



# Mothers' knowledge, attitudes and practices regarding probiotic use during pregnancy and for their infants in Turkey

Umran Cevik Guner<sup>1,\*</sup> and Aygül Kissal<sup>2</sup>

<sup>1</sup>Pediatric Nursing Department, Faculty of Health Sciences, Tokat Gaziosmanpasa University, Tokat, Turkey: <sup>2</sup>Public Health Nursing Department, Faculty of Health Sciences, Tokat Gaziosmanpasa University, Tokat, Turkey

Submitted 24 June 2020: Final revision received 12 February 2021: Accepted 1 March 2021: First published online 5 March 2021

## Abstract

**Objective:** The current study was conducted to determine mothers' knowledge, attitudes and practices regarding probiotic use during pregnancy and for infants between 6 months and 2 years old.

**Design:** The study had a cross-sectional design, and the data were collected using a Socio-demographic Information Form and a Probiotic Information and Attitude Form. The data were evaluated using frequency, percentage and  $\chi^2$  tests.

**Setting:** Two hospitals of one province in the central Black Sea Region, Turkey.

**Participants:** 519 mothers with infants between 6 months and 2 years old who had been hospitalised in paediatric clinics participated in the study.

**Results:** 20.2% of the mothers knew what a probiotic was, 33.1% of them had knowledge of specific probiotic products and 49.7% of them knew that breast milk contains probiotics. A statistically significant difference was found between mothers' knowledge of probiotics and probiotic products, and their ages, education, employment, income, family structure and whether they were actively breast-feeding ( $P < 0.05$ ). A statistically significant difference was found between the mothers' knowledge that breast milk contains probiotics and their ages, education, employment, income, family structure, age of children and actively breast-feeding ( $P < 0.05$ ).

**Conclusion:** The study found that the mothers' knowledge and practices regarding probiotics were inadequate, and that they traditionally used natural products in their daily lives. Evidence-based educational activities should be designed which include information about the definition of probiotics, and their benefits and disadvantages for mothers. Further studies are needed to determine the knowledge and attitudes of health professionals regarding the use of probiotics by mothers with infants and pregnant women.

**Keywords**  
Probiotics  
Foods  
Infant  
Pregnancy  
Natural products

Probiotics are living micro-organisms that are present in specific numbers in the digestive system and that have beneficial effects on the host. In recent years, because of the relationship between intestinal microbiota and human health, interest in probiotic products that have the capacity to alter the microbiota profile has gradually been increasing<sup>(1,2)</sup>. The most common group of probiotic products is fermented yogurt and milk products<sup>(3)</sup>. Breast milk is indicated as a symbiotic nutrient that contains both prebiotics (breast milk oligosaccharides) and probiotics (Bifidobacterium, Lactobacillus)<sup>(2,4)</sup>. Following the breast-feeding period, the nutrients taken in during the transition to nutritional supplements shape the microbiota, as does the nutritional model. Giving age-appropriate nutrients to infants increases the variety of bacteria in their intestines and begins to change

the bacterial composition. The intestinal microbiota reach the composition of adult microbiota at around the ages of 2–3<sup>(5)</sup>. In addition to their presence in food products, probiotics are also available in tablet, powder, sachet and capsule forms<sup>(3)</sup>. Although there are as yet no statistical data on this topic, the market for food containing probiotic cultures is expanding. In many countries, probiotics are available to buy from grocery stores and health food shops without prescription or professional advice<sup>(6)</sup>. Milk products (bio-yogurt, fermented milk, cheese, lactose drinks), liquid supplements and probiotic products that are marketed for weaned and young infants are the main representatives of this trend today<sup>(7)</sup>. Because living bacteria are present in breast milk, probiotics are now included in some baby formulas in a number of countries around the world<sup>(2,6)</sup>.

\*Corresponding author. Emails umrancevik@hotmail.com, umran.guner@gop.edu.tr

© The Author(s), 2021. Published by Cambridge University Press on behalf of The Nutrition Society



There are many studies evaluating the potential beneficial effects of probiotics for the treatment and prevention of various paediatric diseases. The most common objects of study are acute gastroenteritis, ulcerative colitis, Crohn's disease, antibiotic-associated diarrhoea, necrotising enterocolitis, constipation, allergic diseases, infantile colic, obesity and upper respiratory infections, such as flu, cold, sinusitis, otitis media, as well as lower respiratory tract infections such as pneumonia and bronchitis<sup>(1,5,8,9)</sup>. Important studies have demonstrated that the usage of probiotics during pregnancy and in infancy prevents allergic diseases that are likely to emerge in childhood and are not hereditary<sup>(10,11)</sup>. Research has also shown that the probiotic structure in autistic children's intestines is damaged and that probiotic supplements are important during treatment<sup>(12-14)</sup>. Furthermore, probiotics help to reconstruct the intestinal microflora damaged as a result of daily living (diet, stresses) or the use of antibiotics in newborns. Probiotics prevent damage occurring to the intestinal microflora by controlling the increase of bacteria, ferment and mould<sup>(2,14)</sup>.

The efficiency of probiotics depends on the types and strains of bacteria as well as the dosage and length of use<sup>(1)</sup>. For maximum efficiency, it is recommended that probiotics be used every day<sup>(9)</sup>. However, additional evidence is still needed on probiotic use in infants: although probiotic use in healthy infants is generally agreed to be safe, there is a consensus that more reliable evidence is needed, and that the long-term effects should be evaluated<sup>(1)</sup>. Studies have shown that health professionals and consumers worldwide consume probiotics for health reasons; however, they generally do not have enough knowledge about the products and the appropriate ways to use them<sup>(7,15-20)</sup>.

There are a limited number of studies in the world investigating the use of probiotics by mothers for their infants and during pregnancy<sup>(1,19,21,27)</sup>. The knowledge mothers have about probiotics, their attitudes towards them and how they use them during pregnancy and for their infants has not previously been studied in Turkey. Given the increasing availability of probiotics and the latest scientific evidence, it is clearly important that practitioners know which diseases probiotics are effective for, and how they should be used during pregnancy and for infants. The purpose of this research was thus to find out what mothers in Turkey knew about probiotics and what their attitudes were towards them. In addition, the study investigated how mothers used probiotics during pregnancy and for their infant, and what factors influenced them in this.

## Methods

### *Study design and sampling*

The current study had a cross-sectional design and was reported in accordance with the Strengthening of Reporting of Observational Studies in Epidemiology (STROBE) statement. The population and sample of the study consisted of mothers with infants between 6 months

and 2 years old who had been hospitalised in the paediatric clinics of a university and a public hospital of one province in the central Black Sea Region in Turkey between 28 May and 31 October 2018 (*N* 519). The inclusion criteria were agreeing to participate, not having any hearing problems and being able to understand Turkish.

### *Instruments*

Data were collected using the Sociodemographic Information Form and the Probiotic Information and Attitudes Form. The questionnaires were pre-applied to ten mothers in the clinic and were revised and finalised according to their responses.

### *Socio-demographic Information Form*

This form consisted of eight questions about the mother's age, education, employment status, income status, the family structure, age of the child, gender of the child and whether they were actively breast-feeding.

### *Probiotic Information and Attitudes Form*

This form consists of two parts and included thirty questions to determine how mothers used probiotics during pregnancy and for their infant, and their knowledge about and attitudes towards probiotics. The first part contained ten questions about the mothers' use and knowledge of probiotics; these questions were developed by researchers in line with the literature<sup>(1,15,17,21)</sup>. They included the following: What are probiotics in your opinion? Which foods are probiotics in? Do you think breast milk is a probiotic food? How often did you use probiotic foods during your pregnancy/How often do you give them to your baby? What were/are your reasons for this? Have you benefited from this? Where/from whom did you first learn about probiotics?, etc. Probiotics were defined as live micro-organisms which, when administered in adequate amounts, confer a health benefit on the host<sup>(22,23)</sup>. The participants who were able to describe probiotic in this way were evaluated as 'knowing about' them, while those who were not able to do so were evaluated as 'not knowing about' probiotics. The second part of the form was about information and the mothers' attitudes and consisted of twenty questions with a five-point grading system using the statements, 'Strongly agree', 'Agree', 'Neither agree nor disagree', 'Do not agree' and 'Strongly disagree'. Permission was granted to use the form<sup>(15)</sup>.

### *Data collection*

The data collection tools were filled out during face-to-face interviews by three members of staff who had been trained by the researchers. Verbal and written consent was obtained from each mother. The interviews were conducted in two stages. In the first stage, the mothers were asked what probiotics were, whether they knew of any products containing probiotics and whether they knew if



breast milk was probiotic. In the second stage, for mothers who did not know what probiotics were, the interviewers provided them with a definition and then asked the remaining questions. The collection of data took approximately 15–20 min.

### Statistical analysis

The research data were encoded in the SPSS 20 package software. The statistical significance of the data was assessed at  $P < 0.05$ . The data were tested using descriptive (frequency, percentage) and  $\chi^2$  inferential statistical models.

### Dependent and independent variables

The dependent variable of the study was determined to be the level of knowledge, and the attitudes and practices of the mothers regarding probiotic use during pregnancy and for infants between 6 months and 2 years old.

The independent variables were the mother's age, education, employment status (whether or not they were current in paid employment), income status (low, middle, high), family structure (nuclear or extended), the age and gender of the child and actively breast-feeding status (whether they were continuing to breast-feed their child at the time the study occurred).

### Results

Of the 519 mothers, 20.2% were able to say what probiotics were before being given the definition, 33.1% of them knew which products contained probiotics and 49.7% of them knew that breast milk contains probiotics.

Table 1 compares the mothers' socio-demographic variables with their knowledge of probiotics. There was a statistically significant difference between the mothers' knowing what probiotics were and which products contained probiotics, and their age, education, employment status, income status, family structure and whether they were actively breast-feeding ( $P < 0.05$ ). The mothers who knew which products contained probiotics and what probiotics were had a higher level of education, a higher income, were employed, had nuclear families and were actively breast-feeding. The mothers who were 25 years old or younger were less likely to know what probiotics were and which products contained them. However, no statistically significant difference was found between them in terms of children's age and gender ( $P > 0.05$ ). There was a statistically significant difference between mothers' knowledge that breast milk contains probiotics and their age, education, employment status, income, family structure, child's age and breast-feeding ( $P < 0.05$ ). The mothers who knew that breast milk contains probiotics had a higher level of education, a higher income, were employed, had

nuclear families and were actively breast-feeding. The mothers who were 25 years old or younger and whose children were 1 year old or less were not as likely to know breast milk contains probiotics. However, no statistically significant difference was found between them in terms of gender of the child ( $P > 0.05$ ) (Table 1).

Table 2 shows mothers' sources of information and reasons for using probiotics during pregnancy and for their infants. 21.2% of the mothers stated that they used products with probiotics during their pregnancy to strengthen their immune system, while 17.5% of them used probiotics for digestive problems. 26.2% of them used probiotics to strengthen their infant's immune systems, while 18.7% of them used them for digestive problems. 98.9% of the mothers who used probiotics during pregnancy and 99.4% of them who used them for their infants thought that they were beneficial (Table 2).

When the mothers were asked what their sources of information about probiotics were, 59.3% of them stated that they had not learned about probiotics during their pregnancy, while 11.4% of them had heard about them from the TV/radio/newspapers, etc. and 10.6% had been informed about them by their doctors. In terms of using probiotics for their infants, 23.3% stated that they had never heard anything about doing this, 26.0% of them had heard about doing this from other sources (books, neighbours, etc.) and 11.0% of them had been informed that they could do this by a nurse (Table 2).

Figure 1 shows the mothers' use of probiotic products during pregnancy and for their infants. Cheese (92.9%), homemade yogurt (91.5%), ayran (90.9%), butter (90.4%), natural cow's milk (76.9%), ice cream (72.4%) and pickles (70.7%) were the most common probiotic foods consumed by mothers during pregnancy. They most commonly fed their infants ready-made baby formulas (64.5%), home-made yogurt (64.0%), cheese (54.4%) and ayran (57.4%) (Fig. 1).

Table 3 shows the mothers' frequency of use of products containing probiotics during their pregnancy and for their infants. The products containing probiotics which they consumed either once or two to three times a day during pregnancy were cheese (69.7 and 5.4%, respectively), butter (22.7%; 36.0%), home-made yogurt (42.8%; 11.6%), ayran (32.0%; 10.2%) and natural cows' milk (24.9%; 6.4%). The products containing probiotics they fed their infants either once or two to three times a day were baby formulas (18.5 and 40.5%, respectively), cheese (46.4%; 2.3%), home-made yogurt (41.2%; 8.3%), butter (14.1%; 25.4%) and natural cow's milk (23.3%; 9.1%) (Table 3).

Table 4 shows the mothers' knowledge and attitudes regarding products containing probiotics. More than 90% of the mothers responded 'Agree' or 'Strongly agree' to statements P1, P2, P3 and P4, and more than 70% of them responded 'Agree' or 'Strongly agree' to statements P5, P6, P9, P11, P12, P14, P15 and P16.

**Table 1** Mothers' knowledge of probiotics in comparison with their socio-demographic variables

Socio-demographic variables	n	%	Knowing what probiotics are				Knowing which products containing probiotics				Knowing that breast milk contains probiotics			
			Knows		Does not know		Knows		Does not know		Knows		Does not know	
			n	%	n	%	n	%	n	%	n	%	n	%
<b>Age</b>														
20 and under	33	6.4	0	0	33	100.0	0	0	33	100.0	4	12.1	29	87.9
21–25	106	20.4	14	13.2	92	86.8	31	29.2	75	70.8	45	42.5	61	57.5
26–30	168	32.4	44	26.2	124	73.8	65	38.7	103	61.3	95	56.5	73	43.5
31–35	110	21.2	24	21.8	86	77.5	41	37.3	69	62.7	61	55.5	49	44.5
36 and older	102	19.7	23	22.5	79	78.2	35	34.3	67	65.7	53	52.0	49	48.0
Statistics*			$\chi^2 = 15.818; P = 0.003$				$\chi^2 = 20.330; P = 0.000$				$\chi^2 = 25.685; P = 0.000$			
<b>Education</b>														
Primary school and lower	135	26.0	10	7.4	125	92.6	18	13.3	117	86.7	46	34.1	89	65.9
Secondary school	128	24.7	11	8.6	117	91.4	30	23.4	98	76.6	49	38.3	79	61.7
High School	135	26.0	24	17.8	111	82.2	41	30.4	94	69.6	64	47.4	71	52.6
University and higher	121	23.3	60	49.6	61	50.4	83	68.6	38	31.4	99	81.8	22	18.2
Statistics*			$\chi^2 = 89.614; P = 0.000$				$\chi^2 = 98.454; P = 0.000$				$\chi^2 = 70.076; P = 0.000$			
<b>Employment status</b>														
Employed	175	33.7	74	42.3	101	57.7	110	62.9	65	37.1	135	77.1	40	22.9
Unemployed	344	66.3	31	9.0	313	91.0	62	18.0	282	82.0	123	35.8	221	64.2
Statistics*			$\chi^2 = 79.577; P = 0.000$				$\chi^2 = 105.225; P = 0.000$				$\chi^2 = 79.475; P = 0.000$			
<b>Income status</b>														
Low	51	9.8	3	5.9	48	94.1	8	15.7	43	84.3	14	27.5	37	72.5
Middle	388	74.8	62	16.0	326	84.0	110	28.4	278	71.6	181	46.6	207	53.4
High	80	15.4	40	50.0	40	50.0	54	67.5	26	32.5	63	78.8	17	21.3
Statistics*			$\chi^2 = 54.783; P = 0.000$				$\chi^2 = 53.654; P = 0.000$				$\chi^2 = 38.549; P = 0.000$			
<b>Family structure</b>														
Nuclear family	315	60.7	79	25.1	236	74.9	127	40.3	188	59.7	173	54.9	142	45.1
Extended family	204	39.3	26	12.7	178	87.3	45	22.1	159	77.9	85	41.7	119	58.3
Statistics*			$\chi^2 = 11.672; P = 0.001$				$\chi^2 = 18.629; P = 0.000$				$\chi^2 = 8.700; P = 0.003$			
<b>Age of child</b>														
0–12 months	256	49.3	46	18.0	210	82.0	76	29.7	180	70.3	111	43.4	145	56.6
13–24 months	170	32.8	38	22.4	132	77.6	59	34.7	111	65.3	93	54.7	77	45.3
25–36 months	93	17.9	21	22.6	72	77.4	37	39.8	56	60.2	54	58.1	39	41.9
Statistics*			$\chi^2 = 1.604; P = 0.448$				$\chi^2 = 3.419; P = 0.181$				$\chi^2 = 8.424; P = 0.015$			
<b>Gender of child</b>														
Female	242	46.6	46	19.0	196	81.0	79	32.6	163	67.4	125	51.7	117	48.3
Male	277	53.4	59	21.3	218	78.7	83	33.6	184	66.4	133	48.0	144	52.0
Statistics*			$\chi^2 = 0.420; P = 0.517$				$\chi^2 = 0.050; P = 0.822$				$\chi^2 = 0.684; P = 0.408$			
<b>Actively breast-feeding</b>														
Yes	354	68.2	59	16.7	295	83.3	107	30.2	247	69.8	156	44.1	198	55.9
No	165	31.8	46	27.9	119	72.1	65	39.4	100	60.6	102	61.8	63	38.2
Statistics*			$\chi^2 = 8.767; P = 0.003$				$\chi^2 = 4.269; P = 0.039$				$\chi^2 = 14.184; P = 0.000$			

\* $\chi^2/P$  = chi-square test/ $P$  significance value.

## Discussion

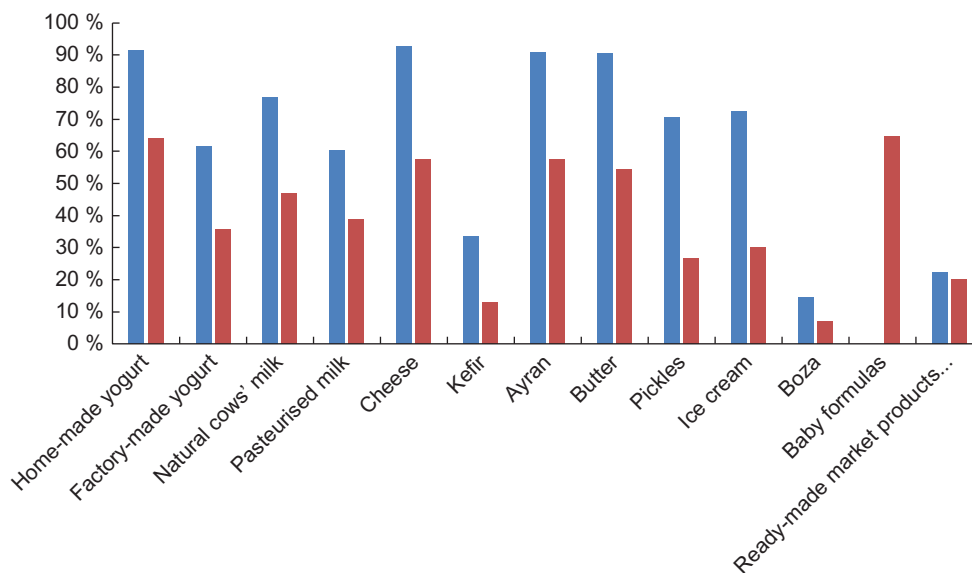
Given that the amount of research on the positive effects of probiotics on health is increasing, it is necessary to assess mothers' knowledge and attitudes regarding probiotics and how they actually use them. There is a limited amount of information available in the literature on the use of probiotic products during pregnancy and childhood. Research indicates that the use of probiotics differs in different cultures and societies<sup>(19)</sup>. The current study was conducted to assess mothers' knowledge and attitudes regarding probiotics and how they use them during pregnancy and for infants of between 6 months and 2 years old. It was found that although the mothers did not have sufficient knowledge about what probiotics were, about which products contained probiotics and about whether breast milk

contains probiotics, they had, nevertheless, been using natural products with probiotics daily. The mothers did not state whether they had chosen to buy probiotic products or whether they had been prescribed them by their doctors. At the beginning of the research, they were asked what probiotics were and which products contained probiotics. 20.2% of them were able to say what probiotics were, 33.1% of them knew which products contained probiotics and 49.7% of them knew that breast milk contains probiotics. In contrast with the findings of this research, in another study examining mothers' knowledge about probiotics and their use of them for their infants, the percentages of mothers who had heard about probiotics (99.3%) and who knew that probiotics consist of bacteria (87.0%) were found to be high<sup>(1)</sup>. In another study, 65.2% of the participants were found to be familiar with the term, while 32.9%

**Table 2** Mothers' reasons and sources of information for the use of probiotics during pregnancy and for their infants

	During pregnancy		For their infants	
	<i>n</i>	%	<i>n</i>	%
<b>Reason for use*</b>				
Respiratory system problems	18	3.5	20	3.9
Digestive system problems	91	17.5	97	18.7
To strengthen the immune system	110	21.2	136	26.2
For allergies (atopic eczema, hay fever)	10	1.9	10	1.9
Other	11	2.1	12	2.3
<b>Benefiting from the probiotic products?</b>				
Yes	172	98.9	175	99.4
No	2	1.1	1	0.6
<b>Sources of information about probiotics*</b>				
Never heard of them	308	59.3	121	23.3
From a friend	23	4.4	16	3.1
From a relative	16	3.1	16	3.1
From my doctor	55	10.6	44	8.5
From my nurse	18	3.5	57	11.0
TV/radio/newspapers, etc.	59	11.4	32	6.2
From the internet (Facebook, Twitter, etc.)	28	5.4	29	5.6
Other (books, neighbours, etc.)	44	8.5	135	26.0

\*More than one choice is marked.


**Fig. 1** (colour online) Mothers' use of probiotic products during pregnancy and for their infants\* (%). ■, during pregnancy; ■, for their infants

of them had not heard it before<sup>(24)</sup>. Many studies have indicated that people in general, including students, do not know enough about probiotics<sup>(7,15–19,25)</sup>. Likewise, in the research by Amarauche, health professionals' level of knowledge and awareness of probiotics were found to be low<sup>(20)</sup>. In research carried out on health professionals in Turkey, 67.4% of them responded that their knowledge of probiotics was 'moderate' while 16.3% said that it was 'bad' or 'very bad'<sup>(26)</sup>. These findings are not surprising as the use of probiotics is generally not promoted in Turkey, whether among health professionals, in the food industry or in advertising.

The current study found that there was a relationship between the mothers' age, education level, employment, income, family structure and actively breast-feeding, and whether they knew what probiotics were, which products contained probiotics and that breast milk contains probiotics. In contrast with this research, in the study of Bridgman *et al.*, no significant difference was found between the socio-demographic features (age, marital status, education, income, ethnic background and place of birth) of mothers who stated that they gave probiotic products to their infants and those who did not<sup>(1)</sup>. According to another study, there was no statistically significant difference between income

**Table 3** Mothers' frequency of use of products containing probiotics during their pregnancy and for their infants

Products containing probiotics		Once a day		Two to three times a day		Once a week		Once every 15 d		Once a month	
		n	%	n	%	n	%	n	%	n	%
		Home-made yogurt	During pregnancy	222	42.8	60	11.6	130	25.0	31	6.0
	For their infants	214	41.2	43	8.3	51	9.8	17	3.3	7	1.3
Factory-made yogurt	During pregnancy	85	16.4	26	5.0	115	22.2	44	8.5	50	9.6
	For their infants	82	15.8	8	1.5	56	10.8	20	3.9	19	3.7
Natural cows' milk	During pregnancy	129	24.9	33	6.4	130	25.0	46	8.9	61	11.8
	For their infants	121	23.3	47	9.1	35	6.7	21	4.0	19	3.7
Pasteurised milk	During pregnancy	131	25.2	29	5.6	91	17.5	23	4.4	39	7.5
	For their infants	103	19.8	26	5.0	48	9.2	11	2.1	14	2.7
Cheese	During pregnancy	362	69.7	28	5.4	61	11.8	22	4.2	9	1.7
	For their infants	241	46.4	12	2.3	30	5.8	11	2.1	4	0.8
Kefir	During pregnancy	28	5.4	7	1.3	61	11.8	37	7.1	41	7.9
	For their infants	12	2.3	11	2.1	13	2.5	13	2.5	18	3.5
Ayran	During pregnancy	166	32.0	53	10.2	209	40.3	31	6.0	13	2.5
	For their infants	139	26.8	22	4.2	113	21.8	13	2.5	11	2.1
Butter	During pregnancy	118	22.7	187	36.0	88	17.0	61	11.8	15	2.9
	For their infants	73	14.1	112	25.4	45	8.7	25	4.8	8	1.5
Fresh fruit juice	During pregnancy	70	13.5	13	2.5	164	31.6	66	12.7	65	12.5
	For their infants	109	21.0	19	3.7	108	20.8	21	4.0	25	4.8
Pickles	During pregnancy	74	14.3	11	2.1	123	23.7	68	13.1	91	17.5
	For their infants	22	4.2	9	1.7	57	11.0	26	5.0	24	4.6
Ice cream	During pregnancy	66	12.7	9	1.7	147	28.3	42	8.1	112	21.6
	For their infants	21	4.0	6	1.2	67	12.9	20	3.9	42	8.1
Boza	During pregnancy	9	1.7	3	0.6	18	3.5	11	2.1	34	6.6
	For their infants	0	0.0	10	1.9	8	1.5	5	1.0	13	2.5
Baby formulas	During pregnancy	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	For their infants	96	18.5	210	40.5	19	3.7	5	1.0	5	1.0
Ready-made products with probiotics	During pregnancy	18	3.5	9	1.7	80	15.4	8	1.5	2	0.4
	For their infants	27	5.2	13	2.5	56	10.8	5	1.0	4	0.8

**Table 4** Mother's knowledge and attitudes regarding products containing probiotics

	Strongly disagree		Disagree		Neither agree nor disagree		Agree		Strongly agree	
	n	%	n	%	n	%	n	%	n	%
	P1 Probiotic products can make you feel better	2	0.4	5	1.0	41	7.9	335	64.5	136
P2 Probiotic products can be beneficial for health	1	0.2	2	0.4	27	5.2	327	63.0	162	31.2
P3 Probiotic products help strengthen the immune system	1	0.2	3	0.6	32	6.2	291	56.1	192	37.0
P4 Yogurt contributes to the regulation of the digestive system	3	0.6	6	1.2	34	6.6	280	53.9	196	37.8
P5 Probiotic products contain a high number of micro-organisms	5	1.0	35	6.7	110	21.2	207	39.9	162	31.2
P6 Probiotic products help prevent diseases	6	1.2	13	2.5	35	6.7	283	54.5	182	35.1
P7 Probiotic products increase the risk of cancer	183	35.3	141	27.2	138	26.6	47	9.1	10	1.9
P8 The micro-organisms in probiotic products are always alive	59	11.4	58	11.2	230	44.3	133	25.6	39	7.5
P9 Probiotic products can help the body heal	9	1.7	29	5.6	70	13.5	301	58.0	110	21.2
P10 Probiotic products might cause diarrhoea	38	7.3	109	21.0	168	32.4	134	25.8	70	13.5
P11 Probiotic products help prevent cancer	6	1.2	12	2.3	97	18.7	259	49.9	145	27.9
P12 Probiotic products help prevent the growth of micro-organisms that cause disease	5	1.0	20	3.9	86	16.6	255	49.1	153	29.5
P13 Probiotic products are resistant to antibiotics	59	11.4	59	11.4	179	34.5	150	28.9	72	13.9
P14 Probiotic products positively affect eye health	1	0.2	32	6.2	160	30.8	224	43.2	102	19.7
P15 Probiotic products positively affect skin health	4	0.8	18	3.5	113	21.8	271	52.2	113	21.8
P16 Probiotic products can help you lose weight	9	1.7	36	6.9	92	17.7	251	48.4	131	25.2
P17 Probiotic products are appetising/tasty	36	6.9	64	12.3	158	30.4	192	37.0	69	13.3
P18 Probiotic products are obtained without fermentation	46	8.9	123	23.7	173	33.3	118	22.7	59	11.4
P19 Probiotic products reduce the need for vitamins and minerals	51	9.8	110	21.2	168	32.4	135	26.0	55	10.6
P20 Probiotic products are usually produced through natural methods	17	3.3	32	6.2	129	24.9	251	48.4	90	17.3



level, age, gender, ethnic background or education<sup>(24)</sup>. These results may be due to various sociocultural factors. There is a limited amount of research on this topic in literature and it is thus important that these relationships be more extensively analysed in future studies.

According to the current study, mothers used probiotics both during their pregnancy and for their infants in order to strengthen the immune system (21.2 and 26.2%, respectively) and to counter digestive problems (17.5%; 18.7%). Likewise, in the research of Betz *et al.* probiotics and prebiotics were defined as the most beneficial supplements for the digestive system<sup>(17)</sup>. In another study, it was found that the participants used probiotics to maintain gastrointestinal health (51.1%), to bolster the immune system (40.8%) and to reduce the side effects of medication (26%)<sup>(24)</sup>. In the research of Viana *et al.*, 29.5% of the participants used probiotics to lower cholesterol, while 28.3% of them used them to cure diarrhoea<sup>(7)</sup>. A study found that 48.1% of students who consumed probiotics used them for their 'intestinal benefits', and 18.5% of them used them in order to have a 'responsive immune system'<sup>(25)</sup>. These findings suggest that it is these kind of messages about the benefits of probiotics that are most frequently communicated.

Nevertheless, the mothers who participated in the current study stated that they had learned very little from the media, health professionals or other sources of information about the use of probiotics. Other studies have found that participants had learned more about probiotics than was the case in the current research. For example, one study found that most information about probiotics had been received from the media<sup>(17)</sup>. In line with the current research, another study found that most of the mothers included had heard about probiotics through the media (43.3%), followed by 25.2% from a friend and 20.3% from a health professional (doctor, pharmacist or midwife)<sup>(1)</sup>. In the research of Chin-Lee *et al.*, the most common source of information about probiotics was a friend (26.5%), followed by a doctor's recommendation (22.4%)<sup>(24)</sup>. According to another study, students learned about probiotics in classes (35.9%), from TV advertisements (34.2%), TV programmes (28.2%), health professionals (19.7%) and newspapers/other media (8.5%)<sup>(25)</sup>. These findings indicate that mothers are not being sufficiently informed by health professionals and the media. Health professionals need to better explain the protective and beneficial effects of probiotics to society in general and, in particular, to be clear about how products containing probiotics can be consumed during pregnancy and early childhood.

In the current study, most of the mothers stated that probiotics are found in milk and milk products. Likewise, in the research of Viana *et al.* most of the participants mentioned that probiotics are mostly found in milk and milk products<sup>(7)</sup>. Similarly, in research carried out on in-patients, 72% of the participants defined yogurt as being probiotic<sup>(17)</sup>. In another study, 4.6% of the students named yogurt, 3% of them named milk and 1.5% of them named cheese as sources of probiotics<sup>(25)</sup>. In a descriptive study examining the nutrition of children under

the age of 5 in Bulawayo, Zimbabwe, it was found that more than 90% of caregivers stated that fermented milk (lacto), yogurt and fermented maize meal were probiotics<sup>(21)</sup>. According to another study, most probiotic users (79.6%) preferred to consume probiotic food products rather than capsules, pills or powders<sup>(24)</sup>. Many women may prefer milk and milk products as a source of probiotics because these products are widely advertised and readily available in the retail market. Knowing that milk and milk products contain probiotics is important as it allows consumers to make a positive choice to consume them for their health benefits.

The findings of this research indicate that the women used probiotics more frequently during pregnancy than for their infants. According to one study, 89.3% of mothers consumed products with probiotics for themselves, while only 50.8% fed them to their infant<sup>(1)</sup>. Another study found that almost all the caregivers (99%) used fermented products (milk, yogurt and fermented maize porridge) to nourish children under 5<sup>(21)</sup>. According to the research carried out by Kirui *et al.* in Kenya, the use of mursik, which is a probiotic product, was low for children under 5, and families did not have enough information about mursik<sup>(27)</sup>. The findings of the current study show that the dietary habits of the mothers were very traditional and that they did not have enough knowledge about the benefits of probiotics.

The findings regarding the attitudes of the mothers who participated in the study were positive. Similar to the current study, several other studies also found that the participants had positive beliefs about, and attitudes towards, probiotics<sup>(1,19,21)</sup>. Further investigation is needed into beliefs about, and attitudes towards, probiotics, especially during pregnancy and parenthood.

### **Strengths and limitations of the study**

One strength of the study was that the sample population (*N*519) was receiving health care in the paediatric clinics of a university hospital and a public hospital. These hospitals are health institutions that are easily accessible to mothers from all segments of society (low, middle and high income, and educated/uneducated). The large sample size increased the ability of the study to be representative of the society. In addition, the pilot study allowed the questionnaire to be assessed for clarity and technical errors. The current study thus provides important implications for future research in the area about use of probiotics.

However, the fact that the study was conducted in the paediatric clinics of only two hospitals in one province of Turkey is a limitation and means that the study cannot be generalised to all women in this society.

### **Conclusion**

Given the increase in the number of studies demonstrating the beneficial health effects of probiotics, it is important to inform

mothers about their proper use. The current study shows that mothers' knowledge about, and use of, probiotics is not yet adequate. A number of recommendations can be made in the light of these findings. Evidence-based information should be provided, and mothers should be better educated about what probiotics are, as well as their benefits and disadvantages. Studies should be conducted to find how much, and what kind of, information health professionals are giving to pregnant women and women with children about how to use probiotics. It is, however, important to keep in mind that the results of the current study cannot be generalised to the population and only represent the women who were present in the hospitals at one specific time. Future research should include larger sample populations that are more representative of each society in general.

### Acknowledgements

**Acknowledgements:** The authors would particularly like to thank the women who participated in the study. Additionally, we would like to thank the trained staff members who contributed to our research during the questionnaire phase. **Financial support:** The authors declare that the current study received no funding. **Conflict of interest:** The authors did not report any conflict of interest for the current study. **Authorship:** Ü.Ç.G. has contributions such as research design, data analysis, writing the first draft of the article and presenting the article to the journal. A.K. has contributions such as research design, writing the article and presenting the article to the journal. The authors contributed to the article and they reviewed the article from a critical perspective. The final paper was approved by the authors. **Ethics of human subject participation:** Before starting the study, the ethics committee of Gaziosmanpaşa University Faculty of Medicine approved the current study. Ethics committee decision number is 18-KAEK-021. Verbal and written consent was obtained from each mother. During the study, the provisions of Helsinki Declaration were respected.

### References

1. Bridgman SL, Azad MB, Field CJ *et al.* (2014) Maternal perspectives on the use of probiotics in infants: a cross-sectional survey. *BMC Complement Altern Med* **14**, 366.
2. Vandenplas Y & Huysentruyt K (2018) Probiotic interventions to optimise the infant and child microbiota. *World Nutr J* **1**, 23–30. doi: 10.25220/WNJ.V01i2.0005.
3. Köroğlu Ö, Bakır E, Uludağ G *et al.* (2015) Kefir and health. *Kabramanmaraş Sütçü İmam Univ J Natural Sci* **18**, 26–30.
4. Güney R & Çınar N (2017) Breastmilk and development of microbiota. *J Biotechnol Strategic Health Res* **1**, 17–24.
5. Özdemir A & Demirel ZB (2017) The relation between diet and microbiota. *J Biotechnol Strategic Health Res* **1**, 25–33.
6. Ceyhan N & Aliç H (2012) Intestinal microflora and probiotics. *Turk J Sci Rev* **5**, 107–113.
7. Viana JV, Cruz AG, Zoellner SS *et al.* (2008) Probiotic foods: consumer perception and attitudes. *Int J Food Sci Technol* **43**, 1577–1580.

8. Arica SG, Arica V & Özer C (2012) Probiotic use in the treatment and prevention of upper respiratory tract infection in children. *Turk J Fam Med Primary Care* **6**, 22–29.
9. Usta M & Urgancı N (2014) Probiotic use in childhood. *J Curr Pediatr* **12**, 88–94.
10. Pelucchi C, Chatenoud L, Turati F *et al.* (2012) Probiotics supplementation during pregnancy or infancy for the prevention of atopic dermatitis: a meta-analysis. *Epidemiology* **23**, 402–414.
11. Bertelsen RJ, Brantsæter AL, Magnus MC *et al.* (2014) Probiotic milk consumption in pregnancy and infancy and subsequent childhood allergic diseases. *J Allergy Clin Immunol* **133**, 165–171.
12. Green VA, Pituch KA, Itchon J *et al.* (2006) Internet survey of treatments used by parents of children with autism. *Res Dev Disabil* **27**, 70–84.
13. Gilbert JA, Krajmalnik-Brown R, Porazinska DL *et al.* (2013) Toward effective probiotics for autism and other neurodevelopmental disorders. *Cell* **155**, 1446–1448.
14. Çetinbaş S, Kemeriz F, Göker G *et al.* (2017) Human microbiome: nutritional and health effects. *Acad Food J* **15**, 409–415.
15. Balkış M (2011) Determination the nutrition habits, probiotic nutrient consumptions and the knowledge of probiotics of the high school students: Kulu sample. *Selçuk University Institute of Social Sciences*. Unpublished Master Thesis, Konya.
16. Oliver L, Rasmussen H, Gregoire MB *et al.* (2014) Health care providers' knowledge, perceptions, and use of probiotics and prebiotics. *TICN* **29**, 39–49.
17. Betz M, Uzueta A, Rasmussen H *et al.* (2015) Knowledge, use and perceptions of probiotics and prebiotics in hospitalised patients. *Nutr Diet* **72**, 261–266.
18. Yurttaş M & Yılmaz A (2017) Determination of knowledge level and consumption status of health school students regarding probiotic products. *Gümüşhane Univ J Health Sci* **6**, 64–69.
19. Andersen SS, Michaelsen KF, Laursen RP *et al.* (2018) Why parents are skeptical about using probiotics preventively for small children: a Danish qualitative study. *BMC Complement Altern Med* **18**, 336.
20. Amarauche CO (2016) Assessing the awareness and knowledge on the use of probiotics by healthcare professionals in Nigeria. *J Young Pharm* **8**, 53–55.
21. Gumede S & Chelule PK (2014) The level of knowledge, usage patterns and perceptions of fermented foods for feeding children under-five years in Bulawayo, Zimbabwe: child nutrition and feeding practices. *Afr J Phys Health Educ Recreation Dance* **20**, 244–252.
22. FAO/WHO (2002) Guidelines for the evaluation of probiotics in food. *Joint FAO/WHO Working Group Report on Drafting for the Evaluation of Probiotics in Food*. London, ON, Canada: WHO.
23. Kılıç İ & Şahin Ö (2013) Probiotic use in newborns. *Clin J Pediatr* **5**, 29–35.
24. Chin-Lee B, Curry WJ, Fetterman J *et al.* (2014) Patient experience and use of probiotics in community-based health care settings. *Patient Prefer Adherence* **8**, 1513–1520.
25. Al-Nabulsi AA, Obiedat B, Ali R *et al.* (2014) Knowledge of probiotics and factors affecting their consumption by Jordanian college students. *Int J Probiotics Prebiotics* **9**, 77–86.
26. Altındış M, İnci MB, Elmas B *et al.* (2018) Knowledge, attitudes and behaviors about probiotic activities of family doctors, Pediatrician and Pharmacists in Turkey. *J Biotechnol Strategic Health Res* **2**, 108–116.
27. Kirui E, Nguka G, Wango J *et al.* (2017) Factors that negatively influence consumption of traditionally fermented milk (Mursik) among preschool children (1–5 Years Old) in Kapseret Location-Uasin Gishu County, Kenya. *AJFAND* **17**, 12295–12310.