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Assessment of Saudi Public Knowledge, Attitude and Awareness towards Oral Benefits of Probiotics: A Cross-Sectional Study

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Little is known about probiotic consumption or beliefs, in spite of its enhanced availability. Therefore, the aim of this study was to assess the knowledge, awareness, and attitudes of Saudi publics towards the oral benefits of probiotics. The web-based cross-sectional survey was conducted among 600 Saudi individuals through a questionnaire which was randomly distributed through online social media. Each of them was asked to complete a questionnaire including socio-demographic data and took a probiotic knowledge test.Probiotic knowledge was significantly linked with marital status, gender and those who are working in the health field, Majority of them were females (87.1%) being more knowledgeable than males (79.9%). The highest percentages of participants who heard about beneficial bacteria were those who are in the age group 36-45 years old at 87.3%, highly educated at 87.5%, postgraduates at 89.2%, married at 88.9%, and those who are working in the health field at 94.4%. Although beneficial, lack of sufficient knowledge concerning probiotics restricted its usage among few respondents. There is a need for further education and promotion of the general public in regards to the definition, oral benefits, sources and usage of probiotics.

Keywords: Awareness, Knowledge and Attitude,Oral Benefits,Probiotics.

Health and wellness

Public awareness and interest in food that is highly related to their health benefits are flourishing. Even though there is a gap between the biomedical sciences experiments and the business of marketing, the accessibility of health-promoting channels/media leads the consumer to seek healthier food and drinks.[1,2]

Lactic acid bacteria

It has been documented that the gastrointestinal tract of an adult human contains up to 500 different species of microorganisms present in interdependence with the host, providing benefits such as protection against microbial infections, stimulating immune function. Any decrease in this normal endogenous flora may lead to the microbial imbalance which might result in gastroenteritis and diarrhea.[3] The term "functional food" was introduced in Japan in the 1980s describing food products fortified with special constituents that provide beneficial health effect. Lactic acid bacteria and bifidobacteria were heavily studied as normal components of the intestinal microbiota having a safe application within the food industry.[1]

Probiotics

The FAO/ WHO definition of a probiotic: "Live microorganisms which when administered

in adequate amounts confer a health benefit on the host",[4] however, inconsistencies between FAO/WHO Expert Consultation Report and the FAO/WHO Guidelines were clarified to take into account advances in science and applications.[5]

Recent studies have shown a high level of awareness, knowledge, and consumption of probiotics supplements in some developed countries such as Canada, Australia, and the USA which deliver an advanced health care system,[3] however, this appears in contrary to some developing countries such as Nigeria and Arabian Gulf countries.[6]

MATERIAL AND METHODS

Study Design

A web-based cross-sectional survey questionnaire was randomly distributed through online social media (WhatsApp and Twitter) to reach at least 600 Saudi individuals (minimum sample size). The survey was conducted from October to November 2017.

The questionnaire was divided into two sections: demographic information; and awareness towards probiotic benefits on the oral cavity. The number of questions was 6 for the first section and 8 for the second section; with a total of 14 questions. 1115 participates completed the online survey.

Statistical Analysis

All statistical analyses were set at a significant level of when P-value less than 0.05 ($P<0.05$) using statistical program (SPSS) version 22.0 software (SPSS Inc., Chicago, IL, USA). The frequencies and percentages for all nominal variables were calculated.Chi-square and Fisher's exact tests were used to compare the demographic characteristics with different questions of the questionnaire.

RESULTS

Demographic Data

The total number of the current study respondents was 1093 and a vast majority of them were females (70.9%), aged <45 years old (almost 80%), married (62.8%) and highly educated (65%). More than half of the respondents (52.2%) are unemployed, 35.7% are the employee and working outside the health field, and 4.8% are the employee and working within the health field. Among those who are working within the health field, 18.9% is the dentist. Social media was the highest scored source of information by 39% for the current study participants followed by Self-Culture (Reading medical books and magazines) by 34.5%, friends, and family by 19%, while hospitals and doctors

Table 1. Demographic data of the study participants

	Frequency (%)
Gender	
Male	302 (27.1 %)
Female	791 (70.9 %)
Age groups	
15 – 25 y	303 (27.2 %)
26 – 35 y	266 (23.9 %)
36 – 45 y	301 (27.0 %)
46 y +	223 (20.0 %)
Education levels	
Low Education	368 (33.0 %)
High Education	725 (65.0 %)
Education levels	
Uneducated	1 (0.1 %)
Elementary school	11 (1.0 %)
Intermediate school	31 (2.8 %)
High school	325 (29.1 %)
Bachelor	623 (55.9 %)
Postgraduate	102 (9.1 %)
Marital status	
Single	345 (30.9 %)
Married	700 (62.8 %)
Others	47 (4.2 %)
Job title	
The employee, working in the health field	54 (4.8 %)
Employee, I do not work in the health field	398 (35.7 %)
Non-employee	582 (52.2 %)
If you are working in the health field, in any area: (n=53)	
Nurse	8 (15.1 %)
Pharmacy	3 (5.7 %)
Medicine	9 (17.0 %)
Dentist	10 (18.9 %)
Applied medical sciences	12 (22.6 %)
Others	11 (20.8 %)
Sources of knowledge	
Friends and family	186 (19.0 %)
Self-Culture (Reading medical books and magazines)	338 (34.5 %)
Hospitals and doctors	74 (7.5 %)
Social media	383 (39.0 %)

were the lowest scored source by only 7.5% of the study participants**(Table 1)**.

Awareness of Probiotics

When respondents were asked if they have ever heard of beneficial bacteria, the results showed that most of the participants answered "yes". The analysis was done according to the respondent's socio-demographic characteristics and it was found that a statistically significant (P<0.01) higher percentage of females (87.1%) compared to males (79.9%) have ever heard about beneficial bacteria. The highest percentages of participants who heard about beneficial bacteria were those who are in the age group 36-45 years old at 87.3%, highly educated at 87.5%, postgraduates at 89.2%, married at 88.9%, and those who are working in the health field at 94.4%. There was a statistically significant difference between the different age groups, different educational level groups, marital status and job title groups in regards to if they hear or did not hear about beneficial bacteria since all P-values were < 0.05**(Table 2).**

Attitude towards Effects of Oral Probiotics

Most of the participants have a positive attitude towards the point that beneficial bacteria have a positive and beneficial effect on oral and dental health. It was positively scored by 78% of females and 65.2% of males with a highly statistically significant difference between the two genders (P<0.01). The positive score was higher among those aged 35-46 years old with a statistically significant difference between the different age groups (P<0.05). 76.6% of highly educated have the positive attitude towards that point compared to 71.9% of the low educated participants, however, such difference was statistically non-significant (P0.10). Similarly, there were no statistically significant differences

Table 2. Study participants' distribution based on demographic data

	Total	Have you ever heard of beneficial bacteria? Yes	No	P-value
Gender				
Male	298	238 (79.9 %)	60 (20.1 %)	0.003
Female	783	682 (87.1 %)	101 (12.9 %)	
Age groups				
15 – 25 y	301	235 (78.1 %)	66 (21.9 %)	
26 – 35 y	263	221 (84.0 %)	42 (16.0 %)	P<0.0001
36 – 45 y	300	262 (87.3 %)	38 (12.7 %)	
46 y +	217	201 (92.6 %)	16 (7.4 %)	
Education levels				
Low Education	361	290 (80.3 %)	71 (19.7 %)	0.002
High Education	720	630 (87.5 %)	90 (12.5 %)	
Education levels				0.004
Uneducated	1	0 (0 %)	1 (100 %)	
Elementary school	10	7 (70 %)	3 (30 %)	
Intermediate school	31	23 (74.2 %)	8 (25.8 %)	
High school	319	260 (81.5 %)	59 (18.5 %)	
Bachelor	618	539 (87.2 %)	79 (12.8 %)	
Postgraduate	102	91 (89.2 %)	11 (10.8 %)	
Marital status				
Single	340	267 (78.5 %)	73 (21.5 %)	P<0.0001
Married	694	617 (88.9 %)	77 (11.1 %)	
Others	46	35 (76.1 %)	11 (23.9 %)	
Job title				0.042
The employee, working in the health field	54	51 (94.4 %)	3 (5.6 %)	
Employee, I do not work in the health field	393	340 (86.5 %)	53 (13.5 %)	
Non-employee	575	477 (83.0 %)	98 (17.0 %)	

between the different educational level, marital status and job title groups in terms of their attitude towards that point, giving that the highest positive attitude was from young adult participants, and employee working in the health field at 85.7% and 80.8%; respectively**(Table 3)**.

Most of the participants have a negative attitude towards the question" Do you think beneficial bacteria have a negative or harmful effect on oral and dental health?" The negative attitude was non-statistically significant (P 0.41) lower in males compared to females at 74.5% and 77.1%, respectively. Participants aged>46 years old showed the highest negative attitude at 83.3%, with a statistically significant difference between the different age groups (P <0.01). There were no statistically significant differences between the different educational level, marital status, and job title groups in terms of their attitude towards that point. The negative attitude was higher among intermediate school, those who are not working in the health field and married participants at 87.5%, 79.3%, and 77.9%, respectively **(Table4)**.

As shown in **(Table 5)**, the question "What do you think is the negative effect of beneficial bacteria on oral health and general health?" was correctly answered (Cause imbalance in the balance of oral bacteria) by 62.3% and 58.7% of males and females respectively, with no significant difference. Additionally, the highest percentage of correct answers to it was seen from participants ages 36-45, high educational level, single and participants who are working in the health field. However, there were no statistically significant differences between the different groups of age group, educational level, marital status and job title (all P-value > 0.05).

The highest proportion of participants knows the beneficial effect of beneficial bacteria on oral and dental health (prevent or reduce dental carries), such knowledge was higher

Table 3. Positive attitude towards the effects of oral probiotics among participants

	Do you think beneficial bacteria have a positive and beneficial effect on oral and dental health?		P-value
	Yes	No	
Gender			
Male	163 (65.2%)	87 (34.8 %)	P<0.0001
Female	565 (78.0 %)	159 (22.0 %)	
Age groups			
15 – 25 y	191 (74.6 %)	65 (25.4 %)	
26 – 35 y	157 (66.8 %)	78 (33.2 %)	0.008
36 – 45 y	213 (78.0 %)	60 (22.0 %)	
46 y +	166 (79.4 %)	43 (20.6 %)	
Education levels			
Low Education	230 (71.9 %)	90 (28.1 %)	0.109
High Education	501 (76.6 %)	153 (23.4 %)	
Education levels			0.388
Elementary school	6 (85.7 %)	1 (14.3 %)	
Intermediate school	16 (66.7 %)	8 (33.3 %)	
High school	208 (72.0 %)	81 (28.0 %)	
Bachelor	434 (77.1 %)	129 (22.9 %)	
Postgraduate	67 (73.6 %)	24 (26.4 %)	
Marital status			
Single	222 (76.0 %)	70 (24.0 %)	
Married	473 (73.8 %)	168 (26.2 %)	0.248
Others	34 (85.0 %)	6 (15.0 %)	
Job title			
The employee, working in the health field	42 (80.8 %)	10 (19.2 %)	
Employee, I do not work in the health field	271 (76.1 %)	85 (23.9 %)	0.411
Non-employee	377 (73.5 %)	136 (26.5 %)	

among females, eldest age group, participants other than single and married, highly educated and those who are working in the health field at 75.4%, 79.9%, 77.1%, 74%, and 76.2%. The differences in knowledge were only statistically significant among genders, age groups and marital status with a P-value of 0.01, <0.01, and 0.02, respectively**(Table 6)**.

As shown in **(Table 7)**, the vast majority of the participants (87.5% of males and 91.6% of females) have the correct knowledge about the benefits of beneficial bacteria (good for immunity). Results showed no statistically significant differences between the groups of any of the studied socio-demographic characteristics, as all P values were >0.05.

Most of the participants (77.6% of males and 86.6% of females) heard the correct information that beneficial bacteria are found in yogurt. Such knowledge was higher in females, eldest, highly educated, married and those who are not working in the health field. The differences in-between the knowledge of genders, age groups, educational level, marital status and job title groups were statistically significant**(Table 8)**.

DISCUSSION

There has been a spiraling interest in utilizing natural remedies to treat or avert human ailments. In the developed world the growth of probiotic products has been rapidly increased.[7] Our study revealed that the general population in Saudi Arabia seems to have good awareness and knowledge of probiotics. In accordance with the study of Reshma Thirunavakarasu et al,[8] the respondents of the current study showed that there is a high level of knowledge and awareness on the

Table 4. Negative attitude towards the effects of oral probiotics among participants

	Do you think beneficial bacteria have a positive and beneficial effect on oral and dental health?		P-value
	Yes	No	
Gender			
Male	63 (25.5 %)	184 (74.5 %)	0.415
Female	162 (22.9 %)	544 (77.1 %)	
Age groups			
15 – 25 y	75 (29.6 %)	178 (70.4 %)	
26 – 35 y	48 (21.1 %)	180 (78.9 %)	0.009
36 – 45 y	69 (25.3 %)	204 (74.7 %)	
46 y +	33 (16.7 %)	165 (83.3 %)	
Education levels			
Low Education	76 (24.5 %)	234 (75.5 %)	0.647
High Education	149 (23.2 %)	494 (76.8 %)	
Education levels			0.451
Elementary school	3 (42.9 %)	4 (57.1 %)	
Intermediate school	3 (12.5 %)	21 (87.5 %)	
High school	70 (25.1 %)	209 (74.9 %)	
Bachelor	130 (23.5 %)	424 (76.5 %)	
Postgraduate	19 (21.3 %)	70 (78.7 %)	
Marital status			
Single	79 (27.1 %)	212 (72.9 %)	0.238
Married	137 (22.1 %)	484 (77.9 %)	
Others	9 (22.5 %)	31 (77.5 %)	
Job title			
The employee, working in the health field	17 (32.7 %)	35 (67.3 %)	0.121
Employee, I do not work in the health field	72 (20.7 %)	276 (79.3 %)	
Non-employee	123 (24.5 %)	380 (75.5 %)	

importance of probiotics towards one's health, and most of the respondents were females. This might be justified by females' better compliance and fulfillment to fill the online survey since they are highly active in the social media. We also noticed that in the current study, females had greater knowledge and awareness level than males. It was in concordance with the study by Al-Nabulsi et al, where 75.7% of female students correctly identified probiotics.[9] The behaviors of men and women are considerably dissimilar, predominantly toward healthy foods. Men exhibit reduced eagerness to comply with dietary guidelines than women. One probable justification for this might be that since women are more knowledgeable about food and nutrition than men, they are more engrossed and interested in their physical appearance and health.[9]But in contrastto Payahoo et al study,[10] reported female students had the lower level of knowledge than male students. Another study by Babajimopoulos et al supported Payahoo et al study in which 29% of men were more familiar than women (18%) with the term probiotics among urban consumers in Greece.[9]

Additionally, a higher knowledge level was shown in the current study compared to a previous study conducted on medical science students where they had a satisfactory level of knowledge about probiotics and their health effects this was anticipated due to the quality of education and training that the health science students usually receive. In this study, respondents had only elementary education and those in health care professions showed the highest positive attitude at 85.7% and 80.8% respectively. The high percentage of those with elementary education could be attributed to the wide exposure to different general topics in life. One more survey done on general

Table 5. Study participants' background of probiotics negative effect

	Do you think beneficial bacteria have a positive and beneficial effect on oral and dental health?		P-value
	Correct answer	Wrong answer	
Gender			
Male	48 (62.3 %)	29 (37.7 %)	0.572
Female	148 (58.7 %)	104 (41.3 %)	
Age groups			
15 – 25 y	56 (63.6%)	32 (36.4 %)	
26 – 35 y	45 (53.6 %)	39 (46.4%)	0.174
36 – 45 y	68 (66.0 %)	35 (34.0 %)	
46 y +	28 (51.9 %)	26 (48.1 %)	
Education levels			
Low Education	69 (63.3 %)	40 (36.7 %)	0.332
High Education	127 (57.7 %)	93 (42.3 %)	
Education levels			0.158
Elementary school	2 (50.0 %)	2 (50.0 %)	
Intermediate school	3 (30.0 %)	7 (70.0 %)	
High school	64 (67.4 %)	31 (32.6 %)	
Bachelor	110 (57.3 %)	82 (42.7 %)	
Postgraduate	17 (60.7 %)	11 (39.3 %)	
Marital status			
Single	64 (64.6 %)	35 (35.4 %)	0.061
Married	126 (58.6 %)	89 (41.4 %)	
Others	4 (30.8 %)	9 (69.2 %)	
Job title			
The employee, working in the health field	13 (61.9 %)	8 (38.1 %)	0.991
Employee, I do not work in the health field	72 (60.5 %)	47 (39.5 %)	
Non-employee	102 (61.1 %)	65 (38.9%)	

dental practitioners revealed that around 22% of the respondents were not aware of the constituents of probiotics, and 19% of them were above 55 years of age, which implicit that the information of probiotics was highest in younger age groups.[11] It was in accordance with another study by Betz et al, who found that younger patients (<45 years of age) (P = 0.011), and who had higher education level (P = 0.001) were more likely to be familiar with the probiotic perception than older patients, or with less education.[12] But in disparity to this, the study conducted in Jordan exposed that college students had deprived knowledge of probiotics. Merely 11.7% of students had a little level of knowledge about probiotics and 7.0% were capable to recognize probiotics.[9] Also, another study revealed insufficient knowledge and awareness regarding probiotics among the chemists.[13]

Moreover, a higher percentage of respondents reported that they heard and aware of the term probiotics compared to a Nigerian study published in 2015,[3] putting in consideration that the Nigerian one was conducted on healthcare professionals. The current study showed that a maximum number of participants were aware of the beneficial role of probiotics in decreasing dental caries and improving the immunity. This is in contrast to what have been previously reported in the study conducted in Brazil,[14] in which only 7.86% of participants have chosen "reduction of caries" when asked the benefits arising from the ingestion of probiotic foods compared to 87.5% of males and 91.6% of females in our study who did so. This reflects the high knowledge and awareness level of the Saudi population about the benefits of probiotics in prevention of caries, putting in consideration that the current study was conducted among the general population not only dental ones. Additionally, when this question was asked to dental students in a similar study, results

Table 6. Study participants' background of probiotics beneficial effect

	Do you think beneficial bacteria have a positive and beneficial effect on oral and dental health?		P-value
	Correct answer	Wrong answer	
Gender			
Male	114 (66.3 %)	58 (33.7 %)	0.017
Female	439 (75.4 %)	143 (24.6 %)	
Age groups			0.003
15 – 25 y	125 (63.5 %)	72 (36.5 %)	
26 – 35 y	126 (76.8 %)	38 (23.2 %)	
36 – 45 y	168 (73.4 %)	61 (26.6 %)	
46 y +	131 (79.9 %)	33 (20.1 %)	
Education levels			
Low Education	173 (71.5 %)	69 (28.5 %)	0.47
High Education	381 (74.0 %$)	134 (26.0 %)	
Education levels			
Elementary school	3 (50.0 %)	3 (50.0 %)	0.169
Intermediate school	10 (52.6 %)	9 (47.4 %)	
High school	160 (73.7 %)	57 (26.3 %)	
Bachelor	336 (74.5 %)	115 (25.5 %)	
Postgraduate	45 (70.3 %)	19 (29.7 %)	
Marital status			
Single	152 (66.4 %)	77 (33.6 %)	0.025
Married	373 (75.8 %)	119 (24.2 %)	
Others	27 (77.1 %)	8 (22.9 %)	
Job title			
The employee, working in the health field	32 (76.2 %)	10 (23.8 %)	0.913
Employee, I do not work in the health field	206 (73.3 %)	75 (26.7 %)	
Non-employee	286 (73.1 %)	105 (26.9 %)	

showed that 80.5% of participants were unaware of the role of probiotics in the prevention of any disease in the oral cavity.[8]

The current study clearly revealed that the participants had a basic knowledge of probiotics. Such results might be due to the fact that there is a correlation between having heard of probiotics and knowing about probiotics since the majority of the participants heard about probiotics and correctly answering it as "found in yogurt". It was in line with Reshma et al, where 44.5% of the participants have selected yogurt as the source. On the other hand, 32.5% have selected both milk and yogurts as the source of probiotics.[8]Yogurt was scored as the preferred source of probiotics by almost half of Nigerian clinicians.[7] A similar study exhibited results in which 38.2% have selected yogurt as the source, however, 54.6% of the respondents were unaware of the source.[15]

In the study of Stanczak and Heuberger published in 2009,[15] when participants were asked about the reason for consuming probiotics they have chosen the option 'increase immune function', and this is in line with the current study since vast majority have chosen the same option when asked about the benefits of probiotics. But it is in contrast with the study by Reshma et al when asked concerning the motive for consuming probiotics 83.5% of the respondents have selected the option to improve the gastrointestinal condition.[8] A 2007 consumer attitudes survey revealed that 37% of respondents were consuming probiotics for immune health and 41% for digestive health and 11% for immunity.[16] and 41% for digestion in the study by Betz et al.[12]

Some of the respondents had some concerns in regards to the use of probiotics and they think that probiotics have a negative or harmful

Table 7. Study participants' knowledge of probiotics benefits

	What are the benefits of beneficial bacteria in your opinion?		P-value
	Correct answer	Wrong answer	
Gender			
Male	217 (87.5 %)	31 (12.5 %)	0.053
Female	669 (91.6 %)	61(8.4 %)	
Age groups			
15 – 25 y	229 (90.2 %)	25 (9.8 %)	0.5
26 – 35 y	214 (90.7 %)	22 (9.3 %)	
36 – 45 y	246 (88.8 %)	31 (11.2 %)	
46 y +	196 (92.9 %)	15 (7.1 %)	
Education levels			
Low Education	294 (90.7 %)	30 (9.3 %)	0.857
High Education	592 (90.4 %)	63 (9.6 %)	
Education levels			
Elementary school	7 (87.5 %)	1 (12.5 %)	0.763
Intermediate school	23 (92.0 %)	2 (8.0 %)	
High school	264 (90.7 %)	27 (9.3 %)	
Bachelor	514 (91.0 %)	51 (9.0%)	
Postgraduate	78 (86.7 %)	12 (13.3 %)	
Marital status			
Single	255 (87.9 %)	35 (12.1 %)	0.199
Married	593 (91.7 %)	54 (8.3 %)	
Others	37 (90.2 %)	4 (9.8 %)	
Job title			
The employee, working in the health field	47 (90.4 %)	5 (9.6 %)	0.934
Employee, I do not work in the health field	327 (91.3 %)	31 (8.7 %)	
Non-employee	466 (90.7 %)	48 (9.3 %)	

effect on oral and dental health, mainly imbalance in oral bacteria. In the Nigerian study,[3] healthcare professionals also raised many concerns regarding the use of probiotics including the possibility of the products being unsafe as they may lead to patients' infection. There are some studies suggest that such reported cases of fungemia and bacterial sepsis due to the use of probiotics may have been observed in compromised immune system patients or those with chronic diseases.[3] But in contrast to this in a study by Betz et al, revealed that patients did not consider that probiotics were harmful, as declared by 90% of patients replied with 'not at all' or 'a little' to the statement 'probiotics are harmful'.[12]To support this, another study exhibited 96.3% of the consumers found probiotic consumption as safe as they didn't found any side effects after consuming probiotics.[17]

The participants showed a reasonably high educational level and the replies were observed to be almost independent of this requisite, a finding which is similar to what has been previously reported in the literature.[3] Similarly, is working in the health field wasn't necessary for good knowledge and attitude towards probiotics, since the current results showed no significant difference between those who are working and those who are not working in the health field in most of the assessed items. The limitation of the current study was a poor response of males when compared to females. This could be due to un-cooperation of males to fill the online survey which could have been different if the hard copy of the survey was distributed.

CONCLUSION

The results obtained from this cross-sectional survey study among the general Saudi population and health care professionals showed

Table 8. Study participants' knowledge of probiotics

	What did you hear about beneficial bacteria?		P-value
	Correct answer	Wrong answer	
Gender			
Male	187 (77.6 %)	54 (22.4 %)	0.001
Female	605 (86.6 %)	94 (13.4 %)	
Age groups			
15 – 25 y	153 (64.0 %)	86 (36.0 %)	
26 – 35 y	200 (88.1 %)	27 (11.9 %)	P<0.0001
36 – 45 y	245 (92.1 %)	21 (7.9 %)	
46 y +	197 (94.7 %)	11 (5.3 %)	
Education levels			
Low Education	241 (79.3 %)	63 (20.7 %)	0.005
High Education	551 (86.5 %)	86 (13.5 %)	
Education levels			
Elementary school	6 (85.7 %)	1 (14.3 %)	0.057
Intermediate school	20 (76.9 %)	6 (23.1 %)	
High school	215 (79.3 %)	56 (20.7 %)	
Bachelor	476 (87.0 %)	71 (13.0 %)	
Postgraduate	75 (83.3 %)	15 (16.7 %)	
Marital status			
Single	190 (69.6 %)	83 (30.4 %)	P<0.0001
Married	570 (90.5 %)	60 (9.5 %)	
Others	31 (83.8 %)	6 (16.2 %)	
Job title			
The employee, working in the health field	42 (82.4 %)	9 (17.6 %)	0.001
Employee, I do not work in the health field	314 (90.2 %)	34 (9.8 %)	
Non-employee	393 (80.7 %)	94 (19.3 %)	

that they have good knowledge, awareness, and attitude towards probiotics and its significance in dentistry. Despite a plethora of information accessible on probiotics, few respondents did not hear about probiotics, unaware of its benefits and don't know its source. This signifies the enormity of the gap that subsists in the propagation of scientific information to the general community in Saudi Arabia. This also indicates that still there is a need for further education and promotion of the general public in regards to the definition, oral benefits, sources and usage of probiotics. A further clinical investigation should be carried on to confirm the beneficial influence of the oral probiotics on dental and oral health.

REFERENCES

1. Chingriyo Raihing UMS. Consumer Knowledge and Awareness of Prebiotic and Probiotic Foods. *International Journal of Scientific Research and Reviews.*; **3**:91 - 104 (2014).
2. Rijkers GT, de Vos WM, Brummer RJ, Morelli L, Corthier G, Marteau P. Health benefits and health claims of probiotics: bridging science and marketing. *The British journal of nutrition.*; **106**: 1291-6 (2011).
3. Amarauche CO. Assessing the Awareness and Knowledge on the Use of Probiotics by Healthcare Professionals in Nigeria. *Journal of Young Pharmacists.*; **8**: 53-5 (2015).
4. Joint FAO/WHO Working Group Report on Drafting Guidelines for the Evaluation of Probiotics in Food London, Ontario, Canada.: Food and Agriculture Organization of the United Nations and WHO; 2002.
5. Hill C, Guarner F, Reid G, et al. Expert consensus document. The International Scientific Association for Probiotics and Prebiotics consensus statement on the scope and appropriate use of the term probiotic. *Nature reviews Gastroenterology & hepatology.*; **11**:506-14 (2014).
6. Senok AC. Probiotics in the Arabian Gulf Region. *Food & Nutrition Research.*; **53** (2009).
7. Anukam KC OE, Reid G. Knowledge of probiotics by Nigerian clinicians *International Journal of Probiotics and Prebiotics.*; **1**:57-62 (2006).
8. Thirunavakarasu R. Survey on Knowledge and Awareness of Probiotics among Dental Students. I*nternational Journal of Pharmacy & Technology.*; **9**: 29129-35 (2017).
9. Al-Nabulsi Anas A OB, Ali Rasha, Osaili Tareq M, Bawadi Heba, Abushelaibi Aisha, Shaker Reyad R, Holley Richard A. Knowledge of probiotics and factors affecting their consumption by Jordanian college students. *International Journal of Probiotics and Prebiotics.*; **9**: 77-86 (2014).
10. Payahoo L, Nikniaz Z, Mahdavi R, Asghari Jafar Abadi M. Perceptions of medical sciences students towards probiotics. *Health promotion perspectives.*; **2**:96-102 (2012).
11. Sam Prasad RR. Probiotic awareness among general dentists in Chennai.*Journal of Oral Medicine, Oral Surgery, Oral Pathology and Oral Radiology.*; **3**:45-7 (2017).
12. Melanie Betz AU, Heather Rasmussen, Mary Gregoire, Cassandra Vanderwall, Gretchen Witowich. Knowledge, use and perceptions of probiotics and prebiotics in hospitalised patients. Nutrition & Dietetics, *Journal of the Dietitians Association of Australia.*; **72**:261-6 (2015).
13. Shetty SM, Shah DS, Goyal G, Kathuria NS, Abraham J, Bhatia V. A study to find the status of probiotics in New Delhi, India and review of strains of bacteria used as probiotics. *Journal of International Society of Preventive & Community Dentistry.*; **4**:S18-22 (2014).
14. Julia V. Viana AGDC, Sidney S. Zoellner, Ramon Silva, Aline L. D. Batista. Probiotic foods: consumer perception and attitudes. *International Journal of Food Science & Technology.*; **43**:1577-80 (2008).
15. Stanczak M, Heuberger R. Assessment of the Knowledge and Beliefs Regarding Probiotic Use. *American Journal of Health Education.*; **40**:207-11 (2009).
16. International Food Information Council Foundation FIYNaFSR. Food & Health Survey: Consumer Attitudes toward Food, Nutrition & Health. (2009).
17. Kaur Palki Sahib PRK, Singh Satinder Pal, Singh Apoorva, Gupta Nidhi. Awareness and Knowledge of People Towards Probiotics Products in Punjab Region. *International Journal of Applied Biology and Pharmaceutical Technology.*; **7**:154 -60 (2016).