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EVALUATION OF EFFECTIVENESS OF TRAINING IN OBESE ADOLESCENT ABOUT NUTRITION, PHYSICAL ACTIVITY AND MENSTRUAL SYMPTOMS ON HEALTH LIFESTYLE BEHAVIOURS AND MENSTRUAL SYMPTOMS

BESLENME, FİZİKSEL AKTİVİTE VE MENSTÜREL SEMPTOMLARA AİT EĞİTİMİN OBEZ ADOLESANLARDA SAĞLİKLI YAŞAM TARZİ DAVRANİŞLARİ VE MENSTÜREL SEMPTOMLAR ÜZERİNE ETKİSİNİN DEĞERLENDİRİLMESİ

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Abstract

Aim: Planned trainings focused on a specific health problem can promote health behaviors and healing illnesses symptoms. This study was conducted to evaluate the effect of "Healthy lifestyle behaviors and menstruation (HLB-MENS)" training given according to the Health Promotion Model (HPM) in order to improve the menstrual symptoms of adolescent obese girls.

Method: This randomise controlled intervention study was conducted from September 1, 2017 to January 21, 2018. Since the obese group would be composed of sensitive individuals, an improbable-random sampling method was used in the first stage. In the second stage, randomized assignment from volunteers was performed. The study included 9th, 10th, and 11th-grade obese girls in high schools. They divided two groups as intervention (n=63) and control (n=65) (power of 80.1%, p = <0.05, effect size = 0.80). The intervention group received 16 weeks of planned training, the control group was not included in the training. The training consisted of three different titles. The lessons were held in two stages as basic training and reinforcement training. Participants took a total of 7 hours of lessons on each subject.

Results: Positive developments in healthy lifestyle behaviors improved the obese girls' mentural symptoms. In the intervention group MSQ total scores(p<0.007) and menstrual pain decreased(p < 0.001). HLBS-II total scores(p<0.001), and physical activity subscale scores(p<0.026.) were increased. The rates of walking, physical activity behaviours and physical activity duration increased above 4 h,(p<0.001). Difficulty in walking from daily activities (p<0.004) and fast food consumption (p<0.002) reduced.

Conclution: Menstrual symptoms can negatively affect the quality of life and academic success of obese young girls who already have some internal problems. Therefore, authorities should consider research evidence on obesity-related issues when designing education plans for young people and developing relevant guidelines and standardized programs.

Trial registration*:* NCT04044833

Anahtar Kelimeler: : Planned training, Obese girls, Menstrual Symptoms, Health Life Style Behaviours

Özet

Amaç: Belirli bir sağlık sorununa odaklanan planlı eğitimler, sağlık davranışlarını teşvik edebilir ve hastalık semptomlarını iyileştirebilir. Bu çalışma, adölesan obez kızların menstrüel semptomlarını iyileştirmek amacıyla Sağlığı Geliştirme Modeli'ne (HPM) göre verilen "Sağlıklı yaşam biçimi davranışları ve menstürasyon (HLB-MENS)" eğitiminin etkisini değerlendirmek amacıyla yapılmıştır.

Metod: Bu randomize kontrollü çalışma 1 eylül 2017 - 21 ocak 2018 tarihleri arasında gerçekleştirilmiştir. Obez grup duyarlı bireylerden oluştuğu için ilk aşamada olasılık dışı rastgele örnekleme yöntemi kullanılmıştır. ikinci aşamada, gönüllülerden rastgele atama yapılmıştır. Araştırmaya liselerde okuyan 9., 10. ve 11. sınıf obez kız çocukları (vücut kitle indeksi > 26,7 kg/m2) dahil edilmiştir. Müdahale (n=63) ve kontrol (n=65) olarak iki grupla çalışılmıştır. Etki büyüklüğü = 0,80 (%80,1 ve p = ,05,)dir. Müdahale grubu 16 haftalık planlı eğitim almış, kontrol grubu katılmamıştır. Eğitim üç farklı başlıktan oluşuyordu. Dersler temel eğitim ve pekiştirme eğitimi olmak üzere iki aşamada gerçekleştirilmiştir. Katılımcılar her bir konuda toplam 7 saat ders aldılar.

Bulgular: Sağlıklı yaşam tarzı davranışlarındaki olumlu gelişmeler, obez kızların ruhsal semptomlarını iyileştirdi. Müdahale grubunda MSQ toplam puanları (p<0,007) ve menstrüel ağrı azaldı (p<0,001). HLBS-II toplam puanları (p<0.001) ve fiziksel aktivite alt ölçek puanları (p<0.026.) arttı. Yürüme oranları, fiziksel aktivite davranışları ve fiziksel aktivite süreleri 4 saatin üzerine çıktı, (p<0,001). Günlük aktivitelerden yürüme güçlüğü (p<0,004) ve fast food tüketimi (p<0,002) azaldı.

Sonuç: Obez genç kızların adet belirtileri yaşam kalitelerini ve akademik başarılarını olumsuz etkileyebilmektedir. Bu nedenle, yetkililer gençler için eğitim planları tasarlarken ve ilgili yönergeler ve standartlaştırılmış programlar geliştirirken obezite ile ilgili konularda araştırma kanıtlarını dikkate almalıdır. Ayrıca obez genç kızların adet belirtilerini sağlıklı yaşam biçimi davranışlarıyla öğreten HPM modelini benimseyen okullarda ve gençlik merkezlerinde rehberlik hizmetleri açılmalıdır.

Trial registration*:* NCT04044833

Anahtar Kelimeler: Planlı eğitim, Obez kızlar, Menstürel Semptomlar, Sağlıklı Yaşam Tarzı Davranışları

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INTRODUCTION

Obesity is considered a growing public health problem as it is associated with many comorbidities (1). It is also closely related to women's health and affects it negatively. Obesity in women causes menstrual irregularities, chronic oligo-anovulation, pregnancy complications and infertility as a result of various hormonal abnormalities such as increased testosterone and insulin concentrations and decreased sex hormone binding globulin (SHBG) concentration (1,2). The most important gynecological and obstetric problems triggered by obesity in obese young girls (OYG) are menstrual symptoms (3,4). Studies have reported that 64% of girls with a high body mass index have menstrual irregularity, 63.6% of them have dysmenorrhea (5), they experience menstrual bleeding and an increase in the number of days, which impairs the quality of life of obese girls (6,7).

Previous studies highlight the importance of transforming scientific knowledge on nutrition and physical activity into permanent healthy lifestyle behaviors (8-12). Previous studies examining the relationship between diet and menstrual problems reported that among women with severe menstrual symptoms and menstrual pain, daily consumption of sugar, junk food, fish, alcohol, and cigarettes was found to be significantly higher than those without severe menstrual symptoms and menstrual pain (7-13). A similar study found that women who consumed olive oil had less menstrual bleeding, and women who consumed a local type of ham often had more bleeding. In addition, it has been stated that women who eat more fruit experience lesser menstrual pain than those who do not eat fruits (14). Barnard et al. used low-fat vegetarian diet interventions on women aged 18–33 years throughout two menstrual cycles and reported that this diet reduced the intensity of dysmenorrhea. The diet in the study restricted animal products, fats, fried foods, avocados, olives, nuts, nut butter, and snacks, and included a high intake of grains, legumes, vegetables, and fruits (15). In other studies, it has been shown that a Mediterranean diet reduces dysmenorrhea (14), skipping breakfast increases menstrual symptoms (16), and fish oil consumption improves primary dysmenorrhea (17).

It has been reported that a short-term moderate-intensity aerobic exercise program reduces the severity of dysmenorrhea and menstrual symptoms and improves the quality of life in young adults with dysmenorrhea (18,19). Furthermore, physical activity helps regulate the menstrual cycle, ovulation, and fertility due to the decrease in testosterone levels and increase in sex hormone-binding globulin as well as in reducing abdominal fat, blood sugar, lipids, and insulin resistance (7,20).

In the light of these explanations, a training was planned according to The Health Promotion Model (HPM) in order to reduce the menstrual problems that may affect especially obese young girls and to gain healthy lifestyle behaviors. The main idea of the model; establishing a healthy lifestyle to improve health, therefore changing behaviors to be healthy. Health promotion is defined as the individual's ability to improve his/her own health and gain the power to increase control over his/her own health.

The model emphasizes the responsibility of raising awareness of individuals about the importance of healthy lifestyle behaviors and counseling individuals (21). The success of the efforts to protect and improve health; Undoubtedly, it is possible by changing people's knowledge, thoughts and value judgments. The easiest way to achieve this change is health education (21).

A literature review has revealed that there is no study evaluating the effects of training courses about nutrition, physical activity, and menstrual symptoms on healthy lifestyle behaviors and menstrual symptoms.

The output of this study is that obese adolescent girls realize their erroneous behaviors in physical activity, eating and menstrual attitudes related to healthy lifestyle

behaviors and gain new and consistent behaviors with a planned education.

This study was conducted to evaluate the effect of "Healthy lifestyle behaviors and menstruation (HLB-MENS)" training given according to the Health Promotion Model (HPM) in order to improve the menstrual symptoms of adolescent obese girls.

The planned trainings in the study covers three important issues such as physical activity, nutrition, and improving menstrual symptom relations among obese girls. "Although there are studies on these topics in the literature about adolescents (8,9,22,23). None of these studies were designed in such a format specific for obese girls.

MATERIAL AND METHODS

Hypothesis

H0: There is no a difference between the Menstrual Symptom before and after the training courses given to obese adolescent girls.

H1: There is a correlation between the mean scores of HLBS-II and MSQ.

Type of Study

The research was carried out as a randomized controlled trial.

Where and When Was İt Conducted?

The research was carried out in three state high schools providing full-time education in a district of Ankara between September 1, 2017 and January 21, 2018"

In the first stage, BMIs were calculated by measuring the height and weight of 1300 girls.

In three state high schools providing full-time education in a district of Ankara. These schools were chosen because the number of students was high and there were students from different socioeconomic levels.

Ethical Considerations

An ethics committee report was taken from Ankara Yıldırım Beyazıt University Social and Human Science Ethic Committee/Turkey on October 5, 2017. The search code is 521 and the protocol number is 15. Verbal and written consent was obtained from the participants.

Power Analysis

Before choosing the sample, a power analysis was performed with the G power package program. As a result of the analysis, it was revealed that a study with a power rate of 80.1% should be conducted with two groups of 64 individuals and 128 participants.

Participants

Mid-obese adolescent girls (n = 128) aged 14–17 years participated in this study.

Inclusion and exclusion criteria

According to the WHO BMI classification of young girls (WHO 2022), participants who were 14 years (BMI > 26.7), 15 years (BMI > 27.6), 16 years (BMI > 28.2), or 14–16 years old and were studying in 9th, 10th, and 11th grades, who had no communication problems and voluntarily participated in the study, were included.

Those who did not meet these criteria and did not participate in training and measurements at any stage of the study were excluded.

Sample Chosen

The study included 9th, 10th, and 11th grade obese girls in high schools. Since the group would be composed of sensitive individuals, an improbable-random sampling method was used in the first stage. In the second stage, randomization was performed in the excel random method.

In the first stage, BMIs, heights, and weights of 1300 girls were measured. During this process, students were coded according to their student and branch numbers. A total of 128 obese students were determined for randomization.

In the second stage, girls who agreed to participate in the training and monitoring were determined and then randomly divided into two groups, namely, intervention (n = 63) and control (n = 65) groups. Randomization was performed using the Microsoft-Excel package program. After these measurements, each student who met the criteria was informed

about the study steps by the researcher at a different time from lessons (Figure 1).

Measures

A "Personal Information Form" was prepared by the researcher according to the literature (6,25-27). A "Student Follow-up Schedule" was developed for the girls to record their menstrual pain and symptoms, weight, and BMI measurements during the specified periods.

MSQ was developed by Chesney and Tasto to assess menstrual pain and symptoms in 1975 (28). In 2013, Guvenc, Seven, and Akyuz (2014) conducted a reliability and validity study. The Cronbach's Alpha value of the scale is 0.86. In our study, it was found to be 0.91 and 0.92 before and after the training courses, respectively (29).

Healthy Lifestyle Behavior Scale II (HLSB-II) was developed by Walker, Sechrist, and Pender (1987) in 1987 (30). Bahar, Beşer, Gördes, Ersin, and Kıssal (2008) studied the validity and reliability of its Turkish version in 2008 (30). Cronbach's Alpha value of the scale is 0.92. In our study, the Cronbach's Alpha value of the scale was found to be 0.91 and 0.92 before and after the training courses, respectively.

Data Collection

Before the training, Personal Information Form, HLBS-II, and MSQ were applied to the intervention and control groups determined randomly and Student Follow-up Schedules were distributed. Then, training courses were given to the intervention group in person using an interactive method. During the training, previously mentioned measurements/follow-up were periodically performed in both groups. At the end of the intervention, trainings on the same subject were given to the control group to ensure equal opportunity in education.

This training program was prepared by the researchers by taking expert opinions from the Department of Exercise and Sport Sciences, Nutrition and Dietetics, Women health nursing departments of the university.

Weights, BMIs, and menstrual symptoms of intervention and control groups were monitored. After the training, HLBS-II and MSQ scales were applied to the intervention and control groups, follow-up schedules were collected, and training courses were provided to both groups. Training courses consisted of two stages.

In the first stage, 120 min of basic training was given to the girls on a weekly basis for four weeks (40 min on physical activity, 40 min on diet, and 40 min on menstrual symptoms). Physical activity training was prohibited; the training included information on definition of physical activities and exercise benefits, the harms of sedentary life, home and school activities suitable for adolescence and their durations, and WHO's physical activity recommendations for adolescents (at this stage, for students who wanted to exercise at home, American Heart Association 3 Mile Walk video was recommended to obese girls).

Nutritional training: The importance of nutrition, what are nutritional requirements, and how are they met? Practical applications such as healthy eating plate, food pyramid, healthy eating habits, and nutritional problems.

Menstrual symptom training: Menstrual physiology, severe symptoms and ways of recovery, and the relationship of menstrual symptoms to nutrition and exercise.

In the second stage, reinforcement-training courses of 120 min were given once a month for three months. Periodic follow-up of the intervention and control groups was carried out by recording their BMIs (Tanita BC 730 branded) and menstrual symptoms in the first three days of their menstruation in five periods (Figure 1).

Statistical Analysis

Data were analyzed by using SPSS Statistics for Windows, Version 23.0 (IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp). Descriptive data were compared using the chi-square and Mann–Whitney U tests, whereas Wilcoxon's and McNemar's tests were used to compare the

menstruation findings of the girls before and after the training. Dependent samples t-test was used in the intragroup comparison of total samples t-test. Pearson's correlation analysis was used to determine the relationship between total HLBS-II and MSQ scores.

RESULTS

Table 1 presents the individual characteristics of the girls.

Table 2 presents distribution of the findings regarding the daily eating habits of the students before the education, within the group HLBS-II, MSQ, and subdimension scores. A comparison of differences between the groups was performed by using the independent after the education and between the groups is presented. The tests were performed with Mc Nemar Test, X^2: Chi-Square Test, Wilcoxon test, Mann Whitney U Tests, depending on whether one or more answers were given to the questions asked. In the intervention group, the rate of eating only home-cooked food increased, and the weekly consumption of fizzy drinks and chocolate decreased ($p>0.05$).

Table 1. Distribution of Demographic Characteristics of Participants (n =128)

Characteristics	Intervention Group (n = 63)		Control Group (n = 65)		Analysis
	n	%	n	%	
High School					
Vocational School For Girls	41	65.1	36	55.4	$X^2 = 1.360$ p = 0.507
A High School	15	23.8	21	32.3	
B High School	7	11.1	8	12.3	
Age					
14	23	36.5	20	30.8	$X^2 = 1.104$ p = 0.576
15	29	46.0	29	44.6	
16	11	17.5	16	24.6	
Family Income					
Income Is Less Than Expenses	14	22.2	17	26.2	$X^2 = 0.27$ p = 0.873
Income Expenses Equal	43	68.3	42	64.6	
Income Is More Than The Expense	6	9.5	6	9.2	
Types Of Family					
Nuclear Family	56	88.9	56	86.2	$X^X = 0.648$ p = 0.723
Extended Family	2	3.2	4	6.2	
Single Parent Family	5	7.9	5	7.7	
Influence of Personal Communication in the Menstruation Period					
Is affected	12	19.0	14	21.5	$X^2 = 1.535$ p = 0.464
Not Affected	29	46.0	23	35.4	
Now and Then	22	34.9	28	43.1	
Weight (kg)	$\bar{x}$	**SD**	$\bar{x}$	**SD**	
First Follow-Up	78.70	10.66	79.21	9.14	U = 1886.5 p = 0.443
Second Follow-Up	79.53	10.62	79.88	9.40	U = 1932.5 p = 0.584
Third Follow-Up	79.82	10.85	79.86	9.75	U = 1983.5 p = 0.760
BMI (kg/cm^2)	$\bar{x}$	**SD**	$\bar{x}$	**SD**	
BMI (First Measurement)	30.18	3.19	29.97	2.98	U = 1966.0 p = 0.698
BMI (Second Measurement)	30.40	3.21	30.01	3.11	U = 1818.5 p = 0.275
BMI (Third Measurement)	30.59	3.42	29.69	4.64	U = 1791.5 p = 0.222
Height (cm)	$\bar{x}$	**SS**	$\bar{x}$	**SD**	
	161.35	6.00	162.75	5.07	U = 1708.5 p = 0.105
Menstrual Features	$\bar{x}$	**SD**	$\bar{x}$	**SD**	
Menstruation Period (Day)	30.68	4.44	30.48	7.23	U = 1809.5 p = 0.231
Duration of Menstruation (Day)	5.32	1.39	5.97	1.41	U = 1592.5 p = 0.056

Table 2. Distribution of the findings regarding the daily eating habits of the students before the education, within the group after the education and between the groups (n=128).

Nutritional Characteristics	**Pre-Training**				**Post-Training**				**Analysis***	
	Intervention (n=63)		**Control (n=65)**		**Intervention (n=63)**		**Control (n=65)**			
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**P^i**	**P^c**
Daily Nutrition Pattern										
Fast Food	1	1.6	1	1.5	1	1.6	4	6.2	1.000	0.375
	X^2=0.000 p=0.982				X^2=1.777 p=0.182					
Only Home Cooking	29	46.0	32	49.2	39	61.9	35	53.8	**0.002**	0.508
	X^2=0.131 p=0.717				X^2=0.852 p=0.356					
Both Fast Food and Home Cooking	32	50.8	30	46.2	23	36.5	34	52.3	**0.004**	0.219
	X^2=0.276 p=0.599				X^2=3.233 p=0.072					
Beverage and Chocolate	**Pre-Training**				**Post-Training**				**Analysis***	
	Intervention (n=63)		**Control (n=65)**		**Intervention (n=63)**		**Control (n=65)**			
	x̄	**SS**	**x̄**	**SS**	**x̄**	**SS**	**x̄**	**SS**	**P^i**	**P^c**
Daily Black Tea	1.86	1.84	1.78	1.82	1.10	0.30	1.20	0.40	0.007	0.101
	U=2016.5 p=0.879				U=1882.5 p=0.420					
Daily Coffea	1.37	1.84	2.48	2.46	1.57	1.36	1.98	1.97	0.007	0.295
	U=1475.5 **p=0.005**				U=1496.5 **p=0.007**					
Weekly fizzy drink	2.05	3.23	1.09	2.07	1.06	1.19	2.25	2.56	0.010	0.519
	U=1556.0 **p=0.013**				U=1682.5 p=0.060					
Weekly Chocolate	3.02	3.18	2.78	1.83	1.62	2.74	1.00	1.78	**p<0.001**	0.200
	U=1855.0 p=0.349				U=1345.5 **p=0.001**					

* Mc Nemar Test, X^2: Chi-square Test, Beverage and Chocolate: Wilcoxon test, Mann Whitney U Test, p<0.05 statistically significant, **The question was given more than one answer, Pi: Before and after the training of the intervention group, Pc: Control group before and after training.

Table 3 presents distribution of the findings regarding the daily physical activity habits of the students before the education, within the group after the education and between the groups is presented. In the intervention group, the duration of weekly physical activity increased, and the rate of doing walking, individual sports and team sports among the activity types increased (p>0.05).

Table 4 presents distribution of the findings of some problems experienced by the students during the menstruation period before the education, within the group after the education and between the groups. Problems related to walking, sleeping and doing sports, which are among the difficulties experienced during the menstruation period, have decreased in intervention group (p<0.05).

Table 5 presents the findings regarding the severity of menstrual pain experienced by the girls in the intervention and control groups by the follow-up months. Intergroup menstrual pain comparison of the intervention group revealed that there was a statistically significant difference between the pretraining and fourth-month menstrual pain ($p < 0.05$). This result was obtained by performing McN: McNemar's Test, X^2: Qi-Square tests.

Table 6 presents the intragroup and intergroup distribution of the total mean scores of MSQ and its subdimensions before and after the training courses. There were significant differences in the intervention group in terms of negative effects/somatic complaints, pain symptoms, and total mean scores of MSQ ($p < 0.05$).

Table 7 presents the relationship between the total mean scores of HLBS-II and MSQ. The correlation analysis revealed that there was no statistically significant relationship between the total HLBS-II and MSQ scores ($p > 0.05$).

Table 3. Distribution of the findings regarding the daily physical activity habits of the students before the education, within the group after the education and between the groups (n=128).

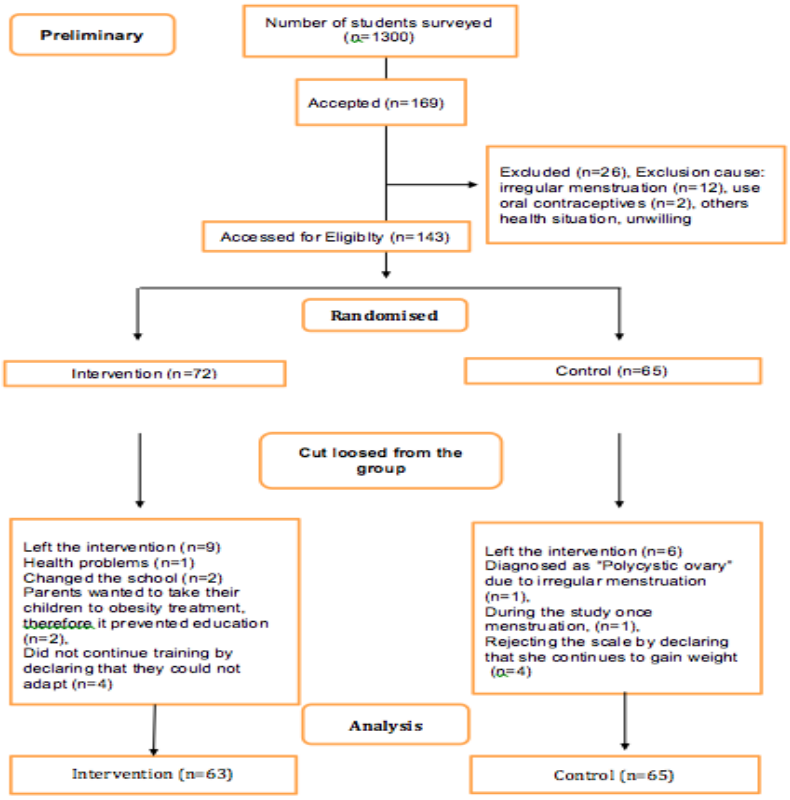
	Pre-Training				Post-Training				Analysis*	
	Intervention (n=63)		Control (n=65)		Intervention (n=63)		Control (n=65)			
	n	%	n	%	n	%	n	%	P^i	P^c
Frequency of Physical Activity										
I dont't	12	19.0	8	12.3	2	3.2	8	12.3	0.051	0.053
Everyday	12	19.0	9	13.8	12	19.0	8	12.3		
A Few Times A Week	20	31.7	30	46.2	22	34.9	28	43.1		
Once a week	11	17.5	11	16.9	20	31.7	19	29.2		
A Few Times A Month	8	12.7	7	10.8	7	11.1	2	3.1		
	X^2=3.265 p=0.515				X^2=8.318 p=0.081					
Physical Activity Time										
Two Hours a Week	35	55.6	35	53.8	43	68.3	39	60.0	**0.010**	0.172
3-4 Hours a Week	10	15.9	15	12	18.5	14.3	12	18.5		
More than 4 Hours a Week	7	11.1	8	8	12.3	14.3	8	12.3		
None	11	17.5	7	6	9.2	3.2	6	9.2		
	X^2=1.925 p=0.588				X^2=2.746 p=0.431					
Physical Activity Type**										
Walk	42	66.7	50	76.9	53	84.1	56	86.2	**0.001**	0.070
	X^2=1.665 p=0.197				X^2=0.104 p=0.747					
Running	9	14.3	15	23.1	9	14.3	16	24.6	1.000	1.000
	X^2=1.623 p=0.203				X^2=2.172 p=0.141					
Aerobic	1	1.6	5	7.7	1	1.6	4	6.2	1.000	1.000
	X^2=1.477 p=0.208				X^2=0.769 p=0.381					
Combat Sports	8	12.7	2	3.1	9.5	4.6	3	4.6	0.500	1.000
	X^2=2.885 p=0.089				X^2==0.548 p=0.459					
Individual Sports	12	19.0	14	21.5	20	31.7	16	24.6	**0.021**	0.500
	X^2=0.123 p=0.726				X^2=0.805 p=0.370					
Dance	10	15.9	16	24.6	11	17.5	17	26.2	1.000	1.000
	X^2=1.511 p=0.219				X^2=1.415 p=0.234					

* Mc Nemar Test, X^2: Chi-Square Test, $p<0.05$ statistically significant **The question was given more than one answer, Pi: Before and after the training of the intervention group, Pc: Before and after the training of the control group.

Table 4. The distribution of the findings of some problems experienced by the students during the menstruation period before the education, within the group after the education and between the groups (n=128).

Some Problems Experienced During Menstruation Period	Pre-Training				Post-Training				Analysis*	
	Intervention (n=63)		Control (n=65)		Intervention (n=63)		Control (n=65)			
	s	%	s	%	s	%	s	%	P^I	P^C
Due to Menstruation Pain Having Difficulty in Daily Activities										
Yes	43	68.3	40	61.5	40	63.5	35	53.8	0.250	0.063
No	20	31.7	25	38.5	23	36.5	30	46.2		
	X^2=0.633 p=0.426				X^2=1.227 p=0.268					
What Daily Activities Difficulty Experiencing**										
To wal	24	38.1	30	46.2	15	23.8	20	30.8	**0.004**	**0.013**
	X^2=0.852 p=0.356				X^2=0.780 p=0.377					
To sleep	15	23.8	13	20.0	5	7.9	16	24.6	**0.002**	0.375
	X^2=0.272 p=0.602				X^2=6.489 **p=0.011**					
Taking a bath	6	9.5	5	7.7	3	4.8	4	6.2	0.250	1.000
	X^2=0.137 p=0.712				X^2=0.000 p=1.000					
Go to school	19	30.2	23	35.4	15	23.8	23	35.4	0.219	1.000
	X^2=0.396 p=0.529				X^2=2.053 p=0.152					
To eat	7	11.1	5	7.7	2	3.2	6	9.2	0.125	1.000
	X^2=0.440 p=0.507				X^2=2.003 p=0.157					
Sport	13	20.6	18	27.7	10	15.9	20	30.8	0.375	0.625
	X^2=0.868 p=0.351				X^2=3.956 p=**0.047**					
Is Menstruation Keeping You From Attending School?										
Yes	4	6.3	1	1.5	4	6.3	1	1.5	0.284	0.102
No	36	57.1	35	53.8	38	60.3	31	47.7		
Time to time	23	36.5	29	44.6	21	33.3	33	50.8		
	X^2=2.604 p=0.272				X^2=5.297 p=0.071					

* Mc Nemar Test, X^2: Chi-square Test, p<0.05 statistically significant, **More than one answer was given to the question, P^I: Before and after the training of the intervention group, p^C: Before and after the training of the control group.



Figgure 1. CONSORT Diagram

Table 5. Menstruation Pain-Feeling Situations According to the Planned Monitoring (n = 128).

Feeling of Menstruation Pain		**Preintervention Menstrual Pain**		**First Follow-Up Menstrual Pain**		**Second Follow-Up Menstrual Pain**		**Third Follow-Up Menstrual Pain**		**Forth Follow-Up Menstrual Pain**		**Analysis***
		n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	
Intervention Group (n = 63)	No Pain	4	6.3	8	12.7	10	15.9	8	12.7	9	14.3	McN = 16.000 **p < 0.001**
	Less Pain	21	33.3	23	36.5	21	33.3	31	49.2	27	42.9	
	Severe Pain	38	60.3	32	50.8	32	50.8	24	38.1	27	42.9	
Control Group (n = 65)	No Pain	8	12.3	10	15.4	10	15.4	10	15.4	10	15.4	McN = 2.667 p = 0.264
	Less Pain	27	41.5	24	36.9	28	43.1	28	43.1	27	41.5	
	Severe Pain	30	46.2	31	47.7	27	41.5	27	41.5	28	43.1	
Analysis		X^2 = 2.994 p = 0.224		X^2 = 0.228 p = 0.892		X^2 = 1.393 p = 0.498		X^2 = 0.520 p = 0.771		X^2 = 0.040 p = 0.980		

McN: McNemar's Test, X^2:Qi-Square

DISCUSSION

In the first part of the study was observed that obese adolescent girls did not experience weight loss and BMI changes during the training in which they had menstruation every 30 days and for 5 days on average. The fact that there was no change in weight and BMI during the training suggests that obese adolescent girls are a group that resists healthy lifestyle behaviors, and a longer-term and pragmatic training can be obtained to support this hypothesis.

In our study, it was observed that the consumption of fast food, sugar-sweetened beverages and chocolate decreased significantly in the intervention group and the rate of those who only ate home-made food increased. According to studies examining the daily diet of adolescents, adolescents consume fast food and similar snack foods, foods with high fat and carbohydrate content, and do not pay attention to a balanced diet (32,33). In the study of Altun et al., it was stated that students tended to products such as fast food and carbonated drinks more due to "ease of access to food" (34). Studies indicate that daily consumption of tea, coffee, cola and chocolate has negative effects on menstruation (35). A similar study was conducted with 487 students, and at the end of two school semesters, consumption of sugar-sweetened beverages and high-energy snacks decreased in adolescents after the intervention (36). These results support our hypothesis that planned education positively affects nutritional habits. Although physical activities help reduce menstrual symptoms, young girls in Turkey are quite inactive (37).

In this study, it is seen that the rate of walking and individual sports and the number of hours of physical activity increased after the training. In this study, the increase in the physical activities of the students may be effective in the decrease in the MSQ total scores of the OYGs. The fact that the dysmenorrhea symptoms of girls decreased at the end of the 8-week training program that Denhavi et al. applied to high school students (19), shows that planned training increases physical activity and that the menstrual symptoms of girls with increased physical activity decrease. Studies show that students generally develop preferences according to the opportunities offered. On the other hand, culturally, girls stated that they participate in fewer activities due to reasons such as not going out late hours and not finding sports fields safe in Turkey (38).

Table 6. Distribution of the Total Scale Score related to MSQ and HLBS its Subdimensions Before and After Training in-Group and Between Groups (n = 128).

Subdimension of Scale's	**Intervention (n = 63)**			**Control (n = 65)**			**Analysis (Intergroup)** [b]
	x̄±SS	**Medyan-Min.Mak.**	**Variable**	**x̄±SS**	**Medyan-Min.Mak.**	**Variable**	
MSQ Negative Impact Somatic complaints BT	2.66 ± 0.83	2.38 (1.46-4.69)	-13,19	2.72± 0.91	2.69 (14.69)	2,86	t=0.392 p=0.696
MSQ Negative Impact Somatic complaints AT	2.35 ± 0.67	2.31 (1.23-4)		2.80± 0.86	2.85 (1-4.54)		t=3.278 **p=0.001**
	t=4.806 **p<0.001**			t=-0.875 p=0.385			
MSQ Pain Symptoms BT	3.11± 0.96	3.33 (1.17-4.83)	-21,01	2.99± 1.09	3.17 (1-5)	1,64	t=-0.643 p=0.522
MSQ Pain Symptoms AT	2.57±0.75	2.50 (1.33-4.83)		3.04± 1.16	3.00 (1-5)		t=2.676 p=**0.009**
	t=6.990 **p<0.001**			t=-0.451 p=0.654			
MSQ Coping Methods BT	2.38± 1.13	2.33 (1-5)	-1,28	2.24± 1.14	2.00 (1-5)	-0,45	t=-0.699 p=0.486
MSQ Coping Methods AT	2.35± 0.94	2.33 (1-5)		2.23± 1.16	2.00 (1-5)		t=-0.636 p=0.526
	t=0.295 p=0.769			t=0.046 p=0.963			
MSQ BT	2.74± 0.77	2.59 (1.5-4.5)	-13,69	2.73± 0.89	2.59 (1-4.77)	2,15	t=-0.101 p=0.919
MSQ AT	2.41± 0.63	2.27 (1.36-3.91)		2.79± 0.88	2.77 (1.05-4.68)		t=2.761 p=**0.007**
Analysis (in-group)[a]	t=5.898 **p<0.001**			t=-0.728 p=0.470			
HLBS Health responsibility B.T.	16.83 ±5.09	16.00 (9-30)	4,16	17.09 ± 5.34	16.00 (9-33)	-2,77	t=0.289 p=0.773
Sağlık Sorumluluğu A.T.	17.56 ±3.71	17.00 (10-27)		16.63± 5.08	16.00 (9-30)		t=-1.178 p=0.241
	t=-1.351 p=0.182			t=0.744 p=0.459			
Physical activity B.Ö.	16.54±5.22	17.00 (8-27)	6,02	16.38± 4.91	16.00 (8-32)	1,68	t=-0.173 p=0.863
Physical activity A.T.	17.60±4.18	17.00 (10-28)		16.66 ±4.99	16.00 (8-30)		t=-1.155 p=0.250
	t=-2.275 p=0.026			t=-0.468 p=0.642			

Table 6.(continue) Distribution of the Total Scale Score related to MSQ and HLBS its Subdimensions Before and After Training in-Group and Between Groups (n = 128).

Subdimension of Scale's	**Intervention (n = 63)**			**Control (n = 65)**			**Analysis (Intergroup)** [b]
	$\bar{x}$±SS	**Medyan-Min.Mak.**	**Variable**	**$\bar{x}$±SS**	**Medyan-Min.Mak.**	**Variable**	
Nutrition B.T.	19.94 ±4.17	20.00 (10-30)	4.41	19.69 ± 4.26	19.00 (10-29)	1.65	t=-0.328 p=0.744
Nutrition A.T.	20.86 ±3.64	21.00 (11-30)		20.02 ± 4.41	20.00 (9-34)		t=-1.176 p=0.242
	t=-1.930 p=0.058			t=-0.703 p=0.485			
Spiritual Development B.T.	25.13±5.34	24.00 (12-36)	2.56	24.29± 4.96	24.00 (13-35)	1.94	t=-0.916 p=0.361
Spiritual Development A.T.	25.79±4.27	26.00 (17-36)		24.77 ± 5.06	24.00 (15-36)		t=-1.235 p=0.219
	t=-1.342 p=0.185			t=-0.858 p=0.394			
Interpersonal Relations B.T.	24.56±5.24	24.00 (11-36)	3.23	25.12 ± 5.03	24.00 (14-36)	1.76	t=0.625 p=0.533
Interpersonal Relations A.T.	25.38±4.94	25.00 (13-35)		25.57 ± 5.00	25.00 (13-35)		t=0.214 p=0.831
	t=-1.593 p=0.116			t=-0.925 p=0.359			
Stres MAnagement B.T.	18.87± 4.72	19.00 (10-31)	6.26	18.80± 3.84	19.00 (9-27)	2.19	t=-0.096 p=0.924
Stres Management A.T.	20.13 ±3.93	20.00 (14-32)		19.22 ± 4.54	19.00 (9-31)		t=-1.213 p=0.228
	t=-2.524 p=0.014			t=-0.742 p=0.461			
HLSBS B.T.	121.86±23.58	120.00 (71-188)	5.70	121.38± 19.93	118.00 (81-177)	2.79	t=-0.123 p=0.903
HLSBS A.T.	129.22±18.86	130.00 (99-176)		124.86± 22.38	123.00 (82-193)		t=-1.190 p=0.236
Analysis (ingroup)*	**t=-3.683 p<0.001**			t=-1.465 p=0.148			

[a]Dependent Sample t-test, [b]Independent Sample t-test, *p < 0.05 Statistically Significant, BT: Before Training, AT: After Training

Table 7. Distribution of the Findings of the Relationship between the HLSBS II and the MSQ Total Scale Score Averages (n = 128).

		Negative Impact Somatic Complaints BT	Pain Symptoms	Coping Methods	MSQ
Health Responsibility	r	0.146	0.171	0.088	0.163
	p	0.100	0.054	0.324	0.066
Physical Activity	r	0.006	0.038	−0.017	0.014
	p	0.947	0.666	0.853	0.878
Nutrition	r	−0.025	0.036	0.079	0.011
	p	0.782	0.686	0.378	0.898
Spiritual Development	r	0.015	0.073	0.131	0.058
	p	0.868	0.411	0.140	0.514
Interpersonal Relations	r	**0.186***	0.097	0.169	**0.178***
	p	0.035	0.277	0.057	0.044
Stress Management	r	0.043	−0.015	0.101	0.040
	p	0.629	0.867	0.258	0.653
HLSBS II	r	0.088	0.094	0.123	0.108
	p	0.326	0.290	0.166	0.224

*r: Pearson Correlation Coefficient, p < 0.05 Statistically Significant.

Before the training, OYGs had more difficulties in walking, doing sports and sleeping, but at the end of the training, these problems decreased in the intervention group. The reason for these developments may be that OYGs increase their physical activities, give up fast food, that is, consume less fatty foods. Because the reduction of adipose tissue helps to regulate immune and inflammatory functions (39).

The reason why walking improved in the intervention and control groups may be that the last month of the study coincided with the beginning of spring and the young people started to spend more time outdoors. These difficulties were similar in the study of Schoep et al. (2019)(40). In Bakır's study, it was observed that the sleep quality of the students increased at the end of the training given to improve dysmenorrhea (38). Wang et al. reported a negative relationship between pain and sleep quality (41). According to the study, when women with primary dysmenorrhea exercise regularly, the severity of pain in the waist and abdomen decreases and sleep quality improves. Sample studies show that planned trainings are effective in improving the problems seen during menstruation, and this study supports the results.

In this study, students in the intervention group stated that they experienced more severe pain than the control group using the "Facial Expression Rating Scale" when asked "How would you describe the last menstrual pain" before the training? While the pain rates in the control group did not change as the training continued, the rate of those who said "there is severe pain" in the intervention group decreased significantly compared to the pre-treatment period, and the rate of those who said "there is little pain and no pain" increased. There are few studies in the literature in which menstrual pain is monitored periodically with scales. As an example, in a study by Potur et al., in which 193 students were followed, low-heat effective pain strips were applied to one of the experimental groups (n=66) in two menstrual cycles and the pain was followed by the visual pain scale (VAS), and it was reflected in the pain scale that the application reduced dysmenorrhea (42). In Sönmezer's study to measure the effectiveness of connective tissue massage and kinesiotaping treatment in primary dysmenorrhea, two groups of 16 young women followed up with both VAS and Short Form McGill Pain Questionnaires for 3 menstrual cycles in order to measure the severity of menstruation pain. At the end of the study, a significant decrease was observed in all evaluation parameters related to pain (43). In a similar study, De Almeida et al. performed

connective tissue massage to 72 women aged 10-28 years, and the cases were followed up with VAS for 3 menstrual cycles, and it was visually demonstrated that the application was effective on primary dysmenorrhea (44).

Total mean scores of MSQ were found to statistically increase in the intervention group after the training courses (t=5.898 **p<0.001**). Similar training courses for reducing menstrual symptoms have been shown to be effective in reducing menstrual symptoms of middle adolescent and obese girls (45-48). In this study, negative effects/somatic complaints such as irritability, anger, tension, headache, abdominal tenderness, weakness, and dizziness before and during menstruation period were found to decrease in the intervention group after the training courses ($t = 4.806$, $p < 0.001$) and a statistically significant difference was observed between the groups ($t = 3.278$, $p = 0.001$). This new information about OYG can be used as basic information in future studies conducted for obese girls. Similar to our study, Bakır reported that the "Premenstrual Symptom Scale" scores of the students, which define the negative effects somatic complaints of the students, decreased significantly after the training courses about healthy lifestyle behaviors (38). Other studies, in which the training courses were not given to obese female students but the results were evaluated before and after the training as in our study, have shown that planned training courses given to adolescents can reduce negative effects or somatic complaints. For instance, in a study, participants were divided into groups such as control, aerobic, and stretching exercises groups. An eight-week training program, three times per week, was planned for aerobic and stretching exercise groups. Following the training, menstrual symptoms were observed to improve (45). In a randomized controlled experimental trial, aromatherapy was applied through inhalation to the students; at the end of the study, a statistically significant difference was found between the groups in terms of the PMS scale and anxiety subdimension scores (50). Similarly, premenstrual and menstrual problems as well as dysmenorrheic problems like stress, depressive feelings, exhaustion, weakness, headache, and pelvic pain have reportedly decreased owing to such training programs aimed at reducing menstrual symptoms as healthy lifestyle behaviors, exercise, aerobics, swimming, hot water, biofeedback, and yoga (22,38,48,51-54). FNMPTr training courses are thought to be effective in reducing menstrual symptoms of OYG.

In our study, "pain symptoms" subdimension mean scores of the intervention group in the MSQ scale was observed to decrease after the training courses, meaning that the symptoms were improved. In some studies, training on menstrual problems and hygiene was planned and after the training, it was observed that menstrual pain of the students decreased and their quality of life increased (46,48,51,54). In a study by Tang, a six-month training on coping with dysmenorrhea was given to students; at the end of the sixth month, a significant improvement was observed in both the visual pain scale results of the female students and other dysmenorrheal problems (56). The findings suggested that FNMPTr training was effective in reducing menstrual pain of OYG. In this study, "methods of coping with menstrual symptoms" subdimension mean scores of the girls were found to be high in the intervention group, but this difference was not statistically significant ($t = 0.295$, $p = 0.769$).

Total mean scores of HLBS-II were found to statistically increase in the intervention group after the training courses ($t = -3.683$; $p < 0.001$) (Table 7). However, the fact that there was no statistically significant increase in the total mean scores of HLBS-II among the groups suggested that the FNMPTr courses given to the adolescents were not effective in OYG health life behaviors (Before training: $t = -0.123$ and $p = 0.903$; after training: $t = -1.190$ and $p = 0.236$) ($p > 0.05$) (Table 6). This result is new information about OYG. It can be used as basic knowledge in studies conducted for obese girls. In some previous studies, adolescents were given training on nutrition, physical activity, healthy lifestyles, and health improvement, and it was found that the HLBS-II scores of the youth statistically increased after these training courses (8,57-61). In this study, there was a statistically significant improvement at the end of the training in the physical activity and stress coping sub-dimensions of the HLSB II scale, but no statistically different results were obtained in the other dimensions.

In this study, "physical activities" subdimension scores of the intervention group were found to have significantly increased after the training courses ($t = -2.275$; $p = 0.026$) (Table 3). Many studies point out that the awareness of physical activity created in adolescents rapidly increases their level of daily

physical activity (8,63-69). In another study of 11 risky obese adolescents, which was a school-based study of healthy lifestyle behaviors, it was revealed that physical activity behaviors increased after the training (70). In another study, obese individuals were given 40 min of aerobic/exercise three times a week for eight weeks and at the end of the study, it was observed that the oxidant–antioxidant imbalance caused by obesity improved and their physical activity and quality of life increased (71). In a study conducted in the United States, obese girls were enrolled in a 12-week dance exercise program, resulting in a decrease in TV-viewing rates and an increase in their activities (8).

There was a significant increase in "stress management" subdimension total mean scores of the intervention group in HLBS-II scale after the training. In studies by Geçkil and Yıldız (2006), Bakır (2017), Yılmaz (2008), Yeşilfidan and Adana (2017), Hsiao et al. (2005), and Wei et al. (2012), "coping with the stress" subdimension mean scores were reported to significantly increase following the training courses, including coping with the stress subjects or training courses were reported to bring positive behaviors (58-61,72). Young people's primary interest and need for this information may have led to higher scores on this issue.

Table 7 presents the relationship between the total mean scores of HLBS-II and MSQ.

In this study, at the end of the training, there were weak positive relationships between "interpersonal relationships" subdimension total mean scores in the HLBS-II scale and "negative effects/somatic complaints" subdimension total mean scores in the MSQ scale ($r = 0.186$, $p = 0.035$) and between "interpersonal relationships" subdimension total mean scores and "MSQ" ($r = 0.178$, $p = 0.044$).

Since there was no other study that revealed the relationship between HLBS-II and MSQ in obese adolescents, we could not compare this correlation.

However, as a result of a study by Daşıkan et al. (2014) in which they investigated the menstrual complaints of nurses, 61% of the study group had problems in interpersonal relationships before and during the menstruation and their menstrual symptoms increased (56).

According to another study, on premenstrual symptoms, premenstrual and menstrual period problems were found to be higher in women (46.2%) who had problems in their individual relationships (56).

Studies have reported that the attention providing selectivity decreases and memory weakens during the follicular phase in women with moderate–severe PMS.79 In a study by Eggert et al. (2017), authors reported a significant relationship between PMS and cognitive–emotional processes (73). In the same study, women have been reported to have negative feelings more particularly during the menstruation period and scores from the scales measuring their cognitive levels are low. These results are more common in obese individuals, indicating that menstrual symptoms bring biochemical, physical, emotional, and mental burdens to women. All these burdens are the basis for negative effects/somatic complaints. It is a normal reaction that women under these burdens have aggressive and depressive feelings, their interpersonal relationships become impaired and their MSQ symptoms increase. Considering these findings, the results obtained from the abovementioned studies do not support our results. This correlation obtained at the end of the training was quite interesting. Because what was expected was a positive correlation of training-enhanced HLSB behaviors with menstrual symptoms.

CONCLUSION

In conclusion, although behavioral change is difficult in obese girls, Planned education have effected Menstrual symptoms positively.

The research enabled obese adolescent girls to realize their erroneous behaviors in physical activity, eating and menstruation attitudes related to healthy lifestyle behaviors and to gain new and consistent behaviors with a planned education. Improvements in healthy lifestyle behaviors such as physical activity and diet throughout the study had a domino effect on menstrual symptoms. It reduced MSQ scores and therefore menstrual symptoms.

Menstrual symptoms can negatively affect the quality of life and academic success of obese young girls who already have some internal problems. Therefore, authorities should consider research evidence on obesity-related issues when designing education plans for young people and developing relevant guidelines and standardized programs. In addition, guidance services should be opened in schools and youth centers that adopt the HPM model, which teaches obese young girls' menstrual symptoms with healthy lifestyle behaviors. The long-term effects of this model can only be seen with longer training and follow-

up studies. Future studies should focus on the relationship between obese girls' biomarkers that change with planned trainig and their menstrual symptoms.

Limitations

The first limitation is that OYG do not want to participate in education. They did not want to be labeled and showed plenty of resistance. The school's and researcher's special environment and time arrangements comforted the girls. Secondly, families had difficulty in accepting their daughters to participate in the education as an obese group. When the families were informed about the beneficial results of the previous studies, they supported their daughters' participation in this training. However, some families remained reluctant and prevented their daughters' participation in the training on the pretext of taking them to a dietician. Since obese adolescents are a very sensitive group, we tried to solve problems by paying attention to communication at every stage of education. Although the number of obese adolescents participating in this study is thought to be sufficient for the study to be generalizable, the results of the studies to be conducted with the participation of more obese girls may be interesting.

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Authors' Contributions

HT carried out study devising, study planning, implementation, data collection, and writing; SŞ carried out devising, planning, analyzing, and reviewing of the study. All authors have read and approved the final version of the manuscript, and agree with the order of presentation of the authors.

Competing Interests

The authors declare that they have no competing interests.

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