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ARAŞTIRMA / RESEARCH

The impact of education given to obese and preobese university students according to the health promotion model on nutrition and physical activities

Obez ve preobez üniversite öğrencilerine sağlığı geliştirme modeline göre verilen eğitimin beslenme ve fiziksel aktivitelerine etkisi

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Abstract

Purpose: This investigation was conducted in order to evaluate the impact of education given to university students according to the Health Promotion Model (HPM) on their practices about nutrition and physical activity.
Materials and Methods: This interventional study was conducted in Amasya University in the 2017–2018 educational year. Intervention and a control groups were formed from the students having a body mass index (BMI) 25 and over. A sociodemographic questionnaire, Healthy Lifestyle Behaviours Scale–II (HLBS-II), and International Physical Activity Questionnaire (IPAQ) were administered to the students and height and weight measures were taken. The students in the intervention group were given education on healthy lifestyle behaviours in accordance with the HPM.
Results:. In the intervention and control groups, significant increases were found in the HLBS sub-scale scores after education. The increase in the intervention group was significantly higher than the control group. The increase in the IPAQ total score and walking sub-dimension score was significantly higher in the intervention group compared to the control group.
Conclusion: Education according to the HPM significantly improved the behaviours of students related to health responsibility, nutrition, and physical activity.

Keywords: Student, health promotion model, healthy lifestyle behaviours, physical activity, intervention

Öz

Amaç. Bu araştırma üniversite öğrencilerine Sağlığı Geliştirme Modeline göre verilen eğitimin, öğrencilerin beslenme ve fiziksel aktivite ile ilgili bilgi, tutum ve danranışlarına etkisini değerlendirmek amacıyla yapılmıştır.
Gereç ve Yöntem: Bu müdahale araştırması Amasya Üniversitesinde 2017–2018 eğtim–öğretim yılında yapıldı. Beden kitle indeksi (BKİ) değeri 25 ve üzerinde olan 134 öğrenci müdahale grubuna, 132 öğrenci kontrol grubuna alındı. Öğrencilere sosyodemografik anket formu, Sağlıklı Yaşam Biçimi Davranışları Ölçeği (SYBDÖ) ve Uluslararası Fiziksel Aktivite Anketi (UFAA) uygulandı. Müdahale grubundaki öğrencilere, Sağlığı Geliştirme Modeline uygun olarak, sağlıklı yaşam biçimi davranışları ile ilgili eğitim verildi. Eğitimden üç ay sonra aynı anket ve ölçekler yeniden uygulandı
Bulgular: Müdahale ve kontrol gruplarında eğitimden sonra SYBDÖ alt boyut puanlarının çoğunda önemli ölçüde artış saptandı. SYBDÖ Toplam puanı ile Sağlık Sorumluluğu ve Beslenme ve alt boyutlarında müdahale grubundaki artış kontrol grubuna göre önemli ölçüde yüksek bulundu. Eğitim sonrasında, UFAA Toplam skoru ve Yürüme alt boyutu skorundaki artış müdahale grunbunda kontrol grubuna göre önemli ölçüde yüksek bulundu..
Sonuç: Üniversite öğrencilerine Sağlığı Geliştirme Modeline göre verilen eğim, öğrencilerin özellikle sağlık sorumluluğu, beslenme ve fiziksel aktivite ile ilgili tutum ve davranışlarında önemli ölçüde iyileşme sağlamıştır.

Anahtar kelimeler: Öğrenci, sağlığı geliştirme modeli, sağlıklı yaşam biçimi davranışları,beslenme, fiziksel aktivite

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INTRODUCTION

Obesity is defined as abnormal or excessive fat accumulation[1,2]. Generally, obesity is based on the Body Mass Index (BMI) and World Health Organization (WHO) classification, though there are various criteria to assess obesity status. BMI is found by dividing an individual's body weight (kg) into the square of height (m) (BMI = kg / m2). Adults with a BMI value between 25.0 and 29.9 are classified as pre-obese while those with 30 and over are considered obese[2]. Obesity is an important public health issue on a global scale. The obesity prevalence in the United States is 32.3% for the age range between 20 and 39[3]. According to the 2017 report of the Organization for Economic Cooperation and Development (OECD), almost one in two adults and one in six children are in the pre-obese or obese category. Adult obesity rates are highest in the USA, Mexico, New Zealand and Hungary, and lowest in Japan and Korea. It is estimated that the rates of obesity will increase rapidly until 2030, and it is predicted that especially Korea and Switzerland will be one of the countries where the increase will be highest[4]. Global Burden of Disease: GBD According to the 2015 report of the Obesity Cooperation Group, the obese population in the world has reached 711.4 million. 107.7 million of them are children and 603.7 million are adults[5]. The OECD's 2017 report on the prevalence of obesity among adults in Turkey was reported to be 22.3%. This rate is well above the average of OECD countries (19.5%)[4].

Obesity is associated with many health, social, psychological, and demographic problems. The risk of diabetes, hyperlipidaemia, hypertensive diseases, coronary heart diseases, stroke, infarction, osteoarthritis, and endometrial, breast, and colon cancers increase in obese people[6-9]. Obesity is also an important risk factor for urinary incontinence, dementia, some types of cancer, and musculoskeletal diseases[7].

Lifestyle changes and medical treatment are applied together for the treatment of obesity. During the treatment, first changing lifestyle and then medical treatment application is recommended[10]. Studies showed that appropriate lifestyle changes were effective in preventing obesity[11]. It is known that non-drug methods are effective in developing and improving mental health and quality of life[10].

Physical activity is not only important in terms of improving physical health and prolonging life, but also in preventing diseases. Regular physical activity has been found to reduce body fat in obese people. Inadequate physical activity and inappropriate diet is the second common cause of death in the United States[12].

According to WHO, individuals aged between 15 are 24 are classified as young. Of Turkey's population, 16.41% are young people[13]. Healthy lifestyle behaviours start to develop from the infancy and childhood periods in the family environment and these behaviours continue developing in the school environment. Students have more autonomy and control in their university years than they have in other periods of their lives. Healthy lifestyle behaviours are strengthened in this transition period. Therefore, it is important to implement and plan strategies to protect and improve health for young groups[14, 15].

According to WHO, healthy lifestyle behaviours are developed and tested between the ages10 and 19. This period determines what kind of an adult that a person will become in the future[16]. The Health Promotion Model (HPM), which was created by Pender, is one of the frequently used training models to develop healthy lifestyle behaviours[17].

The main reason of Health Promotion model used in this study; The basic concepts of the model is that it is a model suitable for the education to be given to university students who are open to development and change. The individual characteristics and experiences included in the model enable students to question the inappropriate behaviors they have previously taken in the areas of healthy lifestyle and nutrition and physical activity. In addition, it provides a better understanding of the possible benefits of the planned trainings (adequate and balanced nutrition, health responsibility, physical activity, obesity) and integration into their lives. Finally, information about how to meet the urgent demands and preferences in the model is important in terms of teaching students how to solve possible obstacles that may arise against the health behaviors desired to be taught.

This intervention study aimed to evaluate the effect of education given to obese and pre-obese university students according to the Health Promotion Model on their knowledge, attitudes, and behaviours related to nutrition and physical activity.

MATERIALS AND METHODS

The study, designed as a pre-and post-test interventional study with a control group, was conducted at Faculty of Science and Letters and Vocational School of Social Sciences of Amasya University in the academic year of 2017–2018. The study was conducted on students studying in the Amasya University, Faculty of Science and Letters, and the Vocational School of Social Sciences. Ethical approval and administrative permission was obtained from the Erciyes University Clinical Research Ethics Committee (Dated 07.07.2017 and numbered 2017/364) and the administrations of the related schools prior to research (Dated 05.06.2017 and numbered E.13091).

Measures

Sociodemographic questionnaire form

This form included 43 questions and was prepared by researchers to determine students' sociodemographic characteristics and their nutritional status. The questions asked the students' school department and grade, age, gender, family type, and educational level of their parents, place of residence, smoking and alcohol use, and their nutritional status.

International Physical Activity Survey (IPAQ)

Craig et al. developed the IPAQ in 1998[18] and Öztürk conducted its validity and reliability test in Turkey[19]. The short form of the scale includes 7 questions and provides information about the time allocated to walking and both mild and intense physical activity. The equivalent of physical activities is calculated as metabolic equivalent of task (MET)–minutes. MET–minutes is the product of the duration of the activity (minutes) and the MET score. In IPAQ, walking, mild physical activity, and intense physical activity are assessed as 3.3 MET, 4.0 MET and 8.0 MET respectively. Separate MET-minute scores are calculated for walking, mild physical activity, intense physical activity, and total physical activity. Higher scores indicate a higher physical activity level.

Healthy Lifestyle Behaviour Scale-II (HLBS-II):

Walker et al. developed the HLBS in 1987 and its first version consisted of 48 items and six factors[20]. The scale was revised in 1996 and named the Healthy Lifestyle Behaviour Scale-II (HLBS-II). The scale consists of 52 four-point Likert-type items and six subscales. These subscales are spiritual development, interpersonal relationships, nutrition, physical activity, health responsibility, and stress management[21]. The answers given to the expressions in the scale are as follows: never, sometimes, often, and regularly, which are scored as 1, 2, 3, and 4, respectively. The lowest and highest obtainable scores from the scale are 52 and 208, respectively.

Bahar et al. re-administered the validity and reliability test of the HLBS-II in Turkey[22]. A study by Bahar et al. found that the alpha coefficient was 0.92 for the entire scale and 0.64-0.80 for the subscales. There is no cut-off point for the HLBS-II total score and subscale scores. High scores received from all scales indicate more appropriate lifestyle behaviours.

Procedure

The study was conducted in two phases. Overweigh and obese students (BMI≥25) were determined in the first phase. In the second phase, intervention and control groups were formed from the students having a BMI 25 or over and a randomized controlled study was conducted. Individuals with a body mass index of 25 and above and who agreed to participate in the study were included in the study. Students with communication disabilities and inaccessible during the study were excluded from the study.

Confidence level, power level, and effect size were taken as 0.95, 0.80, and 0,5, respectively to determine the sample size. The minimum sample size for the intervention and control groups was found to be 64. Considering that losses might occur during the study, it was decided that approximately 150 people be included in each group. Thinking that approximately 30% of the students BMI value would be 25 or over, it was calculated that at least 1000 students needed to be included in the first phase.

It was determined that 2320 students were studying in the Faculty of Science and Letters and Vocational School of Social Sciences of Amasya University, in the academic year of 2017–2018. It was planned that all of these students would be included in the first part of the study. It was calculated that 1160 students would be reached if half of the students were contacted.

Researchers visited the students in their classrooms. Students were informed about the study and they gave their verbal and written consent before the questionnaire was applied. Students agreeing to participate in the study were distributed the sociodemographic questionnaire, HLBS-II and IPAQ. The participants filled out the questionnaire and scales under the supervision of researchers. Height and weight measures of the students were taken. Weight was measured by weighing machine with light clothes on and height was measured with a standard measuring tape without shoes.

A total of 1676 students were reached in the first phase of the study. Of these students, 294 had a BMI of 25 or over. These students were classified as overweight (BMI=25.0–29.9) and obese (BMI≥30). Two students did not want to participate in the second phase of the study. The students who agreed to participate in the second phase of the study were randomly divided into two equal groups according to their gender and BMI classification. These groups were designated as the intervention and control groups by lot. So, 146 students were included in both the intervention and control groups.

The students in the intervention group were divided into four subgroups consisting of 36-37 people. Education between February 1 and March 1, 2018 as the date 45-minute session was conducted at the university. Each group was given education four times on health responsibility, nutrition, and physical activity subjects. During education, brainstorming, in group discussion, and demonstration techniques with visual materials were applied in addition to verbal lecture. Following the completion of face-to-face training, the participants in the intervention group were sent reminder messages once a week via e-mail and mobile phone. Post–test data was collected three months after face-to-face education was completed. In the post–test application, the same questionnaire and scales were re-applied to students in the intervention and control groups in the same way and students' weight and height measures were taken. In the post–test application, 12 people from the intervention group and 14 from the control group could not be reached and they were excluded from the study. Thus, data of 134 people from the intervention group and 132 from the control group was evaluated (Figure 1).

After the post-test, the students in the control group were trained on obesity, nutrition, physical activity and health responsibility given to the intervention group in a single session.

Statistical analysis

The data obtained from this study were analyzed with IBM SPSS Statistics Version 22 package program. The Kolmogorov Simirnov test was used to test the fit of the quantitative data for normal distribution. Intra–group and inter–group comparisons were performed to evaluate the effect of the intervention applied. Unpaired t test, Mann Whitney U test, and Pearson chi square test were used for inter–group comparisons, while the Wilcoxon signed ranks test, McNemar, and McNemar Bowker tests were used for intra–group comparisons. $p<0.05$ values were considered significant in statistical analysis.

RESULTS

The comparisons of descriptive characteristics of the students, who completed the second phase of the study, in the education and control groups are given in Table 1.

No significant difference was found between the intervention and control groups in terms of the various descriptive characteristics in Table 1. As shown in Table 2 and 3, a considerable similarity was found between the intervention and control groups in terms of nutritional characteristics. The percentage of those who only consumed energy drinks was higher in the control group than in the intervention group. No significant change occurred in nutritional characteristics after education. In addition, the characteristics regarding exercising status dramatically changed after education in the intervention group. The percentages of those who exercised significantly increased, especially the percentage of those who exercised once a week.

Table 4 and 5 showed no significant difference between the intervention and control groups in terms of HLBS-II and IPAQ in the pre-test. Significant changes occurred in both the intervention and control groups after the education period. The increase of health responsibility and nutrition subscales, and total score of HLBS-II in the intervention group was higher than those of the control group. Mild physical activity, walking, and IPAQ total scores of the intervention and control groups increased post-test. The mean BMI values of the intervention and control groups were 28.0±2.9

and 27.9±2.9, respectively in the pre-test while these values were 28.0±3.4 and 27.8±2.8 in the post-test and no significant difference was found between the intervention and control groups in the pre-test and post-test ($p>0.05$).

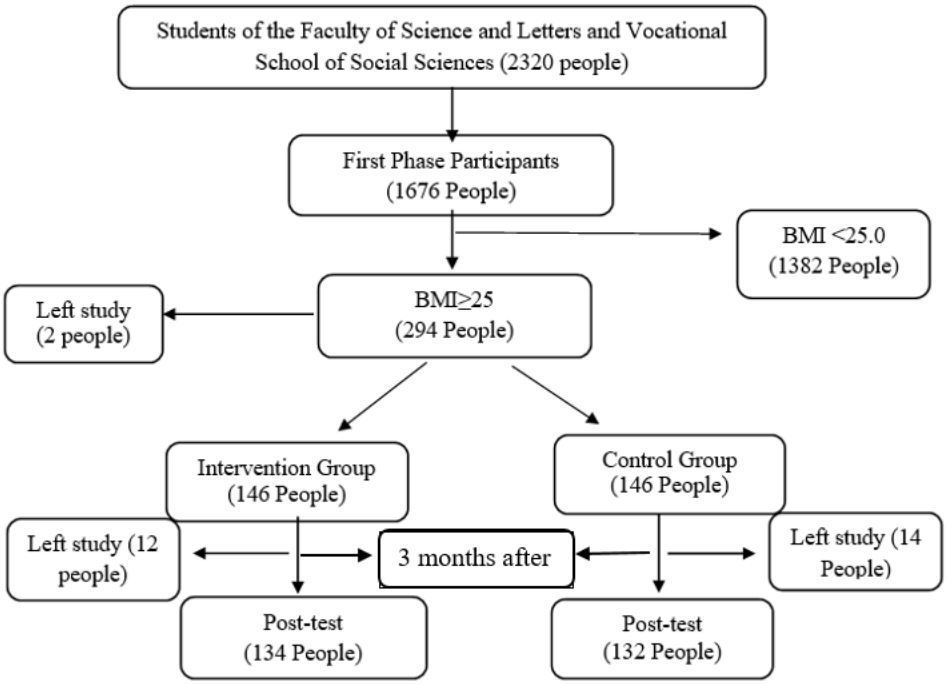

Figure 1. Study flow chart

DISCUSSION

In the second phase of the study, the students whose BMI value was 25 and over were divided into intervention and control groups and students in the intervention group were given health education. A statistically significant difference was found between the education and control groups in terms of the number of meals consumed, the most skipped meals, fast food consumption, and consumption of beverages other than water in meals during the period after the education. According to the Turkey Nutrition and Health Survey results, the rate of those consuming three main meals throughout the country was 67.9%. The most skipped meals are breakfast and lunch with a rate of 20.4%[23]. In the study, meals that were frequently skipped in both the intervention group and the control group were lunch and breakfast, respectively (Table 2). Onurlubas et al, in his study on 444 university students studying at Trakya University, the most skipped meal was lunch (52.3%), followed by breakfast (42.4%) and dinner (5.3%), respectively[24].

Energy consumption is 30-50% among adolescents and young adults. However, it was determined that the total energy drink consumption in the intervention and control groups was compatible with the literature[25-27]. While the percentage of those who stated that they currently consumed energy drinks decreased from 15.7% to 14.2% in the intervention group, it remained 26.5% in the control group (Table 2). No significant change was found in the percentage of energy drink consumers in pre-test and post-test in both groups.

Table 1. Descriptive characteristics of the intervention and control groups

Characteristics	Groups	Intervention Group (n = 134)		Control Group (n = 132)		X^2 / t	p
		Number	%	Number	%		
Gender	Male	53	39.5	55	41.7	0.123	0.726
	Female	81	60.5	77	58.3		
Age (years) (mean) ±SD)		21.1 ± 3.7		21.2 ± 4.7		0.179	0.858
BMI (kg/m²)(mean) ±SD)		28.0 ± 2.9		27.9 ± 2.9		0.179	0.858
BMI Classification	25 – 29.9	106	79.1	106	80.3	0.059	0.808
	30 and Over	28	20.9	26	19.7		
Smoking	Never smoked	80	59.7	71	53.8	3.182	0.204
	Quit	11	8.2	20	15.2		
	Currently Smokes	43	32.1	41	31.1		
Alcohol Use	Never Used	114	85.1	101	76.5	4.944	0.084
	Quit	11	8.2	11	8.3		
	Currently Drinks	9	6.7	20	15.2		
Chronic Disease	Yes	4	3.0	7	5.3	0.901	0.342
	No	130	97.0	125	94.7		
Continuous Medication Users	Yes	5	3.7	6	4.5	0.001	0.980
	No	129	96.3	126	95.5		
Total		134	100.0	132	100.0		

Table 2. Comparison of nutritional characteristics of the intervention and control groups in pre-test and post-test

Characteristics	Groups	Pre-test				Post-test				Comparison in the Intervention Group	Comparison in the Control Group
		Intervention Group		Control Group		Intervention Group		Control Group		p	p
		Number	%	Number	%	Number	%	Number	%		
Number of Meals	1	3	2.24	0	0.0	0	0.0	0	0.0	0.030	0.368**
	2	69	53.7	74	60.6	79	59.0	83	62.9		
	3	50	35.1	51	34.8	43	32.1	46	35.6		
	4+	12	9.0	7	4.5	12	9.0	3	1.5		
Comparison		X^2= 4.486, p=0.214				X^2=5.585, p=0.061					
Generally Skipped Meal	Breakfast	36	34.6	34	32.7	35	41.7	35	37.6	0.873**	0.162**
	Lunch	62	59.6	64	61.5	45	53.6	53	57.0		
	Dinner	6	5.8	6	5.8	4	4.8	5	5.4		
Comparison		X^2 = 0.089, p = 0.957				X^2 =-. p=0.869					
Snack Consumption	Yes	110	82.1	100	75.8	115	86.5	110	83.3	0.344*	0.021*
	No	24	17.9	32	24.2	19	13.5	22	15.9		
Comparison		X^2 = 1.246, p = 0.205				X^2 = 0.292, p=0.589					
Fast Food Consumption Frequency	Almost every day	7	5.2	11	8.3	7	5.2	11	8.3	0.392**	0.406**
	2 to 6 times a week	29	21.6	35	26.5	27	20.2	37	28.0		
	Once or less in a week	82	61.2	67	50.8	83	61.9	69	52.3		
	Never consumes	16	11.9	19	14.4	17	12.7	15	11.4		
Comparison		X^2 = 3.24, p = 0.361				X^2 = 3.851, p=0.278					
Drinking Beverages Instead of Water	Yes	125	93.3	126	95.5	128	95.5	126	95.5	0.250*	1.000*
	No	9	6.7	6	4.5	6	4.5	6	4.5		
Comparison		X^2 = 0.252, p = 0.616				X^2 = 0.000, p=1.000					
	Yes	21	15.7	35	26.5	19	14.2	35	26.5	0.688*	1.000*

Energy Drink Consumption	No	113	84.3	97	73.5	115	85.8	97	73.5		
Comparison		X^2 = 4.334, p = 0.037				X^2= 6.254, p=0.012					
Total		134	100.0	132	100.0	134	100.0	132	100.0		

*: McNemar test, **: McNemar Bowker test

Table 3. The comparison of exercising status of the intervention and control groups in pre-test and post-test

Characteristics	**Groups**	**Pre-test**				**Post-test**				**Comparison in the Education Group**	**Comparison in the Control Group**
		Intervention Group		Control Group		Intervention Group		Control Group			
		Number	%	Number	%	Number	%	Number	%	p	p
Exercising Status	Exercising Regularly	15	11.2	15	11.4	25	18.6	14	10.6	0.001**	0.064**
	Exercising Irregularly	79	59.0	84	63.6	85	63.4	91	68.9		
	Not Exercising	40	29.8	33	25.0	24	17.9	27	20.5		
Comparison		X^2 = 0.810, p = 0.667				X^2 = 3.469. p = 0.177					
Exercising Frequency	Almost every day	15	16.0	14	14.1	12	10.9	12	11.4	0.001**	0.001**
	2 to 3 times a week	36	38.3	39	39.4	50	45.4	43	40.9		
	Once a week	21	22.3	20	20.2	41	37.3	47	44.8		
	Rare- less than once a week	22	23.4	26	26.3	7	6.4	3	2.9		
Comparison		X^2 = 0.383, p = 0.944				X^2 = 2.421. p = 0.490					
Aim of Exercising	Weight loss	43	45.7	53	53.5	61	55.5	58	55.2	0.046**	0.261**
	Being healthy	44	46.8	35	35.4	43	39.1	39	37.1		
	Other	7	7.5	11	11.1	6	5.4	8	7.6		
Comparison		X^2 = 2.828, p = 0.243				X^2 = 0.440. p = 0.802					
Total		134	100.0	132	100.0	134	100.0	132	100.0		

**: McNemar Bowker test

When examining the exercising status of students in pre-test and post-test and the reasons for exercising, a statistically significant increase was detected in the percentage of those who were exercising regularly in the intervention group. The percentage of those who were exercising regularly before education was 11.2% and it rose to 18.6% after education in the intervention group. Of the students in the intervention group 45.7% and 46.8%, respectively said that they exercised to lose weight to be healthy

before education while the percentage of those claiming that they exercised to lose weight increased to 55.5% after education (Table 3). In a multicenter study involving 300,000 people whose physical activity levels were questioned in 76 countries, the proportion of those who did not perform physical activity worldwide was calculated as 21.0%. In the research, it has been observed that physical inactivity is higher in female gender, high socioeconomic level and elderly individuals[28]. In each period of life, acquiring the habit of exercising is important in terms of gaining healthy lifestyle behaviours. Exercising must be considered as a basis of weight control among young people.

Table 4. The comparison of HLBS-II scores of the intervention and control groups in pre-test and post-test

Subdimensions	Groups	Pre-test		Post-test		Difference		Intra-group comparisons*	
		Mean±SD	Median (Min-Max)	Mean±SD	Median (Min-Max)	Mean±SD	Median (Min-Max)	Z	p
Spiritual Development	Education (n=134)	27.0±4.8	28 (11-36)	26.8±4.4	27 (16-36)	0.1±2.3	0 (-12-11)	0.882	0.378
	Control (n=132)	27.1±4.6	28 (16-36)	26.9±4.2	27 (16-36)	0.1±1.7	0 (-6-6)	-0.562	0.574
	Comparison**	Z= -0.769, p=0.442		Z= -0.608, p=0.543		Z = 0.923, p = 0.356			
Health Responsibility	Education (n=134)	19.0±4.9	19 (9-31)	21.2±4.0	20.5 (13-33)	2.1±2.8	2 (-12-9)	7.547	0.001
	Control (n=132)	19.1±4.6	19 (10-32)	20.2±4.2	20 (11-32)	1.1±1.8	1 (-4-6)	5.785	0.001
	Comparison**	Z= -0.104, p=0.917		Z= -1.888, p=0.059		Z= 4.395, p = 0.001			
Physical Activity	Education (n=134)	16.9±5.2	17 (8-31)	17.2±4.5	17 (9-31)	0.4±2.5	0 (-9-5)	2.866	0.004
	Control (n=132)	16.4±5.0	16 (8-32)	16.7±5.3	17 (8-30)	0.4±2.1	0 (-10-7)	3.272	0.001
	Comparison**	Z= -0.869, p=0.385		Z= -0.768, p=0.443		Z = 0.907, p = 0.364			
Nutrition	Education (n=134)	19.7±4.1	19 (9-30)	21.6±3.2	21 (15-30)	1.9±2.7	2 (010-10)	7.582	0.001
	Control (n=132)	20.2±4.0	20 (11-34)	21.1±3.6	21 (13-34)	0.9±2.0	1 (-11-7)	5.636	0.001
	Comparison**	Z= -1.083, p=0.279		Z= -0.886. p=0.375		Z = 4.158, p = 0.001			
Interpersonal Relationships	Education (n=134)	25.8±4.5	26 (13-35)	25.8±4.4	26 (17-36)	0.1±3.0	0 (-16-15)	0.102	0.919
	Control (n=132)	25.4±4.2	25 (16-36)	25.6±4.1	26 (16-36)	0.2±1.5	0 (-7-6)	1.849	0.065
	Comparison**	Z= -1.076, p=0.282		Z= -0.474, p=0.636		Z = 0.982, p = 0.326			
Stress Management	Education (n=134)	19.6±4.2	20 (11-29)	19.6±4.1	20 (11-31)	0.1±2.4	0 (-10-8)	0.993	0.320
	Control (n=132)	19.1±4.3	19.5 (8-31)	19.4±4.0	19.5 (10-31)	0.3±1.8	0 (-7-6)	2.047	0.041
	Comparison**	Z= -0.642, p=0.521		Z= -0.388, p =0.698		Z = 0.039, p = 0.969			
Total Score	Education (n=134)	127.8±21.3	129 (72-135)	132.4±19.0	133 (92-186)	4.6±11.9	5.5 (-68-49)	7.347	0.001
	Control (n=132)	126.9±19.2	125 (92-195)	129.8±18.4	129 (96-195)	2.9±4.4	3.0 (-26-15)	7.410	0.001
	Comparison**	Z= -0.716, p=0.474		Z= -1.164, p=0.244		Z = 4.223, p =0.001			

*: Wilcoxon sigmed ranks test, **: Mann-Whitney U test

In the period before education, the mean total HLBS-II scores were 127.8±21.3 and 126.9±19.2 in the intervention and control groups, respectively. The mean scores of both groups increased after education; however, the increase in score of the intervention group was significantly higher than the control group (Table 4).

A study by Kostak et al.[29] conducted with 474 university students found that the mean HLBS-II was 126.55±18.76 while a study by Yılmazel et al.[30] found it to be 121.57±19.65 in nursing students. In a study conducted by Sen et al. with 251 university students, the mean score of HLBS-II was found 118.0 ± 21.0[31]. According to previous studies, there were many

studies conducted in this area and similar results were obtained[32-35]. Considering that the maximum obtainable score from healthy lifestyle behaviours is 208, the scores obtained from our study are moderate. The significant increase in the scores of the intervention group after health education showed that the provided information was correctly transferred into students' life behaviours and students started to develop positive behaviours. Previous studies also showed that students were positively affected by the initiatives aiming to improve healthy life behaviours[36, 37].

The scores after the education were significantly higher in health responsibility, physical activity, and nutrition subscales than the scores obtained before the education in both the intervention and control groups. However, the increase of health responsibility and nutrition subscale scores in the intervention group was significantly higher than the control group (Table 4).

Table 5. Comparison of IPAQ scores of the intervention and control groups in pre-test and post-test

Subscales	Groups	MET Score in Pre-test		MET Score in Post-test		Difference		Intra-group comparisons*	
		Mean±SD	Median (Min-Max)	Mean±SD	Median (Min-Max)	Mean ±SD	Median (Min-Max)	Z	p
Intense Physical Activity	Study (n=134)	312.2±970.2	0 (0-7680)	249.0±613.4	0 (0-3840)	-63.3± 698.4	0 (-5760-2400)	0.849	0.396
	Control (n=132)	631.1±1701.4	0 (0-9600)	205.5±861.8	0 (0-8640)	-425.8 ±1431.3	0 (-9600-2400)	3.865	0.001
	Comparison**	Z= -1.263, p=0.207		Z= -1.513, p=0.13		Z = 2.651, p = 0.008			
Mild Physical Activity	Study (n=134)	103.0±312.2	0 (0-1920)	399.9±673.2	120 (0-3840)	296.9 ±601.8	120 (-960-3840)	6.446	0.001
	Control (n=132)	211.5±656.2	0 (0-4320)	502.9±744.2	210 (0-4800)	291.4 ±801, 6	100 (-3420-2880)	5.198	0.001
	Comparison**	Z= -1.868, p=0.062		Z= -1.312, p =0.19		Z = 0.325, p = 0.745			
Walking	Study (n=134)	895.8±1012.9	561 (0-4158)	2171.7± 1224.0	1980 (0-5544)	1275.9±1325.6	1188 (-3168-5445)	8.553	0.001
	Control (n=132)	1155.6 ± 1606.5	594 (0-11088)	1903.4± 1274.1	1980 (0-5940)	1751.8 ± 747.8	618.75 (-6336-4653)	5.522	0.001
	Comparison**	Z= -0.571, p = 0.568		Z = -1.807, p = 0.071.		Z = 2.755, p = 0.006			
Total Score	Study (n=134)	1311.0 ± 1604.8	733 (0-7077)	2820.5 ± 1 890	2376 (0-9792)	1509.5±1678.0	1380 (-3837-7624.5)	8.355	0.001
	Control (n=132)	1998.4 ± 2952.3	961.5 (0-20130)	2611.8± 2097.5	2160 (0-13860)	613.4 ± 2925.2	633.75 (-19356-5460)	4.382	0.001
	Comparison**	Z = -1.508, p = 0.132		Z= -1.37, p=0.171		Z = 3.136, p = 0.002			

*: Wilcoxon sigmed ranks test, **: Mann-Whitney U test

Physical activity levels of the students were evaluated and the MET scores of the intervention and the control groups were found to be 1311.0±1604.8 and 1998.4±2952.3, respectively. Walking activity was considered an important part of the total physical activity score (Table 5). When MET scores were recalculated after the intervention period, physical activity levels increased in both the study and control

groups and intra-group differences were found statistically significant. Considering the difference between the students, the increase in the IPAQ total MET score and walking subscale MET score were found to be significantly higher in the intervention group compared to the control group. It was thought that BMI values of the students were 25 and over and they exercised even though it was not regular. The increase in MET scores in both groups after the education was attributed to this fact. The higher increase in the intervention group than in the control group may be attributed to the fact that the given health education was effective. A study by Savci et al. conducted with 1097 students showed that the total MET score was 1958±1588[38]. The same study found that the MET score of the students with a BMI of less than 25 was 1947±1591 and 2062±1571 with a BMI of 25 or above.

The mean BMI of the students in the intervention and the control groups were 28.0±2.9 and 27.9±2.9, respectively. No significant change was found in mean BMI values in both groups after education. While positive changes were observed in healthy lifestyle behaviours, the identical BMI values may be dependent on the fact that the period between the measurements was short and the education was given once. It is important for students to acquire appropriate diet and physical activity habits to maintain the ideal weight according to their height. For this purpose, the education should continue and good health behaviours should become a lifestyle.

This study had various limitations. Firstly, data other than weight and height measurements were based on the statement of the participants. In particular, participants may not have answered questions about behaviour correctly. Secondly, the data received after the education was collected three months after the education. Therefore, the data obtained did not show the long-term results of education. Thirdly, the education given the intervention group may have affected the students in the control group because the students were in the same environment. Fourthly, the effect of seasonal change on physical activity and nutritional behaviour during the study was ignored. Fifthly, the post-test measurements were taken by the researchers and no blind method was applied. However, no difference was found between the weight and height values of the intervention and control groups post-test. Therefore, it can be thought that there was no measurement bias.In conclusion, the education provided to university students according to the HPM significantly improved their practices regarding health responsibility, nutrition, and physical activity. The nutrition and physical activity scores significantly increased in the control group in the course of three months. This change in the control group may be attributed to the fact that the education given to the intervention group affected other students as well. Education programs aiming to improve healthy lifestyle behaviours of all university students should be planned.

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