

Knowledge, Attitudes and Understanding of Probiotics Among Pediatricians in Different Regions of Saudi Arabia

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Abstract

BACKGROUND: Probiotics are live microorganisms that, when administered in adequate amounts, confer a health benefit on the host. Many studies reported that knowledge and attitudes of health professionals have a medium level of knowledge of probiotics.

OBJECTIVE: Evaluate knowledge and practice styles among pediatricians working in different regions of Saudi Arabia regarding probiotics.

DESIGN: Cross-sectional study.

SETTING: Pediatric hospitals; central, western, eastern, northern, and southern regions, Saudi Arabia.

PATIENTS AND METHODS: A survey of 550 pediatric providers (PPs) conducted and completed by pediatricians which included pediatric residents (PRs), pediatric specialist (PSs) and pediatric consultants (PCs) and pediatric gastroenterologists (PGs). They were asked anonymously about knowledge and practice of probiotics.

MAIN OUTCOME MEASURES: Evaluate knowledge and practice styles among pediatricians working in Saudi Arabia regarding probiotics.

SAMPLE SIZE: 550 pediatric providers (PPs) in the cross-sectional analysis.

RESULTS: A response rate of 82% yielded 452 questionnaires. Among respondents, 261 of 452 (57.7%) were aware of the definition of probiotics. There were significant differences in the percentage of participants who have little knowledge of probiotics ($P < 0.05$), with a maximum in PRs and a minimum in PGs. The most common probiotic used by all participants was *Lactobacillus acidophilus* (63.3%), and *Mycobacterium avium* was the probiotic least often prescribed (8.6%). The majority of participants reported that probiotics were used to improve digestion and improve GI immunity, but there were no significant differences found between groups ($P = 0.298$). The majority of PRs and PSs correctly reported that probiotics reduce the risk of antibiotic-induced diarrhea (74.9% and 80.2%) respectively, but there were no significant differences among them. Internet (50.0%) was the source of probiotics-related information to all pediatricians.

LIMITATION: There may be some response bias—PPs who have a special interest in probiotics may have been more likely to respond to the survey.

CONCLUSION: Significant differences in knowledge and practice patterns exist regarding probiotics. Identification of knowledge gaps may be useful to develop educational materials to improve proper definition, knowledge, and the use of probiotics.

Introduction

The International Scientific Association for Probiotics and Prebiotics (ISAPP) published the most recent and widely accepted definition of probiotics as follows: “live microorganisms that, when administered in adequate amounts, confer a health benefit on the host”.¹ Several species of the genera *Bifidobacterium* and *Lactobacillus* are claimed to have a core benefit on healthy gut microbiota by creating a favorable gut environment. Meta-analyses also suggest that they are effective against infectious diarrhea, antibiotic-associated diarrhea, travelers’ diarrhea, slow gut transit, irritable bowel syndrome, abdominal pain and bloating, and ulcerative colitis.^{2,3,4}

Probiotics are regarded as complementary and alternative medicine along with vitamins, minerals, and other dietary supplements.⁵

Today, probiotics are commercially available substances that are found not only in dietary supplements, drugs, functional foods, and beverages, but also in products such as skin creams, vaginal capsules and tampons, and chewable tablets for gum health.⁶ Despite the widespread and easily accessible evidence that supports the benefits of probiotic use, health professionals may hesitate in recommending probiotics to patients when they receive conflicting messages. Health professionals may have difficulties in processing large volumes of information generated by commercial enterprises about the benefits and use of probiotics.

Although there is a global growing interest in the field, little is known about practicing pediatricians’ perceptions regarding the use and efficacy of probiotics. Information describing how often pediatricians encounter probiotic usage in their practices and their specific recommendations to their patients has not previously been reported. Knowledge of medical care providers’ familiarity and opinions regarding probiotic-based treatments is important as more patients begin to incorporate these supplements into their own medical regimens and as more clinical research investigating probiotic effectiveness become available. Sabina et al⁷ surveyed 1066 health professionals and reported that knowledge and attitudes of health professionals have a medium level of knowledge of probiotics. One of the assessment measures to determine the effectiveness of campaign messages is to conduct knowledge and attitudes surveys of pediatricians. Understanding the spectrum of management styles used in the care of children with probiotics would be paramount for improving quality of care, having a positive effect on a child’s quality of life and achieving better health outcomes.

This is the first study in Saudi Arabia to directly assess practicing pediatricians’ perceptions on the use, and practice patterns for recommending probiotics in the treatment of several disorders. Therefore, our aim was to investigate the current knowledge, attitude, and practice of pediatricians

regarding probiotics in all regions of Saudi Arabia.

Methods

Participants

Participants were asked to complete the questionnaire if they were pediatricians. Pediatrician is defined as a physician involved in clinical care, research, or teaching related to pediatric medicine. Pediatricians were classified as pediatric residents (PRs), pediatric specialist (PSs) and pediatric consultants (PCs) and pediatric gastroenterologists (PGs).

The study started between January 2020 and March 2020. This cross-sectional national survey was conducted in 5 regions of Saudi Arabia: central region (CR), western region (WR), eastern region (ER), northern region (NR), and southern region (SR). Saudi Arabia's population is 31 million and children ages 0 to 14 years represent 29.4% of the population. The survey population consisted of members listed as pediatrician by the Saudi Pediatric Association, the Saudi Commission for Health Specialties, and the Ministry of Health. These criteria result in an initial target cohort of approximately 4100 members. From this cohort, a random sample of 440 members was obtained.

Survey Design

We designed a brief, user-friendly questionnaire that assessed the knowledge and attitudes of pediatricians regarding probiotics. The questionnaire was pilot tested by a sample of pediatric gastroenterologists. The questionnaire then revised based on reproducibility, validity, and question value. Changes and modifications were made based on the pilot results. The survey was administered during direct communication (interviewed face-to-face). Other methods of the survey ways distributed via email or telephones. The English version of the questionnaire were answered by participants. The survey estimated to take 10 minutes on average to complete.

Questionnaire Instrument

The questions were modeled and changed based on those used in previously published studies on the knowledge of probiotics.⁸ The questionnaire consists of 15 items in 3 subscales: demographics and practice characteristics (5 items); definition and knowledge of probiotics (9 items); and source of probiotics -related information (1 item). The survey includes multiple-choice questions. All questionnaire items asked participants to choose the best answer. Some response options were on a scale: all of the time, most of the time, sometimes, seldom (rarely), and never.

Questionnaire Subscales

Demographics and Practice Characteristics:

Participating pediatricians were asked for their age, title, gender, type of practice (general or subspecialty), and level of health care institute to identify potential differences in systematic approach of probiotics that may be influenced.

Definition, Indication and Management of Probiotics:

Participants were asked to provide the definition of probiotics. The respondents were queried as to the most common strain of probiotics.

Participants were also surveyed how to treat infants with probiotics.

Source of Probiotic-Related Information:

Participants were asked whether they had probiotics-related information available to them. The participants were asked to rank the best source of probiotics -related information that they used from a list that included medical journals, conferences, newsletters, internet, and pharmaceutical company sponsored symposia.

Statistical Analysis

Data will be analyzed using SPSS PC+ version 21.0 statistical software (SPSS Inc., Chicago, IL). Descriptive statistics (mean, SD and percentages) will be used to describe the quantitative and categorical study and outcome variables. Karl Pearson chi-square test will be used to observe the association between the categorical study and outcome variables. A P value of < 0.05 will be used to report the statistical significance of results.

Results

Demographics

Of the 550 questionnaires distributed to participating pediatricians, 452 (response rate 82%) were completed and analyzed. Thirteen questionnaires were excluded because of missing or incomplete data. Most of respondents were less than 30 years of age (43.4%), followed by those who are between 30–40 years of age (41.4%), followed by those who are between 41–50 years old (7.1%), and those who are over 50 years

of age (8.2%). Our sample had equal females and males' respondents 226 (50.0%). Among them, 44% were pediatric residents, 23.7% were pediatric consultants, 19.0% were pediatric specialists, and 3.1% were pediatric gastroenterologists. Respondents from government hospitals represented the highest proportion (89.6%), followed by respondents from private hospitals (10.4%). Demographic and practice characteristics of the study participants are listed in Table 1.

Table 1
Demographic and practice characteristics of the study participants

Demographics		n	%
Age	< 30 years	196	43.4
	30–40 years	187	41.4
	41–50 years	32	7.1
	> 50 years	37	8.2
Gender	Male	226	50.0
	Female	226	50.0
Qualification (title /position)	PR	199	44.0
	PS	86	19.0
	ACP	31	6.9
	Ass CP	15	3.3
	CP	107	23.7
	PG	14	3.1
Region of practice	Eastern Region	29	6.4
	Western Region	168	37.2
	Central Region	174	38.5
	Northern Region	53	11.7
	Southern Region	28	6.2
Institution	Government hospital	405	89.6
	Private hospital	47	10.4
	Total	452	100

PR; Pediatric resident, PS; Pediatric specialist, ACP; Assistant consultant of pediatric, Ass CP; Associate consultant of pediatric, CP; Consultant of pediatric, PG; Pediatric gastroenterologist

Definition, Indication and Management of Probiotics

When survey respondents were asked about the definition of probiotics, 261 of 452 respondents (57.7%) were aware of the definition of probiotics as live microorganisms that when administered in adequate amounts, confer a health benefit to the host (Fig. 1). Among them, 62.8% of pediatric residents and 48.8% of pediatric specialists reported that they have little knowledge of probiotics. In contrast, consultants of pediatrics exhibited little knowledge of probiotics (47.7%) while pediatric gastroenterologists showed that they have excellent knowledge regarding probiotics (42.9%) ($p < 0.000$). Correlation between responders' status and knowledge about probiotics is shown in Table 2.

Table 2
Correlation between responders' status and knowledge about probiotics

How is your knowledge about probiotics?					
Qualification (title position)	No knowledge No (%)	Little knowledge No (%)	Medium knowledge No (%)	Good knowledge No (%)	P value
PR	35(17.6)	125(62.8)	37(18.6)	2(1.0)	0.001
PS	6(7.0)	42(48.8)	28(32.6)	10(11.6)	
ACP	1(3.2)	14(45.2)	14(45.2)	2(6.5)	
Ass CP	4(26.7)	2(13.3)	7(46.7)	2(13.3)	
CP	1(0.9)	51(47.7)	37(34.6)	18(16.8)	
PG	1(7.1)	3(21.4)	4(28.6)	6(42.9)	
Total No (%)	48(10.6)	237(52.4)	127(28.1)	40 (8.8)	
PR; Pediatric resident, PS; Pediatric specialist, ACP; Assistant consultant of pediatric, Ass CP; Associate consultant of pediatric, CP; Consultant of pediatric, PG; Pediatric gastroenterologist					

There were significant differences in the percentage of participants who asked which systems they think the probiotics has an effect on. 86% of pediatric consultants reported that probiotics has effects on the GI system ($P < 0.001$). Assistant consultants (48.4%), associate consultants (40%), pediatric residents (81%), and pediatric specialists (68.6%) reported that probiotics has effects on the GI system.

In response to questions about clinical indications for prescribing probiotics, there was no significant differences ($P = 0.298$) were found between them. However, majority of participants reported that probiotics were used to improve digestion and improve GI immunity. Correlation between responders' status and indications of probiotics is shown (Table 3).

Table 3
Correlation between responders' status and indications of probiotics

	Which of the following systems you think the probiotics has effects?					Why you are prescribing probiotics?					
	GI system	Immune system	Respiratory system	Cardiology system	p-value	Preventive during antibiotic treatment	Improved digestion	Improve GI immunity	Reduce bloating	Reduce allergic conditions	p-value
PR	163(81.9)	27(13.6)	6(3.0)	3(1.5)	0.000	24(12.1)	84(42.2)	67(33.7)	18(9.0)	6(3.0)	0.298
PS	59(68.6)	18(20.9)	5(5.8)	4(4.7)		15(17.4)	30(34.9)	33(38.4)	6(7.0)	2(2.3)	
ACP	15(48.4)	11(35.5)	3(9.7)	2(6.5)		4(12.9)	8(25.8)	10(32.3)	7(22.6)	2(6.5)	
Ass CP	6(40.0)	5(33.3)	3(20.0)	1(6.7)		2(13.3)	2(13.3)	5(33.3)	4(26.7)	2(13.3)	
CP	92(86.0)	11(10.3)	2(1.9)	2(1.9)		13(12.1)	41(38.3)	42(39.3)	8(7.5)	3(2.8)	
PG	9(64.3)	1(7.1)	2(14.3)	2(14.3)		1(7.1)	3(21.4)	7(50.0)	2(14.3)	1(7.1)	
Total	344	73	21	14		59	168	164	45	16	
PR; Pediatric resident, PS; Pediatric specialist, ACP; Assistant consultant of pediatric, Ass CP; Associate consultant of pediatric, CP; Consultant of pediatric, PG; Pediatric gastroenterologist											

Among the participants who responded to the survey, the majority of pediatric residents and pediatric specialists correctly reported that probiotics reduce the risk of antibiotic-induced diarrhea (74.9% and 80.2%) respectively, but there were no significant differences among them. When survey respondents were asked about the prescription of probiotics, nearly half of the participants (57.7%) reported that probiotics must be taken before meals. Among them, 61.3% of pediatric residents, 58.9% of pediatric consultants and 57.1% pediatric gastroenterologists chose the correct answer, but there were no significant differences among them ($P = 0.182$). The most common probiotic used by all participants was lactobacillus acidophilus (63.3%), and mycobacterium avium was the probiotic least often prescribed (8.6%). Regarding lactobacillus rhamnosus as probiotic strains used by pediatricians, there were no significant differences among groups ($P = 0.840$). Correlation between responders' status and knowledge of probiotics is shown (Table 3,4). Regarding the source of probiotics-related information, our study showed that sources of pediatrician's

information on probiotics included; internet (50.0%), medical journals (44.0%), medical conferences (28.8%), newsletters (11.9%), and radio or TV (8.0%).

Table 4
Correlation between responders' status and knowledge of probiotics

	Do you think probiotics will reduce the risk of antibiotic-induced diarrhea?			Do you think probiotics should be taken before a meal?			Lactobacillus rhamnosus is the most microbial species in probiotic Strains		
	True	False	p-value	True	False	p-value	Yes	No	p-value
PR	149(74.9)	50(25.1)	0.270	122(61.3)	77(38.7)	0.182	64(32.2)	135(67.8)	0.840
PS	69(80.2)	17(19.8)		40(46.5)	46(53.5)		28(32.6)	58(67.4)	
ACP	18(58.1)	13(41.9)		21(67.7)	10(32.3)		13(41.9)	18(58.1)	
Ass CP	10(66.7)	5(33.3)		7(46.7)	8(53.3)		4(26.7)	11(73.3)	
CP	79(73.8)	28(26.2)		63(58.9)	44(41.1)		35(32.7)	72(67.3)	
PG	10(71.4)	4(28.6)		8(57.1)	6(42.9)		6(42.9)	8(57.1)	
Total	335	117		261	191		150	302	

PR; Pediatric resident, PS; Pediatric specialist, ACP; Assistant consultant of pediatric, Ass CP; Associate consultant of pediatric, CP; Consultant of pediatric, PG; Pediatric gastroenterologist

In summary, an unanticipated finding of this study was the possible differences in probiotic use practice patterns among PS, PR, PG, ACP and CP. Overall, the responses indicated that PR and CP were more likely to report themselves as familiar with the literature related to probiotics and the various available probiotic preparations.

Discussion

To our knowledge, this is the largest study in the Middle East describing pediatricians' knowledge, attitude, and practice regarding probiotics.

Stanczak et al surveyed 335 primary care physicians and reported that 38.5% of respondents had heard of probiotics, but only 27.2% stated that they knew what probiotics are [9]. The present study reflects that 57.7% of respondents were aware of the definition of probiotics.

In our study, it was discouraging to find that more than half of the pediatricians reported their little knowledge of probiotics with significant differences in knowledge were noted between PC from other pediatricians. These data may be explained by lack of educational materials and different access to resources in some regions of Saudi Arabia. The date et al taken together with our observation demonstrated that probiotics are popular among gastroenterologists for the treatment of gastrointestinal disorders [10].

In the present study, Lactobacillus acidophilus (63.3%) was the most common probiotic used by all participants. On the other hand, Draper et al demonstrated that Lactobacillus GG was often prescribed for general bowel health [11]. Another study showed that most surveyed physicians prescribed Bifidobacterium infantis and VSL#3 frequently for irritable bowel syndrome, antibiotic-associated diarrhea [12]. The probiotic strains belonging to the Lactobacillus and Bifidobacterium genera that are most commonly used as probiotics are well known in the literature [13, 14]. Our observation in the present data showed that probiotic prescribing is common but lacks consistency, with choice of probiotic frequently left to the patient, even for indications with some strain-specific evidence. These different kinds of probiotics which prescribed by participants may indicate us to use various educational tools, including peer reviewed publications, media, seminars, university courses to introduce the concepts and explain indications, advantages and limitations of these probiotics.

Most of our respondents (86%) reported that probiotics were used to improve digestion and improve gastrointestinal immunity. Similar to study et al, 98% of respondents believed that probiotics have a role in treating gastrointestinal illnesses or symptoms [12].

The data et al taken together with the observation in our participants suggest common indications for probiotics were prevention and treatment of antibiotic-associated diarrhea [11, 12].

However, many pediatric gastroenterologists worldwide do not use probiotics for acute infectious diarrhea owing to lack of appropriate guidelines and/or poorly designed products [15].

Meta-analyses have shown probiotics are well documented, and their use alone or in combination with other therapies can therefore be considered "evidence-based," such as for antibiotic-associated diarrhea in adults and children [16].

In response to the question of how respondents prescribed probiotics, majority (58%) reported that probiotics should be taken before a meal. Similar to the observations by Tompkins et al and Sabina et al confirmed the highest survival of probiotics if given with a meal or before a meal, and the lowest survival if taken after a meal [7, 17]. These results emphasize the importance for healthcare professionals to be properly educated and updated on probiotics because improved knowledge about probiotics would lead to increased prescriptive confidence [16].

The strengths of our study are that the study is cross sectional, the survey was conducted in all regions of Saudi Arabia, and most questionnaires were filled out under the supervision of the investigators to avoid misinterpretation of the questions. This study has several limitations. There may be some response bias—PPs who have a special interest in probiotics may have been more likely to respond to the survey. Thus, the state of knowledge of probiotics among PPs may be even lower than that reported in this study. The PR and PCs in our sample demonstrated a higher response rate than others possibly because of more interest or more exposure to probiotics-related disorders.

In summary, our study was to contribute to a better understanding of probiotics in the clinical practice of Saudi pediatricians who are involved in pediatric healthcare. The effective implementation of this practice will benefit from additional supporting studies and the eventual development of clinical practice guidelines supported by the Saudi gastroenterology society.

Conclusion

The following conclusions are drawn from this study:

1. This study provides valuable insight into knowledge, attitude, and practice of pediatricians working in Saudi Arabia regarding probiotics.
2. Significant differences in knowledge gap and practice patterns exist among pediatricians from different regions of Saudi Arabia regarding the definition, knowledge, and the use of probiotics.
3. The identification of gaps in knowledge and practice may be helpful to policymakers who are in charge of developing educational materials for pediatricians about enough knowledge of probiotics.
4. Further prospective multi-center studies would enable the acquisition of valuable information to help develop recommendations for the use of probiotics in pediatric clinical practice.

Declarations

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Consent

Informed consent was obtained from all participants include in the study.

Ethical approval

The ethics committee of King Abdullah International Medical Research Center approved the study (RJ20/048/J). The recipients were considered to have consented if they filled out the questionnaire as the research presents no more than minimal risk of harm to subjects and involves no procedures. All of the information collected was kept strictly confidential.

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Figures

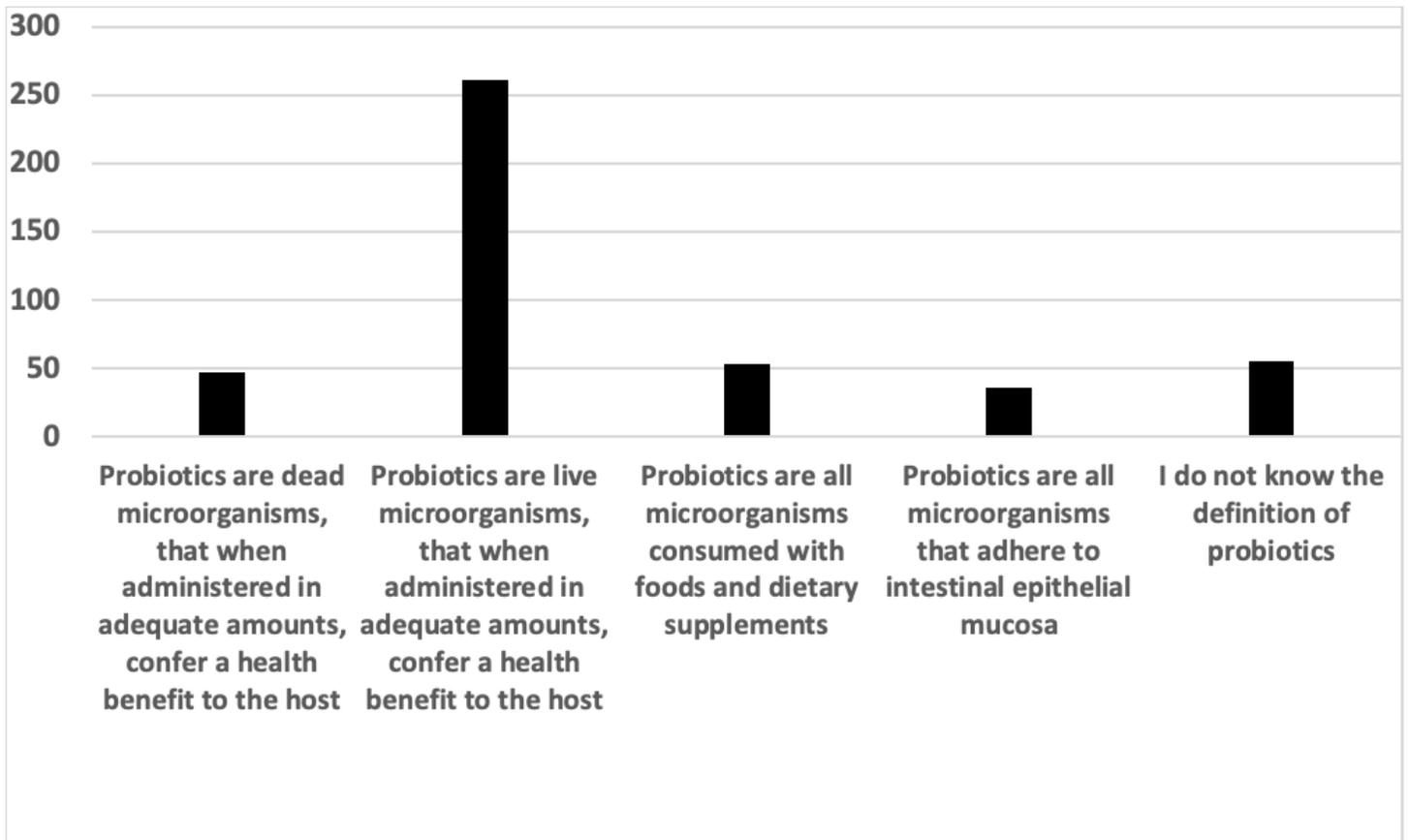


Figure 1

Figure 1

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