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ORIGINAL ARTICLE

# Assessment of Knowledge and Attitudes of Physicians and Pharmacists on Probiotics: A Cross-Sectional Survey

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## ABSTRACT

**Objectives:** Probiotics have been gaining increased attention from the public recently, which originates concerns about their rationale use among healthcare professionals. Although there is evidence on the efficacy and safety of probiotics in certain gastrointestinal disorders, it is important to identify healthcare professionals' opinions on probiotics. This study aimed to identify the opinions of pharmacists and physicians on the use of probiotics.

**Materials and Methods:** This cross-sectional study was conducted between November, 2017 and August, 2018 among pharmacists and physicians practicing in Ankara, Türkiye. An electronic survey was designed and sent to the participants *via* e-mail.

**Results:** A total of 361 pharmacists (74.5% female) and 356 physicians (42.4% female) participated in the study. Approximately two-thirds of pharmacists and physicians were familiar with the mechanism of action and indications of probiotics. Most pharmacists and physicians recommended probiotics to be used in gastrointestinal system disorders (99.7% and 97.7%). Other areas that probiotics are commonly recommended was genitourinary system (29.3%) by pharmacists and dermatological symptoms (15.1%) by phycisians, respectively. Considering patient advice regarding the probiotics, pharmacists (63.3%) seemed to receive more requests compared to physicians (30.9%); and with regard to the probiotic recommendation, 70.7% and 38.2% of pharmacists and physicians, respectively, indicated that they have no concerns, but 61% of physicians have concerns on reimbursement policy when prescribing.

**Conclusion:** Pharmacists and physicians are healthcare providers commonly asked about probiotics by patients. Therefore, it is important to address healthcare professionals' concerns and increase their knowledge of the use of probiotics for different health conditions. Given that probiotic products can be purchased without a prescription, healthcare professionals in primary care settings should be more vigilant about the rational use of probiotics.

**Keywords:** Probiotics, pharmacist, physician, community

## INTRODUCTION

A balance between the amount and types of microorganisms in the human gastrointestinal tract provides a healthy immune system. Any deficiency or dysfunction in the immune system can lead to infections, necessitating the use of antibiotics. Gut flora is responsible for 80% of the immune system and has to be reinforced through healthy nutrition to maintain balance within the gastrointestinal system; however, inappropriate use of antibiotics damages the flora.[1] According to the research, bacterial diversity has been found to be high in people who have not been exposed to antibiotics before, and it has also been shown that malnutrition causes microorganism loss in urban life. Therefore, it is recommended that the human body be physically strengthened with supplementary food, nutritional support, or probiotics to prevent unintentional loss of microorganisms.

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The intestinal microbiota is a unique structure and is associated with various diseases ranging from allergies to inflammatory bowel disease. While a causal relationship has not been fully defined and has been investigated for safety issues in certain populations (such as immunocompromised patients), the use of probiotics is considered a dietary supplement for treating disease. The use of probiotics is recommended for treating many diseases, such as inflammatory bowel disease, short bowel syndrome, antibiotic-associated and acute diarrhea, *Clostridium difficile* and *Helicobacter pylori* infections, urogenital infections, food sensitivity, and allergies.[2] In the pediatric population, they are also used for treating diarrhea, atopic dermatitis, and colitis.[3] Probiotics were defined by the World Health Organization in 2002[4] as "live microorganisms which, when administered in adequate amounts, confer a health benefit on the host". The most commonly used microorganisms are *Lactobacillus (rhamnosus, casei, casei shirota, acidophilus, johnsonii, plantarum, bulgaricus,* and *reuteri), Bifidobacterium* (*breve, bifidum, infantis,* and *animalis*) genera and the fungus *Saccharomyces boulardii*.[5,6] Probiotic products that can be easily purchased from supermarkets or community pharmacies are described as yogurt, capsules, powders, or tablets.[7] The use of commercially available products is increasing in the general population, both in the community and in other healthcare settings. Therefore, clinicians should evaluate the evidence of efficacy and safety of probiotics in specific indications that meet the needs of the individual patient.

Primary healthcare professionals are often the first contact person in the community for healthcare advice, especially in the context of self-care. Therefore, before making any recommendations for probiotics, it is important for healthcare professionals for a particular patient to know the probiotic's dosage form, content (especially the genera, not the strain), total dose, and duration of use.[8] Furthermore, any potential interactions with concurrently used antibiotics and antifungals may result in a loss of efficacy in probiotic treatment. The use of probiotics in immunosuppressive patients, patients with central venous catheters, individuals with hypersensitivity to milk/lactose, or certain patient groups, such as those with severe pancreatitis, may also be problematic.[7]

There are few studies that have investigated the attitudes and practices of healthcare professionals toward probiotic use and have addressed the demands of patients and the public regarding probiotic consumption in health issues.[2,8-10] The aim of this study was to determine the knowledge and attitudes of physicians and pharmacists regarding the use of probiotics in general practice.

## MATERIALS AND METHODS

This cross-sectional study was conducted between November, 2017 and August, 2018 through an electronic survey of pharmacists and physicians in Ankara (Türkiye). The structured questions specific to the research were developed by the researchers through a comprehensive literature review, and the final version of the questionnaires for both pharmacists and physicians was developed separately using a survey platform (Google Docs). Each survey consisted of two sections; the first part questioned the demographics of participants (8 questions for pharmacists and 11 questions for physicians) and the second part focused on the knowledge and attitudes of participants (12 multiple choice questions for pharmacists and 10 questions for physicians) on probiotic use. The study protocol conformed to the ethical guidelines of the Helsinki Declaration and was approved by the Ethics Committee (Zekai Tahir Burak Maternity Hospital Ethics Board, no: 23/2018).

The survey was delivered to a convenient sample of physicians and pharmacists working in Ankara, who were invited to participate in the survey *via* professional e-mail groups. The participants responded to the online survey, if they volunteered to participate in the study, and informed consent was obtained *via* the survey link.

### *Statistical analysis*

The data were analyzed as descriptive statistics (mean and percentages) using IBM SPSS version 22 (IBM SPSS Inc., Chicago, USA) after a normalization test was performed. Comparison of the responses between pharmacists and physicians was analyzed using Student's *t*-test. Statistical significance was expressed as $p < 0.05$.

## RESULTS

A total of 361 pharmacists and 356 physicians participated in the study. Among them, 88.1% of pharmacists and 84.8% of physicians were practicing in community settings. The majority of physicians was over 40 years old and had more than 10 years of experience in the profession (Table 1). The participating physicians were slightly older and had a longer duration of experience in the profession compared with the pharmacists ($p < 0.05$). The specialties of the physicians were internal medicine in 227 (63.8%), basic medical science in 114 (32%), and surgical medicine in 15 (4.2%) participants, and no difference was found in terms of their attitudes toward probiotic usage ($p > 0.05$).

Unfortunately, 60.4% of physicians and 72.2% of pharmacists have indicated not to follow any national or international literature with regard to general information sources on drugs and/or diseases; however, almost half of the participants (50.6% and 54.3% of physicians and pharmacists, respectively) were influenced by information given by medical representatives of the pharmaceutical industry. In particular to probiotics, a majority of physicians (89.6%) and pharmacists (85.3%) stated that they were first informed about probiotics more than 2 years ago through congress/symposium/workshop/meeting (75.7% and 54.2%, respectively), medical representatives (46.3% and 31.2%, respectively), and literature (33.7% and 26.4%, respectively). Interestingly, 9.3% of physicians and 32.4% of pharmacists were introduced to probiotics by a pharmacist.

Healthcare professionals were also evaluated for their personal use and suggestions for using probiotics to their families and friends, when necessary; 79.2% of physicians and 88.3% of pharmacists stated that they used probiotics, 90.7% of physicians and 97.2% of pharmacists stated that they

**Table 1. Demographics of the participants**

| Participants | n (%) | | |
|---|---|---|---|
| | Pharmacists (n= 361) | Physicians (n= 356) | *p* value* |
| Female | 269 (74.5) | 151 (42.4) | |
| Male | 92 (25.5) | 205 (57.6) | |
| Age, years | | | |
| 20-29 | 126 (34.9) | 37 (10.4) | |
| 30-39 | 86 (23.8) | 77 (21.6) | < 0.00001 |
| ≥ 40 | 149 (41.3) | 242 (68) | |
| Years in the profession | | | |
| < 5 | 120 (33.2) | 40 (11.2) | |
| 5-10 | 44 (12.2) | 47 (13.2) | < 0.00001 |
| > 10 | 197 (54.6) | 269 (75.6) | |

*Chi-square test

recommended probiotics to their family members. Although 62.5% of pharmacists and 59% of physicians stated that they have sufficient knowledge (or are more familiar with) about the mechanism of action and indications of probiotics, their attitudes toward probiotic use differed (Table 2).

Opinions of healthcare professionals on the attitudes of their colleagues revealed that 62.2% of pharmacists and 55.6% of physicians believed that their colleagues do not have sufficient knowledge of probiotics, and 9.5% of pharmacists and 14.3% of physicians believed that their colleagues have prejudices.

## DISCUSSION

Probiotics have been recognized as useful options for treating a variety of gastrointestinal disorders, but note that their efficacy depends on the species, dose, disease, and duration of treatment.[7,11,12]

A study conducted in China showed that 65% of physicians prescribe antibiotics, whereas 57% prescribe probiotics for treating acute diarrhea during hospitalization.[13] In contrast, 53% of surgeons and 81% of gastroenterologists in the UK recommended or prescribed probiotics for the treatment of irritable bowel syndrome (IBS) (71%) and functional diarrhea (48%) for >12 months.[14] The practice of gastroenterologists in the USA is similar to that of their UK counterparts; 98% of them believed probiotics had a role in the treatment of gastrointestinal symptoms, while 93% of them reported that patients they examined took probiotics for IBS and *Clostridioides*-associated diarrhea.[15] Similar to the findings of these studies, pharmacists (99.7%) and physicians (97.7%) suggested the use of probiotics mainly for gastrointestinal diseases in this study.

Probiotics are perceived as natural and safe products by the public and can easily be purchased from supermarkets or pharmacies without a prescription or any prior medical consultation. According to a study conducted in Australia, 72% of the population had used complementary medicine (CM) in the last year and 17% had used probiotics; moreover, pharmacy customers indicated that they want to have information from a pharmacist on the safety, interactions, and effectiveness of CMs.[16] The most commonly used CM products by pediatric patients (or caregivers) with gastrointestinal disorders in gastroenterology outpatient clinics in Canada were multivitamins (65%), calcium (35%), probiotics (14%), and fish oil-omega-3 fatty acids (13%); 76% of respondents reported that they would like to discuss issues with a physician on the use of CM concurrently with prescribed medicines and 52% indicated that they would seek advice from a pharmacist.[17] In this study, 30.9% of physicians and 63.6% of pharmacists stated that their patients requested information about probiotics. These percentages may reflect the fact that the purchase of those products does not require a prescription; therefore, people can easily obtain them at pharmacies. In addition, 62.9% of physicians and 70.3% of pharmacists stated that they had received positive feedback from patients on probiotic usage, and 43.5% of physicians recommended probiotics to patients who were also prescribed antibiotics. These findings have highlighted the role of primary care health professionals in the community's perception of the use of probiotics.

A study on the knowledge and attitudes of physicians on infantile colic revealed that only 2.2% reported that parents have used probiotics and 4.5% of pediatricians considered using probiotics in cases of infantile colic. Although pediatricians acknowledge the relationship between colic symptoms and adjunctive remedies, they were less likely to counsel parents on probiotic use, and therefore probiotics were used in only 4.5% of cases.[18] Similar issues emerged in this study in which physicians and pharmacists had different perspectives on probiotic advice ($p$ < 0.00001); 59.6% and 97.7% of the physicians stated that they recommended probiotics for 0-18 age group and gastrointestinal diseases, respectively. However, pharmacists reported to recommend probiotics for people aged 0-18 years (54.6%) and 18-40 years (54%).

**Table 2. Attitudes of healthcare professionals toward the use of probiotics**

| Participants | n = number of respondents (%) | | |
|---|---|---|---|
| | Pharmacists | Physicians | *p* value* |
| **Age group frequently suggested to be used** | **326 (100)** | **356 (100)** | |
| 0-18 years | 178 (54.6) | 212 (59.6) | |
| 18-40 years | 176 (54) | 67 (18.8) | < 0.00001 |
| 40-64 years | 111 (34) | 45 (12.6) | |
| ≥ 65 years | 64 (19.6) | 32 (9) | |
| **Diseases frequently suggested to be used** | **338 (100)** | **344 (100)** | |
| Gastrointestinal system | 337 (99.7) | 336 (97.7) | |
| Genitourinary system | 99 (29.3) | 28 (8.1) | |
| Endocrine system | 32 (9.5) | 38 (11) | |
| Cardiovascular system | 10 (3) | 16 (4.7) | |
| Neurological system | 31 (9.2) | 31 (9) | |
| Dermatological | 89 (26.3) | 52 (15.1) | |
| **Requests for advice from patients regarding probiotics** | **338 (100)** | **349 (100)** | |
| Yes, received | 215 (63.6) | 108 (30.9) | |
| **Receive feedback from patients regarding probiotic usage** | **337 (100)** | **356 (100)** | |
| None | 99 (29.4) | 127 (35.7) | 0.05 |
| Positive | 237 (70.3) | 224 (62.9) | |
| Negative | 1 (0.3) | 5 (1.4) | |
| **Concerns on suggesting probiotics;** | **328 (100)** | **356 (100)** | |
| No concerns | 232 (70.7) | 136 (38.2) | |
| Recently developed drug | 19 (5.8) | 23 (6.5) | |
| The same effect can be achieved in a non-medical way | 25 (7.6) | 48 (13.5) | < 0.00001 |
| Not have sufficient knowledge of the mechanism | 48 (14.6) | 50 (14) | |
| No reimbursement when prescribed | N/A | 217 (61) | |
| Others | 16 (4.9) | 5 (1.4) | |
| **Allocated space for probiotics at the pharmacy;** | **331 (100)** | N/A | |
| Yes, it is allocated | 215 (63.6) | | |
| **Suggested to a patient who is also prescribed an antibiotic by myself** | N/A | **356 (100)**<br>155 (43.5) | |

*Chi-square test, N/A: Not applicable

While probiotics are commonly recommended and purchased at primary care, 80% of pharmacists working in intensive care units (ICU) indicated that they would never consider recommending probiotics for the prevention of ventilator-associated pneumonia because of not being sure of the safety (43%) and efficacy (47%) of probiotics. Nevertheless, they were more likely to recommend probiotics for preventing *Clostridioides* diarrhea in the ICU. They further indicated that they obtain information on probiotics by communicating with their colleagues (78%), scientific journals (67%), media (15%), and medical representatives (7%).[19] Regarding the sources of information, healthcare professionals in Europe indicated that they acquired knowledge on probiotics from books (53.3%), websites (34.9%), at work (28%), pharmacies (25%), and radio/television (9.7%).[2]

The study by Marupuru et al.[9] has shown that probiotics were used by 53% of pharmacists (mainly for general health and wellness but also treating stomach and intestinal illness), and 89% of pharmacists would recommend probiotics to patients, friends, and relatives. In the study where the participants were all healthcare professionals from Europe stated that 92% of pharmacists and allied health professionals and more than 84% of physicians and dentists had already used probiotics, and in general 87.5% of health professionals advised people (such as

patients, friends, and relatives),[2] whereas it was found in this study that 88.3% of pharmacists had used probiotics and 97.2% recommended it for relatives and friends.

Research conducted in community care settings in Canada revealed that most community pharmacists (66%) recommend natural products, including probiotics, to patients, most frequently concurrently with other drugs (69%).[20] In a study conducted in South Africa, 78% of pharmacists reported being slightly too familiar with probiotics.[8] Another study that included all healthcare professionals from different parts of Europe reported that pharmacists' self-evaluated (on a 5 point Likert scale) knowledge on probiotics (rated as "good") was significantly higher than that of physicians (rated as "medium").[2] Just over one-third of pharmacists in this study indicated to have sufficient knowledge on probiotics, whereas 23.2% believed that physicians in general have sufficient knowledge and recommend probiotics to patients. With regard to having concerns before giving advice on probiotics, 70.7% of pharmacists reported having no concerns, whereas 60.9% of physicians stated that they have concerns about prescribing because of probiotics having no reimbursement. A study conducted among pharmacists reported that 15% of pharmacists had negative attitudes that CM products (including probiotics) interfered with standard medical care.[8] The findings from Pakistan revealed that only 15.1% of healthcare professionals (including pharmacists and physicians) had a good knowledge regarding the use of probiotics, and lack of knowledge about the clinical use of probiotics (57%) and the high cost of probiotics (35.4%) were the most common reasons for not recommending.[10] These concerns can be overcome by globally accepted expert recommendations. Guidance for probiotic use was issued,[21,22] which indicated that knowing the correct definition of probiotics, making the correct choice among mono-strain or multi-strain products, being sure about the safety and clinical efficacy of the strains, avoiding antibiotic resistance genes, and choosing probiotic strains resistant to the gastrointestinal environment will help to maintain rational use of probiotics.

*Study limitations*

According to the health statistics report by the Turkish Ministry of Health,[23] approximately 28,000 pharmacists and 145,000 physicians practice in different settings in Türkiye. In particular, in Ankara province, 2,278 general practitioners and 2,297 pharmacists were registered in 2016. Therefore, reaching approximately 15% of the targeted population is one of the main limitations of this study. In addition, pharmacists and physicians unfamiliar with probiotics may not have responded to the survey, which may have caused sampling bias. The participants of this study were mainly from metropolitan cities, and the findings may not reflect the practice norms nationwide; however, it will help to provide comparative views for further studies to be conducted in developed and/or developing countries.

## CONCLUSION

A discrepancy in knowledge, attitudes, and practices among healthcare professionals still exists in local settings, which may affect public perception and health behavior regarding probiotic use. The aggregated data from local exploratory studies would indicate practice patterns for probiotic use and identify further needs of patients and healthcare professionals in different health settings. Due to the increasing number of licensed probiotic products, insufficient knowledge of practitioners, and influence of medical representatives on practitioners, it is important to have scientific and updated information sources available for healthcare practitioners.

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*Ethics*

**Ethics Committee Approval:** Zekai Tahir Burak Maternity Hospital Ethics Board, Ankara (no: 23/2018).

**Informed Consent:** Informed consent was obtained by the participants once they agreed to participate in the online survey.

*Authorship Contributions*

Concept: H.B.G., K.D., T.K., Design: H.B.G., K.D., T.K., Data Collection or Processing: H.B.G., Analysis or Interpretation: K.D., A.B.E., Literature Search: H.B.G., Writing: A.B.E., H.B.G., K.D.

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