Journal of Young Pharmacists, 2023; 15(1):138-143.
www.jyoungpharm.org

Original Article

Lebanese Pediatricians' Knowledge, Attitude and Practice Patterns toward Probiotics

Aya Ali Hashem Taleb[1,*], Sara Issam Abdel Samad[1], Issam Hekmat Abdel Samad[2], Mohamad Khaled Rahal[1], Nathalie Adel Lahoud[3], Marwan Ghazi El Akel[1,4], Ahmad Ibrahim Dimassi[1]

[1]School of Pharmacy, Lebanese International University, Beirut, LEBANON
[2]Department of Pediatrics, Ain Wazein Medical Village, Mount Lebanon, LEBANON.
[3]Department of Epidemiology, Faculties of Pharmacy and Public Health, Lebanese University, Beirut, LEBANON.
[4]Inspect_LB: Institut National de Santé Publique, Épidémiologie Clinique et Toxicologie, Beirut, LEBANON.

ABSTRACT

Background: Over the past few years, the use of probiotics increased remarkably, along with the increase in antibiotics resistance. With the wide variety of probiotic strains and different brands available in the Lebanese market, a major concern has arisen regarding prescriber awareness and knowledge of probiotics and their use. The goal of this study is to assess Lebanese pediatricians' probiotic knowledge, attitudes, and practice patterns. **Materials and Methods:** A multicenter cross-sectional observational study was carried out. It included Lebanese pediatricians who were chosen by convenience. Participants were required to complete a four-part questionnaire that included demographics; knowledge about probiotics, attitude and practice, and a total of 12 points knowledge score was estimated. **Results:** The questionnaire was completed by 126 of the 149 eligible pediatricians. 89.7% of participants were familiar with the correct definition of probiotics. The calculated median knowledge score was 8 [6-9] points. According to the bivariate analysis, pediatricians prescribing probiotics showed higher knowledge score in comparison to those who do not (*P* value=0.007); In terms of consultations per day, those who examined 10-20 patients per day had a significantly higher knowledge score than those with less than 10 and more than 20 patients per day. (*P* value=0.004). **Conclusion:** The data showed a good knowledge, that is positively affecting the pattern of prescription of probiotics, yet it could be further improved.

Keywords: Attitude, Knowledge score, Lebanese Pediatricians, Practice, Probiotics, Strains.

Correspondence:
Dr. Aya Hashem Taleb, PharmD
Lebanese International University, School of Pharmacy, Mazraa, Beirut-146404, LEBANON.
E-mail id: Aya_taleb@live.com

Received: 29-07-2022 ;
Revised: 20-08-2022 ;
Accepted: 25-09-2022.

INTRODUCTION

According to the International Scientific Association for Probiotics and Prebiotics (ISAPP), probiotics are defined as: "live micro-organisms that, when administered in adequate amounts, confer a health benefit on the host".[1] Many strains of probiotics were studied in various health conditions; the most familiar genera are Genus *Lactobacillus*, Genus *Bifidobacterium*, Genus *Saccharomyces*.[2] These probiotics can be obtained from dietary sources, primarily from dairy products.[3]

Although the mechanism of action of these microorganisms isn't fully understood, many possible molecular mechanisms were proposed.[4] Probiotics have been used for numerous conditions, mainly for gastrointestinal disorders as irritable bowel disease,[5] *Clostridium difficile* infection,[6] and for non-GI disorders as well, including allergy,[7] and metabolic disorders.[8] Manufacturers promote probiotic products as beneficial to human's health, neglecting any possible safety concerns. The latter might include allergic reactions and opportunistic infections.[9] Unfortunately, research in this field is limited; therefore little information regarding probiotic benefit is available to health care professionals and the general public. Previous studies were conducted to determine health care provider's knowledge and perception to the use of probiotics.[10-13] Despite the fact that each of these studies stated a different level of knowledge and awareness regarding probiotics, all of them emphasized on the importance of continuous education in the health care field.

Since the introduction of the concept of probiotics in Lebanon, indications for its use have varied between physicians and their preference. In addition to that, with the large diverse availability of probiotics strains and brands in the Lebanese market, a major concern has emerged about the prescribers' extent of the awareness and knowledge of probiotics and their use. Therefore, this study was conducted to assess the Lebanese pediatricians' knowledge, perception, toward the use of probiotics.

DOI: 10.5530/097515050476

Table1: 'Probiotics knowledge score' grade distribution.

Question	Correct Answer	Points
Probiotic Definition	Live bacteria that are helpful to your health when consuming them	1
Indications	Allergy	1
	Gut Health IBD	1
	IBS	1
	Immune Health	1
	Overweight/ Obesity	1
Mechanism of Action	Improving Intestinal barrier functioning	1
		1
	Modulating pain perception	1
	Modulating the Immune system	1
	Suppressing the growth/ invasion of pathogenic bacteria	
Uses	Prophylaxis	1
	Treatment	1
Total Grade		12

Abbreviations: **IBD:** Inflammatory bowel disease; **IBS:** Irritable bowel disease.

MATERIALS AND METHODS

Study design

This cross-sectional, multicenter, observational study was conducted from December 2018 to May 2019. It targeted the Lebanese pediatricians, from all over Lebanon, who was part of the Lebanese Pediatric Society (LPS). The research sample was extracted from Lebanese Pediatric Society contact list.

The study was reviewed and approved by the Institutional Review Board of the School of Pharmacy (IRB number: 2020RC-062-LIUSOP), at the Lebanese International University (LIU) – Beirut, this research and ethics committee was established to look at the ethical aspects of the research projects and to grant approval for research to proceed. Both Oral and written informed consent (provided within the original data collection sheet) were obtained from all the participating pediatricians in the study; the investigators declared to the participants that the study respects their privacy and confidentiality and the results of the study will be presented anonymously without the disclosure of the hospital or physician's identity.

Study population

The study took place at community and hospital settings. According to the literature, study population should be relatively homogenous; thereby inclusion and exclusion criteria should be established in order to collect a reliable sample size.[14] Inclusion criteria define the study population in a uniform, consistent and objective aspect, whereas, exclusion criteria represent the factors that makes the individual ineligible to be enrolled in the study.[15]

Thereby, in this study, eligible participants were pediatricians legally practicing their profession by being a member of the Lebanese Order of Physicians, as well as a member of the Lebanese Pediatric Society in Beirut and Tripoli, so any participant missing these criteria was excluded from the study.

With the use of the software Epi-info version 7.2.2.6, the minimum required sample size was calculated using the following: the reported number of registered pediatricians at the LPS is 1363 (N = 1363). Based on a similar study conducted in Ahmedabad, India,[11] the expected frequency of acceptable knowledge was 91.3%. Thus, the minimum sample size calculated was 115 participants with a confidence level of 95% and an acceptable margin of error of 5%.

Questionnaire design

The questionnaire was modeled and inspired by similar previous studies.[12,13] It was designed by the investigators to seek the research objective; it involved 4 sections that included the demographics of the physician, the knowledge about probiotics, the attitude toward its use, and an assessment of their practice.

Before starting active data collection, a pilot study was conducted on 10 pediatricians. As a result, 2 questions from the original questionnaire were modified to be more comprehensive for the target population.

Data collection

The data collection occurred by visiting the physicians either at their private clinics or at their outpatient clinics at the hospitals. The pediatricians were contacted by phone at the beginning in order to take an appointment to meet them face-to-face at their clinics. The data collection sheet was filled by the physician, with the supervision of the investigators, in a process lasting for 5-15 min. The questions in the questionnaire were afterwards transformed to a knowledge score Table 1, based on a validated score in a similar study conducted in India, where one point was given for the correct answer and zero points for the incorrect one.[11]

Data analysis

Statistical analysis was conducted using the SPSS (Statistical Package of Social Science) version 23. The quantitative data were characterized by determining the percentage, mean, standard deviation (SD), and median, quartiles, maximum and minimum values. Nominal data were described using numbers and percentages. Various statistical tests were used to check for the associations between different variables. Man-Whitney test was used to assess the relation between the knowledge score and gender, sub-specialty, whether the pediatrician is a researcher, and prescribes probiotics. Associations between the knowledge score and patient population, consultations number per day were determined using the Kruskal-Wallis test. Spearman test

was used to examine the association of the knowledge score and the pediatrician's age and years in practice. The 95% confidence intervals (CI) were based on likelihood. All P values were two-sided and were considered significant whenever it was <0.05.

Once the data was obtained from the questionnaires, it was analyzed, and a knowledge score was computed by a team of clinical pharmacists and an epidemiologist, in order to check for the general knowledge of the enrolled pediatricians about probiotics. This score was used to properly assess the knowledge of pediatricians about the use of probiotics, and to shed light on the possible gap in the knowledge that might be the reason behind the inappropriate practice and use of probiotic products among the pediatric population.

Study Outcomes

The primary outcome of this study was to assess the knowledge, attitude, and practice of Lebanese pediatricians concerning the use of probiotics. Whereas the secondary outcomes were to evaluate whether the knowledge is influenced by factors; such as age, subspecialty, years of practice, and additional position (researcher or university), and if this knowledge itself might influence the practice.

RESULTS

A total of 149 pediatricians were initially screened, 11 refused to participate and 12 quit the study, ending up with a total of 126 participants who fulfilled the inclusion criteria and were enrolled in the study, with a response rate of 84.56%. Demographic data, as displayed in Table 2, showed that enrolled pediatricians had a mean age of 47.86 ± 11.57 (Mean years ± standard deviation SD), and a median years of practice of 20 [9.5-26] (Median [Interquartile range]). Regarding the gender, 58.7% of the responders were males. All the participants were general pediatricians, of which 36.5% had an additional subspecialty.

When asked about the definition of probiotics, the vast majority of the pediatricians, 113 (89.7%), chose the right definition which is "live bacteria that are helpful to your health when you consume them". Concerning probiotics' source, the majority of the pediatricians have chosen more than one option, 79.4% of them claimed that cultured dairy products are the best source, whereas 24.6% said that food supplements provide a good source for probiotic. As for the indication of probiotics, 91.3% of our target population selected gut health.

With respect to its use, 88.1% participants considered that probiotics are used for both prophylaxis and treatment. Thirty seven participants (29.4%) believed that they don't need any further education concerning probiotics and their use; on the contrary to the 69.8% of pediatricians who claimed that they prefer to get more knowledge.

A probiotic knowledge score (PKS) was calculated (Table 1); a mean PKS of 7.58 points ± 2.48 (Mean ± SD) was obtained, with a median of 8.0 [6-9] points. When asked whether probiotics are beneficial or not, most of the participants 78 (61.9%) agreed, 25 (19.8%) strongly agreed, 15 (11.9%) had a neutral attitude, 3 (2.4%) disagreed and 3 (2.4%) strongly disagreed on its benefit. The main reason for the pediatricians to disagree or being neutral towards the benefit of probiotics was that probiotics have no proven benefit (100%); two pediatricians left a note that "probiotics could increase the risk of autoimmune disease".

When the pediatricians were asked about the affordability of probiotics in Lebanon, 77% of the participants believed that probiotics are affordable to their patients. From the enrolled sample, 24.6% of them claimed that they consult < 10 patients per day, 50.8% consult 10-20, and 17.5% consult > 20 patients per day. Among the participants, 88.9% prescribed probiotics.

The prescribers were further classified based on their personal preference of the probiotics strains, where 15.9% prefer single strains and 70.6% favor a combination of strains. Concerning the dosing regimen, the participants were asked about the regimen

Table 2: Demographic Characteristics of Pediatricians.

Characteristics		N (Percentage)
Age (Mean ± SD)		47.86 ± 11.57
Gender	Male	74 (58.7%)
	Female	52 (41.3%)
General Pediatricians		126 (100%)
Additional Subspecialty		46 (36.5%)
Years in Practice (Median ±IQR)		20 [9.5-26]
Patient Population	In/Out	105 (83.3%)
	Out	10 (7.9%)
	In	7 (5.6%)
Researcher/University Instructor		43 (34.1%)

Abbreviations: **SD:** Standard deviation; **IQR:** Interquartile range; **N:** Sample size

in both acute and chronic conditions. For acute conditions, data has shown that a twice daily regimen is the most commonly recommended regimen, usually prescribed for 1 week. Whereas for chronic therapy, the most frequently used dosing regimen is the once daily regimen for 1 month, on the other hand 17.5% of the pediatricians declared that they do not use probiotics for chronic conditions.

Moreover, the prescribers stated that they extensively prescribe probiotics for the management of antibiotic associated diarrhea (AAD); 43.7% tended to prescribe it along with the antibiotic course, 38.9% recommended its use after the antibiotics course, and a minority did not recommend probiotics for AAD.

Primary Outcome: Knowledge of pediatricians about probiotics and its use in acute infectious diarrhea in children

The mean knowledge score for all the enrolled pediatricians was 7.58±2.48 points (Mean ± SD). The median of the total knowledge score was 8 [6-9] points (Median [Quartiles]); 51.6 % of the participants had a knowledge score of ≥8 points, which is defined as a good knowledge.

Secondary Outcome: Association between the knowledge score and the different variables through bivariate Analysis

A non-parametric bivariate analysis, using the Kruskal- wallis test revealed that physicians who consulted 10-20 patients per day had a significant higher knowledge when compared to those who have > 20 and < 10 consults per day (mean rank 66.6 vs 60.45 vs 42.27 respectively (Pvalue = 0.004).

Another non-parametric test (Man-Whitney test) revealed that physicians, who prescribed probiotics throughout their practice, had a better knowledge when compared to the non-prescribers, with a mean rank of 65.93 vs 37.73, and a Pvalue of 0.007.

Contrarily, the analysis displayed that the knowledge score was not affected by gender, subspecialty, years of practice, patient population, and whether the participant is a researcher or a university instructor. For further details refer to Table 3.

DISCUSSION

The quantitative data of this study demonstrated that the pediatricians' knowledge about probiotics was remarkably high, where 89.7% were able to identify the correct definition

Table 3: Bivariate analysis of the association between mean knowledge scores and demographic/attitude of the studied population (*n*=126).

Knowledge	Mean Rank	Sum of Ranks	*P* value	Test
Gender				
Males	61.05	4518	0.364	Man-Whitney
Females	66.98	3483		
Age	R spearman= 0.055		0.556	Spearman
Sub-specialty				
No	64.76	5181	0.605	Man-Whitney
Yes	61.30	2820		
Years of Practice	R spearman = 0.066		0.475	Spearman
Patient Population				
In patients	47		0.457	Kruskal-Wallis
Out patients	56.7			
In- out patients	62.92			
Researcher				
No	58	4408	0.395	Man-Whitney
Yes	63.53	2732		
Consultations number				
<10	42.27		0.004	Kruskal-Wallis
10-20	66.6			
>20	60.45			
Prescribed Probiotics				
No	37.73	490.5	0.007	Man-Whitney
Yes	65.93	7384		

Abbreviations: R spearman, Rank-order correlation

of probiotics, which is "live bacteria that are helpful to your health when you consume them".[12] Interestingly, when compared to a similar study conducted by Oliver L *et al.* in the USA, that aimed to assess the health care providers' (including pediatricians) knowledge, perceptions, and use of probiotics and prebiotic, an equivalent percentage of the physicians (91%) defined probiotics properly.[12] Thus surprisingly, pediatricians in developing countries and those in developed countries have similar knowledge; this could be due to the access of the Lebanese pediatricians to the American society guidelines and their implication in the management of various health conditions among the Lebanese population. In this study, the computed mean Probiotic Knowledge Score (PKS) was 7.58 ± 2.48 (mean score ± SD), with a median of 8.0. The latter shows that the Lebanese pediatricians have an acceptable knowledge score when it comes to probiotics, yet, it could be further improved, which was demonstrated by the 69.8% of the participants who claimed that they prefer to gain more knowledge via conferences (42.1%). A comparable study conducted in Nigeria has shown that the Nigerian health care professionals have limited awareness and knowledge of the beneficial probiotics; this may be due to the restricted access to updated studies and peer reviewed journals that require prepaid subscriptions.[13] Therefore, the continuous education in Lebanon can be motivated and empowered by providing unlimited and free access to the updated reputable journals, as well as highlighting the major role of the pharmacists, who are considered to be potential drug experts, in assisting the educational process.

The pediatricians' attitude usually reflects the preconceived ideas towards the probiotics as a concept and their willingness to recommend it. The pediatricians in our study disclosed a high confidence that probiotics are beneficial to the human's health (81.7%), on the contrary to the remaining part who disagreed on its benefits claiming that it has no proven benefit. Contradictory studies are present concerning the benefit of probiotics.[9] Although, few studies have shed light on the fact that the use of probiotics is not risk free; some have demonstrated the risk of sepsis and fungemia in a number of populations.[13]

According to the World Gastroenterology Organization Global Guidelines for the use of probiotics and prebiotics, probiotics have been indicated for antibiotic-associated diarrhea, *Clostridium difficile* – associated diarrhea, *Helicobacter pylori*, immune health, IBD, IBS, colic, lactose malabsorption, necrotizing enterocolitis, non-alcoholic fatty liver disease, and for the prevention of systemic infections,[16] in addition to a promising role in the management of metabolic diseases, such as overweight and obesity.[8,17] As for our study, pediatricians seem to prescribe probiotics predominantly for gastrointestinal disorders; this could be mainly because probiotics were shown to have a great role in gastrointestinal disorders, and the pharmaceutical companies as well as the medical journals majorly highlight the probiotics' role particularly for this indication, which is believed to be one of the oldest indications of probiotics. As for the pediatricians' recommendations for single or combined strains of probiotics, 70.6 % preferred a combination of strains. When it comes to the availability of the single strains probiotics in the Lebanese market, it tends to be limited in number, where the majority is a combination of different strains.

Concerning the use of probiotics for antibiotic – associated diarrhea, 43.7% of the enrolled physicians recommended probiotics to be co-administered with antibiotics as prevention of AAD and 38.9% after the completion of the antibiotic course for the management of AAD. The available literature emphasized on probiotics' possible role in the prevention of AAD when co-administered with antibiotics. A study conducted by Alam S and Mushtaq M, in 2009, revealed that probiotics prevented antibiotic associated diarrhea in 1 out of 7 children.[18] Some claim that 10-25% of the total AAD is related to Clostridium difficile-associated diarrhea (CDAD),[19] yet, studies have shown that CDAD is less common among the pediatric population.[18]

As for the relationship between the number of consultations per day and the knowledge score, physicians consulting 10-20 patients tend to have a significantly better knowledge than those consulting >20 or even < 10 patients per day. This could be explained by the fact that physicians who have more than 20 consults per day tend to have a busy day, after which they tend to be too exhausted to seek further education, whereas those having less than 10 consults could be more into administrative work rather than a pure medical one, so they could be less interested in updating their medical knowledge, mainly in controversial topics.

Lastly, enrolled pediatricians who prescribed probiotics had a significantly higher knowledge score than those who didn't. It is logical, where pediatricians are motivated to know more about the prescribed medications' and supplements' safety and efficacy in various indications. We should also highlight the role of the pharmaceutical companies that aid in spreading knowledge among the physicians via conferences and workshops.

Strengths and Limitations

This study evaluated Lebanese pediatricians' knowledge, attitudes, and beliefs about probiotics; this descriptive study is one of a kind in Lebanon tackling this specific subject. Moreover, the researchers of this study are clinical pharmacists who worked previously in community pharmacies, thus they are considered as drug experts as well as they have quiet the good knowledge about the possible probiotic indications. In addition to that, their experience as community pharmacists allowed them to have an insight into the available probiotics brands in the Lebanese market and the pattern of prescription of probiotics by the physicians. Concerning the data collection, the researchers themselves collected the data through face-to-face interviews with the pediatricians. Another empowering point is that a

pilot study was conducted prior to the data collection, which allowed the amelioration of the final questionnaire. Finally, the study included multiple centers from all across Lebanon, which increased the diversity of the possible answers.

As for the limitations, being a cross-sectional study made it impossible to determine any possible cause-effect relations amongst the use of probiotics and the likely side effects, as well as it made it difficult to establish a pharmaco-economic conclusion, whether the use of probiotics would be cost effective in Lebanon or not. Another limitation involving the questionnaire is its length, where some of the participants complained that the questionnaire is too long, so it might have negatively affected the quality of their answers. Also, the sample size was relatively small, although it statistically satisfied the minimum required sample size. Finally, the physicians were chosen by convenience due to the time limits provided for the study.

CONCLUSION

This study has shed light on the gaps in the literature concerning the knowledge of pediatricians and its effect on their practice, among the Lebanese population and even the Middle Eastern region. As a next step, we will work on validating this scale on Lebanese pediatricians.

The participants claimed that their knowledge could be further improved through conferences, lectures and workshops. In addition to that, the appropriate use of probiotics, still needs to be stressed among the Lebanese pediatricians; these findings could be translated to health educational practice through pharmacists, who are considered as drug experts, and are knowledgeable enough to update the physicians and other health care professionals with the most recent information about probiotics. At last, further studies, including a diverse larger sample, are warranted to investigate the knowledge and its influence on the practice concerning probiotics and their role in health improvement.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ABBREVIATIONS

ISAPP: International Scientific Association for Probiotics and Prebiotics; **LPS:** Lebanese Pediatric Society; **LIU:** Lebanese International University; **SPSS:** Statistical Package of Social Science; **SD:** Standard Deviation; **CI:** Confidence Interval; **PKS:** Probiotic Knowledge Score; **AAD:** Antibiotic Associated Diarrhea; **IBD:** Inflammatory Bowel Disease; **IBS:** Irritable Bowel Syndrome; **CDAD:** Clostridium Difficile-associated Diarrhea.

REFERENCES

1. Gibson GR, Hutkins R, Sanders ME, Prescott SL, Reimer RA, Salminen SJ, *et al*. Expert consensus document: the International Scientific Association for Probiotics and Prebiotics (ISAPP) consensus statement on the definition and scope of prebiotics. Nat Rev Gastroenterol Hepatol. 2017;14(8):491-502. doi: 10.1038/nrgastro.2017.75, PMID 28611480.
2. Potočnjak M, Pušić P, Frece J, Abram M, Janković T, Gobin I. Three New *Lactobacillus plantarum* Strains in the Probiotic Toolbox against Gut Pathogen *Salmonella enterica* Serotype Typhimurium. Food Technol Biotechnol. 2017;55(1):48-54. doi: 10.17113/ftb.55.01.17.4693, PMID 28559733.
3. Awaisheh SS. Probiotic food products classes, types, and processing. Inprobiotics 2012. IntechOpen.
4. Lebeer S, Bron PA, Marco ML, Van Pijkeren JP, O'Connell Motherway MO, Hill C, *et al*. Identification of probiotic effector molecules: present state and future perspectives. Curr Opin Biotechnol. 2018;49:217-23. doi: 10.1016/j.copbio.2017.10.007, PMID 29153882.
5. Alard J, Peucelle V, Boutillier D, Breton J, Kuylle S, Pot B, *et al*. New probiotic strains for inflammatory bowel disease management identified by combining *in vitro* and *in vivo* approaches. Benef Microbes. 2018;9(2):317-31. doi: 10.3920/BM2017.0097, PMID 29488412.
6. Lau CS, Chamberlain RS. Probiotics are effective at preventing *Clostridium difficile*-associated diarrhea: a systematic review and meta-analysis. Int J Gen Med. 2016;9:27-37. doi: 10.2147/IJGM.S98280, PMID 26955289.
7. Cuello-Garcia CA, Brożek JL, Fiocchi A, Pawankar R, Yepes-Nuñez JJ, Terracciano L, *et al*. Probiotics for the prevention of allergy: a systematic review and meta-analysis of randomized controlled trials. J Allergy Clin Immunol. 2015;136(4):952-61. doi: 10.1016/j.jaci.2015.04.031, PMID 26044853.
8. Koutnikova H, Genser B, Monteiro-Sepulveda M, Faurie JM, Rizkalla S, Schrezenmeir J, *et al*. Impact of bacterial probiotics on obesity, diabetes and non-alcoholic fatty liver disease related variables: a systematic review and meta-analysis of randomised controlled trials. BMJ Open. 2019;9(3):e017995. doi: 10.1136/bmjopen-2017-017995, PMID 30928918.
9. Cohen PA. Probiotic Safety-No Guarantees. JAMA Intern Med. 2018;178(12):1577-8. doi: 10.1001/jamainternmed.2018.5403, PMID 30242393.
10. Ababneh M, Elrashed N, Al-Azayzih A. Evaluation of Jordanian healthcare providers' knowledge, attitudes, and practice patterns towards probiotics. Expert Rev Pharmacoecon Outcomes Res. 2020;20(1):93-7. doi: 10.1080/14737167.2019.1609354, PMID 31023117.
11. Soni R, Tank K, Jain N. Knowledge, attitude and practice of health professionals about probiotic use in Ahmedabad, India. Nutr Food Sci. 2018;48(1):125-35. doi: 10.1108/NFS-02-2017-0032.
12. Oliver L, Rasmussen H, Gregoire MB, Chen Y. Health care provider's knowledge, perceptions, and use of probiotics and prebiotics. Top Clin Nutr. 2014;29(2):139-49. doi: 10.1097/01.TIN.0000445898.98017.eb.
13. Otuto Amarauche CO. Assessing the awareness and knowledge on the use of probiotics by healthcare professionals in Nigeria. J Young Pharm. 2015;8(1):53-5. doi: 10.5530/jyp.2016.1.12.
14. Garg R. Methodology for research I. Indian J Anaesth. 2016;60(9):640-5. doi: 10.4103/0019-5049.190619, PMID 27729690.
15. Stanley K. Design of randomized controlled trials. Circulation. 2007;115(9):1164-9. doi: 10.1161/CIRCULATIONAHA.105.594945, PMID 17339574.
16. H. Arjmandi B. The Role of Prebiotics and Probiotics in Human Health. J Food Nutr Disor;s1(1). doi: 10.4172/2324-9323.S1-e001.
17. Kobyliak N, Conte C, Cammarota G, Haley AP, Styriak I, Gaspar L, *et al*. Probiotics in prevention and treatment of obesity: a critical view. Nutr Metab (Lond). 2016;13(1):14. doi: 10.1186/s12986-016-0067-0, PMID 26900391.
18. Alam S, Mushtaq M. Antibiotic associated diarrhea in children. Indian Pediatr. 2009;46(6):491-6. PMID 19556659.
19. Blossom DB, McDonald LC. The challenges posed by reemerging *Clostridium difficile* infection. Clin Infect Dis. 2007;45(2):222-7. doi: 10.1086/518874, PMID 17578783.

Cite this article: Taleb AAH, Samad SIA, Samad IHA, Rahal MK, Lahoud NA, Akel MGE, *et al*. Lebanese Pediatricians' Knowledge, Attitude and Practice Patterns toward Probiotics. J Young Pharm. 2023;15(1):138-43.

APPENDIXES

Data Collection Sheet

Lebanese Pediatricians' Knowledge, Attitude and Practice Patterns toward Probiotics

Demographics

Gender: ☐ Male ☐ Female

Age: years old

In which Governorate do you work?

☐ Beirut ☐ North Lebanon ☐ Beqaa ☐ Akkar

☐ Mount Lebanon ☐ South Lebanon ☐ Nabatiyeh ☐ Baalbeck-Hermel

General Pediatrician: ☐ No ☐ Yes

Subspecialty: ☐No ☐ Yes, specify _____

Education completed in:

Medical School:

☐ Lebanon ☐ Russia ☐ Others, specify _____

☐ Europe ☐ USA

Residency Program:

☐ Lebanon ☐ Russia ☐ Others, specify _____

☐ Europe ☐ USA

Fellowship Program:

☐ Lebanon ☐ Russia ☐ Others, specify _____

☐ Europe ☐ USA

Years in practice: _____ years

Patient population:

☐In patients ☐ In/out patients ☐ Out patients

Are you a researcher or a university instructor:

☐ No ☐ Yes

Knowledge

What are probiotics?

☐ Cleaning products to help kill bacteria on fruits and vegetables

☐ Fibers that help feed the good bacteria in your body

☐ Live bacteria that are helpful to your health when you consume them

☐ Natural antibiotics

☐ Substances that make food taste sweeter

☐ Others, specify _____

What is the best probiotics source in your opinion?

☐ Cultured dairy products (yogurt, milk, sour cream, kefir…)

☐ Fermented food

☐ Food supplements

What are the indication**(s)** for probiotics use? (you can choose more than one option)

☐ Allergy

☐ General digestion/Gut health

☐ Heart health

☐ IBD (Crohn's disease/Ulcerative colitis)
☐ IBS
☐ Immune health
☐ Mental health/Stress
☐ Overweight/Obesity
☐ Others, specify _____

Probiotics act by:
☐ Improving intestinal barrier functioning
☐ Modulating pain perception
☐ Modulating the immune system
☐ Suppressing the growth/invasion of pathogenic bacteria
☐ All of the above

The use of probiotics is usually for:
☐ Prophylaxis
☐ Treatment
☐ Both

Do you think you need more knowledge about probiotics and their use?
☐ No ☐ Yes

If **yes**, how?
☐ Conferences
☐ Lectures
☐ Workshops
☐ Others, specify _____

Attitude

Do you think probiotics are beneficial?
☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐Agree ☐ Strongly Agree

If **no**, why?
☐ Carcinogenic
☐ Lead to infection
☐ No proven benefit
☐ Others, specify _____

Do you think patients could afford buying probiotics?
☐ No ☐ Yes

If **no**, how would we help the patient to buy them?
☐ Insurance
☐ Lower the price
☐ NSSF
☐ Samples
☐ Others, specify _____

Do you think the patient would be compliant to a probiotic course?
☐ No ☐ Yes

If **no**, why?

☐ Frequency of administration
☐ Price
☐ Treatment duration
☐ Others, specify _____

Have you tried it for personal use? (for yourself or family members)
☐ No ☐ Yes

If **yes**, was the result beneficial?
☐ No ☐ Yes

Practice

On average, how many consultations do you do per day?
☐ < 10
☐ 10-20 Specify (optional): _____
☐ > 20

How many days do you work per week? _____ days

Do you prescribe probiotics?
☐ No ☐ Yes

If NO move onto the next section

If YES answer the below questions

Do you prefer probiotics as?
☐ Single strains
☐ Combination of strains
☐ Specify brand (optional): _____

How often do you prescribe it?
☐ Once weekly
☐ Twice weekly
☐ ≥3 Times/week, specify _____

For what condition**(s)** do you prescribe it? (you can choose more than one option)
☐ Allergy
☐ General digestion/Gut health
☐ Heart health
☐ IBD (Crohn's disease/Ulcerative colitis)
☐ IBS
☐ Immune health
☐ Mental health/Stress
☐ Overweight/Obesity
☐ Others, specify _____

What is the dose regimen of probiotics that you prescribe for an **acute treatment**?
☐ Once daily
☐ Twice daily
☐ ≥3 Times/day
☐ Others, specify _____

For how long do you prescribe probiotics in an **acute treatment**?

☐ 1week
☐ 2 weeks
☐ 3 weeks
☐ 4 weeks

What is the dose regimen of probiotics that you prescribe for a **maintenance treatment**?

☐ Once daily
☐ Twice daily
☐ ≥3 Times/day
☐ Others, specify _____

For how long do you prescribe probiotics in a **maintenance treatment**?

☐ 1 month
☐ 2 months
☐ 3 months
☐ 4 months

What dosage form do you prescribe the most?

☐ Capsules
☐ Liquid
☐ Sachets
☐ Others, specify _____

Would you recommend probiotics consumption as:

☐ Dietary intake
☐ Food supplements
☐ Both
☐ Others, specify _____

Would you prescribe probiotics _____ antibiotic course to prevent the occurrence of Antibiotics Associated Diarrhea (AAD):

☐ After
☐ With
☐ Others, specify _____