dietetics	Yeditepe University	2020
Bachelor	Nutrition and Dietetics	Bahçeşehir University	2016
High School	-	Namık Kemal Anatolian High School – Tekirdağ	2012

Foreign languages	Foreign Language Exam Mark (#)
English	Upper Intermediate (75)
French	Beginner

Work Experience (Sort from the last to past)

Role	1.1.1. Institution	Period (Year - Year)
		-
		-

Computer Skills

Program	Usage skills
Office Programs	Upper Intermediate
SPSS	Intermediate
BEBIS	Upper Intermediate