Original investigation

Evaluation of University Students' Nutritional Knowledge Attitudes and Behaviors

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ABSTRACT

Objectives: In this study, nutritional habits of students, knowledge attitudes and behaviors about healthy nutrition will be evaluated.

Materials and Methods: The sample comprised 818 students enrolled in the departments of the School of Health Sciences and the bachelor's programs offered by the Faculty of Medicine. The developed data collection form consists of 52 questions.

Results: In this study 818 (665 female, 153 male) students were reached. 22.3% of the students stated that smoke and 10.2% stated that used alcohol. The nutritional knowledge level was significantly higher in non-smokers, those that did not consume alcohol, those with a family history of diabetes mellitus, hypertension or coronary disease, those that exercised ≥6 hours a week, those that had knowledge of and consumed probiotic products, and those that had >3 meals/day (p=0.019, p=0.001, p=0.048, p=0.006, p=0.032, p=0.046, p=0.000, p=0.000, p=0.001, respectively). There was no significant relationship between the participants' level of nutritional knowledge and the educational level of their parents, monthly net income, type of accommodation, BMI, whether they had previously received nutritional education, skipping meals, consumption of milk, egg, bread or water, sleep duration, and constipation (p=0.88, p=0.069, p=0.055, p=0.070, p=0.072, p=0.0671, p=0.244, p=0.425, p=0.494, p=0.177, p=0.186, p=0.088, respectively).

Conclusion: Students should be educated about converting their knowledge about healthy nutrition into attitudes and behaviors, and their knowledge should be increased with courses and various activities related to healthy nutrition.

Keywords: Nutrition, knowledge, student, probiotic, meal, activity

INTRODUCTION

The healthy life and economic development of society depend on the health of individuals constituting it. The basis of health is an adequate and balanced diet (1, 2). In Turkey, malnutrition is an important social problem, with the riskiest group being university students. University students in Turkey mostly do not have a regular diet, and the lack of healthy dietary habits is basically attributed to two reasons: ignorance and economic insufficiency.

The beginning of university education marks the opening of a new period for young people in which they leave their accustomed family environment, become more open to external influences, and have more freedom in their daily life choices. One of the basic decisions that they need to make on their own is their diet. The important features of this period are economic problems, difficulties adapting to a new order, and the process of communication and learning with many people of different

ages, sexes and cultures (1–3). During this period, young people may exhibit different health-related behaviors, such as smoking, engaging in sports, continuously dieting, overeating, malnutrition, and alcohol use, which may change the eating habits of university students. Students with sufficient finances can shape their diet better (3, 4).

Diet is the most important and changeable lifestyle determinant of human health (1). Both malnutrition and over nutrition play an important role in the occurrence of deaths and diseases. In particular, the fact that there are a large number of diseases caused by poor eating habits and their prevention by changing dietary habits has led studies to shift their focus in this direction. Therefore, the determination of nutritional status is the cornerstone of improving the health of both an individual and a society. Such data also provides the opportunity to plan, implement and reevaluate many activities, including

the development of national food and nutrition policies (food security, food safety, healthy eating, and lifestyle) and priorities, and preparation of food-related guidelines (5, 6).

Since university students are example models of a society, it is important for this group to have proper eating habits both for themselves and for public health. The changing dietary habits negatively affect students' physical and mental states, which may also have an impact on their educational performance. For these reasons, it is very important to determine the dietary habits of university students and to create appropriate solutions for the problems identified.

This study investigated the dietary habits of university-level students and the effects of various factors on dietary habits, and evaluated whether there was a difference between departments-schools in terms of students' nutritional knowledge level, attitudes and behaviors.

MATERIAL and METHOD

Study Population and Sample
This is a descriptive epidemiological study. The sample size was not previously determined since the aim was to reach the whole target population consisting of students attending KTO Karatay University, School of Health Sciences and Faculty of Medicine, Turkey. The final sample comprised 818 students enrolled in the departments of the Academy of Health Sciences (Audiology, Nursing, Nutrition and Dietetics, Physical Therapy and Rehabilitation, Child Development, and Midwifery) and the bachelor's programs offered by the Faculty of Medicine. As the last year students of some departments have not started education (since the university was established recently), less data were obtained in total.

Data collection tool
A data collection form was developed by the researchers with the support of literature. A data collection form was developed and consisted of 52 questions, of which 16 inquired about the socio-demographic characteristics of the participants, 14 were related to the students' nutritional attitudes and behaviors, and the remaining 14 measured their level of nutritional knowledge. The form was administered using the face-to-face interview method. Each form was completed in approximately 15 minutes. For the 14 questions measuring the level of knowledge in the data collection form, the correct answers were scored 1 point and an incorrect answer or no response was scored 0. Accordingly, the participants that provided correct answers to 70% of the questions (a score of 10 or more) were considered to have sufficient knowledge.

Data analysis
SPSS 18 package program was used for data entry and analysis and Microsoft Office Word program was used for writing reports. During statistical analyses, the arithmetic mean ± standard deviation, median (minimum-maximum) values, frequency distributions, and percentages were used to summarize the categorical data. The chi-square test was used to determine the relationships between the categorical data. The normality analysis of the numerical data was performed, and since the data was not normally distributed, non-parametric tests were used in further analysis. The comparison of the numerical data was undertaken using the Mann-Whitney U test for two independent groups and the Kruskal-Wallis test for more than two groups. Statistical significance was accepted as the presence of a $p<0.05$. The Mann-Whitney U test was also applied as a post-hoc test. Applying the Bonferroni correction, a $p<0.01$ was considered to indicate statistical significance.

RESULTS

Within the scope of the research, 830 students were reached; however, 12 questionnaires with missing data in the data collection forms were excluded from analysis; thus, the total number of evaluated questionnaires was 818. The mean age of the students was 20.8±2.1 (17–37) years, their mean height (cm) was 167.3±8.06 (145–194), and their mean weight (kg) was 61.9±12.6 (39–115).

Socio-Demographic Characteristics
Concerning the educational level of parents, 31.4% of the participants' mothers and 20.6% of the participants' fathers had completed primary school. The percentage of students whose average monthly income was more than 6.000 TL (34.4%) was higher compared to the other income groups. Of the participants, 62.3% lived with their parents and 26.1% stayed in dormitories.

When the smoking and alcohol-related habits of the participants were examined, it was observed that the male participants (43.3%, n=66) smoked more than the female participants (17.5%, n=116), and 20.9% (n=32) of male and 7.7% (n=51) of female stated that they consumed alcoholic beverages.

A chronic disease was present in 8.8% of the students (8.7% of female and 9.2% of male). The presence/absence of a chronic disease did not significantly differ by gender (p=0.870). In addition, 49% of the students reported a family history of a chronic disease, which was mostly diabetes mellitus (42.8%), followed by hypertension (18.1%), coronary diseases (10.4%), and cancer (4.6%). Socio-demographic characteristics of the students are given in Table 1.

Dietary Habits
This part of the questionnaire provided findings related to the students' dietary habits, such as the number of meals eaten per day, whether they skipped a meal (if yes, which meal and why?), food consumed between meals, factors affecting their food-related decisions, eating habits before sleeping, and their preferred snacks.

Tablo 1. Sociodemographic characteristics of students

	n	%
Gender		
Female	665	81.3
Male	153	18.7
Mother's education		
Elementary school	255	31.4
Middle school	139	17.1
High school	208	25.6
Universty	174	21.4
Graduate school	24	3.0
Father's education		
Elementary school	168	20.6
Middle school	112	13.8
High school	184	22.6
Universty	293	36.0
Graduate school	57	7.0
Monthly household income (TL)		
<2.000	37	4.6
2.000-4.000	234	29.4
4.000-6.000	252	31.6
6.000≤	274	34.4
Place of Living		
With family	508	62.3
Dorm	213	26.1
Student residence (single person)	28	3.4
Student residence (2 or more people)	67	8.2
Smoking		
*Yes	182	22.3
No	634	77.7
Alcohol consumption		
*Yes	83	10.2
No	734	89.8
Chronic disease		
Yes	72	8.8
No	745	91.1
Chronic illness in the family		
Yes	401	49.0
No	417	51.9
Type of chronic disease in the family		
Diabetes mellitus	350	42.8
Hypertension	148	18.1
Heart disease	85	10.4
Cancer	38	4.6
Other	23	2.8
Obese relatives in the family		
Yes	278	34.0
No	540	66.0

Female n=665, male n=153, * significant differences between male and female p<0.01

Tablo 2. Health behavior and dietary habit of the students

	n	%
Number of meals eaten per day including main meals and snacks (meals/day)		
<3	185	22.7
3	331	40.6
>3	299	36.7
Skipping meals		
Yes	691	84.8
No	124	15.2
Which meal skipp		
Breakfast	341	48.5
Lunch	172	24.5
Dinner	35	5
Snacks between meals	155	22
Reason for skipping meals		
Lack of time	247	34.5
Reluctance to wake up	146	20.5
Lack of appetite	199	27.8
The absence of someone else to prepare food	92	12.8
Other	32	4.5
The most important meal		
Breakfast	272	33.3
Lunch	162	19.9
Dinner	375	46
Snacks between meals	7	0.9
Most important issue in food selection		
To the quality of the ingredients used	79	9.7
Should be filling	234	28.7
Their choice of food	266	32.7
Price	29	3.6
To be cooked in a clean environment	146	17.9
Other	60	7.4
The habit of eating 2 hours before bedtime		
Yes	413	50.7
No	401	49.3
Choice of snacks		
Biscuit-cake	211	25.9
Chips	87	10.7
Nut	141	17.3
Chocolate	310	38.1
Dried fruit	44	5.4
Other	21	2.6

24.5% lunch, 5% dinner, and 22% snacks between meals. The most common reason for skipping meals was reported as the lack of time (34.5%), followed by the lack of appetite (27.8%), reluctance to wake up earlier in the morning (to prepare breakfast) (20.5%), and the absence of someone else to prepare food for the participants (12.8%). The most important meal was considered to be the dinner (46%).

Concerning their choice of food, 32.7% of the students prioritized the food they liked, 28.7% thought it should be filling, 17.9% wanted it to be cooked in a clean environment, and 9.7% paid attention to the quality of the ingredients used. Another important difference was in the participants' choice of snacks, with the most consumed food between the meals being chocolate (38.1%), followed by biscuit-cake (25.9%), nuts (17.3%), chips (10.7%), and dried fruit (5.4%).

Information about health behavior and dietary habit of the students is given in Table 2.

Regular eating habits were evaluated in terms of the number of meals. A regular diet was defined as having three mail meals per day or three main meals plus at least one snack between meals, which was found in 395 (70.9%) individuals. The number of students that had less than three meals a day (irregular diet) was 162 (29.1%).

Breakfast is often thought to be the most important meal of the day as it is known to provide energy for the brain and improve learning. It is also known to contribute significantly to the total daily energy and nutrient intake. Skipping breakfast may affect performance during the rest of the day. In this study, of the 15.2% students stating that they skipped meals, 48.5% skipped breakfast,

Tablo 3. Weekly consumption frequency of some foods

	Everyday		Often		Sometimes		Rarely		Never	
	n	%	n	%	n	%	n	%	n	%
Milk	82	10.1	185	22.8	293	36.1	191	23.5	61	7.5
*Fruit	133	16.3	296	36.4	265	32.6	109	13.4	11	1.3
Acidic-sugary beverages	54	6.7	149	18.3	248	30.5	270	33.3	91	11.2
**Vegetables	131	16.1	379	46.6	227	27.9	64	7.9	12	1.5
*Red meats	41	5.1	397	49	275	34	70	8.6	27	3.3
Fish	6	0.7	98	12.1	317	39.1	306	37.7	84	10.4
Fast food (hamburger, pizza, sandwich, toasted)	72	8.8	260	31.9	257	31.7	190	23.3	35	4.3

Female n=665, male n=153, significant differences between male and female *p<0.05, ** p<0.01

When the nutrition components of the participants' diets were examined, it was determined that most consumed vegetables and fruit, with fish being rarely preferred. Evaluated on a daily basis, the rates of those who consumed fruit, vegetables and milk were 16.3%, 16.1% and 10.1%, respectively. There was no significant relationship between the students' body mass index (BMI) and their consumption of fast food and acidic-sugary beverages. The daily water consumption was >12 glasses in 90% of the female students and 20% of the male students.

Information on the weekly consumption frequency of some foods is given in Table 3.

The students' responses concerning bowel habits revealed that constipation was not significantly related to their consumption of fruit, water or bread, type of accommodation, BMI (kg/m²), probiotic product consumption, and level of knowledge about probiotics (p=0.527, p=0.288, p=0.281, p=0.598, p=0.513, p=0.054, p=0.144, p=0.175, respectively).

Of the participants, 69.9% (72% of female and 58.2% of male) had knowledge of probiotic products, and 85.9% (88.3% of female, 75.2% of male) consumed these products. When the reasons for not consuming these products were questioned (115 students), it

was found that 27% thought that they were not palatable, 24.3% did not know about them, 24.3% considered that they did not need them in their diet, and 16.5% did not find them natural.

When asked to evaluate their own eating habits, 42.9% of the students said that they thought they were eating healthy. There was no difference between the male (47.1%) and female (42%) participants in terms of their perception of their dietary habits (p=0.254).

While 27.9% of the students stated that they both watched their diet and exercised for weight control, 20% controlled their weight only through their diet, 17.1% only engaged in sports, and 35% did neither. Furthermore, 48.3% of the sample stated that they did not do any sports, 35% engaged in sporting activities 1–3 hours/week, 10.6% 4–6 hours/week, and 6.2% >6 hours/week.

Level of Nutritional Knowledge

The nutritional knowledge level was significantly higher in non-smokers, those that did not consume alcohol, those with a family history of diabetes mellitus, hypertension or coronary disease, those that exercised ≥6 hours a week, those that had knowledge of and consumed probiotic products, and those that had >3 meals/day (p=0.019, p=0.001, p=0.048, p=0.006, p=0.032, p=0.046, p=0.000, p=0.000, p=0.001, respectively). The students that

Tablo 4. Answers to nutritional knowledge level questions

	True		False		No idea	
	n	%	n	%	n	%
1. When choosing food, it should be paid attention that it is cooked and presented in a clean environment.	813	99.4	3	0.4	2	0.2
2. Prepared foods, packaged foods, etc. should be considered in nutrition.	745	91.1	52	6.4	21	2.6
3. Probiotics have positive effects on cancer, hyperlipidemia, allergies, immune system and gastrointestinal system diseases.	653	79.8	22	2.7	143	17.5
4. I can maintain my form easily if I eat low fat.	414	50.6	311	38	93	11.4
5. I can eat any food that says "light" or "natural" on its label.	139	17	575	70.3	104	12.7
6. Eat less and often is healthy for the body.	593	72.5	138	16.9	87	10.6
7. Tea, coffee and cola replace water.	62	7.6	734	89.7	22	2.7
8. Eggs are high in cholesterol.	193	23.6	350	42.8	275	33.6
9. All juices are healthy.	59	7.2	707	86.4	52	6.4
10. Fruit juice and fruit have the same nutritional value.	39	4.8	744	91	35	4.3
11. Desired foods should be consumed regardless of their importance in terms of health.	100	12.2	704	86.1	14	1.7
12. It is important to read the label information in foods.	778	95.1	23	2.8	17	2.1
13. Only naturally grown vegetables and fruits should be preferred.	685	83.7	73	8.9	60	7.3
14. It is important to have healthy snacks between meals.	762	93.2	34	4.2	22	2.7

consumed acidic-sugary beverages and those that mostly ate fast food were found to have a lower level of nutritional knowledge (p<0.001 for both). The female participants' level of knowledge being significantly higher compared to male (p<0.001).

There was no significant relationship between the participants' level of nutritional knowledge and the educational level of their parents, monthly net income, type of accommodation, BMI, whether they had previously received nutritional education, skipping meals, consumption of milk, egg, bread or water, sleep duration, and constipation (p=0.88, p=0.069, p=0.055, p=0.070, p=0.072, p=0.0671, p=0.244, p=0.425, p=0.494, p=0.177, p=0.186, p=0.088, respectively).

When the departments were evaluated in terms of nutritional knowledge level, the difference between the departments in terms of knowledge level was significant (p<0.001).

Answers to nutritional knowledge level questions and differences in nutritional knowledge level is given in Table 4 and Table 5.

Table 5. Differences in nutritional knowledge level

	p
Female	0.000
Non-smokers	0.019
Not consuming alcohol	0.001
Family history of diabetes mellitus	0.048
Family history of hypertension	0.006
Family history of coronary disease	0.032
That exercised ≥6 hours a week	0.046
Consumed probiotic products	0.000
*That consumed acidic-sugary beverages	0.000
That had >3 meals/day	0.001
*That mostly ate fast food	0.000
Students in the nutrition department	0.000

*low nutritional knowledge level

DISCUSSION

University students are one of the important groups to be considered in terms of dietary habits, and there are many studies on this subject (1–6). Our study was relatively more comprehensive than others in the literature and aimed at determining cross-department comparisons, as well as the students' dietary habits, nutritional knowledge, attitudes and behaviors, and food preferences.

According to the data obtained from this study, 60.9% of the students had a normal body weight, 11.6% were overweight, and 2.3% were obese. The female participants had a lower BMI than the male students (p<0.001), which is considered to be because the former attach more importance to their physical appearance. The monthly income was more than 6.000 TL in 34.4% of the students, which, we think, may be associated with attending a foundation university.

An important part of a healthy lifestyle is to avoid drinking alcohol and smoking cigarettes (2, 6, 7). According to the World Health Organization, smoking is currently the most serious risk factor for

health and is a major cause of premature mortality in developed countries (8). Górska-Kłęk et al. stated that 40% of the students in their sample smoked and 50% consumed one glass of alcohol a day (9). Latin American studies conducted by Silva and Petroski on students revealed that 7.1% were smokers, 52.3% consumed alcohol (10). In the current study, most of the students stated that they did not smoke (87.3%) or drink alcohol (89.8%), and the percentages of smokers and those that consumed alcohol were 22.3 and 10.2, respectively. It was also observed that the male participants (43.4%) smoked more than the females (17.5). Furthermore, 20.9% of men and 7.7% of women stated that they consumed alcoholic beverages. The difference between the genders in terms of smoking and alcohol consumption was statistically significant (p<0.001 for both).

One of the main criteria for eating behaviors assessment is the number of meals eaten daily. Various studies show that university students generally have an irregular diet or eat unhealthy food (11–13). In a study conducted with the students attending, the rate of those with regular eating habits was reported to be 74.6% (14), and another study undertaken in 2012 with University students determined that 40.2% had three meals and 59.8% had less than three meals a day (6). In the current study, 395 students had a regular diet while those eating less than three meals per day (irregular diet) was 162. These findings indicate that our study group had more regular eating habits than the other students. Furthermore, we observed that the students that lived with their parents or those that shared accommodation with their friends had a more regular diet than those staying at dormitories. Similarly, there was a significant relationship between the type of accommodation and the students' perception of their own diet since those that stayed at student houses or dormitories believed that they did not eat healthy (p=0.038). We consider that the sample being enrolled in health-related departments and 62.3% of the participants living with their families had an effect on these findings.

Skipping of meals is a very common practice among undergraduates (15, 16). Although breakfast is very important for the health and well-being of the body, students may find it difficult to take as they are always in a hurry to go for their classes (17). In a study investigating the dietary habits of students enrolled in Italian university, 63.9% of the sample had breakfast every day while 11% either rarely or never had breakfast (18). In another study conducted with students attending the Lebanese American University in Beirut, 2/3 of the participants had breakfast on an irregular basis (19). In our study, 48.5% of the students stated that they skipped breakfast in the morning. The evening meal was the main meal to which the students attached most importance while breakfast was mostly skipped, which is consistent with the literature. No significant difference was observed between the genders concerning the importance of meals (p=0.366).

When the students' reasons for skipping meals and having an irregular diet were investigated, it was seen that in a study by Sajwani RA (2009), the rate of skipping meals was 51.2% and the rate of skipping meals due to the lack of time was 41.9% (20). Similarly, in the research conducted by Omage K, time constraints were at the top of the list for university students' reasons to skip a meal, and this was followed

by reluctance to prepare meals (17). This is in agreement with our results which indicated that 34.5% of the students complained about the lack of time while other important reasons included reluctance to wake up earlier in the morning to prepare breakfast.

In a study on the eating habits of university students, the rate of those that never consumed red meat and fish was 10.3% and 21.7%, respectively (21). These rates were slightly lower in our study (3.3% and 10.4% respectively). While there was a difference between the genders in terms of consumption of fruit, red meat, and vegetables as part of their diet (p=0.037, p=0.047, p=0.000, respectively), no significant difference was observed in relation to their fish and weekly milk consumption (p=0.084, p=0.616, respectively). In addition, the female students preferred fruit and vegetables, while the male students tended to consume red meat and acidic-sugary beverages. Neslişah et al. also noted that there was no difference between the male and female participants in the consumption of fruit and vegetables (22).

When the fast food consumption of the students was evaluated, no significant difference was found between men and women. In contrast, Teleman et al. reported that the males consumed more fast food than the females in their sample (p<0.005) (18).

In their study with 296 students, Payahoo et al. reported that 50.7% of the students had knowledge of probiotics, while this rate was 69.6% (23). The knowledge and use of probiotics were higher among the female students compared to the males. However, no correlation was found between BMI and the consumption or knowledge of probiotic products (p=0.389, p=0.087, respectively). A significant relationship was observed between the students' type of accommodation and their level of knowledge and consumption of probiotic products, with the students living with their families (62.3%) having a higher level of knowledge and consumption of these products (p=0.002, p=0.011, respectively). We consider that this situation is influenced by the importance attached to the consumption of such foods as homemade yoghurt, pickles, and kefir in the Turkish society. In addition, considering that for 12.8% of the students, the reason for skipping meals was the absence of someone else to prepare the meal, the participants living in a family environment are at an advantage in terms of adopting a healthier and more regular diet.

When the students' level of nutritional knowledge was evaluated in relation to their departments, the difference between the departments in terms of the knowledge level was significant (p<0.001). This difference was mostly due to the high level of knowledge of the students attending the nutrition department (95%). Furthermore, it was seen that the scores of the departments in nutritional knowledge were generally high, which can be attributed to 54.1% of the students having received nutritional education as part of their undergraduate program. There was a difference between the genders in terms of their nutritional knowledge level, with the female participants having a higher knowledge level than men (p<0.001). These findings were consistent with the previous reports (22). For example, Buxton et al. found a good level of nutritional knowledge in 62.7% of nursing care students. This rate was even higher in our study, at 84.3% (24).

Strengths and limitations of this study

The study evaluated the nutritional habits of students as well as their nutritional knowledge. However, our research had some limitations. Our study could be evaluated in a single university because of the high number of questions and the difficulty of implementation. This study adds to the existing literature that nutrition education is inadequate and several barriers are contributing to the current situation. In addition, the present findings may be confounded by the seasonal variation in dietary intakes and social desirability bias. Our study explored students' opinions regarding nutrition education but did not evaluate whether improving nutrition education will result in improved nutrition practice behavior or enhance clinical outcomes.

CONCLUSION

This study, evaluating the dietary habits and nutritional knowledge, attitudes and behaviors of university students, revealed that the participants skipped meals at a high rate, the most skipped meal was breakfast, and most students skipped meals due to the lack of time. Although the students mostly included the main nutrients in their meals, they were found to have inadequate or unbalanced diets due to the missing meals. It was also observed that the groups of students with regular eating habits were mostly females, those that lived with their families, and those that consumed less fast food. The fact that the participants were studying at health-related departments constituted a sample group that is important not only for their own health but also for their possible impact on public health in their future professions. Therefore, in universities, educational conferences and scientific activities should be frequently organized to emphasize the importance of adopting a healthy and regular diet, nutrition, and engaging in sports, and thus a new culture of healthy life awareness and nutrition should be established. Furthermore, healthy food should be provided in the cafeteria and the vicinity of the departments, and young people should be made aware of the importance of physical activity. In addition, considering that smoking is a major threat to young people, necessary precautions should be taken to discourage them from taking up this habit and never starting smoking is the most effective method. Finally, this study covered only the students studying at health-related departments. Thus, a larger-scale study including other faculties and schools is recommended for future work.

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