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ASSESSMENT AND COMPARISON OF KNOWLEDGE, ATTITUDE AND PERCEPTION ON PREBIOTIC AND PROBIOTIC FOODS AMONG DIETITIANS AND STUDENTS PURSUING NUTRITION COURSE.

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ABSTRACT

BACKGROUND: *Studies have proven that prebiotics and probiotics helped in prevention and treatment of several conditions. It is important to know that a nutrition professional should have proper knowledge on nutraceuticals and nutritional properties, types of probiotic species, application of specific strains, dosage, safety, shelf life and the emerging ingredients and products containing them. Lack of awareness and poor knowledge will lead to misguiding the patients.*

OBJECTIVE: *To compare the association/relation between the knowledge, attitude, perception and overall KAP scores on probiotics and prebiotics with the years of experience, qualification, and practice (dietary consumption of these foods on regular basis) among the working and student category.*

RESULTS: *Through this online survey conducted among dieticians of various field and students pursuing nutrition it was seen that, there was significant difference in the level of perception among the two groups, with a mean perception score (13.97 ± 3.501) of the working categories which was found to be significantly greater (p= 0.000) than the mean perception score (12.38 ± 3.583) of the students. When assessed the overall knowledge, attitude and perception (KAP) score it was seen that the mean KAP score (82.29 ± 7.681) of the working categories was found tobe significantly greater(p=0.000) than the mean KAP score (79.68 ± 7.683) of the student indicating that the workingcategory had better perception and overall KAP score about probiotics and prebiotics. A significant association wasfound between highest qualification and perception (χ^2 = 25.137, p = 0.014). The relationship on how the number of years of experience influences knowledge, attitude, perception and the overall knowledge, attitude and perception score was also tested. It was found that the knowledge and attitude scores did not show any significant relationship. But with perception score it showed a positive weak correlation at 1% level. Same way it showed a positive weak correlation at 5% level with the overall knowledge, attitude, and perception scores*

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CONCLUSION: *In this study it can concluded that the working and student category had a fair knowledge and attitude towards probiotics and prebiotics, but the working category showed a significant positive perception as compared to the student category. It was also found that as the qualification and the year of working experience increases the perception towards recommending probiotics and prebiotics also increases.*

Keywords: *PROBIOTICS, PREBIOTICS, FUNCTIONAL FOODS, MICROBIOTA, DIETITIANS*

INTRODUCTION

Sharing an important and unique role in human nutrition, probiotics and prebiotics is focused on maintainingthe balance of bacterial activity in the body (Douglas and Sanders, 2008). The use of probiotics was first started during2000 BC when preservation of milk was discovered (Ozen and Dinleyici, 2015). The human gastrointestinal tract houses variety of bacterial population between the stomach, small intestine, and colon (Fooks, Fuller and Gibson, 1999). Within the gastrointestinal tract there exist approximately 300 to 500 species of bacteria consisting of 2 million genes (EM, 2013) or 10 (Wang, 2009) bacteria per gram of intestine content (Gueimonde and Salminen, 2006). Recent studies have clearly indicated that gut microbiota in humans play a very crucial role in host health andwell-being (Tuohy et al., 2003).

Probiotics is defined as “live microorganisms that, when administered in adequate amounts, confer a health benefit on the host” (Gibson et al., 2017). Lactobacilli and bifidobacterial are called as probiotics and considered to be beneficial to human health (Bezkorovainy, 2001). Irritable bowel syndrome, diarrhoea, constipation, diverticulitis & ulcerative colitis are the common ailment during which probiotics were recommended to the patients. Other than these it was also given to patients who are susceptible to infection, mothers & babies with allergic family history, older persons, during and after a course of antibiotics and before traveling abroad (Oliver et al., 2014). Examples of probioticfoods are yoghurt, buttermilk, butter, pickles, idly, dosa, wine, kimchi, sauerkraut, cheddar cheese, Swiss cheese, goatcheese, fermented sausage, and kefir (Beena Divya et al., 2012).

Prebiotics is defined as “a non-digestible compound that, through its metabolization by microorganisms in the gut, modulates the composition and/or activity of the gut microbiota, thus, conferring a beneficial physiological effecton the host” (Gibson et al., 2010). Inulin and oligosaccharides are the prebiotics that are most studied and recognizedas dietary fiber in several countries (Wang, 2009).

The use of probiotics and prebiotics has gained extreme importance in recent years with people becoming aware of the factors that influence having a healthy gut which in turn helps maintaining their health. Healthcare professionals including general physicians, nurses, registered dietitians, dietitians, nutritionists, pharmacists, community nurses play a vital role in providing necessary education to patients or clients. And it is important that these health care professionals have the right knowledge, attitude, and perception of what

they recommend.

This study formulated aims in assessing and comparing the knowledge, attitude, and perception on probiotic and prebiotic foods amongst the dieticians and students who are pursuing nutrition as their core subject.

METHODOLOGY AND MATERIALS

A validated questionnaire was used to collect the data related to Socio-demographic details, Knowledge, Attitude and Perception on prebiotic and probiotic foods. The dietary consumption pattern of prebiotic and probiotic foods was recorded using Food Frequency Questionnaire (FFQ).

STATISTICAL ANALYSIS:

Statistical analysis was completed using SPSS software. Chi square, Correlation, Independent sample t tests were used as appropriate to compare the association/relation between the knowledge, attitude, perception and overallKAP scores with the years of experience, qualification, and practice (dietary consumption of probiotics and prebiotics on regular basis) among the working and student category.

SELECTION OF SAMPLES:

Snow-ball sampling (random/non-probability sampling) was selected as per the inclusion and exclusion criteria. Samples involved in the study were446 participants out of which 212 were dietitians and 234 were students pursuing nutrition as a major subject living in India where most participants are from Telangana, Karnataka, Kerala, and Tamil Nadu states.

TABLE 1: CATEGORIES OF PARTICIPANTS INVOLVED IN THE STUDY

GROUP	GROUP NAME	NUMBER OF PARTICIPANTS
1	Dietitians	212
2	Students	234
	Total	446

STUDY DESIGN:

It is a cross-sectional observational study conducted on dietitians and the student's pursuing nutrition as a major subject. This study is designed to assess and compare the knowledge, attitude, and perception of prebiotic and probiotic foods among the dietitians and the students through an online survey since it is not feasible to use controlledexperimentation.

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RESULTS

Dietitians(n=212;47.5%) practicing in various fields and students(n=234;52.5%) pursuing nutrition took part in this online survey from distinct part of India. Amongst the total number of participants 94.4% represented female population, 4.7% were male and 0.9% preferred not to say. Major section 334(74.9%) of the participants aged between 18 to 25 years, 82(18.4%) were between 26 to 33 years and 30(6.7%) of the population represented the age group above 34 years. Considering the highest qualification of all the participants 359(80.5%) have pursued their masters, 77(17.3%) have their highest qualification as bachelors, 7(1.6%) are Registered Dietitians and 3(0.7%) have their PhDcompleted.

Registered dietitians were familiar with both the term probiotics and prebiotics when compared to the other health professionals and believed that they are beneficial for overall health and recommended probiotics (78%) and prebiotics (67%). When assessed for their own consumption it was seen that among the registered dieticians 89% consumed probiotics and 78% consumed prebiotics (Oliver et al., 2014).

When accessed for the knowledge among the health professional group it was found that there was no significant difference between knowledge of doctors, pharmacists, and nutritionists. Among the student group it was seen that the medical students had better knowledge when compared to nutrition students. 62.5% of the total nutritionisthad good knowledge score and 37.5% had acceptable knowledge score. 55.7% of the nutrition students had acceptable knowledge score and 19.2% of them had good knowledge score. 85.7% of the participants believed that the probiotics are useful for patients and 48.6% agreed that the use of probiotics significantly affect the outcome of any therapy (Soni, Tank and Jain, 2018).

As a part of assessment of knowledge, the participants were asked to choose the correct definition of probioticsand prebiotics based on their understanding. The results **s**howed that 86.8% (184) from the working and 81.2% (190)from the student population choose the correct option as probiotics is the live microbes that can benefit the host whenconsumed in sufficient amount.

TABLE 2: CLASSIFICATION OF PERCEPTION AMONG WORKING DIETITIANS AND STUDENTS

HEALTH CONDITION	CATEGORY	YES (%)
Recommend topatients	Working	180(84.9)
	Student	155(66.2)
Cardiovascular diseases	Working	138(65.1)
	Student	120(51.3)

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Irritable bowel syndrome	Working	172(81.1)
	Student	149(63.7)
Ulcerative colitis	Working	142(67)
	Student	118(50.4)
Allergies	Working	84(39.6)
	Student	93(39.7)
Overweight obese	Working	181(85.4)
	Student	168(71.8)
Infant formula	Working	99(46.7)
	Student	98(41.9)
Before travel abroad	Working	123(58)
	Student	105(44.9)
Aged people	Working	181(85.4)
	Student	163(69.7)

A set of questions were asked to assess the perception and practice of probiotics and prebiotics amongst dietitians and students pursuing nutrition and were supposed to opt one among the three options given (yes, no, and not yet). Majority of the respondents from both working and student category have responded "yes" to the health conditions such as cardiovascular disease, irritable bowel syndrome, ulcerative colitis, allergies, to people who are obese and overweight, in the form of infant formula, to aged people and before travelling abroad suggesting their recommendation is shown in **(table 2)**

The results for a survey to assess the perception among different health professionals showed that 91.2% of dietitians and 78% of the general practitioners who responded recommended probiotics, while only a small percent of nurses (51.6%) recommended its usage. Irritable bowel syndrome, diarrhoea, constipation, diverticulitis & ulcerative colitis are the common ailment during which probiotics were recommended to the patients. Other than these it was also given to patients who are susceptible to infection, mothers & babies with allergic family history, older persons, during and after a course of antibiotics and before traveling abroad.[9]

The opinions on when it is best to take probiotics, in an international study conducted among different health professionals, were different (χ^2 = 28.375; p < 0.001), with 90.2% of respondents identifying that probiotic have beneficial effects if taken during antibiotic therapy, 83.5% for diarrhoea, 70.6% for

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constipation, 63.3% before travelling abroad, and 60.4% for treating allergies (Fijan et al., 2019).

TABLE 3: IN PERCEPTION AMONG WORKING DIETITIANS AND STUDENT CATEGORY

CATEGORY (N)	PERCEPTION SCORE				
	MEAN	T VALUE	P VALUE	95%CONFIDENCE INTERVAL	
				LOWER	UPPER
WORKING (212)	13.97 ± 3.501	4.721	0.000**	0.926	2.247
STUDENT (234)	12.38 ± 3.583				

(** denotes significance at p<0.01)

The mean perception score (13.97 ± 3.501) of the working category was found to be significantly greater (p=0.000) than the mean perception score (12.38 ± 3.583) of the students there is a significant difference in the perception of probiotic and prebiotic recommendations to patients among the working and student categories.

TABLE 4: DIFFERENCE IN OVERALL KNOWLEDGE, ATTITUDE AND PERCEPTION AMONG WORKING DIETITIANS AND STUDENT CATEGORY

CATEGORY (N)	KAP SCORE				
	MEAN	T VALUE	P VALUE	95%CONFIDENCE INTERVAL	
				LOWER	UPPER
WORKING (212)	82.29 ± 7.681	3.582	0.000**	1.177	4.040
STUDENT (234)	79.68 ± 7.683				

(* *denotes significance at 1% interval)

The mean KAP score (82.29 ± 7.681) of the working category was found to be significantly greater than the mean KAP score (79.68 ± 7.683) of the students. There is a strong significance (p= 0.000) in overall KAP score between working dietitians and students at 0.01% CI.

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TABLE 5: ASSOCIATION BETWEEN PERCEPTION AND THE VARIOUS CATEGORIES

CATEGORY	PERCEPTION SCORE CLASS					CHI SQUARE	p VALUE E
	POOR (%)	AVERAGE (%)	GOOD(%)	EXCELLENT (%)	TOTAL		
RD/ working in hospital	1(1.3)	10(12.8)	20(25.6)	47(60.3)	78(100)	28.723	0.001**
Freelance dietitian	1(1.3)	4(5.3)	25(33.3)	45(60.0)	75(100)		
Dietitian in gym/spa	3(7.0)	1(2.3)	10(23.3)	29(67.4)	43(100)		
Students + other categories	5(2.0)	53(21.2)	80(32.0)	112(44.8)	250(100)		
Total	10(2.2)	68(15.2)	135(30.3)	233(52.2)	446(100)		

(** denotes significance at $p<0.01$)

A Chi- square test was carried out to find out the significant association between perception and dietitians and students. There was a significant association between distinct categories of working-class including students and perception. ($\chi^2 = 28.723$, $p = 0.001$). A distribution was seen in the total study population, in which among 78 RD/working in hospital, 47(60.3) had excellent perception, 20(25.6) had good perception, 10(12.8) had an average perception, 1(1.3) had poor perception towards probiotic and prebiotic foods. Among 75 freelance dietitians, 45(60) had excellent perception, 25(33.3) had good perception, 4(5.3) had an average perception, 1(1.3) had poor perception towards probiotic and prebiotic foods. Among 43 dietitians working in gym/spa, 29(67.4) had excellent perception, 10(23.3) had good perception, 1(2.3) had an average perception, 3(7.0) had poor perception towards probiotic and prebiotic foods. Among 250 students and others, 112(44.8) had excellent perception, 80(32) had good perception, 53(21.2) had an average perception, 5(2.0) had poor perception towards probiotic and prebiotic foods.

TABLE 6: ASSOCIATION BETWEEN PERCEPTION AND HIGHEST QUALIFICATION OF WORKING DIETITIANS AND STUDENT CATEGORY.

CATEGORY	PERCEPTION SCORE CLASS					CHI-SQUARE	p VALUE
	POOR (%)	AVERAGE (%)	GOOD (%)	EXCELLENT (%)	TOTAL		

Bachelors	3(3.9)	24(31.2)	23(29.9)	27(35.1)	77(100)	25.137	0.014*
Masters	7(2)	44(12.2)	109(30.4)	199(55.4)	359(100)		
PhD	0(0)	0(0)	1(33.3)	2(66.7)	3(100)		
Registered Dietitian	0(0)	0(0)	2(28.6)	5(71.4)	7(100)		
Total	10(2.2)	68(15.2)	135(30.3)	233(52.2)	446(100)		

(*denotes significance at $p<0.05$)

A Chi- square test was carried out to find out the significant association between perception and qualification.There is a significant association between highest qualification and perception towards probiotic and prebiotic foods among dietitians and the students. ($\chi^2 = 25.137$, $p = 0.014$).

A distribution was seen in the total study population, in which among 77 Bachelors as highest qualification, 27(35.1) had excellent perception, 23(29.9) had good perception, 24(31.2) had average perception, 3(3.9) had poor perception towards probiotic and prebiotic foods. Among 359 Masters as highest qualification, 199(55.4) had excellent perception, 109(30.4) had good perception, 44(12.2) had an average perception, 7(2) had poor perception towards probiotic and prebiotic foods. Among 3 respondents with PhD as highest qualification, 2(66.7) had excellent perception, 1(33.3) had good perception towards probiotic and prebiotic foods. Among 7 Registered dietitians, 5(71.4) had excellent perception, 2(28.6) had good perception towards probiotic and prebiotic foods.

TABLE 7: RELATIONSHIP BETWEEN YEARS OF EXPERIENCE AND KNOWLEDGE, ATTITUDE,PERCEPTION AND OVERALL, KNOWLEDGE, ATTITUDE AND PERCEPTION SCORES

	YEARS OF EXPERIENCE	
	PEARSON CORRELATION	**p VALUE**
Knowledge Score	-0.014	0.763^{NS}
Attitude Score	0.071	0.136^{NS}
Perception Score	0.167	0.000**
KAP Score	0.113	0.017*

(* denotes significance at $p<0.05$, ** denotes significance at $p<0.01$, ^{NS} denotes Not significant)

A correlation test is carried out to see the relationship on how the number of years of experience influences knowledge, attitude, perception and the overall knowledge, attitude, and perception scores. With

the knowledge and attitude scores it did not show any significant relationship. But with perception score it showed a positive weakcorrelation at 1% level.

Hence it can be concluded that, as the number of years of experience increases, the perception towards prescribing probiotics and prebiotics also gets improved.

Same way it showed a positive weak correlation at 5% level with the overall knowledge, attitude, and perceptionscores.

DISCUSSION

This online survey was conducted on a total of 446 participants out of which 234 were students who are pursuing nutrition as their core subject and 212 working dieticians working in different fields. The knowledge, attitudeand perception of the participants was assessed and compared with a help of questionnaire containing set of question about probiotics and prebiotics.

As part of assessment of knowledge, the participants were given different options for the correct definition ofthe probiotics and prebiotics. They had to choose one option from the list. It was found that 86.8% of the working class chose the correct option for probiotics, while 81.2% of the student category chose the correct definition. In prebiotic definition as well, a higher percentage of the working class chose the correct definition when compared to the student class.

To assess the perception and practice of probiotics and prebiotics, a set of questions was asked by giving different conditions and their recommendation of probiotics and prebiotics was recorded from their selection of optionfrom ‘yes’, ‘no’ or ‘not sure’. From the result obtained it showed that majority of the respondents, most of the participants from both working and student category opted ‘yes’ for recommending probiotics and prebiotics for different health conditions like cardiovascular disease, irritable bowel syndrome, ulcerative colitis, to people who areobese, in the form of infant formulas, during travelling and for aged people.

A set of questions were given to the participants to assess the level of knowledge, attitude and perceptionand the score for each of it was calculated and classified as ‘excellent’, ‘good’, ‘average’ and ‘poor’.

To assess the difference in knowledge, attitude and perception score among the working and student categories, an independent sample t test was conducted. The results showed that there was no significant difference seen in the level of knowledge and attitude among the two categories, but in the level of perception and overall KAP score a significant difference was seen at 1% significance level.

A chi square test was carried out to find the association between the perception score and the various categoriesof the participants. It was found that there was a significant association seen between the distinct categories of the participants (RD/ working in hospital, Freelance dietitians, Dietitian in gym/spa, students) and their perception.60.3%of the participants working as dietitians in clinical set ups, 60% as freelance dietitians, 67.4% in gyms/spa had an excellent perception towards probiotic and prebiotic foods while only 44.8% of the

student category showed excellent scores.

Again, to assess the association between perception and the educational qualifications of the participants a chi square test was done. 35.1% of the participants with bachelor's degree and 55.4% with master's degree had excellent perception scores, while a significantly higher percentage was seen in the PhD scholars (66.7%) and the registered dietitians (71.4%), which suggest that the latter two groups had higher perception towards probiotic and prebiotic usage. As the p value was found to be less than 0.05, it suggests that there is a significant association seen between theperception and the educational qualification.

A correlation test was carried out to see the relationship on how the number of years of experience influencesknowledge, attitude, perception and overall KAP scores among the working and student categories. It was found thatthe knowledge and attitude scores did not show any significant relation while the perception score showed a significantpositive weak correlation at 1% significance level and the overall KAP score also showed a positive weak correlationat 5% significance level. This shows that as the number of years of working experience increases the perception towards recommending probiotics and prebiotics is also getting improved.

SUMMARY

As society is becoming conscious and aware of nutrition and healthy eating, the trend of including functionalfoods or super foods has gained at most importance. Amongst those foods probiotics and prebiotics are the ones whichare used widely in the form of natural and commercial products.

Both working and student population had good knowledge and a positive attitude on probiotics and prebiotics. But as the working population have got more hands-on experience in the field of nutrition, their perception towards prescribing probiotics and prebiotics for different ailments were found to be better as compared to the student population.

CONCLUSION

The study revealed that both the working class and the student category had a fair knowledge and attitude towards probiotics and prebiotics. While there was a significant difference found in the perception of probiotic and prebiotic recommendations to patients among the working and student category. It was found that working categories were more likely to prescribe probiotics and prebiotics to the patients for different ailments than the student category.It also revealed that as the qualification and the year of working experience increases the perception towards recommending probiotics and prebiotics also increases.

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