

Investigation of the Effect of Nutrition Education on Nutrition Knowledge Level and Nutritional Habits

İbrahim Hakki Çağiran 

Muğla Sıtkı Koçman University, Faculty of
Fethiye Health Sciences, Department of
Nutrition and Dietetics, Muğla, Türkiye,
dyt.ihcagiran@gmail.com, ror.org/05n2cz176



Abstract:

Objective: Maintaining a balanced diet is essential for a healthy and quality life. A healthy diet considers an individual's age, gender, and physical condition and includes adequate amounts of all essential nutrients. University years mark a significant transition from childhood to adulthood, bringing about changes in lifestyle and behaviors, which can also influence attitudes and behaviors related to nutrition and health.

Methods: This study is planned to be conducted among 1st and 4th-year students enrolled in the 2024-2025 academic year in the Department of Nutrition and Dietetics at Faculty of Fethiye Health Sciences. Data collection will involve weight tracking, international physical activity questionnaire (IPAQ), a nutrition knowledge scale, a food consumption frequency record, and a personal information questionnaire, administered face-to-face.

Results: Among the participants, 28 were 1st-year and 45 were 4th-year nutrition and dietetics students. Significant differences were found between the 1st and 4th-year students' scores on the YETPİD (nutrition preference knowledge) and the nutrition knowledge level test ($p<0.05$). The 4th-year students had significantly higher YETPİD (basic nutrition) scores than the 1st-year students ($p<0.05$). Similarly, the 4th-year students scored significantly higher on the YETPİD (nutrition preference) compared to the 1st-year students. The nutrition knowledge test scores of 4th-year students were significantly higher than those of the 1st-year students ($p<0.05$). Additionally, there was a significant correlation between students' IPAQ scores and their YETPİD (basic nutrition) scores ($p<0.05$).

Conclusion: Based on the study findings, it appears that educational programs aimed at improving 1st and 4th-year students' knowledge of portion sizes and nutrition label interpretation not only enhance their knowledge levels but also positively impact their nutritional behaviors. Integrating practical applications into the curriculum alongside theoretical programming can significantly improve its overall quality.

Keywords: Education, Behavior, Students, Nutrients

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1. Introduction

Nutrition is defined as the intake of necessary nutrients in adequate amounts and at the right times to maintain health, prevent disease, and improve quality of life. Adequate and balanced nutrition has a protective effect, reducing health problems that arise from deficiencies in macronutrients and micronutrients (1). To develop healthy eating habits, individuals must possess sufficient nutritional knowledge. This knowledge is essential for making proper food choices and maintaining a healthy lifestyle. At this point, nutrition education serves as an important tool that increases knowledge and shapes attitudes and behaviors. The primary aim of nutrition education is to teach individuals about the relationship between nutrition and health, as well as which foods to consume and in what amounts (2).

The university period is a critical stage, characterized by the transition from adolescence to adulthood, during which significant lifestyle changes occur (3). During this period, eating habits that may continue

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throughout life begin to form. However, the university environment can negatively impact nutritional behaviors due to factors such as living away from family, making independent decisions, social influences, irregular lifestyles, economic constraints, and easy access to unhealthy food options (4). Academic workload, stress, irregular sleep patterns, and insufficient physical activity, in particular, create a foundation for the development of unhealthy eating habits. These habits often persist beyond the university years, contributing to chronic diseases such as obesity, hyperlipidemia, diabetes, and osteoporosis later in life (4,5).

In addition, unhealthy lifestyle behaviors, such as smoking, alcohol consumption, and insufficient physical activity, are commonly observed among university students (6). Therefore, universities are institutions that not only provide academic knowledge, but also shape health-related knowledge, attitudes, and behaviors within social environments. In this context, Nutrition and Dietetics students are particularly important. They receive an education in the science of nutrition, have opportunities to apply their theoretical knowledge to practice, and have the potential to model healthy lifestyles. The literature highlights that nutrition education increases nutritional knowledge levels, promotes healthy eating behaviors, and reduces unhealthy habits among university students (7,8). However, it has also been shown that, despite their knowledge, students may persist in unhealthy lifestyle behaviors. This indicates that the effects of nutrition education must be examined at both the knowledge and behavioral levels.

This study compared the nutritional knowledge, eating behaviors, and physical activity levels of first- and fourth-year students in the Department of Nutrition and Dietetics. Thus, the impact of nutrition education on students' lifestyles and eating behaviors was evaluated, demonstrating the educational process's contribution to acquiring healthy lifestyle habits. The following hypotheses were investigated for this purpose.

H0: There is no difference in nutritional behaviors between 1st- and 4th-year Nutrition and Dietetics students.

H1: There is a difference in nutritional behaviors between 1st- and 4th-year Nutrition and Dietetics students.

H2: There is a difference in physical activity levels between 1st- and 4th-year Nutrition and Dietetics students.

2. Methods

2.1. Study population

The descriptive study was conducted with 1st- and 4th-year volunteer students enrolled in the Nutrition and Dietetics Department of Faculty of Fethiye Health Sciences during the 2024–2025 academic year. Prior to the commencement of the study, the necessary permissions were obtained, and informed consent forms were collected from the participants. The target population included all registered students, totaling 78 individuals.

2.2. Inclusion and Exclusion Criteria

Students who were enrolled in the university, attending the 1st or 4th year during the 2024–2025 academic year, and voluntarily agreed to participate in the study were included. Students who had previously received undergraduate-level nutrition education were defined as exclusion criteria.

2.3. Ethical aspects of the research

Ethical approval for the study was obtained from the Muğla Sıtkı Koçman University Medical and Health Sciences Ethics Committee-2 (Sports and Health) (Decision No: 132, Date: 05.11.2024).

2.4. Surveys and scales

The data were collected using an online Google Forms survey method.

2.4.1. International Physical Activity Questionnaire (IPAQ)

The questionnaire was designed in 1996 by Dr. Micheál Booth (Sydney, Australia) to examine the health and physical activity levels of the population and the relationship between them. IPAQ was developed in both short and long forms to identify adults' physical activity and sedentary lifestyle patterns. In 1998–1999, reliability and validity studies of IPAQ were conducted using the test-retest method across 12 countries and 14 research centers on 6 continents (9). The reliability and validity study of both the short and long forms of the scale in Türkiye was conducted by Öztürk in 2005 (10). The IPAQ-Short Form used in this study consists of 4 sections and a total of 7 questions. The questionnaire is recommended for adults aged 18–69 years. The IPAQ scale is calculated by evaluating vigorous activities (e.g., basketball, football), moderate activities (e.g., folk dancing, bowling), walking, and sitting durations.

2.4.2. Food Frequency Questionnaire (FFQ)

The Food Frequency Questionnaire is a measurement tool used to determine how often and in what quantities individuals consume specific food groups or food items. Consumption frequency was assessed on a daily, weekly, or monthly basis. This method allows for the evaluation of dietary habits and is widely used to examine the relationship between diet and health or disease. The structure of the questionnaire can be adapted according to the researcher's objectives; foods can be listed individually or categorized (e.g., full-fat, semi-skimmed, fat-free). The FFQ used in this study included a total of 18 food items. The food groups were divided into six categories: dairy products, meat-eggs-legumes, fruits and vegetables, cereals, fats and sweets, and beverages. Participants were asked how frequently they consumed each food item (e.g., 1–2 times per day, 1–3 times per week, 4–6 times per week, once every 15 days, once a month, never), and daily energy and nutrient intake were calculated based on these responses (11).

2.4.3. Nutrition Knowledge Level for Adults (YETBİD)

The first section of the scale consists of 20 statements on a 5-point Likert scale assessing participants' basic nutrition knowledge and the relationship between diet and health, followed by a Visual Analog Scale (VAS) evaluating the diet-health relationship. The second section includes 12 statements on a 5-point Likert scale assessing participants' food preferences, followed by a VAS measuring the accuracy of these preferences. Participants responded to the 20 statements under "Basic Nutrition and Diet-Health Relationship" and the 12 statements under "Food Preference" using the options: strongly agree, agree, neither agree nor disagree, disagree, and strongly disagree. Scoring for correct statements was as follows: strongly agree = 4, agree = 3, neither agree nor disagree = 2, disagree = 1, strongly disagree = 0. For incorrect statements, scoring was reversed: strongly agree = 0, agree = 1, neither agree nor disagree = 2, disagree = 3, strongly disagree = 4. Additionally, participants evaluated the relationship between diet and health and the accuracy of their daily food choices using separate VASs ranging from 0 to 10 (12).

2.4. Analysis

Statistical analyses of the data obtained from the study were performed using the IBM SPSS 26.0 software package. Descriptive statistics such as frequency (n), percentage (%), mean (\bar{X}), and standard deviation (SD) were used to evaluate the data. For statistical comparisons, the following tests were applied: Parametric tests: Independent t-test, ANOVA, and Pearson correlation, Non-parametric tests: Mann-Whitney U test, Kruskal-Wallis test, Spearman correlation, and Chi-square test, Correlation

analyses were performed to examine relationships between variables, with Pearson or Spearman correlation coefficients calculated depending on normality assumptions.

3. Results

Among the participants, 5.47% were male, and 94.53% were female. The number of students who reported regular alcohol consumption increased from 10 in the 1st year to 18 in the 4th year. Similarly, the number of students engaging in regular physical activity rose from 28 in the 1st year to 45 in the 4th year (Table 1).

Table 1. Demographic Characteristics of the Groups

Variable		Class	
		1st Class N/(%)	4th Class N/(%)
Gender	Male	1(3.6)	3(6.7)
	Female	27(96.4)	42(93.3)
	Total	28(100)	45(100)
Alcohol consumption	Yes	10(35.7)	18(40)
	No	18(64.3)	27(60)
	Total	28(100)	45(100)
Smoking	Yes	4(14.3)	20(44.4)
	No	24(85.7)	25(55.6)
	Total	28(100)	45(100)
Hookah using	Yes	3(10.7)	2(4.4)
	No	25(89.3)	43(95.6)
	Total	28(100)	45(100)
Doing regular exercise	Yes	4(14.3)	2(4.4)
	No	24(85.7)	43(95.6)
	Total	28(100)	45(100)

Table 2 provides information on the dietary behaviors of the groups. First-grade students identified breakfast as the most important meal of the day, while fourth-grade students ranked breakfast as the most important, followed by dinner. In terms of snacks, 67.9% of first-grade students and 64.4% of fourth-grade students reported preferring fruit. The most common number of meals consumed daily among first-grade students was two, followed by three meals. Similarly, fourth-grade students also most commonly consumed two meals, followed by three meals.

A total of 96.4% of first-grade students and 95.6% of fourth-grade students reported having at least one snack during the day. Regarding meal types, 71.4% of first-grade students reported consuming home-cooked meals, while 29.6% reported consuming fast food. Among fourth-grade students, 93.3% reported consuming home-cooked meals, and 6.7% consumed fast food.

Additionally, 42.9% of first-grade students and 33.3% of fourth-grade students stated that they did not pay attention to the calorie content of meals. Finally, 46.4% of first-grade students and 28.9% of fourth-grade students reported adding salt to their meals without tasting them first.

Table 2. Information on the Nutritional Behaviors of the Groups

	Class	Meal	N/(%)
The most important meal	1 st Class	Breakfast	21(75)
		Lunch	4(14.3)
		Dinner	3(10.7)
		Total	28(100)
	4 th Class	Breakfast	27(60)
		Lunch	2(4.4)
		Dinner	15(33.3)
		Snack	1(2.2)
		Total	45(100)
Food preferred as a snack	1 st Class	Fruit	19(67.9)
		Milk/Yoghurt	4(14.3)
		Cheese	1(3.6)
		Biscuits	4(14.3)
		Total	28(100)
	4 th Class	Fruit	29(64.4)
		Milk/Yoghurt	1(2.2)
		Cheese	10(22.2)
		Biscuits	5(11.1)
		Total	45(100)
Number of daily meals [main meal]	1 st Class	1	2(7.1)
		2	18(64.3)
		3	8(28.6)
		Total	28(100)
	4 th Class	1	4(8.9)
		2	27(60)
		3	14(31.1)
		Total	45(100)
Number of daily meals [snack]	1 st Class	1	15(53.3)
		2	8(28.6)
		3	3(10.7)
		Total	1(3.6)
	4 th Class	1	1(3.6)
		2	28(100)
		3	12(26.7)
		4	21(46.7)
		I don't	4(8.9)
		Total	2(4.4)
Food consumed at meals	1 st Class	1	6(13.3)
		2	45(100)
		3	20(71.4)
		4	8(29.6)
	4 th Class	I don't	28(100)
		Total	42(93.3)
		Homemade food	3(6.6)
		Fast food	45(100)
	1 st Class	Total	3(10.7)
		Homemade food	12(42.9)
		Fast food	13(46.4)
		Total	28(100)
Pay attention to the calories of meals	4 th Class	Yes	7(15.6)
		No	15(33.3)
		Sometimes	23(51.1)
		Total	45(100)
	1 st Class		

Table 2 (Continued)

Add additional salt without tasting	1 st Class	Yes	15(53.6)
		No	10(35.7)
		Sometimes	3(10.7)
		Total	28(100)
	4 th Class	Never	32(71.1)
		Sometimes	12(26.7)
		Frequently	1(2.2)
		Total	45(100)

Table 3 shows the nutrition knowledge level scores of the groups. A significant difference was observed between the groups in terms of YETPİD (basic nutrition), YETPİD (food preference), and nutrition knowledge level test scores ($p<0.05$). Fourth-grade students had significantly higher YETPİD (basic nutrition) scores compared to first-grade students ($p<0.05$). Similarly, the YETPİD (food preference) scores of fourth-grade students were significantly higher than those of first-grade students. Additionally, the nutrition knowledge level test scores of fourth-grade students were significantly higher than those of first-grade students ($p<0.05$).

Table 3. Nutrition Knowledge Level Scores

	Class	Number of Meals	IPAQ				Fisher- Freeman- HaltonExact Test
			Inactive (category 1)	Minimally active (category 2)	Very active (category 3)	Total	
			N/(%)				
Main Meal	1 st Class	1	1(5.3)	1(11.1)	0(0)	2(7.1)	1
		2	12(63.2)	6(66.7)	0(0)	18(64.3)	
		3	6(31.6)	2(22.2)	0(0)	8(28.6)	
		Total	19	9	0(0)	28(100)	
	4 th Class	1	0(0)	4(18.2)	0(0)	4(8.9)	0.225
		2	13(76.5)	10(45.5)	4(66.7)	27(60)	
		3	4(23.5)	8(36.4)	2(33.3)	14(31.1)	
		Total	17	22	6	45(100)	
Snack	1 st Class	1	9(47.4)	6(66.7)	0(0)	15(53.6)	0.825
		2	5(26.3)	3(33.3)	0(0)	8(28.6)	
		3	3(15.8)	0(0)	0(0)	3(10.7)	
		4	1(5.3)	0(0)	0(0)	1(3.6)	
		Don't have snack	1(5.3)	0(0)	0(0)	1(3.6)	
		Total	19	9	0	28(100)	
	4 th Class	1	4(23.5)	6(27.3)	2(33.3)	12(26.7)	0.536
		2	7(41.2)	12(54.5)	2(33.3)	21(46.7)	
		3	2(11.8)	2(9.1)	0(0)	4(8.9)	
		4	0(0)	1(4.5)	1(16.7)	2(4.4)	
		Don't have snack	4(23.5)	1(4.5)	1(16.7)	6(13.3)	
		Total	17	22	6	45(100)	

Table 3 (Continued)

Basic Food	1 st Class	Poor (<45)	12	4	0	16	0.531
		Fair (45-55)	4	3	0	7	
		Good (56-65)	3	1	0	4	
		Very good (>65)	0	1	0	1	
		Total	19	9	0	28	
	4 th Class	Poor (<45)	1	1	0	2	0.049
		Fair (45-55)	12	9	0	21	
		Good (56-65)	4	9	4	17	
		Very good (>65)	0	3	2	5	
		Total	17	22	6	45	
Food Preference	1 st Class	Poor (<30)	11	6	0	17	0.72
		Average (30-36)	6	3	0	9	
		Good (37-42)	2	0	0	2	
		Very good (>42)	0	0	0	0	
		Total	19	9	0	28	
	4 th Class	Poor (<30)	8	13	1	22	0.221
		Average (30-36)	6	5	2	13	
		Good (37-42)	2	2	3	7	
		Very good (>42)	1	2	0	3	
		Total	17	22	6	45	

Table 4 presents the comparison of students' meal frequency, YETPİD scores, and IPAQ values. No significant difference was found between students' IPAQ scores and the number of meals consumed ($p>0.05$). All highly active students were observed to consume 2 or 3 main meals per day. The majority of minimally active and inactive students reported consuming 2 main meals per day. Among highly active students, 83.3% reported having at least one snack during the day. Similarly, the majority of minimally active and inactive students also reported consuming at least one snack daily. A significant difference was found between students' IPAQ scores and YETPİD (basic nutrition) scores ($p<0.05$). Among highly active students, 33.33% had an excellent level of basic nutrition knowledge, and 66.67% had a good level. In contrast, 86.11% of inactive students had moderate or low scores in basic nutrition knowledge. Similarly, 50% of highly active students had good food preference scores, while the

remaining 50% had moderate or poor scores. The majority of minimally active and inactive students had moderate or poor food preference scores.

Table 4. Comparison of IPAQ Values with Number of Meals and YETPİD Scores

	Class	Number of Meals	IPAQ				Fisher- Freeman- HaltonExact Test
			Inactive (category 1)	Minimally active (category 2)	Very active (category 3)	Total	
			N/(%)				
Main Meal	1 st Class	1	1(5.3)	1(11.1)	0(0)	2(7.1)	1
		2	12(63.2)	6(66.7)	0(0)	18(64.3)	
		3	6(31.6)	2(22.2)	0(0)	8(28.6)	
		Total	19	9	0(0)	28(100)	
	4 th Class	1	0(0)	4(18.2)	0(0)	4(8.9)	0.225
		2	13(76.5)	10(45.5)	4(66.7)	27(60)	
		3	4(23.5)	8(36.4)	2(33.3)	14(31.1)	
		Total	17	22	6	45(100)	
Snack	1 st Class	1	9(47.4)	6(66.7)	0(0)	15(53.6)	0.825
		2	5(26.3)	3(33.3)	0(0)	8(28.6)	
		3	3(15.8)	0(0)	0(0)	3(10.7)	
		4	1(5.3)	0(0)	0(0)	1(3.6)	
		Don't have snack	1(5.3)	0(0)	0(0)	1(3.6)	
		Total	19	9	0	28(100)	
	4 th Class	1	4(23.5)	6(27.3)	2(33.3)	12(26.7)	0.536
		2	7(41.2)	12(54.5)	2(33.3)	21(46.7)	
		3	2(11.8)	2(9.1)	0(0)	4(8.9)	
		4	0(0)	1(4.5)	1(16.7)	2(4.4)	
		Don't have snack	4(23.5)	1(4.5)	1(16.7)	6(13.3)	
		Total	17	22	6	45(100)	
Basic Food	1 st Class	Poor (<45)	12	4	0	16	0.531
		Fair (45- 55)	4	3	0	7	
		Good (56-65)	3	1	0	4	
		Very good (>65)	0	1	0	1	
		Total	19	9	0	28	
	4 th Class	Poor (<45)	1	1	0	2	0.049
		Fair (45- 55)	12	9	0	21	
		Good (56-65)	4	9	4	17	
		Very good (>65)	0	3	2	5	
		Total	17	22	6	45	

Table 4 (Continued)

Food Preference	1 st Class	Poor (<30)	11	6	0	17	0.72
		Average (30-36)	6	3	0	9	
		Good (37-42)	2	0	0	2	
		Very good (>42)	0	0	0	0	
		Total	19	9	0	28	
	4 th Class	Poor (<30)	8	13	1	22	0.221
		Average (30-36)	6	5	2	13	
		Good (37-42)	2	2	3	7	
		Very good (>42)	1	2	0	3	
		Total	17	22	6	45	

4. Discussion

This study was conducted to compare the effects of nutrition education on diet quality, nutritional knowledge level, and healthy eating behaviors among university students who have received nutrition education versus those who have not.

4.1. Nutrition knowledge level

In our study, fourth-year students scored significantly higher than first-year students in both basic nutrition and food preference knowledge. This finding suggests that the theoretical and practical courses offered during the latter stages of an undergraduate program contribute to students' knowledge accumulation. Similarly, Çakır et al. (2018) and Demirezen & Coşansu (2005) found that senior health sciences students had significantly higher nutrition knowledge scores than lower-year students (13,14). International studies have also emphasized that nutrition education improves students' knowledge levels and increases awareness of healthy eating in higher grades (15).

4.2. Meal patterns and breakfast habits

In our study, first- and fourth-year students identified breakfast as the most important meal; however, fourth-year students placed greater emphasis on dinner. This suggests that students' awareness of daily energy balance may change with education. Skipping breakfast has been associated with impaired cognitive performance and lower academic achievement in the literature (16,17). Conversely, some studies have shown that university students often skip breakfast and have irregular eating habits (18). The fact that students in our study considered breakfast the most important meal supports the role of nutrition education in raising awareness.

4.3. Snack preferences

In our study, both groups predominantly preferred fruit as a snack. This finding aligns with studies indicating that healthy snack choices are prevalent among university students (19). However, fourth-year students consumed more dairy products and cheese for protein, suggesting that education can expand the variety of snacks chosen. Similarly, Sogari et al. (2018) found that nutrition education encourages students to choose healthier alternatives to fast food (20).

4.4. Home-cooked meals and fast-food consumption

Our results showed that fourth-year students consumed home-cooked meals more frequently and fast food less frequently than first-year students did. This indicates that education promotes healthier eating behaviors. Özdoğan and Özçelik (2011) also found that, although fast food consumption is common among university students, those who receive nutrition education are less likely to consume such foods. Furthermore, the literature widely reports that fast-food consumption is associated with obesity and chronic diseases (21). This may be due to the continuation of nutrition and changes in food preferences.

4.5. Salt consumption habits

In our study, a significant proportion of first-year students reported adding salt to their meals without tasting them first. This behavior was markedly reduced among fourth-year students. This finding demonstrates that education increases awareness of healthy salt consumption habits. In Turkey, salt intake generally exceeds recommended levels, posing a risk for hypertension and other chronic diseases (22). Our results suggest that nutrition education positively contributes to reducing salt intake.

4.6. Physical activity and smoking/alcohol use

In our study, the rate of regular exercise increased among fourth-year students; however, the prevalence of smoking also increased. This may be associated with increased academic stress, the social environment, and independent living conditions during the university years. The World Health Organization (2019) has also reported that tobacco use is a widespread public health problem among young adults. Similarly, studies conducted in Türkiye have shown that smoking rates among health sciences students can exceed expectations (23,24). These findings suggest that nutrition education alone is insufficient and that comprehensive programs promoting healthy lifestyles are necessary.

5. Conclusion and Recommendations

Based on the findings of the research, it has been observed that 4th-year students have a higher level of knowledge regarding portion sizes and interpreting food labels compared to 1st-year students. It was also found that nutrition and dietetics education not only increases students' nutritional knowledge levels but also leads to positive changes in their nutritional behaviors. Students who have achieved behavior change can contribute to establishing a more effective patient-dietitian relationship during their post-graduation field experience.

The study is limited in that the findings, based on students from the Department of Nutrition and Dietetics, cannot be generalized to students from other faculties or to the broader university population. Additionally, if the study was conducted at a single university or within a limited time frame, the results may vary in different periods or at different universities.

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