Original investigation

Knowledge and Attitudes of Ege University Midwifery, Nutrition-Dietetic, and Nursing Students About Natural Functional Foods

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ABSTRACT

Objective: This study aimed to determine the knowledge and attitudes of midwifery, nutrition-dietetic, and nursing students at Ege University about natural functional foods.

Materials and Methods: This descriptive study included all senior midwifery, nutrition-dietetics, and nursing students at Ege University in the 2019–2020 academic year. Of all 442 senior students in these departments, 384 (86.9%) could be reached. The dependent variables were knowledge and attitude regarding functional foods. Knowledge was defined as having heard of and giving at least five examples of functional foods. The attitude was evaluated through the Attitude Towards Functional Foods Scale. The sociodemographic characteristics, health behaviors, and the perceptions of health were independent variables. Data were collected through a questionnaire and the attitude scale. Chi-square test, Student's *t*-test, and one-way analysis of variance were used for the data analyses.

Results: More than half of the students stated that they had never heard of the term 'functional food' previously; 37.5% could not give an example for functional foods. Nutrition dietetics students were able to give more examples of functional foods than nursing and midwifery students (p<0.001). The most known functional foods were yogurt, kefir, whole grains, citrus fruits, herbal tea, and fish. Those who had more control over their health thought that functional foods were more beneficial (p=0.027). There was a positive correlation between the level of knowledge and attitude scores.

Conclusion: This study revealed that although students' attitudes towards functional foods were positive, they did not have sufficient knowledge about them.

Keywords: functional food, knowledge, attitude, university students

INTRODUCTION

The relationship between diet and diseases is well established; epidemiological studies pointed to the role of nutrition and nutrients in the prevention of chronic diseases (1, 2). Nutrients contain components that have positive effects on the health, as well as the macro– and micro-nutrients necessary for metabolic activities (1, 2). Several studies emphasized the beneficial influence of bioactive food components and functional foods, which help maintain the physical and psychological wellbeing as well as improve general health (1, 2, 3). Functional food is commonly defined as "the foods or food ingredients that provide additional benefits on human physiology and metabolic functions, beyond meeting the basic nutritional needs of the body, thus help prevent diseases and achieve a healthier life" (3, 4). Problems associated with excessive-unbalanced nutrition, high prevalence of obesity and chronic diseases, and increased awareness about the risks

posed by increasing the use of chemicals such as pollutants, hormones, and food additives in processed foods lead people to functional foods (5). It was suggested that functional foods should be included in diets, as nutritional strategies might alleviate health problems, and that these foods could be an important tool in the prevention of chronic diseases (2).

Food has to be scientifically proven to provide physiological benefits to body functions for it to be considered a functional food (4). It should have positive effects on human health in terms of the digestive system, immune system, carbohydrate metabolism, protein and fat metabolism, urogenital system, and the cognitive, mental, and psychological functions (6). Functional foods should manifest their effects at the amounts expected to be consumed with diet; they should not be in the form of pills or capsules and

should form the basis of a normal food pattern (7). Functional components in foods are dietary fibers, probiotics-prebiotics-symbiotics, oligosaccharides, sugar alcohols, unsaturated fatty acids, omega-3 fatty acids, unsaturated linoleic acid, antioxidants, peptides and proteins, glycosides, carotenoids, isoprenoids, vitamins and minerals, beta-carotene, phenols, and lactobacteria (8). Fruits, vegetables, cereals, fish, dairy and meat products, lycopene contained in tomatoes, omega-3 fatty acids contained in fish, and pro-prebiotics found in yogurt contain ingredients that show natural functional properties. Epidemiological studies and randomized clinical trials have shown functional nutrients to have positive effects in preventing obesity, reducing the risk of cancer, stimulating the immune system, maintaining gastrointestinal health, improving the heart, urinary system, and vision functions, as well as anti-inflammatory, antibacterial, and antiviral activities (9–12).

Amid increased nutritional abuse and information pollution, access to accurate information about functional nutrients is critical for the individual and community health (10). Although scientific studies have shown that functional foods affect the quality of life, it should be noted that these foods do not create miracles and cannot be used as drugs (12). Ill-informed consumption of functional foods, perception of these foods as medication, and neglect of required medical treatments would pose a significant health risk rather than benefit (10). Nutritionists should be consulted for appropriate and effective functional food recommendations (6). It is also critical that healthcare workers have a substantial amount of knowledge about functional foods to have a positive effect on public health.

This study aimed to determine the knowledge and attitudes of midwifery, nutrition-dietetics, and nursing students at Ege University about functional foods.

MATERIALS AND METHODS

A total of 442 senior students studying in the Departments of Midwifery (n=83), Nutrition and Dietetics (n=67), and Nursing (n=292) at Ege University in the 2019–2020 academic year were included in this descriptive study. The data were collected between September and December 2019.

The dependent variables of the research were knowledge and attitude regarding functional foods. The participants were given the definition of functional food and asked if they had heard of this definition before, they were also asked to write the names of five functional foods. Students were categorized as those who could write down a list of 'less than three' or 'three or more' functional foods. The attitude towards functional foods was evaluated by the Attitude Towards Functional Foods Scale (AFFS) developed and shown to be valid by Özdemir et al. (13). The AFFS is composed of 32 5-point Likert-type items (1-strongly disagree, 5-strongly agree) that reveal the attitudes towards functional foods in a seven-factor structure (a) usage benefits, (b) conditions of use, (c) confidence, (d) requirement, (e) drug effect, (f) flavor and (g) knowledge. The maximum score on the scale is 160 and the minimum score is

32. In the subsections of the scale, there are 8 questions (8–40 points) for usage benefits, 5 questions (5–25 points) for conditions of use, 5 questions (5–25 points) for confidence, 5 questions (5–25 points) for requirement, 3 questions (3–15 points) for drug effect, 3 questions (3–15 points) for flavor, and 3 questions (3–15 points) for knowledge. Averages of the attitude score vary 1–5 points. After the negative items are scored in reverse, as the score and mean score obtained from the scale increases, the positive attitudes of the students towards functional foods also increase.

The independent variables of the research were socio-demographic and academic characteristics of the participants (age, sex, marital status, department, income-expense status, and accommodation during the school period) as well as their behaviors and perceptions about health (physical activity, smoking, alcohol use, the perception of having control over their health, and the effects of some determinants on health). Those who had never smoked in their lifetime or had quit smoking were considered non-smokers. Those who had drunk alcohol less than a few times in a month were grouped with those who did not consume alcohol. Participants who performed at least 30 minutes of uninterrupted moderate physical activity for five days a week were considered to be physically active (14). The impact of some determinants on health and the perception of having control over their health was questioned through the level of participation on a five-point scale.

Data on independent variables and knowledge of functional foods as well as health behaviors and perceptions were collected through a questionnaire, which has been tested in a pilot study on 18 students studying in health-related fields.

Students were contacted in the classroom before the lessons. Information about the study was given, and their consent was obtained. The questionnaire and scale were filled out by the students on their own.

The data have been analyzed with the IBM SPSS Version 26.0 package program. For the statistical analysis, the chi-square test, Student's t-test, and one-way analysis of variance (ANOVA) were used as appropriate. In the chi-square test, in which more than three variables were examined, the group originating from the difference was determined by the Bonferroni method (Z test, adjust p-values). The level of statistical significance was set as p<0.05.

The research permit was obtained from the Ege University Medical Research Ethics Committee (Date of Approval: 25.09.2019, Code Number: 99166796-050.06.04, Approval Number: 19.9.1T/30). Later, the permission for the study was received from Ege University, Schools of Health Sciences and Nursing.

RESULTS

Of the 442 senior students in the targeted departments, 384 students (86.9%) could be reached and participated in the study. Of these, 63% (n=242) studied in the Department of Nursing, 19.8%

J Basic Clin Health Sci 2020; 4:364-370

Arayici ME et al. Knowledge and attitude about functional foods

(n=76) in Midwifery, and 17.2% (n=66) in Nutrition-Dietetics. The average age of the students was 23.03±1.04. Their demographic characteristics, health behaviors, and health perceptions were presented in Table 1. More than three-quarters of the students did not physical activity, 61.7% never smoked, 62.2% consumed alcohol less than a few times a month, or none at all.

In this study, 83.3% of the participants considered that food and nutrition were effective in protecting and improving health. According to the department they study, the proportion of those familiar the term of functional foods was found as 71.2% in Nutrition and Dietetics students, 47.4% in Midwifery students, and 30.6% in Nursing students. More than half of the students stated that they have not heard the term of functional food before (Table 2). The most important source of information for the students who stated that they heard about the term functional food was school/lectures (32.6%) and scientific meetings (19.1%). The students were also asked to write the names of functional foods they know. The number of correct functional foods listed by the students was

given in Table 2. The most commonly identified functional foods were yogurt, kefir, whole grains, citrus, and herbal tea, while 37.5% of the students could not identify any functional foods.

The relationship between the students' ability to provide at least three examples of functional foods and their sociodemographic and academic characteristics and health behaviors and perceptions was given in Table 3. The rate of female students providing at least three examples of functional foods was significantly higher than that of males. The rate of Nutrition-Dietetics and Midwifery students providing at least three examples of functional foods was significantly higher than that of Nursing students. Those who did not drink alcohol or smoke provided more examples of functional foods than the others.

The relationship between the students' attitudes towards functional foods and their sociodemographic academic characteristics were given in Table 4. Significant differences were found between the students of different departments in terms of their total attitude score, and their scores in the factors of benefits, conditions, and confidence. A significant relationship was found between the students' scores in the requirement factor and their gender. Female students were more knowledgeable about functional foods than males, and more of them considered functional foods as a requirement. There was no relationship between the students' attitudes towards functional foods and their accommodation and income-expense perception. No significant relationship was

Table 1. Distribution of the research group according to socio-demographic features, academic features, health behaviors, and perceptions

Mean age, years	Mean±SD (range) 23.03±1.04 (21-29)	n	%
Department			
Midwifery		76	19.8
Nutrition and Dietetic		66	17.2
Nursing		242	63.0
Sex			
Female		330	85.9
Male		54	14.1
Marital status			
Single		376	97.9
Married		8	2.1
Monthly income			
Income is more than expenses		39	10.1
Income is equivalent to expenses		243	63.3
Income is less than expenses		102	26.6
Frequency of physical activity			
Every day		18	4.7
5-6 days a week		37	9.6
2-4 days a week		77	20.1
1 day a week or none		252	65.6
Smoking			
Never smoked		237	61.7
Have smoked before, no longer smokes		54	14.1
Every other day in the past week		34	8.9
At least one cigarette every day in the past week		59	15.4
Alcohol use			
4-7 days a week		12	3.2
1-3 days a week		27	7.0
A few days a month		106	27.6
Less or nothing		239	62.2
Having control over to own health			
Much more[1]		156	40.6
Much less[2]		228	59.4
Total		**384**	**100.0**

Much more[1]= Too much + Much
Much less[2]= Very little + Little + Middle

Table 2. Functional food knowledge of students

	n	%
Having heard the term of functional food		
Yes	157	40.9
No	227	59.1
Having heard the term of functional food according to the departments		
Nutrition-Dietetic		
Yes	47	71.2
No	19	28.8
Midwifery		
Yes	36	47.4
No	40	52.6
Nursing		
Yes	74	30.6
No	168	69.4
The source of hearing functional food term*		
School/lesson	99	32.6
Scientific meeting	58	19.1
Journal / newspaper / article	47	15.5
Family / social environment	31	10.2
Dietitian / doctor	31	10.2
Advertisement	22	7.2
Pharmacy	11	3.6
Social media	5	1.6
Numbers of functional foods written		
None	144	37.5
Less than three	88	22.9
Three and above	152	39.6
Total	**384**	**100.0**

* Multiple options are marked.

J Basic Clin Health Sci 2020; 4:364-370

Arayici ME et al. Knowledge and attitude about functional foods

Table 3. Number of samples given to functional food in groups separated according to their sociodemographic characteristic, academic characteristics, and health behaviors

Independent variable			3 and above		Less than 3		Total***		P*
			N	%	N	%	N	%	
Sex		Female	140	42.4	190	57.6	330	85.9	0.005
		Male	12	22.2	42	77.8	54	14.1	
Department**		Nutrition-Dietetic	40[a]	60.6	26[a]	39.4	66	17.2	0.000
		Midwifery	36[a]	47.4	40[a]	52.6	76	19.8	
		Nursing	76[b]	31.4	166[b]	68.6	242	63.0	
Having control over to own health		Much more[1]	69	44.2	87	55.8	156	40.6	0.123
		Much less[2]	83	36.4	145	63.6	228	59.4	
Physical activity		Yes	21	38.2	34	61.8	55	14.3	0.818
		No	131	39.8	198	60.2	329	85.7	
Smoking		No	127	43.6	164	56.4	291	75.8	0.004
		Yes	25	26.9	68	73.1	93	24.2	
Alcohol use		No	107	44.8	132	55.2	239	62.2	0.008
		Yes	45	31.0	100	69.0	145	37.8	
Total			152	39.6	232	60.4	384	100.0	

*Chi-square test (χ^2), Much more[1]= Too much + Much; Much less[2]= Very little + Little + Middle
**Bonferroni method (*Z testi, adjust p-values There is no significant difference between the same letters*)
*** Row percentages are given in the first 2 columns. Column percentages are given in the "Total" column.
[a]There is no significant difference between the same letters
[b]There is no significant difference between the same letters

Table 4. Averages of students' attitude points for functional foods according to sociodemographic features, academic features, health behaviors, and perceptions

Variable		Total point	Sub-Factor Points						
			Benefit	Condition	Confidence	Requirement	Drug effect	Flavor	Knowledge
		Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD
Sex	Female	3.29±0.40	3.63±0.62	3.21±0.60	2.69±0.63	3.63±0.61	3.27±0.70	3.02±0.62	3.23±0.58
	Male	3.22±0.46	3.56±0.78	3.33±0.78	2.87±0.71	3.35±0.80	3.13±0.79	2.89±0.60	2.94±0.47
	P*	0.239	0.431	0.300	0.071	0.016	0.175	0.140	0.000
Income-expenditure perception	Much	3.28±0.49	3.58±0.85	3.32±0.82	2.92±0.78	3.48±0.76	3.11±0.81	3.05±0.56	3.11±0.64
	Middle + little	3.280.40	3.62±0.62	3.22±0.60	2.69±0.62	3.61±0.63	3.27±0.70	3.00±0.62	3.20±0.57
	P*	0.967	0.763	0.469	0.094	0.332	0.202	0.600	0.385
Department	Dietetic	3.07±0.35	3.28±0.53	2.96±0.53	2.36±0.61	3.62±0.61	3.07±0.58	3.03±0.75	2.97±0.56
	Midwifery	3.27±0.37	3.59±0.67	3.10±0.48	2.63±0.55	3.64±0.64	3.41±0.68	3.03±0.60	3.25±0.65
	Nursing	3.34±0.42	3.72±0.64	3.34±0.66	2.84±0.64	3.57±0.65	3.26±0.74	2.99±0.58	3.23±0.54
	P**	0.000	0.000	0.000	0.000	0.698	0.018	0.862	0.003
Having control over to own health	Much more[1]	3.31±0.42	3.71±0.64	3.28±0.63	2.65±0.66	3.63±0.69	3.25±0.80	3.05±0.66	3.21±0.62
	Much less[2]	3.26±0.40	3.56±0.65	3.19±0.62	2.76±0.63	3.57±0.61	3.26±0.64	2.97±0.58	3.18±0.54
	P*	0.218	0.027	0.189	0.107	0.380	0.924	0.249	0.543
Physical activity	Yes	3.27±0.43	3.66±0.71	3.12±0.73	2.74±0.67	3.59±0.69	3.33±0.71	2.94±0.59	3.15±0.71
	No	3.28±0.41	3.61±0.64	3.25±0.61	2.71±0.64	3.60±0.64	3.24±0.71	3.02±0.62	3.20±0.55
	P*	0.865	0.635	0.151	0.811	0.969	0.405	0.401	0.537
Smoking	Yes	3.24±0.40	3.55±0.68	3.27±0.71	2.80±0.62	3.45±0.71	3.13±0.81	2.96±0.65	3.13±0.59
	No	3.30±0.41	3.64±0.63	3.21±0.60	2.69±0.65	3.64±0.61	3.29±0.68	3.02±0.60	3.21±0.57
	P*	0.261	0.235	0.461	0.142	0.011	0.058	0.373	0.225
Alcohol use	Yes	3.26±0.40	3.61±0.64	3.31±0.62	2.76±0.68	3.46±0.65	3.17±0.77	2.94±0.63	3.16±0.62
	No	3.29±0.42	3.63±0.65	3.18±0.63	2.69±0.62	3.68±0.62	3.30±0.67	3.05±0.60	3.21±0.55
	P*	0.432	0.840	0.050	0.296	0.001	0.091	0.094	0.367
Total		3.28±0.41	3.62±0.65	3.23±0.63	2.72±0.64	3.59±0.64	3.25±0.71	3.01±0.61	3.19±0.57

1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly agree
*T-test (two variables), **ANOVA (more than two variables)

found between students' attitudes towards functional foods (total score) and their health behaviors and perceptions (Table 4). Those who thought they had more control over their health thought that functional foods were more beneficial. Students who did not smoke and drink alcohol agreed more to the idea that functional nutrients were a necessity. No significant relationship was found between physical activity and attitudes about functional foods.

DISCUSSION

It was found in this study that students had positive opinions of functional foods, but their level of knowledge was not sufficient. Among women, those who did not smoke or drink alcohol considered functional foods more necessary, and those who perceived to have control over their health considered functional foods more beneficial.

Having a basic level of knowledge about functional foods among healthcare workers could have positive effects on public health. This study presents important findings in terms of the knowledge and attitudes of students in health-related departments about functional foods and revealed a significant lack of knowledge about this subject.

Previous studies on individuals' perceptions about the health effects of various health behaviors found that the participants considered food and nutrition as more important factors for health than physical activity, genetics, stress, and smoking/alcohol consumption (15, 16). The American Food Information Council reported that a great majority (72%) of the society considered food and nutrition as important determining factors in health (17). Similarly, 83.3% of the participants in this study considered that food and nutrition were effective in protecting and improving health. This result agrees with what was reported (87.2%) in a previous study in Bitlis, Turkey (16). Studies have shown that students, similar to other consumers, are aware of the importance of nutrition on health (15–17).

The studies conducted in several countries in diverse geographies indicated that the participants were not familiar with the concept of functional foods or never heard of this expression (7, 18, 19). For example, in two different studies with health education students in Croatia and Poland, nearly three-quarters of them have not heard of functional food term before (18, 20). The rate of familiarity with the term functional foods was also low in other similar studies in Uruguay, Mauritius, and the Caribbean (21–23). In Turkey, the rate of those who were familiar with this term was found to be lower than in other countries, even among groups with a higher level of education and/or knowledge about nutrition than the general population (7, 16, 24). In a study of academic personnel from various departments in seven universities in Izmir, Turkey, 60% of the participants had never heard of the term functional foods (7). Similarly, our study found that a significant proportion of students from three health/nutrition-related departments did not have sufficient knowledge about functional foods (40.9%). Interestingly, even among the students in the nutrition-dietetics department,

the proportion of those familiar with the term functional foods was 71.2%, which indicates a serious lack of qualified knowledge on the subject.

Nowadays, the Internet is an effective and the fastest source of knowledge on various topics (18). Although there was a degree of variation among studies, the most common source of information about the concept of functional food was the internet (16, 24). In a study covering nutrition-dietetics, nursing, and social work departments, students reported that they learned about functional foods from the internet and experts (20). In a study in Gümüşhane, Turkey, the students and faculty members indicated school and internet as their primary source of information about functional foods (25). In this study, which targeted a similar student population at Ege University, the most common source of knowledge about functional foods was found to be school/lectures and scientific meetings (51.7%). These results suggested that students' access to information through lectures was not the same in every school.

Studies conducted in various countries indicated that attitudes towards functional foods were positive and that the foods and natural products with proven health benefits were preferred (20, 26–28). In studies conducted in Switzerland, Finland, and New Zealand, it was found that consumers preferred functional foods mostly because of their perceived health benefits (27–29). In previous studies on the attitudes of university students, students were found to prefer functional foods to be healthier, more fit, and vigorous (16, 20, 25, 26, 29). Similarly, we found that the general attitudes of the participants about functional foods were positive, foods with proven health benefits were more preferred, and women found functional foods more necessary than men.

In studies with university students in Europe, the most commonly known functional foods were yogurt, dietary fiber, tomato, omega-3 fatty acids, green tea, and whole grains (20, 23, 25, 26, 30). In a study with university students in Turkey the most widely known functional foods were tomato, tea, probiotic yogurt, whole grains, garlic, and red fruits (20, 25, 26). Similarly, in this study, the most commonly known functional foods were yogurt, kefir, whole grains, citrus fruits, herbal tea, and fish. Figs, kiwi, and mineral water were the least known functional foods. Mineral water is a functional product with high mineral content but was not known to be so among students although it is frequently consumed by all age groups. Expectedly, probiotic products such as yogurt and kefir, which are increasingly popular and important for digestive health, were commonly known to be functional foods among students. We also think that advertisements played a significant role in the common perception of yogurt and kefir as functional foods.

Limitations of the Study
This study was limited by the fact that it covered only the opinions of students training in the fields of the health sciences at a single university although it was a fairly large university in the Aegean region of Turkey. Since the data was based on self-reporting, there may be intentional or unintentional reporting bias. The fact that the majority of students were females was also a limiting factor in the comparison between the genders.

J Basic Clin Health Sci 2020; 4:364-370

Arayici ME et al. Knowledge and attitude about functional foods

CONCLUSION

In this study, it was concluded that the students' attitudes towards functional foods were positive but their knowledge about functional foods was not sufficient. The most important sub-factor affecting students' attitudes towards functional food is determined to be the benefit of these foods to health. The taste and usage conditions of functional foods do not have a significant effect on attitude. Although students think that functional foods are necessary, they have an insecure attitude towards these foods.

While the most known functional foods are yogurt, kefir, whole grains, citrus fruits, herbal tea, and fish; the least known ones were found as black seed, soy products, mineral water, and radish.

Suggestions

Unfortunately, the level of knowledge about functional foods is insufficient in all three groups. However, it is seen that the knowledge level of nursing students about functional foods is lower compared to other departments. Awareness of functional foods needs to be increased in this department. In addition to giving more weight to nutrition-related subjects in school lessons, informative posters on functional foods can be hung. Symposiums that will remove the insecurity of students on this subject can be organized. The term of functional food is a concept that has become known in recent years. In this regard, it is recommended to organize on functional foods in-vocational training and symposiums not only for students but also for health professionals in the field.

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