

Short communication

Correlation of Knowledge, Attitude, and Practice Toward Probiotics for the Digestive System among Medical Students in Sebha University

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ABSTRACT

Probiotics are defined by the World Health Organization as live microorganisms that confer health benefits to the host when consumed in adequate amounts. This study aimed to assess the correlation between knowledge, attitude, and practice (KAP) regarding the use of probiotics for digestive health among medical students at Sebha University, Libya. A cross-sectional study was conducted from February to May 2025 among 189 medical students. Most participants were aged 18–21 years (61.6%) and were female (83.1%). Pharmacy students constituted 43.4% of the sample. Although the majority of students demonstrated positive attitudes toward probiotics, knowledge gaps were evident, particularly regarding probiotic species variability and appropriate clinical use. Approximately one-third of participants incorrectly believed probiotics could only be used as dietary supplements. Actual consumption and proactive information-seeking behaviors were low, indicating a gap between positive attitudes and practice. The findings highlight the need for targeted educational interventions to improve students' knowledge and promote evidence-based use of probiotics in future clinical practice.

Introduction

The human gastrointestinal tract (GIT) harbors a complex and diverse community of microorganisms that play a crucial role in maintaining host health. These gut microbiotas contribute to immune system development, protection against pathogenic organisms, and regulation of metabolic and physiological processes [1]. The interaction between the host and intestinal microbiota begins at birth and evolves throughout life, influencing the development of the intestinal epithelium, mucosal immunity, and overall gut function [2].

Disruptions in the composition of gut microbiota have been linked to various diseases, including obesity, diabetes, cardiovascular disorders, and cancer [3]. Probiotics, defined by the FAO/WHO [4] as live microorganisms that confer health benefits when consumed in adequate amounts, have gained significant attention for their ability to enhance digestive health, modulate immune responses, and reduce antibiotic-associated side effects. Increased microbial diversity within the gut is associated with greater resistance to pathogens and improved overall health [5].

Methods

A cross-sectional questionnaire-based study was conducted between February and September 2025 among senior pharmacy students at the Faculty of Pharmacy, Sebha University. The questionnaire was adapted from a previously published Indonesian study [6]. Data were analyzed using SPSS version 26.0. Numerical variables were expressed as mean $\pm$ standard deviation, while categorical variables were presented as frequencies and percentages. Attitude scores were classified as positive (score $\geq$ mean) or negative (score $<$ mean).

Descriptive statistics and appropriate non-parametric tests were applied. Demographic data, including age, gender, faculty, and year of study, were summarized using frequencies and means. Participation was voluntary, and confidentiality of all respondents was assured.

Results and Discussion

A total of 189 medical students from Sebha University participated in the study. The majority of participants were aged 18–21 years (61.6%) and were female (83.1%). Regarding faculty distribution, the largest proportion of participants were from the Faculty of Pharmacy (43.4%), followed by Medical Technology (29.6%), Dentistry (23.3%), and Medicine (3.7%). First-year students constituted the largest academic-year group (43.4%). The internet was the main source of information about probiotics, reported by 75.1% of participants.

Table 1: Socio-demographic characteristics

	No	%
Age		
18-21	117	61.9
22-25	67	35.4
≥25	5	2.6
Gender		
Male	32	16.9
Female	157	83.1
Faculties		
Faculty of Pharmacy	82	43.4
Faculty of Medicine	7	3.7
Faculty of Dentistry	44	23.3
Faculty of Medical Technology	56	29.6
Education Level		
First year	82	43.4
Second year	33	17.5
Third year	47	24.9
Fourth year	18	9.5
Fifth year	9	4.8

The predominance of the internet as a source of probiotic-related information is consistent with previous studies showing that online platforms and social media have become major sources of health information among university students because of their accessibility and rapid dissemination of information [7,8]. In the present study, information obtained from health care professionals, including doctors and pharmacists, as well as lecturers and traditional media, was relatively limited. This finding may reflect the increasing reliance of young adults on digital sources for obtaining health-related information, as previously reported in a United Kingdom (UK) study [9]. However, dependence on online sources may also expose students to incomplete or inaccurate information, emphasizing the importance of strengthening evidence-based health education.

Regarding knowledge, more than half of the students (58.7%) demonstrated poor knowledge of probiotics, while 32.8% had fair knowledge and only 8.5% demonstrated good knowledge (Figure 1).

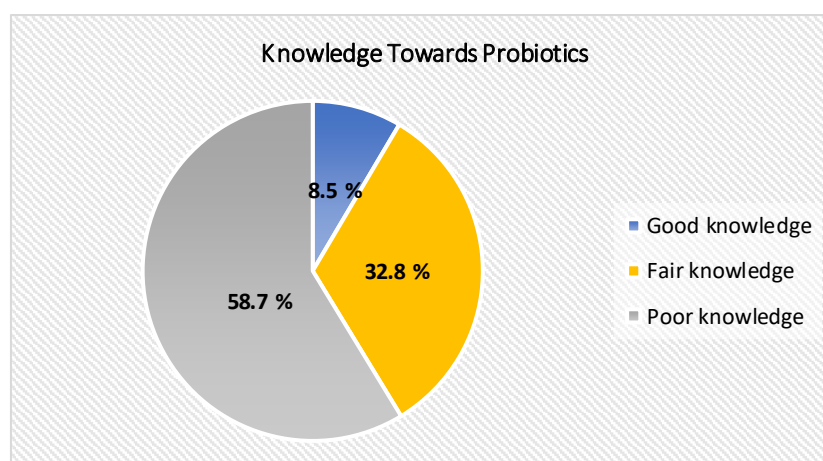


Figure 1: Knowledge Towards Probiotics

Although 61.4% of participants correctly identified the definition of probiotics, knowledge concerning specific probiotic bacterial species, probiotic-containing products, mechanisms of action, and strain-specific effects was generally limited. These findings are consistent with previous research among health sciences students, which reported reasonable awareness of the basic concept of probiotics but inadequate detailed knowledge [10].

The observed knowledge deficit is particularly important because probiotics comprise different microorganisms and strains that may have different effects and clinical applications. General awareness of the term “probiotic” does not necessarily indicate sufficient knowledge for appropriate selection or recommendation. The misconceptions observed in the present study regarding probiotic formulations and their immunomodulatory and gastrointestinal effects may indicate

gaps in students' microbiology, nutrition, and clinical education [11]. Therefore, greater emphasis on evidence-based probiotic information during undergraduate health-professional education may improve students' understanding and future clinical decision-making.

Regarding attitude, 56.6% of the students demonstrated a positive attitude toward probiotics (Figure 2). Nearly half of the participants (47.6%) strongly agreed that they would like to gain further knowledge about probiotics, indicating considerable interest in expanding their understanding of these products. However, responses concerning the recommendation of probiotics and their consideration as a potential treatment option were frequently neutral. This finding suggests that, although students generally showed favorable perceptions of probiotics, they may lack sufficient confidence in their clinical applications. The positive attitude observed in the present study is consistent with findings from an Indonesian study [6], which reported favorable perceptions of probiotics among health sciences students despite gaps in detailed knowledge. The combination of positive attitudes and uncertainty about clinical use may reflect limited exposure to evidence-based probiotic education during medical training. Therefore, strengthening probiotic-related education may help students develop greater confidence and translate their general interest into more informed clinical attitudes and decision-making.

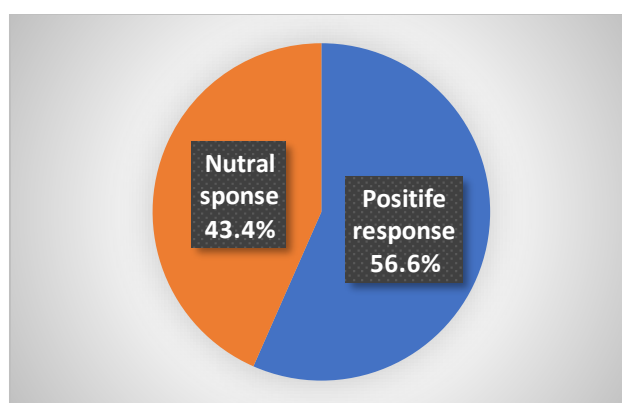


Figure 2: Attitude Towards Probiotics

With respect to practice, 72.5% of students demonstrated positive practice scores (Figure 3). Nevertheless, actual probiotic use was relatively limited. Only 20.6% of participants reported having consumed probiotic products previously, while 13.2% had used probiotics during the previous month. Probiotic use was mainly associated with perceived benefits such as prevention of gastrointestinal infections, enhancement of immunity, and reduction of antibiotic-related adverse effects. These findings are broadly consistent with previous observations reported [10].

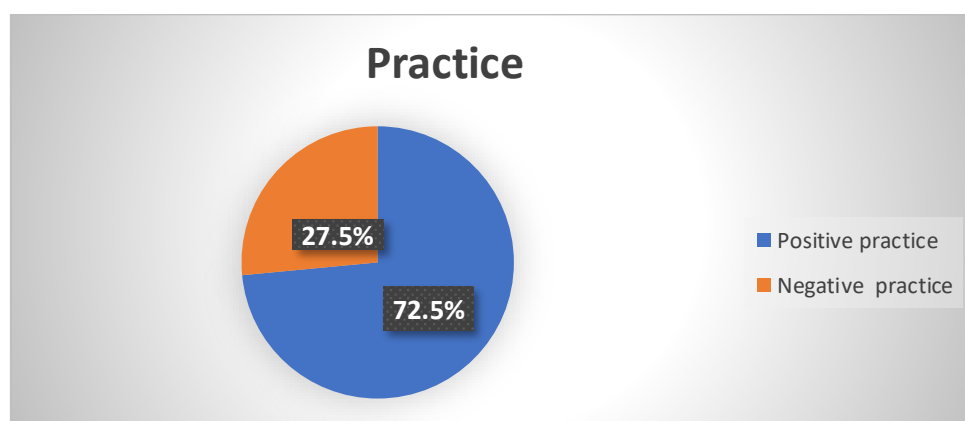


Figure 3: Practice Towards Probiotics

The relatively high practice score despite the low level of actual probiotic consumption suggests that favorable practice responses may not necessarily correspond to frequent personal use. This apparent discrepancy may reflect students' willingness to adopt appropriate behaviors or recommend evidence-based use while having limited personal exposure to probiotic products. It may also indicate uncertainty about the appropriate indications, products, and strains available for specific health conditions.

A statistically significant difference was observed among faculties, with students from the Faculty of Medical Technology demonstrating the highest mean knowledge, attitude, and practice scores compared with students from the other

faculties ($p < 0.05$). This finding indicates that academic background may influence students' understanding and perceptions of probiotics. Differences in curriculum content, exposure to microbiology and related biomedical subjects, and opportunities to encounter probiotic-related information may contribute to this variation.

Overall, the findings demonstrate an important gap between students' attitudes and their level of knowledge and practical use of probiotics. Although more than half of the participants had positive attitudes and nearly three-quarters had positive practice scores, 58.7% had poor knowledge, and actual probiotic consumption remained low. This pattern suggests that positive perceptions alone may not be sufficient to support appropriate probiotic use. Similar observations have been reported in previous studies, where favorable attitudes toward probiotics coexisted with inadequate detailed knowledge [10].

The findings highlight the need to incorporate evidence-based probiotic education into the curricula of health-professional programs at Sebha University and other Libyan universities. Educational content should address probiotic definitions, clinically relevant strains, mechanisms of action, available products, indications, limitations, safety, and evidence supporting their use. Improving students' knowledge may enhance their confidence in evaluating probiotic information and may facilitate more appropriate recommendations in their future professional practice.

The findings should also be interpreted in light of the increasing role of the internet in health-information seeking. Since 75.1% of participants identified the internet as their main source of probiotic information, universities should encourage students to critically evaluate online health information and rely on reliable scientific and professional sources. Integrating digital health-literacy skills into undergraduate education may help reduce misconceptions and improve evidence-based decision-making.

Despite the generally positive attitudes and practice scores, the low level of detailed knowledge represents a significant educational gap. Addressing this gap is particularly important because these students may become future healthcare professionals responsible for providing patients with information about probiotics. Appropriate education should therefore emphasize that probiotic effects may depend on the specific microorganism, strain, dose, formulation, and clinical indication rather than assuming that all probiotic products have equivalent effects.

In conclusion, the present study found that medical students at Sebha University generally demonstrated positive attitudes and relatively favorable practice scores toward probiotics; however, their overall knowledge was limited, particularly concerning specific strains, products, mechanisms, and clinical applications. The predominance of the internet as a source of information and the coexistence of positive attitudes with poor knowledge and limited actual use indicate an important educational gap. Significant differences between faculties further suggest that academic background may influence students' knowledge, attitudes, and practices. These findings support the integration of structured, evidence-based probiotic education into health-professional curricula to improve students' knowledge, critical evaluation of probiotic information, and appropriate future clinical practice.

The present study has several limitations. Its cross-sectional design does not allow causal relationships to be established between knowledge, attitudes, practices, and students' characteristics. In addition, the relatively small sample size may limit the generalizability of the findings to medical and health-professional students in other Libyan universities. Furthermore, the use of a questionnaire may introduce recall and response biases. Larger multicenter studies involving students from different Libyan universities and using standardized and validated questionnaires are recommended.

Future studies should investigate probiotic knowledge and practices among healthcare professionals and the general population and should evaluate the effectiveness of educational interventions. Evidence-based educational programs should emphasize appropriate probiotic selection, indications, effectiveness, and safety. Healthcare professionals, particularly pharmacists, should also be encouraged to provide accurate counseling regarding the appropriate use of probiotic products, potential benefits and limitations, and possible adverse effects.

Conclusion

The study reveals that although most students have a positive attitude and basic awareness of probiotics, their overall knowledge, particularly regarding specific strains, products, and clinical applications, remains limited. Significant misconceptions persist, indicating clear knowledge gaps. The low level of practical use despite favorable attitudes highlights a disconnect between knowledge and practice. These findings emphasize the need for targeted educational interventions to improve students' understanding and promote informed and appropriate use of probiotics in future clinical practice.

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Conflicts of interest

The authors declare that there is no conflict of interest

Ethics statement

Ethical clearance was obtained from the Faculty of Pharmacy, Sebha University. Certificate no: 003\2024, approval date: 2nd/ November/ 2024.

Authors contribution

OSA conceived and designed the study, developed the research methodology, supervised data collection, performed and interpreted the statistical analysis, and contributed to the writing, revision, and final approval of the manuscript. AHA, HA, and EIM contributed to data collection, questionnaire administration, data entry, and preliminary analysis. All authors contributed to the interpretation of the findings, critically reviewed the manuscript, approved the final version, and agreed to be accountable for all aspects of the work.

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