Knowledge and Use of Probiotics among Medical Personnel and Students in Basra

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Abstract

Importance: Probiotics are increasingly discussed in clinical care and public use despite evidence that is strain-specific, indication-specific, and not uniformly supportive across claimed benefits.

Objective: To assess probiotic-related knowledge, beliefs, personal use, and recommendation practices among medical personnel, medical students, and pharmacy students in Basra, Iraq.

Design, Setting, and Participants: This cross-sectional questionnaire-based study was conducted in Basra, Iraq, during February and March 2026 using a structured bilingual questionnaire distributed through convenience sampling in academic and health care settings. A total of 157 eligible respondents were included in the final analysis.

Exposures: Formal probiotic teaching or training and participant educational and professional background.

Main Outcomes and Measures: Knowledge- and belief-related responses, personal probiotic use, recommendation practices, perceived barriers, and a composite probiotic knowledge/evidence-awareness score ranging from 0 to 7.

Results: Among 157 respondents, 101 (64.3%) were female, 66 (42.0%) were pharmacists, 49 (31.2%) were pharmacy students, 27 (17.2%) were physicians, and 15 (9.6%) were medical students. Correct identification of the probiotic definition was observed in 121 respondents (77.1%). Evidence-consistent responses were reported by 81 respondents (51.6%) for strain specificity, 91 (58.0%) for disagreement that all probiotics have the same effect, and 99 (63.1%) for disagreement that probiotics are completely safe for all individuals. The mean (SD) composite score was 4.59 (1.12). Formal probiotic training was associated with a higher composite score (mean rank, 87.25 vs 69.74; $P = .015$), higher self-rated knowledge (39.8% vs 12.2% with scores of 4 to 5; $P < .001$), and greater confidence in explaining probiotics (50.6% vs 25.7% with scores of 4 to 5; $P = .001$). Among professionals, formal training was associated with higher rates of ever recommending or prescribing probiotics (89.1% vs 62.2%; $P = .004$) and recommendation during the last 6 months (80.4% vs 54.1%; $P = .010$).

Conclusions and Relevance: Respondents showed moderate familiarity with probiotics, but important gaps remained in confidence, recommendation criteria, and product or strain selection. Formal probiotic training was the factor most consistently associated with better knowledge-related outcomes and recommendation behavior, supporting the need for clearer evidence-based education and guidance.

Keywords: probiotics, gut microbiota, health care professionals, students, Basra

1 Introduction

The human gastrointestinal tract contains a complex microbial ecosystem known as the *gut microbiota*. This microbial community plays an important role in digestion, metabolism, immune regulation, and resistance to pathogens.[1–3] Although its composition varies substantially between individuals, it is dominated mainly by bacterial phyla such as *Bacteroidetes* and *Firmicutes*.[1,2] Current evidence also suggests that there is no single fixed definition of a *healthy gut microbiome*; rather, it is better understood as a dynamic and resilient ecosystem influenced by host factors, diet, and microbial balance.[4,5] This growing understanding of the gut microbiota has increased interest in interventions intended to modify it, including probiotics.

According to the FAO/WHO Expert Consultation, later reaffirmed by the International Scientific Association for Probiotics and Prebiotics, probiotics are "*live microorganisms which, when administered in adequate amounts, confer a health benefit on the host*".[6,7] Probiotics have been investigated for a wide range of gastrointestinal and non-gastrointestinal conditions. However, their effects are not generalizable across all products or all settings. Current evidence indicates that probiotic benefits are strain-specific, indication-specific, and often dependent on dose, formulation, and target population.[8–11]

This distinction is important because probiotics are often discussed more broadly in public and commercial settings than the evidence clearly supports. Although some probiotic products may be beneficial in selected indications, current evidence does not support treating probiotics as a uniform therapeutic category. For many proposed uses, certainty remains limited, and the underlying mechanisms described in the literature do not justify broad extrapolation across strains or clinical contexts.[10,11] As a result, an important gap can arise between evidence and real-world understanding, particularly among those who may recommend, prescribe, dispense, or discuss these products with patients.

In this context, the knowledge base of current and future health care professionals becomes especially important. Physicians and pharmacists may influence patient perceptions, product choice, and recommendation behavior, while medical and pharmacy students represent future prescribers, dispensers, and health care advisors. Evidence from medical and pharmacy education suggests that deficiencies in medication-related knowledge and prescribing skills during undergraduate training may persist into professional practice, whereas targeted educational interventions can improve these competencies.[12–14]

Several studies have examined probiotic-related knowledge, attitudes, or practices in regional and international health care populations. In Iraq, a study from Mosul highlighted the lack of satisfactory national data regarding health care providers' knowledge and attitudes toward probiotics.[15] A Middle Eastern survey that included Iraq also reported limited probiotic knowledge among health care providers overall.[16] Despite this, to the best of our knowledge, there is currently no published Basra-based study specifically assessing probiotic-related knowledge and use among medical personnel, medical students, and pharmacy students.

Accordingly, this study aimed to assess probiotic-related knowledge, beliefs, personal use, and recommendation practices among medical personnel, medical students, and pharmacy students in Basra, and to identify awareness gaps, misconceptions, and the extent to which respondents' understanding aligns with current evidence-based practice.

2 Methods

2.1 Study Design and Setting

This cross-sectional questionnaire-based study was conducted in Basra, Iraq, during February and March 2026 to assess probiotic-related knowledge and patterns of use among medical personnel, medical students, and pharmacy students.

2.2 Study Population, Eligibility, and Sampling

The target population included physicians, pharmacists, medical students, and pharmacy students based in Basra. Eligible participants were aged 18 years or older and agreed to participate. Duplicate responses, respondents outside the target population, respondents not based in Basra, and incomplete or analytically ineligible responses were excluded. During data cleaning, respondents categorized as "Other" and invalid early-year student entries were removed from the final dataset.

No formal sample size calculation was performed before data collection. Instead, the questionnaire was distributed with the aim of obtaining the largest feasible number of eligible responses during the study period. A convenience sampling approach was used. The questionnaire was distributed by the student researchers through accessible academic and professional networks, with additional recruitment in health care settings in Basra, including community pharmacies and private physician offices. A total of 157 responses were included in the final analysis.

2.3 Study Instrument and Data Collection

Data were collected using a structured bilingual questionnaire in Arabic and English. The questionnaire began with a brief explanation of the study purpose and a consent statement acknowledged by participants before proceeding. Data collection was conducted primarily through Google Forms, although printed questionnaires were also used when needed.

The questionnaire was developed after reviewing similar questionnaire-based studies conducted in India, Pakistan, Iraq, and the United Arab Emirates.[17–21] It was designed to cover demographic and professional characteristics, sources of probiotic-related information, self-rated knowledge and confidence, objective knowledge and evidence-related beliefs, personal use and recommendation practices, and concerns or barriers related to probiotic use or recommendation.

Before the main data collection phase, the questionnaire was reviewed by the academic supervisor for clarity and relevance and pilot tested on a small group that included faculty members, practicing physicians, and pharmacists. Based on the feedback, minor wording modifications were made and an Arabic version of the questionnaire was added. Pilot responses were not included in the final analysis.

The questionnaire was distributed both online and in person through the student researchers' networks and in selected health care and academic settings in Basra. Participation was anonymous, and no personally identifying information was collected. Efforts were made to limit duplicate participation and retain only one response per participant.

2.4 Study Variables, Domains, and Scoring

The study variables were organized into 4 domains: participant characteristics, knowledge and beliefs about probiotics, personal use and recommendation practices, and concerns or limiting factors related to probiotic use or recommendation. As summarized in Table 1, these domains were selected to describe the sample, assess probiotic-related understanding, examine whether that understanding translated into behavior, and identify practical barriers to use or recommendation.

Participant characteristics included age group, gender, professional or academic category, student academic year, years in practice, and formal probiotic teaching or training. Knowledge-related variables included self-rated knowledge, confidence in explaining probiotics, correct identification of the probiotic definition, beliefs regarding strain specificity, beliefs about whether all probiotics have the same effect, beliefs about whether probiotics are completely safe for all individuals, and perceived evidence regarding probiotic use in antibiotic-associated diarrhea, irritable bowel syndrome, and immune boosting. Practice-related variables included personal probiotic use, reason for personal use, history of recommending or prescribing probiotics, recommendation activity during the previous 6 months, recommendation alongside systemic antibiotics, and selected recent recommendation indications. Concern-related variables included uncertainty regarding product or strain choice, insufficient scientific evidence, product quality or viability, possible harm in high-risk patients, lack of clear clinical guidelines, and the main factor limiting probiotic use or recommendation.

To provide a summary measure of probiotic-related knowledge and evidence awareness, a composite score was constructed from 7 items. Correct identification of the probiotic definition was scored as 1 for a correct response and 0 for an incorrect response. The remaining 6 knowledge- or evidence-related items were recoded as 1 for a scientifically appropriate response direction, 0.5 for a neutral or uncertain response, and 0 for an incorrect response direction. The total composite score ranged from 0 to 7, with higher scores indicating better probiotic knowledge and evidence awareness.

For selected analyses, formal probiotic teaching or training was simplified into a binary variable ("No / Not sure" vs "Yes, any formal training"). Multi-response items related to recent recommendation indications and concerns were converted into binary indicator variables so that each option could be analyzed separately. Open-ended comments were reviewed descriptively and grouped into broad thematic categories.

Table 1. Summary of study variable domains

Domain	Variables included	Purpose
Participant characteristics	Age group, gender, participant category, student year, years in practice, formal probiotic training	Describe the sample and examine differences by educational or professional background
Knowledge and beliefs	Self-rated knowledge, confidence, correct probiotic definition, strain specificity, safety and effect beliefs, perceived evidence in antibiotic-associated diarrhea, irritable bowel syndrome, and immune boosting	Assess factual understanding and evidence-related judgment
Practice-related variables	Personal probiotic use, reason for use, ever recommended/prescribed, recommendation in the last 6 months, recommendation with systemic antibiotics, recent recommendation indications	Assess whether probiotic-related understanding translated into behavior
Concerns and limiting factors	Scientific-evidence concerns, product or strain uncertainty, quality concerns, possible harm in high-risk patients, lack of guidelines, main limiting factor	Identify barriers affecting probiotic use or recommendation

2.5 Statistical Analysis

Data were entered and cleaned in Microsoft Excel before being imported into IBM SPSS Statistics version 31 (IBM Corp) for analysis. Categorical variables were summarized using frequencies and percentages, while the composite probiotic knowledge/evidence-awareness score was summarized using mean, standard deviation, and observed range.

Because most study variables were categorical or ordinal, categorical and non-parametric statistical methods were used where appropriate. Associations between categorical variables were examined using cross-tabulation with Pearson's chi-square test, and Fisher's exact test was considered when expected cell counts were small. Comparisons of the composite knowledge/evidence-awareness score between two groups were performed using the Mann–Whitney U test, while comparisons across more than two groups were performed using the Kruskal–Wallis test.

Analyses were structured according to the conceptual relevance of each variable. Knowledge-related and personal-use analyses were conducted in the full sample. Selected analyses also explored differences between students and graduated respondents. Analyses related to recommendation behavior in clinical practice were restricted to practicing professionals when necessary for clearer interpretation. All tests were 2-sided, and $P < .05$ was considered statistically significant.

2.6 Ethical Considerations

Participation was voluntary, and informed consent was obtained at the beginning of the questionnaire. Responses were collected anonymously, and no personally identifiable information was recorded. Data were used solely for academic research purposes.

3 Results

3.1 Participant Characteristics

A total of 157 respondents were included in the final analysis (Tables 2 and 3). The largest age groups were 25 to 29 years (43.9%) and 30 to 39 years (34.4%), and most respondents were female (64.3%). By participant category, 42.0% were pharmacists, 31.2% were pharmacy students, 17.2% were physicians, and 9.6% were medical students. Formal probiotic teaching or training was mixed: 32.5% reported no formal training and 14.6% were unsure, while the remainder reported undergraduate training, workshop or continuing education, or both.

3.2 Knowledge and Beliefs about Probiotics

Knowledge- and belief-related findings are shown in Table 4. Self-rated knowledge and confidence in explaining probiotics were mostly moderate. Correct identification of the probiotic definition was observed in 77.1% of respondents. Evidence-consistent responses were reported by 51.6% for strain specificity, 58.0% for disagreement that all probiotics have the same effect, and 63.1% for disagreement that probiotics are completely safe for all individuals.

Perceived evidence was strongest for antibiotic-associated diarrhea (75.2% rated as moderate or strong), followed by irritable bowel syndrome (72.6%) and immune boosting (63.1%). The composite probiotic knowledge/evidence-awareness score ranged from 2.0 to 7.0, with a mean (SD) of 4.59 (1.12).

Table 2. Demographic and participant characteristics (N = 157)

Age group		**Gender**	
<20	4 (2.5)	Female	101 (64.3)
20 to 24	5 (3.2)	Male	53 (33.8)
25 to 29	69 (43.9)	Prefer not to say	3 (1.9)
30 to 39	54 (34.4)		
≥40	25 (15.9)		
Participant category			
Medical student	15 (9.6)		
Pharmacy student	49 (31.2)		
Physician	27 (17.2)		
Pharmacist	66 (42.0)		

Table 3. Training and experience characteristics

Formal probiotic teaching/training (N = 157)		**Years in practice among professionals (n = 83)**	
No	51 (32.5)	<1 year	19 (22.9)
Not sure	23 (14.6)	1 to 5 years	35 (42.2)
Yes, both	35 (22.3)	6 to 10 years	16 (19.3)
Yes, workshop/continuing education	14 (8.9)	>10 years	13 (15.7)
Yes, undergraduate studies	34 (21.7)		
Student academic year among students (n = 64)			
3rd	13 (20.3)		
4th	12 (18.8)		
5th	36 (56.3)		
6th	3 (4.7)		

Table 4. Knowledge and beliefs about probiotics (N = 157)

Item	**Evidence-consistent**	**Neutral or unknown**	**Evidence-inconsistent**
Correct probiotics definition	121 (77.1)	–	36 (22.9)
Probiotic effects are strain-specific	81 (51.6)	46 (29.3)	30 (19.1)
All probiotics have the same effect	91 (58.0)	42 (26.8)	24 (15.3)
Probiotics are completely safe for all	99 (63.1)	34 (21.7)	24 (15.3)
Perceived evidence for probiotics in AAD	118 (75.2)	20 (12.7)	19 (12.1)
Perceived evidence for probiotics in IBS	114 (72.6)	20 (12.7)	23 (14.6)
Perceived evidence for probiotics in IMB	99 (63.1)	22 (14.0)	36 (22.9)
Composite knowledge/evidence-awareness score: mean (SD), 4.59 (1.12); range, 2.0 to 7.0			

AAD = antibiotic-associated diarrhea; *IBS* = irritable bowel syndrome; *IMB* = immune boosting. Evidence-consistent responses indicate the scientifically appropriate response direction for each item. For the definition item, responses were classified as correct or incorrect only.

3.3 Personal Use, Recommendation Practices, and Barriers

Personal use and recommendation-related findings are shown in Table 5. In the full sample, 43.9% reported personal probiotic use. Among professionals, 77.1% had ever recommended or prescribed probiotics, and 68.7% had done so within the last 6 months. The most commonly reported recent indication was acute infectious diarrhea (57.8%), followed by irritable bowel syndrome (41.0%). Recommendation alongside systemic antibiotics was inconsistent, with many respondents reporting "not sure" or "never."

Among 58 coded open-ended comments, the largest category was "No Suggestion / Unclear" (27.59%). The most frequent actionable themes involved education or awareness, guideline-related needs, and evidence- or research-oriented recommendations, whereas purely cost- or access-related suggestions were less common.

Concerns and limiting factors among graduated respondents are summarized in Table 6. The most frequent concerns were uncertainty regarding product or strain choice (28.0%) and lack of clear clinical guidelines (28.0%), followed by product quality or viability (22.6%), insufficient scientific evidence (21.5%), and possible harm in high-risk patients (20.4%). The main limiting factors were cost and affordability (32.3%), lack of knowledge or confidence (25.8%), and limited access to good quality products (16.1%).

Table 5. Personal use in the full sample and recommendation practices among professionals

Variable	**n (%)**
Full sample (N = 157)	
Ever used probiotics personally: Yes	69 (43.9)
Ever used probiotics personally: No	88 (56.1)
Professionals only (n = 83)	
Ever recommended/prescribed probiotics: Yes	64 (77.1)
Ever recommended/prescribed probiotics: No	19 (22.9)
Any recommendation/prescription in the last 6 months: Yes	57 (68.7)
Any recommendation/prescription in the last 6 months: No	26 (31.3)
Frequency of recommending probiotics with systemic antibiotics	
Always	1 (1.2)
Often	3 (3.6)
Sometimes	11 (13.3)
Rarely	12 (14.5)
Never	24 (28.9)
Not sure	32 (38.6)
Recommended indication in the last 6 months	
Acute infectious diarrhea	48 (57.8)
Irritable bowel syndrome	34 (41.0)
Chronic constipation	16 (19.3)
Immune boosting in healthy individuals	21 (25.3)
Other	16 (19.3)
Did not recommend in last 6 months	26 (31.3)

Table 6. Concerns and limiting factors among graduated respondents (n = 93)

Variable	n (%)
Specific concerns	
Unsure what product or strain to use	26 (28.0)
No clear clinical guidelines	26 (28.0)
Product quality/live organism reliability	21 (22.6)
Not enough scientific evidence	20 (21.5)
Possible harm in high-risk patients	19 (20.4)
Other concern	13 (14.0)
Any specific concern	88 (94.6)
No major concerns	5 (5.4)
Main limiting factor	
Cost and affordability for patients	30 (32.3)
Lack of knowledge or confidence	24 (25.8)
Limited access to good quality products	15 (16.1)
No major limitations	13 (14.0)
Probiotics not important in practice	6 (6.5)
Lack of time to counsel patients	5 (5.4)

3.4 Comparative Analyses

The main comparative analyses are shown in Table 7. Graduated respondents tended to have higher composite knowledge/evidence-awareness scores than students, but the difference was not statistically significant (Mann–Whitney U = 2436; $P = .052$). Correct identification of the probiotic definition (77.4% vs 76.6%; $P = .900$) and personal probiotic use (43.0% vs 45.3%; $P = .775$) were also similar between the groups. These findings suggest that broad respondent status alone, such as being a student or graduated respondent, was not strongly associated with probiotic-related knowledge or personal use in this sample.

Formal probiotic training was significantly associated with better knowledge-related outcomes. Respondents with any formal training had higher composite scores (Mann–Whitney U = 2386; $P = .015$), and higher proportions reported self-rated knowledge scores of 4 to 5 (39.8% vs 12.2%; $P < .001$) and confidence scores of 4 to 5 (50.6% vs 25.7%; $P = .001$). Correct identification of the probiotic definition was also more frequent among trained respondents (83.1% vs 70.3%), although this difference was borderline ($P = .056$). Overall, these findings indicate that formal probiotic training was more strongly associated with better knowledge-related outcomes than broad educational or graduation status alone.

Among professionals, formal training was also associated with recommendation behavior. Trained professionals were more likely to have ever recommended or prescribed probiotics (89.1% vs 62.2%; $P = .004$) and to have recommended them within the last 6 months (80.4% vs 54.1%; $P = .010$). Training was not significantly associated with recommendation alongside systemic antibiotics, although a borderline inverse trend was observed (23.9% vs 43.2%; $P = .062$). This may suggest that formal training was linked not only to greater familiarity, but also to greater readiness to recommend probiotics in practice, while recommendation alongside antibiotics may have been influenced by more selective or cautious decision-making.

Exploratory subgroup analyses by discipline are presented in Table 8. Among students, pharmacy students had higher correct-definition rates than medical students (81.6% vs 60.0%), although the difference was not statistically significant (*P* = .084). Among professionals, pharmacists showed higher rates of ever recommending probiotics (75.8% vs 66.7%) and recent recommendation activity (69.7% vs 55.6%) than physicians, but these differences were also not statistically significant. These exploratory findings may suggest discipline-related differences in probiotic familiarity and recommendation behavior, but the present sample was not large enough to support firm conclusions.

Table 7. Main comparative analyses

Student vs graduated respondents			
Variable	**Students**	**Graduated respondents**	***P* value**
Composite score*	Mean rank 70.56	Mean rank 84.81	.052
Correct probiotics definition	49/64 (76.6%)	72/93 (77.4%)	.900
Ever used probiotics personally	29/64 (45.3%)	40/93 (43.0%)	.775
Formal training and knowledge-related outcomes			
Variable	**No / Not sure training**	**Any formal training**	***P* value**
Composite score*	Mean rank 69.74	Mean rank 87.25	.015
Correct probiotics definition	52/74 (70.3%)	69/83 (83.1%)	.056
Self-rated knowledge score 4 to 5	9/74 (12.2%)	33/83 (39.8%)	<.001
Confidence score 4 to 5†	19/74 (25.7%)	42/83 (50.6%)	.001
Formal training and recommendation behavior among professionals			
Variable	**No / Not sure training**	**Any formal training**	***P* value**
Ever recommended/prescribed probiotics	23/37 (62.2%)	41/46 (89.1%)	.004
Any recommendation in the last 6 months	20/37 (54.1%)	37/46 (80.4%)	.010
Any recommendation with antibiotics	16/37 (43.2%)	11/46 (23.9%)	.062

**Composite score* = composite probiotic knowledge/evidence-awareness score (range, 0 to 7); higher scores indicate better knowledge and evidence awareness.
†*Confidence score 4 to 5* = confidence in explaining probiotics rated as 4 or 5 on the 5-point scale.

Table 8. Exploratory subgroup analyses by discipline

Variable	**Comparison**	**Result**	***P* value**
Knowledge score	Medical vs pharmacy students	Mean rank 27.27 vs 34.10	.209
Correct probiotics definition	Medical vs pharmacy students	60.0% vs 81.6%	.084
Ever used probiotics personally	Medical vs pharmacy students	60.0% vs 40.8%	.192
Knowledge score	Physicians vs pharmacists	Mean rank 44.26 vs 48.12	.527
Ever recommended probiotics	Physicians vs pharmacists	66.7% vs 75.8%	.369
Recommendation in last 6 months	Physicians vs pharmacists	55.6% vs 69.7%	.193

4 Discussion

This study found that respondents in Basra had moderate familiarity with probiotics, but that familiarity did not always translate into confident or practice-ready understanding. The most important finding was that formal probiotic training was consistently associated with better knowledge-related outcomes and greater recommendation behavior, especially among professionals.

A useful way to interpret the present results is to distinguish between *recognition* and *application*. Many respondents could correctly identify the probiotic definition and answered several belief-based items in the scientifically appropriate direction, suggesting that probiotics were not an unfamiliar concept in this population. However, the same respondents were less convincing when the findings were viewed from a practical perspective, especially in terms of confidence, recommendation behavior, and barriers related to product or strain selection. This suggests that the main issue in this sample was not simple awareness of probiotics, but uncertainty about how to use them responsibly and in an evidence-based way.

The findings also suggest that applied confidence may be more important than familiarity alone. Respondents with formal training had higher composite knowledge/evidence-awareness scores, greater self-rated knowledge, and greater confidence in explaining probiotics. Among professionals, training was also associated with a greater likelihood of recommending probiotics. This is important because it suggests that training may help bridge the gap between knowing *about* probiotics and feeling able to use that knowledge in actual clinical or advisory decisions. Importantly, the present study was not designed to support broad probiotic promotion. Probiotic effects are not universal, and the evidence remains heterogeneous, strain-specific, and indication-specific.[10,11] The findings should therefore be interpreted as reflecting respondents' knowledge and use of probiotics in relation to current evidence, not as an endorsement of probiotics as a broadly established therapeutic category.

Compared with previous regional studies, the present findings suggest an intermediate pattern. In Pakistan, Arshad et al found low levels of good knowledge and good practice despite generally positive attitudes toward probiotics,[17] while Khalid et al also reported limited good knowledge among both doctors and medical students, with lack of knowledge identified as the main barrier.[18] By contrast, the Jordanian medical-student study reported acceptable general familiarity and positive attitudes, although only a minority recognized that probiotic effects are strain-specific.[22] In Iraq, Hashim et al found high familiarity with the probiotic definition but limited readiness to recommend probiotics,[15] and Al-Musawe et al similarly identified lack of knowledge about clinical indications as the main barrier to prescribing.[21] Together, these studies suggest that awareness of the term *probiotic* is not the main problem; the more important gap is applied, evidence-based use.

The present results also align with the recent Turkish survey of physicians and pharmacists, which showed that familiarity with probiotics did not necessarily eliminate uncertainty in practice.[23] This is consistent with our finding that many respondents could identify the probiotic definition correctly, yet important gaps remained in confidence, recommendation criteria, and product or strain selection. The Indian student study likewise suggested generally favorable awareness and attitudes,[20] but student awareness alone does not ensure confident clinical application. Overall, the regional literature supports the interpretation that familiarity with probiotics is often broader than the ability to use them critically and selectively.

Formal training was the factor most clearly associated with stronger outcomes in this study. That pattern is important because it points to a potentially modifiable educational target rather than a fixed difference between students and graduated respondents or between disciplines. This interpretation is consistent with evidence on academic detailing and evidence-based prescribing, which shows that structured, evidence-oriented educational outreach can improve prescribing behavior more effectively than passive exposure alone.[24] It is also consistent with broader implementation literature showing that translation of evidence into practice depends not only on knowledge, but also on confidence, contextual support, and the practical ability to act on evidence.[25]

The barrier-related findings fit this interpretation. Although cost was relevant, the deeper barriers were uncertainty about product or strain choice and lack of clear guidance. Similar barriers have been reported in Pakistan, Iraq, and the UAE, where lack of knowledge, unfamiliarity with available products, and cost-related concerns were all prominent.[15,17–19] Across these studies, the recurring problem is not rejection of probiotics, but uncertainty about how to use them appropriately and when they are justified.

This study has several strengths. To the best of our knowledge, it is the first Basra-based study to assess probiotic-related knowledge and use among both health care personnel and medical and pharmacy students. It also examined multiple dimensions together, including knowledge, beliefs, personal use, recommendation behavior, and perceived barriers. In addition, the composite knowledge/evidence-awareness score provided a broader summary of understanding than any single questionnaire item alone.

This study also has limitations. Its cross-sectional design does not allow causal inference, convenience sampling may limit generalizability, and the data were self-reported. Some subgroup analyses were also based on relatively small and uneven groups. Finally, the composite score was a study-specific analytic measure rather than a formally validated scale.

Overall, the findings suggest that respondents in Basra were not unfamiliar with probiotics, but many still lacked the confidence and applied knowledge needed for evidence-based recommendation. Formal training was the most consistent differentiating factor. These results support the need for clearer educational exposure and more practical guidance on strain specificity, indication-specific evidence, uncertainty, and clinically defensible use.

5 Conclusion

This study provides a Basra-based assessment of probiotic-related knowledge, beliefs, personal use, and recommendation practices among medical personnel, medical students, and pharmacy students. Overall, respondents showed moderate familiarity with probiotics, but this did not necessarily translate into confident or practice-ready understanding.

The most important finding was that formal probiotic training was consistently associated with better knowledge-related outcomes and greater recommendation behavior, especially among professionals. At the same time, the findings do not support broad or enthusiastic probiotic promotion, since important uncertainty remained regarding recommendation criteria, strain or product selection, and the strength of evidence across indications.

Taken together, these findings suggest a need for clearer evidence-based probiotic education and more practical guidance, with emphasis on limitations, uncertainty, strain specificity, and clinically defensible decision-making.

Article Information

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