

Knowledge, awareness, and socio-demographic assessment of probiotics, obesity and diabetes

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ARTICLE INFO

Keywords:

Probiotics
Diabetes
Antibiotics
Yogurt
Gut-microbiota

ABSTRACT

Probiotics are living organisms that offer the host health advantages when taken in sufficient amounts. The aim of the study was to evaluate pediatricians' probiotic knowledge and practice patterns across different geographical areas. The purpose of this study is to examine 350 students from the Department of Genetic Engineering and Biotechnology at the University of Rajshahi in Bangladesh to see what information, attitudes, and perceptions they have regarding probiotics. 350 people gladly answered the questionnaire, even though it was distributed among 400 participants. The questionnaire that was self-administered was used to gather data. The data were computed using simple tools. 53.2% of the participants in this case were female. Even though all of the participants were from the biology department, 31.5% of them had never heard of probiotics. The majority of respondents (65%) identified yogurt as the most important source of probiotics. Only 30% of participants were aware that gut microbiota and diabetes are related, despite 46.8% of participants having a family history of the disease. A major worldwide concern is emerging from antibiotic resistance. Approximately 75% of participants used antibiotics without a doctor's prescription, and 63.7% were unaware that medications may damage the gut microbiota. The most encouraging finding of the study was that 90.3% of participants would take probiotics as a medicine if their doctor suggested it. Many people still have disagreements concerning probiotics, and the subject is not well understood. The participants' knowledge of probiotics also varies greatly. To be able to reach the greatest number of people and encourage the development of a healthy generation, this gap needs to be addressed on various levels.

1. Introduction

In the fast-paced world, people are becoming more aware of their health to battle against several diseases like diabetes, obesity, etc., and desire to have foods with high medicinal values. This desire is gradually increasing the demand for functional foods because it contains high fiber, β -glucan, protein, lipids, and specific microorganisms, especially probiotic lactic acid bacteria (LAB), and other prebiotic activities [1].

Probiotics, living micro-organisms, when administered in sufficient quantity to the host, provide a variety of health advantages [2]. For being recognized as probiotics the micro-organisms must have to pass through some basic criteria like survivability under acidic pH, biliary salts condition, and having antagonistic efficacy against pathogens, in other words, they must be beneficiary to the host [3]. The representative

species include *Lactobacillus plantarum*, *Lactobacillus rhamnosus*, *Lactobacillus coryniformis*, *Leuconostoc mesenteroides*, *Lactobacillus brevis*, *Lactobacillus acidophilus* [4,5].

The most significant health advantages of probiotic use are related to the enhancement of gastrointestinal microflora and the treatment of infections of the gastrointestinal tract, including infections, diarrhea brought on by antibiotics, constipation, and as a therapeutic agent against irritable bowel syndrome and inflammatory bowel diseases. Moreover, there is a possible link between T2DM and gut microbiota [6]. Hyperglycemia has been shown to be improved by probiotic use. *Lactobacillus reuteri* GMNL-263, *Lactobacillus rhamnosus* CCFM0528, *Lactobacillus rhamnosus* CCFM0412, *Lactobacillus brevis* and *Lactobacillus plantarum* 13, *Lactobacillus rhamnosus* NCDC17, and *Lactobacillus casei* CCFM419 have all been found to have anti-diabetic properties [7].

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<https://doi.org/10.1016/j.imu.2022.101101>

Received 7 September 2022; Received in revised form 27 September 2022; Accepted 29 September 2022

Available online 4 October 2022

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Furthermore, from previous studies, it is proved that lactic acid bacteria have potential anti-obesity activity. By releasing appetite-regulating hormones lactic acid bacteria help to burn fats [8]. Lactic acid bacteria have been found to be more effective against respiratory and gastrointestinal-tract viruses. LAB possesses several antimicrobial compounds such as bacteriocins, reuterin, hydrogen peroxide, which can be classified as low molecular mass compounds, which are capable to fight against microbes [9]. The initial acquisition of intestinal microbiota is critical in the development of immune processes and pathogen protection. It is also used to boost the immune system, lower serum cholesterol, control cancer, prevent allergies, have antihypertensive effects, and improve lactose metabolism [10]. Moreover, according to the previous report using probiotics has few or no side effects [11]. Lactic acid bacteria are non-pathogenic bacteria that live in the urinary and reproductive system and urinary tract of animals without making any pathogenic effect. It can also be found in fermented foods mostly in milk, yogurt and other dairy products [12]. However, nowadays, cereal-based fermented foods are being chosen as the best source of probiotics, it is not only preferred as probiotics sources for the vegans but also lactose tolerance patients [13].

People are unfamiliar with probiotics, despite widespread and easily accessible evidence to suggest otherwise. So, now it is a need to create a positive attitude of the people towards probiotic use as not many are aware of probiotics and the health benefits associated with the use of probiotics. The present study was aimed at finding out the knowledge, attitude, and practices of people of the Department of Genetic Engineering and Biotechnology, university of Rajshahi, Bangladesh towards the use of the probiotics.

2. Survey based work

The survey was administered among 400 participants and the data were collected from 350 participants of the department of Genetic Engineering and Biotechnology, University of Rajshahi to know about the awareness and knowledge about probiotics.

3. Data collection

The data was collected using a structured questionnaire, which was presented to the participants physically to complete. A consent form was also signed to let them know how their information would be used. All possible precautions were taken to maintain the reliability of the responses. The entire process of data collection was completed during May 2022 to July 2022.

4. Data analysis

The data were entered in Microsoft Excel P value less than 0.05 was statistically significant.

5. Analysis of the survey according to questionnaire

350 responses were gathered from the 400 students that were given the questionnaire (Supplementary file).

Moreover, the survey revealed that females were slightly more willing to respond to any survey, despite the fact that 69% of

participants had a healthy body weight, 20% of them were over-weight, which may be a curse for them (Table 1).

In the case of the term probiotics, 31.5% of participants were not familiar with it. It was astonishing because the data was collected from the students of faculty of biological sciences. Moreover, it was reflecting that common people will not totally be known for probiotics. Lactose intolerance is one of the major threats, around 17% participants are suffering from it and around 50% of participants know the cereal-based foods may be a good source of probiotics and denoted oats as a common one. In this era, antibiotic resistance is becoming an alarming threat and taking antibiotics without being recommended is the main cause of it. Furthermore, they were unaware that antibiotics may kill our beneficial gut microbes (Table 2).

Majority (65%) of the participants marked yogurt as popular source of probiotics (Fig. 1). Diabetes is a common disease and mostly all of the participants are known for it and more than 50% participants had a family history of it (Fig. 2A and B). Furthermore, chances of diabetes are 50-50 from maternal and paternal sides (Fig. 2C). Several medicines are available to treat diabetes, however, those have prominent side effects. Participants marked upset stomach as the main effect of it (Fig. 2D).

Gut microbes play a crucial role in our immune-system, moreover, it has an interconnection with obesity as well as diabetes also. However, around 50% of participants in the biological faculty had not thought about it (Fig. 3A). Disappointedly, 75% of the participants take antibiotics without being permitted by certified doctors (Table 2).

Moreover, 50% participants think probiotics had an effect on the GI system (Fig. 4A). In developed countries people are taking probiotics due to its beneficial effects. Participants thought to boosting immunity and improving digestive system are the main causes behind it (Fig. 4B). The most whelming outcome of the survey was that if the doctors permit, 90.3% participants were willing to take probiotics (Fig. 5).

6. Discussion

Here, we offer a cross-sectional study of participants ($n = 350$) from the biological science faculty of the university of Rajshahi who were assessed for their knowledge, awareness, and socio-demographic assessment of probiotics. The number of female participants were 53.2% (Table 1) denoting that female were more likely than males to participate in any survey-based work. Though all of the participants were from biological sciences, one third of the participants were not familiar with the term probiotics. Literature review reflecting that the healthcare professional from under developed countries are not familiar with this term and professionals from developed countries have vast knowledge about it [14–16]. Lactic acid bacteria are non-pathogenic microorganisms that exist in animal reproductive, urinary, and digestive systems without causing disease. In fermented foods, primarily milk, yogurt, and other dairy products, it can also be found [17]. Today, however, fermented foods made from cereal are recognized as the greatest sources of probiotics since they have additional medical benefits in addition to serving as a probiotic source for lactose intolerance sufferers and vegans [13]. However, in the case of selecting potential source of probiotics, 65% participants denoted yogurt, which is quite similar with the previous findings [18].

Antibiotic resistance is a global threat. Unconscious and unaware usage of antibiotics are the most prominent causes of this resistance [19, 20]. Antibiotics have an adverse effect on our gut-microbiota, which plays crucial role in boosting our immunity [21]. In spite of being

Table 1
Study participants' distribution based on demographic data.

General Criteria	Ranges/Frequency		
Age	22–27		
Gender	Female	Male	
	53.2%	46.8%	
BMI	Healthy weight	Overweight	Underweight
	69%	20%	11%

Table 2
Basic knowledge of the participants about probiotics.

Questions	Yes	No
Percentage of the participants known with the term probiotics	68.5%	31.5%
Lactose intolerance problem	16.9%	83.1%
Taking antibiotics without being recommended by doctors	75%	25%

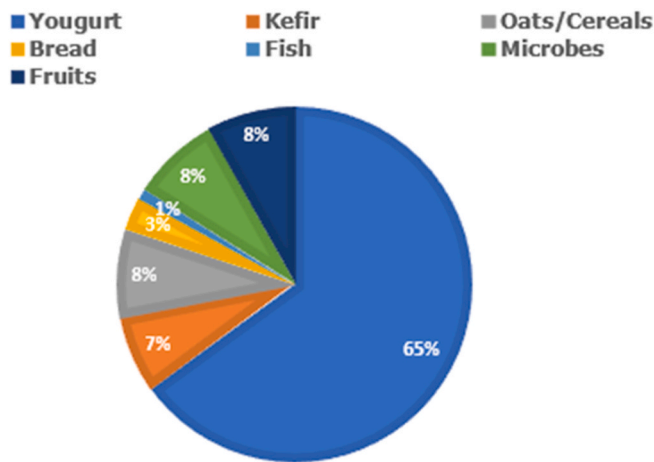


Fig. 1. Common sources of probiotics.

familiar with this, still 75% participants took antibiotics without being recommended by the doctors and 65% had no knowledge that antibiotics may hamper our gut-microbiota. Similar result of self-meditating was found in a literature of O. Ajibola et al. where they mentioned that 43% of undergraduates use antibiotics weekly for self-diagnosed illnesses as well as 27% of the community members use it on monthly

basis [22].

Chronic hyperglycemia brought on by either insulin resistance or the inability to produce insulin is a feature of diabetes mellitus, a hereditary condition [23]. Diabetes is additionally known as the “mother of all diseases” [24,25], and [26]. Although there are drugs available to treat diabetes, due to their negative side effects and the difficulty of finding effective treatments in nature, researchers are working to find a more practical option. Additionally, there may be a connection between gut microbiota and T2DM [6].

Here, 46.8% participants had family history of diabetes that's mean this portion of participants has more probability to have diabetic in near future [27]. However, in previous studies, it was found that diabetes in mothers is more common than in fathers in T2DM patients [28].

Probiotics are believed to be dietary components that can affect people's health. Numerous human clinical research have shown that probiotics provide a variety of advantages for the host. In addition to regulating the gut microbiota and upping the synthesis of short-chain fatty acids, it is also believed that these organisms interact with host cells in the gastrointestinal system, including immune cells, neuron cells, and endocrine cells [29]. Probiotics are being used as a medicine substitute by people in industrialized nations due to its positive health effects [30].

In this study, several data showed that the knowledge of probiotics among the participants was not so strong. Moreover, the percentage will decrease if we attempt to get information from the people with different

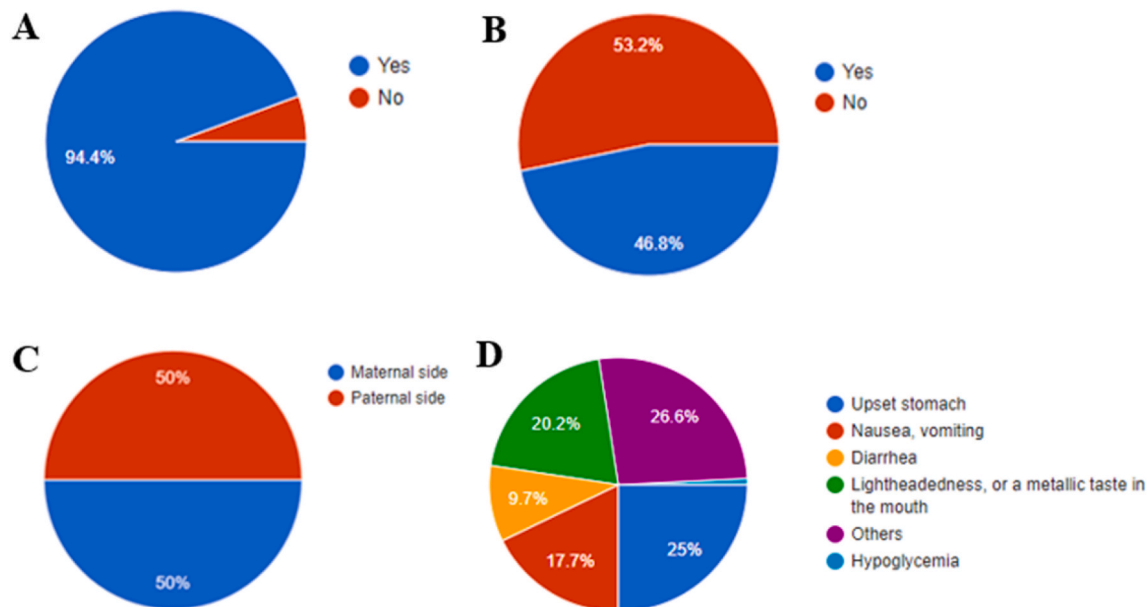


Fig. 2. (A) Knowing the term diabetes, (B) Family history of diabetes, (C) Linkage of diabetes with family history, (D) Adverse effect of the available medicines of diabetes.

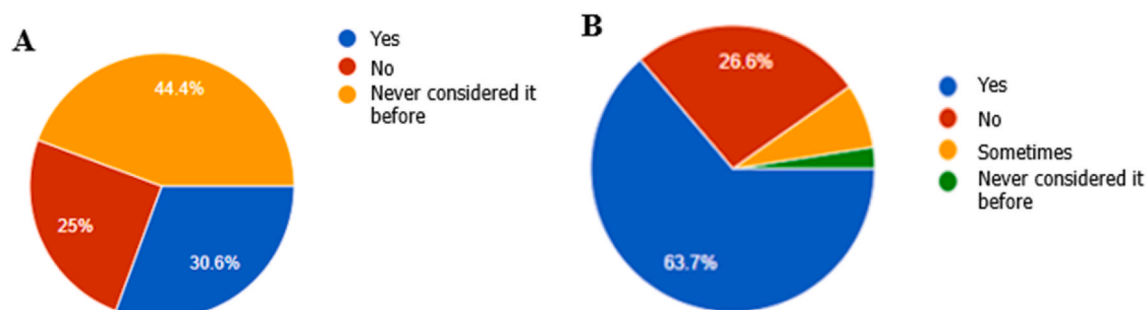


Fig. 3. (A) Knowledge about the relationship between the gut-microbiota and diabetes; (B) Knowledge about the adverse effect of antibiotics on gut microbiota.

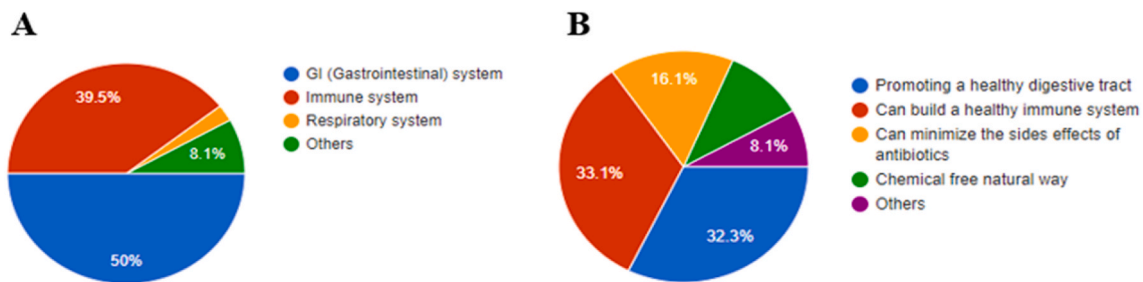


Fig. 4. (A) Effects of probiotics on the mentioned systems; (B) Causes of using probiotics in the developed countries.

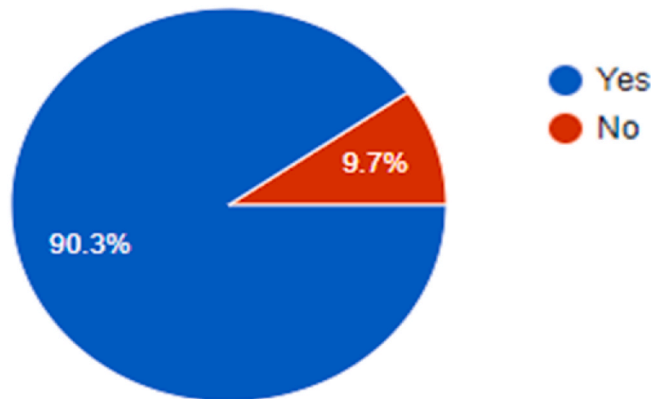


Fig. 5. Acceptance rate of probiotics as a drug.

backgrounds. However, One denoting outcome was that more than 90% of participants consented to take probiotics if doctors recommended them after learning about it.

7. Conclusion

The recent investigation found that there is a lack of understanding and usage of probiotics. Participants did, however, exhibit a favorable attitude toward utilizing probiotics if doctors advise them after considering their positive qualities. The health ministry needs to take certain initiatives to increase public awareness of this word. Additionally, to encourage the growth of a healthy generation, healthcare experts, organizations, and students from associated colleges should raise knowledge of probiotics worldwide.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgement

The authors are grateful to the Microbiology laboratory, Department of Genetic Engineering and Biotechnology, University of Rajshahi, Bangladesh for providing necessary laboratory facilities for conducting this research.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.imu.2022.101101>.

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