RESEARCH ARTICLE

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Impact of Nutrition Course on Lifestyle Behaviors of Students from Different Departments of the Faculty of Health Sciences in Turkey

Ayşe Güneş Bayır[*1], Duygu Güçlü [1], Merve Güney [2], Zeynep Hüdanur Alban [4]

[1] *Department of Nutrition and Dietetics, Faculty of Health Sciences, Bezmialem Vakif University, Istanbul, Turkey*
[2] *Dietitian, Nutrition and Diet Department, Bezmialem Vakif University Hospital, Istanbul, Turkey*
[3] *Dietitian, Istanbul, Turkey*

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ABSTRACT: The time for high education can effect on unhealthy behaviors of students' lifelong. Nutrition courses should be provided during this period, which is one of the most important point in promoting healthy eating habits and exercise behaviors. Therefore, the aim of this study was to evaluate the effect of nutrition courses on the students from different departments of the Faculty of Health Sciences, in Istanbul, Turkey. A survey was conducted by asking eating and physical activity habits including socio-demographic data, and national and international nutrition assessment tests (the 24-h dietary recall and Food Consumption and Food Frequency Questionnaire). Body Mass Index, waist circumference and body fat ratios were calculated using bio-electrical impedance device. Overall, 500 (62.5%) participants were divided into 3 groups: Group 1 (n= 242) who took nutrition course for 1 semester, Group 2 (n = 72) who took this course for 2 semesters, and the control group (n= 186) who did not take the nutrition principles course. Students from control group reported unhealthy and less healthy snacks, whereas a total of 75% in Groups 1 and 2 consume healthy snacks ($p<0.05$). The results revealed that healthy cooking methods were preferred by the control group ($p<0.001$). Additionally, total fat intake and saturated fat consumption in control group was less than in other groups ($p<0.05$ and $p<0.001$). Providing adequate nutrition courses to next generation of health care professionals will help them make better lifestyle choices for their future health status.

Keywords: High education, Nutritional behaviors, Physical activity behaviors, Nutrition principles course, Eating habits, Health sciences

INTRODUCTION

The definition of health has not changed by the World Health Organization (WHO) since years which is having a complete physical, mental and social well-being, absence of disease and fatigue (Brook, 2017). Adequate-balanced nutrition and regular physical activity are the two most important determinants of health (Pekcan, 2008). In order to motivate healthy nutrition and to prevent unbalanced nutrition in individuals, it is necessary to improve eating habits by developing effective human interventions (Turconi et al., 2008).

The health status between adolescence and young adulthood (15-25 years) period in university students can be affected to a large extent due to various unhealthy behaviors such as smoking, alcohol use, drug use, poor nutrition and lack of physical activity (Kara and İşcan, 2016; Brandão et al., 2011). In this term defining, monitoring and evaluating the nutritional status of students are very important for identifying the causes and finding solutions to prevent the health problems (Pekcan, 2008). Therefore, many methods can be used to determine nutritional status such as taking medical history, anthropometric measurements (waist circumference, height-weight calculation, etc.), 24-hour dietary recall, food frequency questionnaire, diet history and biochemical tests. As a result, the evaluation of the data obtained, it is necessary to determine health strategies to promote healthy nutrition in the university environment. Recent studies (WHO, 2020) have shown that approximately 3.2 million deaths per year worldwide are due to health problems. The most problems are associated with the physical inactivity which is the fourth leading risk factor for global deaths (Joseph et al., 2014). Regular physical activity (PA) not only protects against the development of chronic diseases but also improves the quality of life.

Obesity is an increased global health problem that has attracted considerable attention (WHO, 2006). According to the WHO definition overweight and obesity are abnormal or excessive fat accumulation that poses a risk to health. In 2015, approximately 1.9 billion adults (in >15 years) were overweight as well as at least 609 million adults were obese in WHO reports. Currently, obesity is the second preventable causes of death after smoking (Chooi et al., 2019).

In order to prevent obesity, the nutritional education should be provided from early stages of life. It is an important point for promoting lifelong healthy eating and exercise behaviors (Pérez-Rodrigo and Aranceta, 2001). Identifying changes and barriers in healthy eating contribute to develop an adequate and balanced nutritional program. Universities are the ideal areas to promote healthy eating behavior and to reach larger audiences. Therefore, it shows that the nutrition education is an accessible effective

*Corresponding author : agunes@bezmialem.edu.tr

tool in health promotion programs focusing on the development of healthy nutrition practices (Pérez-Rodrigo and Aranceta, 2001). A study (Hilger et al., 2017) in Germany conducted on reasons for unhealthy eating that skipping meals in university students are lack of time and lack of healthy eating alternatives in canteens. In the same study, it was revealed that there was a change in the eating behaviors after they enrolled in the university. These students moved to another city for the education had a greater change in the eating behaviors than the ones staying with their family. In a study (Güneş-Bayir and Alban, 2020) conducted on students from Audiology and Nutrition & Dietetics (ND) departments, 91% of the students were skipped meals. The biggest reason for skipping meals was the lack of time, which is the common result of the study (Hilger et al., 2017) like in Germany. The daily water consumption rate of both departments is below the rates determined by Nutrition Guide of Turkey (TUBER). It was also found that the daily fiber consumption rate determined by European Food Safety Authority (EFSA) and TUBER could not be reached by both department students. In another study (Güneş-Bayır & Güçlü, 2019), students from the ND department took Nutrition Principles course and students from the Nursing department who did not take this course were compared. It was found that ND students had healthier eating behaviors than Nursing students but both department students were undernourished. The level of physical activity and healthy behaviors were better in students of ND department. Significant differences in consumption of various food groups emphasize the importance of Nutrition Principles course among different departments. Similar to this study (Güneş Bayır and Güney, 2019), students from Physiotherapy and Rehabilitation and ND departments were compared for eating and physical activity habits. According to the data obtained, it was found that ND students had healthier eating habits. At the same time, half of the students in both departments were found physically active. Therefore, the aim of this study was to examine and compare the nutritional and lifestyle behaviors of high education students who took and did not take nutrition principles course.

MATERIALS AND METHOD

Study population and data collection

A survey research was carried out using the questionnaire modified from the study of Gunes-Bayir et al. (2015). Filling out the questionnaire was performed face-to-face with the participants and using visual materials (My plate food replicas; Nasco, Wisconsin; USA). The questionnaire was applied to 3 groups at the Bezmialem Vakif University in Faculty of Health Sciences, Istanbul, Turkey. In the first part of the survey, socio-demographic data of the students were taken. In the second part, anthropometric measurements of the students including height which was measured with wall-mount measuring tape (ADE; Tarti medical, Istanbul, Turkey); weight which was measured with bioelectric impedance analyzer (Tanita MC 780; Tarti medical, Istanbul, Turkey) and waist circumference which was measured with tape were recorded. Body mass index (BMI) values were calculated by weight (kg)/height (m^2) formula. Obtained data were classified according to the WHO's BMI standards (WHO, 2020). In this classification, those less than 18.5 kg/m^2 were accepted as weak, those between 18.5-24.9 kg/m^2 were normal weight, those between 25-29 kg/m^2 were overweight and those 30.0-34.9 kg/m^2 were accepted as obese. In the third part of the survey, questions about eating habits such as main dishes and snacks, the frequency of eating outside, daily water consumption, smoking and alcohol habits, etc. were asked. In the fourth part, there were universal test such as the 24-hour dietary recall, food consumption and food frequency questionnaire (FFQ) (Pekcan, 2008). The fifth part included questions about the physical activity status of the participated students in this study.

Data Analyses

Data obtained from the FFQ and the 24-hour dietary recalls were analyzed by the software program namely Nutrition Information System (BeBİS; Pacific Electrical, Electronic and Environmental Technology Products Industry and Trade Limited Co., Istanbul, Turkey).

Statistical Analyses

Statistical analyses of data were performed by SPSS 21.0 software program. Qualitative data were calculated with mean and standard deviation. The T test was used if two groups were distributed normally and Mann-Whitney U test was used, if they were not normally distributed. When the number of groups was 3 or more, the Kruskal Wallis test was used.

RESULTS

Only 62.5% (n = 500) of students in the Bezmialem Vakif University, Faculty of Health Sciences (Istanbul, Turkey) completed the survey. Students' environmental and individual explanatory variables were presented in Table 1. Study participants were divided into 3 groups: A control group includes students who did not take the nutrition principles course (37%; n = 186), Group 1 who took this course for 1 semester (48%; n = 242) and Group 2 who took this course for 2 semesters (14%; n = 72).

Most of students (85%; n = 423) lived in Istanbul. The study was conducted with 443 female (89%) and 57 male (11%) participants. Median age was 20 years. According to BMI, 72% of patients (n = 362) were normal whereas 15% (n = 75) were

overweight and obese. Median body fat mass (BFM) was measured as 23.7%. Waist circumference was above 88 cm for women (11 %; n = 53) and was above 102 cm for men (1%; n = 4). Lifestyle habits of study participants were examined, it was found that 12% of students had smoking behaviour and 9% had drinking alcohol.

Table 1. *Students' variables.*

Variable	n	% of students
Environmental Explanatory Variables		
City		
Istanbul	423	85%
Marmara Region	26	5%
Blacksea	9	2%
Mediterranean	29	6%
Central Anatolia Region	3	1%
Guneydogu Anadolu Region	7	1%
Dogu Anadolu Region	3	1%
Department		
Nutrition and Dietetics	125	25%
Occupational Therapy	12	2%
Physical Therapy and Rehabilitation	83	17%
Nursing	119	24%
Audiology	95	19%
Healthcare Management	66	13%
Nutrition Principles Course		
None (Control Group)	186	37%
1 Semester (Group 1)	242	48%
2 Semesters (Group 2)	72	14%
Individual Explanatory Variables		
Gender		
Female	443	89%
Male	57	11%
Age (years) [median (min - max)]	20 (17-31)	
Body mass index (kg/m^2)		
Underweight (<18.5 kg/m^2)	63	13%
Normal (18.50-24.99 kg/m^2)	362	72%
Overweight (25-29.99 kg/m^2)	56	11%
Obese		
Obese Class I (30-34.99 kg/m^2)	14	3%
Obese Class II (35-39.99 kg/m^2)	5	1%
Obese Class III (≥40.00 kg/m^2)	0	0%
Body Fat Mass (%) [median (min-max)]	23.75 (3-37.50)	
Waist Circumference		
≥88 cm for woman	53	11%
≥102 cm for man	4	1%
Lifestyle Habits		
Smoking Habit		
Yes	61	12%
No	439	88%
Alcohol Habit		
Yes	45	9%
No	455	91%
Regular Physical Activity		
Yes	220	44%
No	280	56%

n: Number of students %: Percentage

Comparison of nutritional behaviours among groups

The results of nutritional behaviours from all three groups were compared and are presented in Table 2. Most of the skipped meals were found in Group 1 (93%) ($p > .05$). Twenty-four percent of the control group ($n = 45$) showed skipped meals due to lack of appetite ($p < .05$) while 29% of Group 1 ($n = 70$) was skipped meals because of being late ($p < .05$). Most of all three groups reported consuming snacks. Eighty-two percent ($n = 59$) of Group 2 reported eating healthy snacks ($p < .05$). However, 37% ($n = 68$) of control group choose eating unhealthy snacks ($p < .05$). Seventy percent ($n = 169$) of Group 1 reported their frequency of eating out once a week or more often and 37% ($n = 67$) of control group indicated that they eat out less than once a week ($p > .05$). The highest median of daily water consumption was 1400 ml in Group 2 ($p > .05$). Sixty-nine percent ($n = 129$) of control group choose healthy methods while 69% ($n = 54$) of Group 2 used unhealthy methods ($p < .001$). In Turkey, the food groups were defined as fruits and vegetables, grains, meat products, and dairy products (TUBER, 2015). In our study, the consumption of meat group was the most in Group 2 (21%; $n = 15$) ($p < .05$) (Table 2 and Fig 1).

Table 2. *Nutritional behaviors of nutrition principal courses students in different semesters number.*

Nutritional Behaviors	Control Group % (n)	Group 1 % (n)	Group 2 %(n)	P values
Skipping meal				
Yes	91 (170)	93 (224)	88 (63)	.405
No	9 (16)	7 (18)	13 (9)	
Causes of skipping meals				
Lack of time	37 (69)	41 (99)	38 (27)	.697
I don't want to, I'm an appetite	24 (45)	23 (56)	10 (7)	.029*
I'm late	12 (22)	29 (70)	23 (42)	.045*
For not preparing	15 (11)	16 (39)	8 (6)	.171
I want to lose weight	4 (7)	5 (12)	1 (1)	.390
I have no habit	17 (32)	13 (31)	7 (5)	.000**
Economic reasons	0	1 (2)	0	.639
Due to snack	18 (33)	19 (46)	19 (14)	.927
Other	2 (4)	1 (3)	4 (3)	.210
Snack Consumption				
Yes	91 (171)	95 (231)	93 (67)	.314
No	8 (15)	5 (11)	7 (5)	
Choices of Snacks				
Healthy	63 (118)	71 (173)	82 (59)	.031*
Unhealthy	37 (68)	29 (69)	17 (12)	
Frequency of Eating Out				
≥ once a week	63 (119)	70 (169)	71 (51)	.411
< once a week	37 (67)	30 (73)	29 (21)	
Water Consumption (ml) [Median (min - max)]	1200 (200 - 4000)	1200 (0 - 3200)	1400 (400 - 3000)	.287[1]
Choices of Cooking Method				
Healthy	69 (129)	65 (156)	31 (22)	.000**
Unhealthy	31 (57)	35 (86)	69 (54)	
Choices of Food Groups				
Dairy Products	53 (98)	57 (139)	61 (44)	.409
Meat	10 (18)	17 (41)	21 (15)	.033*
Fruit and Vegetable	34 (63)	31 (74)	43 (31)	.144
Grains	68 (127)	69 (168)	69 (50)	.965
TOTAL	100 (186)	100 (242)	100 (72)	

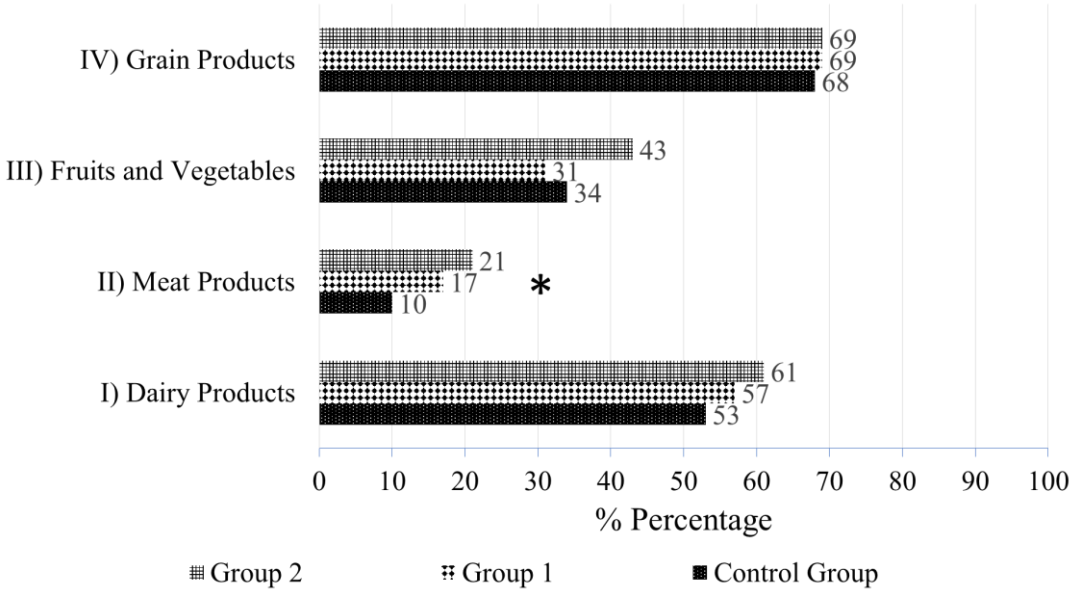

Figure 1. *Students' daily consumption status of food groups*

**p < .05 Pearson Chi-Square Test*

Comparison of nutrients consumptions among groups

The energy and nutrients consumption among different groups are listed in Table 3. Daily energy intake was the less in control group (1330.74 kcal) ($p < .05$) than other groups. Consumption of protein was 52.19 g and of lipid was 57.4 g in control group which was the less in comparison to other groups ($p < .05$). Saturated fatty acid intake was lowest (19.07 g) in control group ($p < .001$) and highest (25.36 g) in Group 2 ($p < .05$). Group 1 reported the consumption of 17.26 g polyunsaturated fatty acid ($p < .001$) and 0.86 g linolenic acid ($p < .05$). When cholesterol intake was sorted, it was the most in Group 2 than Group 1 and control group (274.69 g, 190.53 g, and 152.90 g, respectively) ($p < .001$). Diet fibre consumption was the most (16.74 g; $p < .05$) in Group 1. Daily vitamins intake was also examined and presented in Table 3. Considering of minerals intake, amounts of sodium ($p < .05$), potassium ($p < .05$), calcium ($p < .05$), magnesium ($p < .05$), phosphorus ($p < .05$), iron ($p < .05$), zinc ($p < .05$) and salt ($p < .05$) were less in control group than other groups. Amounts of sodium ($p < .05$), iron ($p < .05$), zinc ($p < .05$) and salt ($p < .05$) were the highest in Group 1. The intake of potassium ($p < .05$), calcium ($p < .05$), magnesium ($p < .05$) and phosphorus ($p < .05$) were the highest in Group 2.

Physical activity behaviors

Only 44% (n = 220) of students reported doing regular physical activity (Table 1). Figure 2 shows comparison of physical activity in three groups. According to control group's data, doing regular physical activity was 37% (n = 69), 63% (n = 117) was not. Doing physical activity was 46% (n = 111), and were not 54% (n = 131) in Group 1. Fifty-six percent (n = 40) students of Group 2 was doing regular physical activity and 44% (n = 32) were not. Results show control group has the less students who were doing not regular physical activity ($p < .05$).

Table 3. *The intake of energy and nutrients of nutrition principal courses students in different semesters number*

	Control group	**Group 1**	**Group 2**	**P value**	**Post – P value**		
					G_C:G_2	G_C:G_1	G_1:G_2
Energy (kcal)	1330.74	1511.43	1508.28	.011*	.440	.008**	1.00
Protein (g)	52.19	58.54	56.77	.040*	.650	.035*	1.00
% Protein	17.00	16.50	16.00	.921			
Lipid (g)	57.40	69.41	65.00	.007**	.246	.006**	1.00
% Lipid	39.50	40.00	41.00	.525			
Saturated Fatty Acid (g)	19.07	21.71	25.36	.000***	.080	.000***	.017*
Monounsaturated Fatty Acid (g)	18.39	21.20	20.42	.081			
Polyunsaturated Fatty Acid (g)	14.47	17.26	13.27	.000***	.117	.027*	.000***
C18:3 Linolenic Acid (g)	0.82	0.86	1.05	.016*	.916	.012*	.076
Cholesterol (mg)	152.90	190.53	274.69	.000***	.013*	.000***	.003**
Carbohydrate (g)	136.76	154.23	146.60	.107			
% Carbohydrate	43.00	43.00	42.50	.441			
Fiber (g)	15.24	16.74	15.99	.046*	.067	.217	1.00
Vitamins							
Vitamin A (µg)	718.15	842.03	874.05	.078			
Carotene (mg)	1.77	1.93	1.79	.463			
Vitamin E (mg)	12.87	16.12	10.67	.000***	.454	.001**	.000***
Vitamin B_1 (mg)	0.54	0.60	0.63	.051			
Vitamin B_2 (mg)	0.90	1.01	1.14	.000***	.013*	.001**	.242
Vitamin B_3 (mg)	18.07	19.45	19.76	.209			
Vitamin B_5 (mg)	3.00	3.27	3.50	.005**	.080	.007**	.368
Vitamin B_6 (mg)	0.97	1.09	1.05	.039*	.328	.042*	1.00
Folic Acid (µg)	182.10	203.83	211.63	.004**	.025*	.013*	.909
Vitamin B_{12} (µg)	2.40	3.00	3.00	.011*	.045*	.028*	1.00
Vitamin C (mg)	61.22	65.97	71.76	.109			
Minerals							
Sodium (mg)	2621.21	3249.56	3031.87	.002**	.746	.001**	.503
Potassium (mg)	1603.24	1811.06	1896.45	.004**	.023*	.013*	.934
Calcium (mg)	442.38	523.63	600.33	.001**	.009**	.003**	.649
Magnesium (mg)	189.16	206.77	217.66	.028*	.241	.032*	1.00
Phosphorus (mg)	794.30	909.88	925.68	.005**	.016*	.027*	1.00
Iron (mg)	8.12	9.28	9.09	.012*	.015*	.139	1.00
Zinc(mg)	7.15	8.18	7.96	.015*	.441	.012*	1.00
Salt (g)	6.27	7.53	6.97	.014*	.800	.011*	1.00

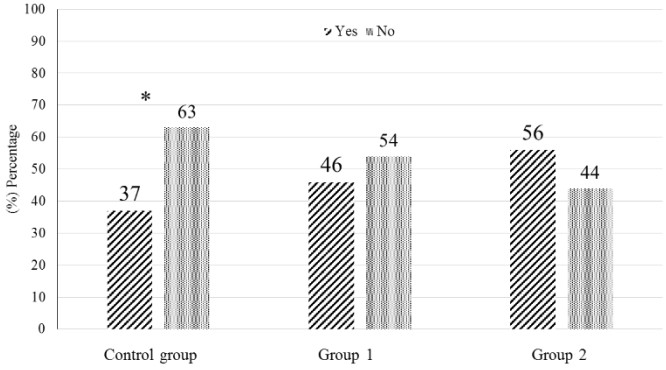

Figure 2. *Regular physical activity behavior of the students*

**p < 0.05 Parson Chi-Square Test*

DISCUSSION

Obesity is one of the main problems in public health among young adults (Kara and İşcan, 2016). It could be prevented by lifestyle changes such as healthy eating and regular physical activity. Lifestyle changes in university students play an important role in the prevention and treatment of obesity (Sira and Pawlak, 2010). To our knowledge, the present work is the first assessing BMI, body fat, eating and physical activity habits among students from different departments of a Faculty of Health Sciences.

The study was also aim to assess the effectiveness of nutrition principles courses on eating and physical activity behaviors of students. Therefore, a questionnaire added with national nutritional scales (FFQ and 24-hour dietary recalls) and visual materials (My plate food replicas) were used and body measurements of students were taken. Results of the BMI calculation showed most participants were in the category of normal healthy weight (72%). Only 11% of the students were overweight and 4% of them were obese. Similarly to our results, university students in Spain, 12.4 % were underweight, 79.2 % were normal weight and 8.4 % were overweight or obese (Lopez et al., 2015). A study which was conducted on university students in Greek indicated that 34.4% of men and 19.9 % of women were overweight, while 5.1 % of men and 3.4% of women were obese (Deliens et al., 2014). In another study, self-administered anthropometric measurements calculated as BMI for 15.686 university students, and the prevalence of overweight or obese students was 22% (Peltzer et al., 2014). All these studies resulted differentially. It is obvious that university life influences students' eating habits and physical activity status hence, body weight is changing. Another indicator and indispensable part of the healthy diet is consumption of fruits and vegetables. Thus, it is important to investigate their intake. A recent study on university students in Brazilian has been shown that the consumption of fruits and vegetables was below the recommended daily intake for this population (Monteiro et al., 2019). In another study the percentage of Italian medical students who consumed fruits and vegetables were 76.6 and 8.3 %, respectively (Lupi et al., 2015). Fruit and vegetables intakes of the university students in the Netherlands were also low (Van den Bogerd et al., 2019). In the present study, fruit and vegetables consumption of students who did not intake nutrition principles courses (34%) were less than the students who take nutrition principles courses (43%) for one semester. However, the calculated average of dietary fiber intake (15.99 gr) was still below the recommended levels for a healthy diet for all student groups like previous study ("Türkiye Beslenme Rehberi [TUBER]", 2015). Students who took the nutrition principles courses for one or two semester reported healthy snacks consumption whereas students who did not take the courses consume unhealthy and less healthy snacks ($p< .05$). In contrast to this findings healthy cooking methods were preferred by students who did not take the courses ($p< .001$). Interestingly, students who took the courses for two semesters choose unhealthy cooking methods (54%).

In addition, the energy and nutrients intake of students were found inadequate for all groups according to national dietary recommendations (TUBER, 2015). Interesting results were also found such as overall lipid intake of students who did not take any nutrition principles courses less than the other groups ($p< .05$). Saturated fat consumption was also lowest in this group ($p< .001$). In contrast to the present study, a study investigated the effect of the nutrition courses on daily fat consumption on university students (Emrich and Mazier, 2009). It was proved that students who took nutrition course consumed less total fat and saturated fat. Another remarkable point is consumption of table salt. While the WHO recommended daily salt consumption should be below 5 gr, all groups took more than 5 gr salt daily (WHO Guideline, 2012). Although, students who did not take nutrition principles course consume fewer salt (6.27gr) than the other groups, it is still more than recommended amount. When all the results from the conducted survey were analyzed carefully, none of the intensity and the duration of the nutrition principles courses were important but the course itself could made students to make healthy dietary choices. Additionally, recent recommendation was on the methodological importance for assessing the impact of nutrition knowledge on healthy eating highlighted that ''Nutrition knowledge is no guarantee for behavioral change'' (Heil and Gärtner, 2019).

In the present work, more than half of the students who did not take nutrition principles courses were classified as physically inactive (63%). These results supported some other national researches. Along the same line, a study with 1097 university students studying health had low physical activity levels (Savcı et al., 2006). University students, especially in Turkey reported challenges in doing physical activity (Arzu et al., 2006). Hence, more physical activity facilities, education and policies are needed and suggested for maintenance and improvement of health (Ilgi and Tangiz, 2016; Monteiro et al., 2019). Especially, the nutritional education recommendation is a common issue in the researches. The present study supported this recommendation and showed an increment of the prevalence of the physical activity in students who took the nutrition principles courses.

Poor dietary habits and physical activity status of the university students were indicated by the present and other studies (Dinger et al., 2014; Lupi et al., 2015). Hence, interventions on eating and physical activity habits are important in this group. Giving the adequate nutrition education and providing the healthy environment (such as canteens, physical activity facilities, etc.) to the university student in order to help them to make better life style choices for their future health status is crucial. Findings from another study on Economics University student who took "Health and Life" course during a semester show improvements in life style behavior (Ilgi and Tangiz, 2016). But there is no study on health care students and specific nutrition course implications on lifestyle behavior and anthropometric measurements.

CONCLUSION

Briefly, to the best of our knowledge, this is the first study to investigate and compare lifestyle behaviors of high education students from 6 different departments at the Faculty of Health Sciences in Istanbul, Turkey.

Providing adequate nutrition education to next generation of health care professionals will help them make better lifestyle choices for their future health status and realize importance of nutrition in health care setting. Overall, this study suggested that nutrition principles course may impact on lifestyle behaviors to improve public health and well-being of university students in the name of young generation. A multidisciplinary collaboration is recommended to educate students from all departments and so improve their value of healthy lifestyle behaviors.

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Ethical Considerations: This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving research study participants were approved by the Bezmialem University Ethic Committee for Non-interventional Studies (Number: 54022451-050.05.04-9). Written informed consent was obtained from all subjects. Before the application, the purpose of the research and the necessary information were given to the participants and informed consent of the participants was obtained.

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CONFLICT OF INTEREST

No conflict of interest was declared by the authors.

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