Progress in Nutrition 2018; Vol. 20, N. 1: 146-160 DOI: 10.23751/pn.v20i1.6301

Original article

The effect of training provided for obese adolescents based on Health Promotion Model on their healthy lifestyle behaviors and life quality

Ayten Yılmaz Yavuz[1], Nazlı Hacıalioğlu[2]

[1] Recep Tayyip Erdoğan University School of Health, Department of Public Health Nursing, Rize, Turkey - E-mail: ayte55@gmail.com;
[2] Atatürk University Faculty of Health, Department of Public Health Nursing, Erzurum, Turkey

Summary. *Objectives:* The purpose of this study is to determine the effect of training provided for obese adolescents based on health promotion model on their healthy lifestyle behaviors and life quality. *Methods:* The research was conducted on the 114 obese adolescents in the form of intervention design with pretest- posttest control group between the dates September 2012 and January 2014. The experiment group was trained for three months within the Health Promotion Model which was constituted to decrease the risk factors of obesity. *Results:* With the training, monitoring and consultancy service provided for obese adolescents, it was found that BMI scores decreased significantly, their nutritional and physical activity habits were regulated, their sedentary life decreased, their general score averages for ALP and PedsQL scale were higher when compared with the pre-test and the difference between the experiment and control groups was found to be statistically significant ($p<0.05$). *Conclusion:* It was determined that the training obese students received which was based on health promotion model helped the students to develop healthy life style behaviors and to increase their life quality.

Key words: health promotion model, healthy life style behaviors, life quality, nursing, training

Introduction

Obesity is one of the most important health problems of our day and its frequency has been increasing gradually (1). According to World Health Organization (WHO)'s 2014 data, it has been reported that the rate of obesity has reached 600 million and an increase between 10-30% has been found in the prevalence of obesity around the world in the last decade (2). Studies in Turkey have reported 30% of individuals to be obese (3) and also 44% increase in the frequency of obesity in the last 12 years (4, 5).

While obesity can be seen in every age group, it shows an increase in the first years of life, between the ages of five and six and in the adolescence period. The fact that obesity develops before the age of five and after the age of 15 is a risk in terms of the continuation of obesity in adulthood (6-8). Although there are no national studies in Turkey examining the frequency of obesity in children and adolescents, there are various studies conducted locally and regionally. Studies have reported that obesity influences between 1.3 and 13.5% of children and adolescents and 50% of the children who enter the period of adolescence as being obese continue to be obese in their adulthood, too (9,10).

In addition to causing various health problems in the advanced periods of life, obesity in adolescents can also cause chronic diseases such as type 2 diabetes, hypertension and hyperlipidemia, which are seen in adults and the young ones (11-12). These chronic diseases, which are known to result from genetic pre-

disposition, lifestyle or environmental factors, are estimated to cause 35 million deaths each year, 80% of which are estimated to take place in low and middle income countries (8). As well as increasing the number of deaths with the diseases it causes, obesity also causes both individual and social problems since it is a chronic illness besides negatively affecting the economy of the country by causing a decrease in work power and an increase in health expenses (10).

Studies have shown weight management programs including diet, activity and behavior therapy and changes in the lifestyle to decrease BMI (13-21), while training which included only stress management was not found to decrease BMI (22). Web-based weight management programs (23), including stress management in the program (24), and at least three months long training and follow up have been shown to increase lifestyle behaviors and life quality (25-30) while other methods different from medication have been stated to be very successful in developing and improving mental health and life quality besides being cost-effective in terms of not having any risks and being inexpensive (25).

One of the most used models in giving health behaviors is Health Promotion Model (HPM) (31). According to HPM, healthy lifestyle behaviors are behaviors that individuals should have. According to WHO, healthy lifestyle behaviors, which are effective in promoting health, are gained and tested in adolescence period which is accepted as the age group of between 10 and 19 (32, 33). Middle (14-17 years of age) and late (17-21 years of age) stages, which are accepted as the developmental stages of adolescents, can be described as developmental periods which are risky in terms of starting negative health behaviors that can cause obesity. In addition, at the end of the adolescence period, anthropometric measurement values of adult life are reached (34).

A great number of researches on obese adolescents have been conducted in the world which have assessed the prevalence of obesity, risk factors, efficiency of healthy lifestyle programs and life quality (35-39). In Turkey, descriptive studies have been conducted such as prevalence studies, risk factors of obesity, and methods used in diagnosis and treatment (9, 13, 40-43). However, no studies have been found on the effect of model-based training for fighting obesity in middle and late adolescence periods on the healthy lifestyle behaviors and life quality of obese adolescents.

The purpose of this study is to research the effect of training based on health promotion model on the healthy lifestyle behaviors and life quality of obese adolescents.

Hypotheses of the Study:

H_1: The training given to students based on Health Promotion Model will decrease BMI.

H_2: The training given to students based on Health Promotion Model will decrease obesity related risk factors.

H_3: The training given to students based on Health Promotion Model will increase healthy lifestyle behaviors.

H_4: The training given to students based on Health Promotion Model will increase life quality.

Material and methods

Study population

The study was conducted with control group method and pretest-posttest design between September and January 2014, in four schools in which the highest number of obesity was determined and 136 obese adolescents between the ages of 14 and 18 with a BMI of ≥95 percentile (11, 43) were found as a result of obesity measurement conducted in 14 high schools in Rize. The experimental and control groups were determined with the method of drawing to provide randomization. The obese adolescents in 2 schools were taken in the experimental group, while the obese adolescents in the other 2 schools were taken in the control group. No sample was chosen. The research was completed with a total of 114 adolescents, 55 experimental and 59 controls who accepted to participate in the study and who met the selection criteria. Inclusion criteria were as follows:

- Not having any physical or mental disabilities preventing exercise,
- Not using any medication or seeing a doctor to lose weight,
- Not doing sports regularly
- Not having any chronic diseases except obesity.

Control Variables: The control variables of the study include Identifying properties of adolescents such as age, gender, monthly income of parents, education and working status of parents, family type, number of children, and presence of obese individuals in the family. When the students in the experimental and control groups were examined in terms of control variables, it was determined that there are not any statistically significant differences and both groups have a homogeneous distribution ($p>0.05$).

Approval was taken from Atatürk University Institute of Health Sciences Ethical Board and permission was taken from Rize provincial directorate for national education and the secondary education institution in which the research was conducted. In addition, the aim and method of the research was explained to the students constituting the research group, the study plan was given in writing and written permission was obtained from the students and their parents.

Data collection and variable definitions

For data collection, "Demographic Characteristics Form for Adolescents", "Obesity Related Risk Factors Form" "Adolescent Lifestyle Scale" and "Pediatric Quality of Life Inventory" were used.

Data Collection Tools

Demographic Characteristics Form for Adolescents: The form which was prepared by the researcher in line with the related literature (9, 20, 40, 42, 44) includes 10 questions about the age and gender of the adolescents, income of the family, parents' education and work status, type of family, number of children and whether there are obese individuals in the family.

Obesity Related Risk Factors Form: It is a form prepared by the researcher in line with the related literature (20, 33, 38, 40, 45). This form consists of 17 questions about BMI, dietary habits, status of sedentary life and physical activity which includes obesity related risk factors.

Adolescent Lifestyle Scale (ALS): The scale which was started to be developed by Pender was completed by Hendricks, Pender and Murdaugh in 2006 to measure the frequency of health promotion behaviors of early, middle and late stage adolescents (31, 46). Turkish validity and reliability studies of the scale were conducted by Ardıç in 2008 (47).

The scale which was based on HPM consists of a total of 44 questions and it has 7 subgroups (health responsibility, physical activity, diet, positive outlook on life, interpersonal relations, stress management and spiritual health) which can be used independently from one another (46-47).

The scale is a 4 likert type scale. 1 point is given for "never", 2 point for "sometimes", 3 point for "frequently" and 4 point for "always". The lowest score of ALS is 44, while the highest score is 176. The scale does not have a cut-off point, positive health behavior increases as the score increases (31, 46-47). Cronbach's alpha value of the Turkish form was found as 0.87. In this study, Cronbach's alpha value was found as 0.91. The scale used in this study was found to be suitable for the sample group.

Pediatric Quality of Life Inventory (PedsQL) (Adolescent 13-18 Years of age form): The inventory (48), which was developed by James W.Varni in 1999 to measure the health-related quality of life of children and adolescents between the ages of 2 and 18, was checked for Turkish validity and reliability for the ages of 13 and 18 by Memik et al. in 2005 (49). It is a life quality scale suitable for both healthy and sick children and adolescents in wide populations such as schools and hospitals (49).

PedsQL consists of a total of 23 items and it has four subscales as physical functioning, emotional functioning, social functioning and school functioning. Physical functioning has 8 items, emotional functioning has 5 items, social functioning has 5 items, and school functioning has 5 items. Scoring is made in three areas. First, physical health summary score (PHSS) (8 items) is measured, secondly psychosocial health summary score (PSHSS) (15 items) which is calculated by the measurement of item scores of emotional, social and school functioning is measured, thirdly total scale score (TSS) (23 items) is measured (48, 50-52). This inventory examines the last month of adolescents. The items in the inventory, which is 5-likert type, are scored between 0 and 100. 100 points are given for

the answer "never", 75 points for "rarely", 50 points for "sometimes" and 0 points for "almost always". The total score is obtained by adding up the points and dividing them by the number of answered items. In case of incomplete items, the scores of completed items are added up and divided into marked items. If more than 50% of the inventory is not completed, the inventory is not assessed. The higher total scale score of PedsQL means the better health-related quality of life (50-52). While the inventory's Cronbach's alpha coefficient was 0.88 for pediatric form (48), Cronbach's alpha value of the Turkish form was 0.82 in adolescent form (49). Cronbach's alpha value of this study was found to be 0.85.

Digital Stadiometer: F.Bosch digital measurement device, which could measure weight between 0 and 150 kg and height between 0 and 200 cm, was used to measure the weight and height of obese adolescents.

Nursing Intervention

The nursing intervention applied to obese students consists of health promotion training and monitoring process. The training structured according to SGM is a program that focuses on building health responsibility, decreasing sedentary behaviors and enhancing physical activity, healthy eating, personal support, healthy life benefits for stress management, and positive self-esteem in order to develop healthful lifestyle behaviors to reduce obesity-related health problems and improve quality of life. The training program given to the obese students was provided for the experimental group after the pre-test, in groups of 10-15 people with the training book named "Healthy Life Circle" structured according to SGM. The training, which includes the stages of teaching, convicting, performing, repeating, and practicing, was conducted by the researcher in the form of group training for ten weeks. It consisted of 30-40 minute interviews once a week. The training was conducted using oral expression, brain storming, discussion and demonstration methods and educational materials such as power point presentations, writing board and video demonstration. Follow-ups were continued for three months after the training as reminding consultancy through email and telephone once a month. No intervention was made on the control group. After the training of the adolescents in the experimental group finished, the training booklet was also given to the adolescents in the control group to comply with the "equality" principle.

Data Assessment

The data obtained from the research were transferred to computer with SPSS package program. In data assessment, Kolmogorov-Smirnov test was used to find out whether all the variables were normally distributed, and Chi-square, Mann-Whitney U Test, Wilcoxon Paired t Test and Friedman Test were used since they were not normally distributed.

Results

When the demographic characteristics of the adolescents in the experimental and control groups within the context of the research were compared, in the experimental group it was found that 47.3% of the adolescents were 16 years old, 51% were female, 60% had equal income and expenditure. It was found that mothers of 63.6% of the adolescents were primary school graduates, fathers of 32.7% of the adolescents were secondary school graduates, mothers of 85.5% were unemployed, while fathers of 89% were employed, 85.5% had nuclear family, families of 67.3% had 3 or more children, and no obese individuals were found in the families of 72.7%. In the control group, it was found that 47.5% of the adolescents were 16 years old, 55.9% were male, 57.7% had equal income and expenditure. It was found that mothers of 55.9% of the adolescents were primary school graduates, fathers of 42.4% of the adolescents were primary school graduates, mothers of 78.0% were unemployed, while fathers of 72.9% were employed, 79.7% had nuclear family, families of 57.6% had 3 or more children, and no obese individuals were found in the families of 55.9% (Table 1).

In the intra-group and intergroup comparisons of BMI pre-test and post-test values of obese adolescents in the experimental and control groups, it was found that the pre-test BMI values of the adolescents in the experimental group, which was 32.06±3.02, decreased (30.61±3.17) after training and the difference was found to be statistically significant ($p<0.05$). The dif-

Table 1. Comparison of Demographic Characteristics of the Adolescents in the Experimental and Control Groups

Demographic Characteristics	Experimental Group (n=55)		Control Group (n=59)		Test and p value
	S	%	S	%	
Age					
14-15 years of age	15	27.3	19	32.2	X^2=1.102
16	26	47.3	28	47.5	p=0.894
17-18 years of age	14	25.4	12	20.3	
Gender					
Female	28	50.9	26	44.1	X^2=0.534
Male	27	49.1	33	55.9	p=0.465
Monthly Income Status of the Family					
Income more than expenditure	12	21.8	14	23.7	X^2=0.076
Equal income and expenditure	33	60.0	34	57.7	p=0.963
Income less than expenditure	10	18.2	11	18.6	
Educational Status of the Family					
Literate	6	10.9	11	18.6	
Primary School	35	63.6	33	55.9	X^2=2.255
Secondary School	7	12.7	10	16.9	p=0.521
High School, University and higher	7	12.7	5	8.6	
Father's Educational Status					
Literate	4	7.3	5	8.5	
Primary School	17	30.9	25	42.4	X^2=2.097
Secondary School	18	32.7	17	28.8	p=0.552
High School and higher	16	29.1	12	20.3	
Mother's Employment Status					
Employed	8	14.5	13	22.0	X^2=1.062
Unemployed	47	85.5	46	78.0	p=0.303
Father's Employment Status					
Employed	49	89.1	43	72.9	X^2=4.802
Unemployed	6	10.9	16	27.1	p=0.028
Family Type					
Nucleus	47	85.5	47	79.7	X^2=0.723
Extended	8	14.5	12	20.3	p=0.697
Number of Children in the Family					
1-2	18	32.7	25	42.4	X^2=1.127
3 and more	37	67.3	34	57.6	p=0.288
Presence of obese individuals in the family					
Mother	4	7.3	9	15.3	
Father	5	9.1	7	11.8	X^2=4.189
Sibling	2	3.6	5	8.5	p=0.381
Mother and Father	4	7.3	5	8.5	
No obese	40	72.7	33	55.9	
Total	55	100.0	59	100.0	

ference between the pre-test and post-test BMI values of the adolescents in the control group was found to be statistically insignificant (p>0.05) (Table 2).

When the obesity related risk factors were compared between groups, it was found that there were no statistically significant differences between experimental and control group adolescents' pre-test obesity related risk factors except for the risk factor of eating too fast (p>0.05). In terms of post-test measurements, it was found that obesity related risk factors in experimental group adolescents had decreased when compared with the adolescents in the control groups and the difference was found to be statistically significant (p<0.05) (Table 3).

When the ALS scale average scores were compared between groups, the difference between the pre-test ALS scale average scores of experimental and control groups was statistically significant in all groups except the dimensions of health responsibility and spiritual health (p<0.05). In terms of post-test measurements, ALS scale average scores of experimental group adolescents who received health promotion training (135.9±14.2) were found to be higher than those of the adolescents in the control group (111.7±19.4) and the difference between groups was found to be statistically significant (p<0.05) (Table 4).

When the PedsQL and sub-dimensions average scores were compared between groups, it was found that there was a statistically significant difference between pre-test PedsQL average scores of experimental and control group adolescents in all sub-dimensions except social functioning and school functioning (p<0.05). In terms of post-test measurements, PedsQL average scores of experimental group adolescents who received health promotion training (86.07±10.9) were found to be higher than those of the adolescents in the control group (74.54±14.0) and the difference between groups was found to be statistically significant (p<0.05) (Table 5).

Discussion

It is thought that in case of obesity resulting from unhealthy lifestyle behaviors, HPM based trainings for adolescents will give them healthy lifestyle behaviors, help obese individuals to get back to normal levels of weight and to maintain their normal levels and positively affect life quality. The purpose of this study is to research the effect of training based on health promotion model on the healthy lifestyle behaviors and life quality of obese adolescents.

In the study, when the BMI pre-test and post-test values of obese adolescents in the experimental and control groups were examined, it was found that the pre-test BMI values of the adolescents in the experimental group decreased after health promotion training and the difference between two groups was found to be statistically significant (p<0.05) (Table 2).

In a study by Nemet et al (14) it was stated that a training which included diet, activity and behavior therapy and was applied 6 times within 3 months decreased BMI. In another study by Muller et al. (19) it was reported that a training to prevent obesity which included the subjects of healthy diet, physical activity and TV watching also decreased BMI.

Table 2. Intra-group and Inter-group comparisons of BMI pre-test and post-test values of obese adolescents in the experimental and control groups

Measurement	Experimental group X ± SS	Control Group X ± SS	Test and p value
Pre-test	32.06±3.02	32.24±3.54	t= 0.29 p= 0.771
Post-test	30.61±3.17	33.02±5.65	t= 2.78 p= 0.006
Test and p value	t=5.46 p= 0.000	t =1.63 p= 0.109	

Table 3. Intra-group and Inter-group comparisons of obesity related risk factors of obese adolescents in the experimental and control groups based on pre-test and post-test measurements

Obesity-related risk	Pre-				Inter-group Comparison Pre-		Post-				Inter –group Comparison Post		Intra-group Pre-Test- Post-
	Experimental		Control				Experimental		Control				
	Number	%	Number	%	X^2	p	Number	%	Number	%	X^2	p	
How the adolescent views his/her weight													**Experimental**
Overweight	15	27.3	11	18.6			16	29.1	6	10.2			X^2= 1.815; p= 0.178
Medium weight	17	30.9	31	52.5	5.465	0.065	29	52.7	33	55.9	8.006	0.018	**Control**
Normal weight	23	41.8	17	28.9			10	18.2	20	33.9			X^2= 2.130; p= 0.144
Number of daily meals													**Experimental**
1-2 meals	40	72.7	31	52.5			5	9.1	32	54.2			X^2= 31.410; p= 0.000
3-5 meals	15	27.3	26	44.1	5.959	0.051	17	30.9	24	40.7	45.814	0.000	**Control**
6 meals	0	0.0	2	3.4			33	60.0	3	5.1			X^2= 0.200; p= 0.655
Skipping meals/having snacks between meals													**Experimental**
Never	3	5.4	7	11.9			22	40.0	12	20.3			X^2= 30.857; p= 0.000
Sometimes	25	45.5	30	50.8	2.427	0.297	32	58.2	24	40.7	24.140	0.000	**Control**
Always	27	49.1	22	37.3			1	1.8	23	39.0			X^2= 1.316; p= 0.251
Having snack after													**Experimental**
Never	5	9.1	11	18.6			34	61.8	16	27.1			X^2= 37.356; p= 0.000
Sometimes	27	49.1	23	39.0	2.516	0.284	20	36.4	18	30.5	28.634	0.000	**Control**
Always	23	41.8	25	42.4			1	1.8	25	42.4			X^2= 0.273; p= 0.602
Having snack after waking up from nocturnal													**Experimental**
Never	11	20.0	16	27.1			52	94.5	20	33.9			X^2= 43.000; p= 0.000
Sometimes	31	56.4	37	62.7	3.899	0.142	3	5.5	33	55.9	45.137	0.000	**Control**
Always	13	23.6	6	10.2			0	0.0	6	10.2			X^2= 0.133; p= 0.715
Eating speed													**Experimental**
Fast	36	65.5	6	10.2			1	1.8	11	18.6			X^2= 51.000; p= 0.000
Middle	19	34.5	47	79.6	39.215	0.000	18	32.7	41	69.5	36.762	0.000	**Control**
Slow	0	0.0	6	10.2			36	65.5	7	11.9			X^2= 1.143; p= 0.285
Sitting at the dinner table for a long time													**Experimental**
Never	3	5.5	7	11.9			27	49.1	6	10.2			X^2= 35.372; p= 0.000
Sometimes	23	41.8	31	52.5	3.930	0.140	26	47.3	39	66.1	28.854	0.000	**Control**
Always	29	52.7	21	35.6			2	3.6	14	23.7			X^2= 0.333; p= 0.564

*Friedman

(continued)

Table 3. Intra-group and Inter-group comparisons of obesity related risk factors of obese adolescents in the experimental and control groups based on pre-test and post-test measurements *(continued)*

Obesity related risk factors	Pre-				Inter Group Comparison Pre		Post				Inter Group Comparison PostTest		Intra Group Pre Test-Post
	Experimental		Control				Experimental		Control				
	Number	%	Number	%	X^2	p	Number	%	Number	%	X^2	p	
State of doing another activity while eating													**Experimental**
Never	2	3.7	7	11.9			13	23.6	10	16.9			X^2= 26.561; p= 0.000
Sometimes	18	32.7	13	22.0	3.665	0.160	35	63.7	16	27.2	24.259	0.000	**Control**
Always	35	63.6	39	66.1			7	12.7	33	55.9			X^2= 2.462; p=
Frequency of fast food consumed in one week													**Experimental**
None	1	1.8	6	10.2			2	3.6	1	1.7			X^2= 25.326; p= 0.000
Once	8	14.5	6	10.2	5.058	0.168	29	52.7	10	16.9	23.192	0.000	**Control**
Twice	20	36.4	15	25.4			19	34.5	23	39.0			X^2= 5.765; p= 0.16
Three times and more	26	47.3	32	54.2			5	9.1	25	42.4			
State of overeating under stress													**Experimental**
Never	8	14.5	12	20.3			30	54.5	10	16.9			X^2= 28.900; p= 0.000
Sometimes	28	50.9	34	57.6	2.368	0.306	21	38.2	28	47.5	22.447	0.000	**Control**
Always	19	34.6	13	22.1			4	7.3	21	35.6			X^2= 1.286; p= 0.257
Time/day spent in front of Computer/TV													**Experimental**
None	0	0.0	3	5.1			18	32.7	8	13.6			X^2= 35.103; p= 0.000
About an hour	15	27.3	20	33.9	3.789	0.150	28	50.9	29	49.2	9.186	0.010	**Control**
More than two hours	40	72.7	36	61.0			9	16.4	22	37.2			X^2= 7.759; p= 0.05
Sport activity frequency/week													**Experimental**
None	38	69.1	29	49.2			3	5.4	35	59.3			X^2= 38.095; p= 0.000
2-3 times a week	16	29.1	27	45.7	4.889	0.087	32	58.2	22	37.3	43.440	0.000	**Control**
3-5 times a week	1	1.8	3	5.1			20	36.4	2	3.4			X^2= 0.806; p= 0.369
Time/week spent for sports activities													**Experimental**
None	38	69.1	30	50.8			1	1.8	27	45.8			X^2= 44.083; p= 0.000
Less than an hour	13	23.6	23	39.0	3.984	0.136	20	36.4	15	25.4	30.745	0.000	**Control**
1 – 2 hours	4	7.3	6	10.2			19	34.5	11	18.6			X^2= 1.125; p= 0.289
2 hours and more	0	0.0	0	0.0			15	27.3	6	10.2			

*Friedman

Table 4. Intra-group and Inter-group comparisons of ALS scale and sub-dimensions based on pre-test and post-test averages of experimental group and control group obese adolescents

ALS Scale and Sub dimensions		Experimental Group		Control Group		Inter-group Comparison Pre Test- Post Test	
		X ± SS	Intra-Group Comparison Pre Test-Post Test	X ± SS	Intra-Group Comparison Pre Test-Post Test	U	p
Health Responsibility	Pre Test	13.69±3.12	Z=6.164 p=0.000	14.31±3.53	Z=0.658 p=0.511	1471.50	0.389
	Post Test	19.35±3.37		14.63±4.07		633.0	0.000
Physical Activity	Pre Test	12.24±2.77	Z=6.464 p=0.000	14.10±2.96	Z=0.189 p=0.850	1007.00	0.000
	Post Test	18.58±2.79		14.22±3.38		517.0	0.000
Diet	Pre Test	15.09±2.89	Z=6.448 p=0.000	17.29±3.16	Z=1.672 p=0.095	932.0	0.000
	post Test	22.96±2.64		18.07±3.08		370.5	0.000
Positive Outlook on Life	Pre Test	15.96±3.33	Z=5.533 p=0.000	17.51±3.79	Z=0.912 p=0.362	1201.50	0.017
	Post Test	19.58±2.71		17.10±3.65		984.0	0.000
Interpersonal Relations	Pre Test	15.27±2.70	Z=5.675 p=0.000	16.71±3.33	Z=0.578 p=0.563	1172.00	0.010
	Post Test	18.85±2.43		16.85±3.45		1091.50	0.002
Stress Management	Pre Test	14.96±2.48	Z=5.890 p=0.000	15.95±2.83	Z=0.670 p=0.503	1207.50	0.018
	Post Test	18.93±2.37		15.61±3.33		682.0	0.000
Spiritual Health	Pre Test	14.40±2.79	Z=5.380 p=0.000	15.29±3.21	Z=0.259 p=0.796	1344.50	0.113
	Post Test	17.65±3.32		15.22±3.80		1066.50	0.002
ALS Scale Total	Pre Test	101.6±15.3	Z=6.444 p=0.000	111.2±16.7	Z=0.182 p=0.856	1027.0	0.001
	Post Test	135.9±14.2		111.7±19.4		504.0	0.000

Table 5. Intra-group and Inter-group comparisons of PedsQL scale and sub-dimensions based on pre-test and post-test averages of experimental group and control group obese adolescents

PedsQL and Sub Dimensions		Experimental Group		Control Group		Inter Group Comparison Pre Test- Post Test	
		X ± SS	Intra-Group Comparison Pre Test-Post Test	X ± SS	Intra-Group Comparison Pre Test-Post Test	U	p
Physical Health	Pre Test	59.49±15.9	Z=5.911 p=0.000	72.62±14.5	Z=0.021 p=0.983	861.00	0.000
	Post Test	86.59±13.5		71.93±16.6		758.50	0.000
Emotional Functioning	Pre Test	59.64±18.0	Z=5.835 p=0.000	69.83±17.5	Z=0.708 p=0.479	1151.50	0.007
	Post Test	81.64±14.5		72.29±20.0		1196.50	0.015
Social Functioning	Pre Test	81.45±13.7	Z=3.981 p=0.000	84.07±12.9	Z= 0.236 p=0.813	1426.00	0.261
	Post Test	91.09±13.0		84.58±14.7		1118.50	0.003
School Functioning	Pre Test	61.45±18.3	Z=5.806 p=0.000	68.14±15.7	Z=0.989 p=0.323	1326.00	0.091
	Post Test	84.64±12.7		70.93±17.4		859.50	0.000
Psychosocial Health	Pre Test	67.52±13.7	Z=6.051 p=0.000	74.01±11.9	Z=0.716 p=0.474	1202.50	0.017
	Post Test	85.79±11.1		75.93±14.9		984.50	0.000
Scale Total Score	Pre Test	64.72±12.3	Z=6.211 p=0.000	73.53±11.4	Z=0.538 p=0.590	931.00	0.000
	Post Test	86.07±10.9		74.54±14.0		816.00	0.000

In their study, Ağca et al. (13) stated that an hour of exercise twice a week for 10 weeks decreased BMI in adolescent girls , while Tucker (15) stated that diet restriction and exercise program on 4-18 age group decreased BMI and Berry et al. (26) stated that 6-week-long weight management training on 7-17 age group adolescent children decreased BMI. Dietary and physical activity regulation training in Kang et al.'s study (17), a training for decreasing the use of drinks with carbohydrate conducted twice in one academic year in

James et al.'s study (21), low calorie diet and exercise on obese adolescents for 12 weeks in Yosmaoğlu and Baltacı's study (18), and weight management program conducted as 7 training sessions in 2.5 months which was structured according to social cognitive theory in Törüner's study (20) were reported to decrease BMI.

The results of this study are in parallel with the results of other studies. However, in Katzer et al's study (22), although a positive change occurred in stress management 12 months after 10-week-long training for stress management in fighting obesity, no change was reported in BMI. In addition, 7-week-long individual training for fighting obesity in Potecha's study (44) and 12-week-long diet change and physical activity training in Caballero et al.'s study (53) did not report any changes in BMI. In this study, addressing issues such as regulation of dietary and exercise behaviors, decreasing the period of sedentary lifestyle and stress management and the follow-up and advisory intervention to make health promotion based trainings a lifestyle were found to cause significant changes in BMI. This result verifies the hypothesis that "The training given to students based on Health Promotion Model will decrease students' BMI".

When the obesity related risk factors were compared between groups, it was found that obesity related risk factors in experimental group adolescents had decreased after health promotion training when compared with the adolescents in the control groups and the difference between the two groups was found to be statistically significant ($p<0.05$) (Table 3).

In terms of obesity related risk factors, Frenn et al. (16) found that with a 4-hour-long training to decrease the rate of fat in the diets of 12-17 age group and to increase physical activity caused an increase in the duration of exercise. In his study, Törüner (20) aimed to give 4th graders changes in behaviors in subjects such as healthy diet, physical activity and sedentary lifestyle by using Social Cognitive theory. This weight management program based on school was applied as 7 training sessions in 2.5 months. Families were also trained to increase the efficiency of the intervention. At the end of the training, it was found that the children's level of information increased and BMI decreased. In their study, Nemet et al. (14) found that a 3-month-long training applied 6 times which included diet, activity and behavior therapy increased diet and activity levels, while Muller et al. (19) found that training for preventing obesity which included the subjects of healthy diet, physical activity and TV watching regulated the status of diet and activity and decreased sedentary life. In another study by Kang et al. (17), it was found that diet and physical activity training given to children caused an increase in children's levels of diet and activity. The results of this study are in parallel with the results of other studies.

Sedentary and/or active life style is effective on the physique and anthropometric measurements at least as much as diet (6, 54). Thus, in obesity programs it is quite important to increase the active exercise periods of children and adolescents, to decrease the duration of sedentary activity, to give the habit of regular exercise and to make these a way of life besides giving them a proper eating habit.

In this study, positive significant differences were found in the obesity related risk factors of dietary habits, sedentary life period and physical activity habits after the health promotion training and this change causes a significant decrease in the BMI of the adolescents in the experimental group. This result verifies the hypothesis that "The training given to students based on Health Promotion Model will decrease students' obesity related risk factors".

When the ALS scale pre-test and post-test average scores of experimental and control group obese adolescents were compared, it was found that the difference between the pre-test and pos-test ALS scale and sub-dimensions average scores of experimental group adolescents were found to be statistically significant ($p<0.05$) (Table 4).

In their study, Sousa et al. (55) reported that healthy lifestyle behaviors developed in adolescents of 12-18 age group after a 6-month-long intervention and 3-month-long follow up with HPM-structured web-based weight management program. In their study, Geçkil et al. (24) found that as a result of 8-week-long training of diet and coping with stress, adolescents' health behaviors about diet, stress management and exercise increased positively and the least behaviors adolescents showed were health responsibility, self-realization and interpersonal support. Berry et al. (26) reported that 3 months after a 6-week-long

weight management program training applied on obese children between the ages of 7 and 17, healthy lifestyle behaviors scale average scores increased and the highest change was in the sub-dimension of physical activity.

In this study, it was found that the highest changes in the sub-dimensions of ALS scale were in diet, health responsibility and physical activity, respectively. Diet, which is one of the sub-dimensions of ALS scale, determined the eating preferences and habits and meal choices of adolescents. Health responsibility influences individuals' levels of responsibility on their health, individuals' starting and maintaining health promotion behaviors. Physical activity determines adolescents' levels of regular exercise or activity (19). In this study, it was found that the training focused on developing health responsibility, decreasing sedentary behaviors, increasing physical activity and managing stress which was given to the adolescents in the experimental group to promote healthy lifestyle behaviors to decrease obesity related health problems and to increase life quality had significant influences on the ALS scale and sub-dimensions (Table 1). This result verifies the hypothesis that "The training given to students based on Health Promotion Model will increase students' healthy lifestyle behaviors".

When the Pediatric Quality of Life Inventory average scores of experimental and control group obese adolescents were examined, it was found that the difference between the pre-test and pos-test PedsQL inventory and sub-dimensions average scores of experimental group adolescents were found to be statistically significant ($p<0.05$) (Table 5).

In a study by Yackobovitch et al. (29), 12-week-long weight management training was found to cause an increase in PedsQL inventory and its sub-dimensions. Pratt et al. (56) found that life quality scores were increased in 8-18 years old children who were followed with obesity treatment program and Modi et al. (30) reported that medical weight management program was effective in increasing the life quality of 5-18 years old obese children. Alıcı and Pınar (25) reported that the 3-month-old training given to 18-65 years old obese individuals for six times developed and improved life quality. 12-week-long training including dietary and exercise recommendations by Poeta et al. (27) increased average scores of all sub-dimensions of PedsQL except school functioning. The highest change in pre-test and pos-test average scores was in physical health sub-dimension (pre-test 60.1-78.1, post-test 82.8-96.9), while the highest score in the pre-test and post-test sub-dimensions of the scale was in social functioning (pre-test 80.0-90.0, post-test 86.2-100.0). Similarly, in the present study, the highest change in pre-test and pos-test average scores of the experimental group in PedsQL and sub-dimensions was in physical health sub-dimension (pre-test=59.49±15.9, post-test=86.59±13.5), while the highest score in the pre-test and post-test sub-dimensions of the scale was in social functioning (pre-test=81.45±13.7, post-test =91.09±13.0) (Table 2).

Hofsteenge et al. (28) reported that a diet and physical activity training given to 11-18 years old obese adolescents for 7 times with time intervals of 2 weeks caused a significant development in the emotional and social functioning of the life quality scale and they commented that adolescents' attending school increased social functioning. The positive change observed in all the sub-dimensions of life quality scale in this study is thought to result from the fact that the 10-week-long training of diet, physical activity and sedentary life, which are accepted as the primary reasons of obesity, are given together. It can also be said that the group training caused peer influence and increased motivation.

In literature, it is recommended that nurses who give regular and programmed trainings about health and diseases should give information that positively affects physical, social and psychological dimensions of life quality especially in chronic diseases that influence life quality and the state of well-being (32). In this study, it was found that the training focused on developing health responsibility, decreasing sedentary behaviors, increasing physical activity and managing stress which was given to the adolescents in the experimental group to promote healthy lifestyle behaviors to decrease obesity related health problems and to increase life quality had significant influences on the PedsQL inventory and its sub-dimensions. This result verifies the hypothesis that "The training given to students based on Health Promotion Model will increase students' life quality".

Study limitation

This study was conducted in the schools in a city center of Turkey. Thus, the results of the study cannot be generalized to all obese adolescents.

Conclusion

The results of the study show that the training given to obese adolescents based on Health Promotion Model is an effective model in developing healthy lifestyle behaviors and increasing quality of life. In line with these results, it can be recommended that training should be given to increase awareness and protect individuals from obesity since it is an important cause of disease and death; adolescents should be followed by public health nurses and school health nurses to prevent obesity and problems that can be caused by obesity; intervention and consultancy services should be given and the society should be trained for awareness through mass media such as press and television.

References

1. Bağrıaçık N. National Obesity Prevention and Treatment Guide, 1st edn. Obesity Research Society Publications: İstanbul, Turkey, 2009.
2. World Health Organization. Obesity and Overweight Fact Sheet No:311, Geneva, June 2016.
3. Bağrıaçık N, Onat H, İlhan B, Tarakcı T, Ozar Z, Özyazar M, Hatemi H, Yıldız G. Obesity profile in Turkey, International Journal of Diabetes and Metabolism 2009; 17: 5-8.
4. Satman İ, TURDEP II Working Group. Turkey Diabetes Prevalence Studies: TURDEP-I and TURDEP-II. 47. National Diabetes Congres, Antalya, Turkey, 2011.
5. Satman İ, Yılmaz T, engül A, Salman S, Salman F, Uygur S, Bastar I, Tütüncü Y, Sargin M, Dinççag N, Karsidag K, Kalaça S, Ozcan C, King H. Population-based study of diabetes and risk characteritics in Turkey. Diabetes Care 2002, 25: 1551-1556.
6. Cinaz P, Bideci A. Obesite. In: Günöz H, Öcal G, Kurtoğlu Y (eds). Pediatric Endocrinology, 1st edn. Publications of Pediatric Endocrinology and Oxygen Society: Kalkan Press: Kayseri, Turkey, 2003, pp 487-505.
7. Çom S, Irmak H, Kesici C, Besler T. Obesity and Physical Activity Training Modules for Public Trainings, 1st edn. Koza Printing: Ankara, Turkey, 2011.
8. Aygün M. Obesity and Management. In: Durna Z (ed). Chronic Diseases and Care, 1 st edn. Nobel Bookstores: İstanbul, Turkey, 2012, pp 341-348.
9. Metinoğlu İ, Metinoğlu S, Metinoğlu Y. Factors affectıng the prevalence of obesıty in students between the ages of 10-12 in Kastamonu. Acıbadem University Journal of Health Sciences 2012; 3: 117-123.
10. Berberoğlu M. Obesity in adolescents. I. Ü. Cerrahpaşa Faculty of Medicine Continuing Medical Education Activities Adolescent Health II Symposium Series 2008; 63: 79- 80.
11. Behrman RE, Kliegman RM, Jenson HB. Nelson Textbook of Pediatrics, 1st edn. Nobel Bookstores: İstanbul, Turkey, 2008, pp 53-66, 173-177.
12. Yıldırım M, Akyol A, Ersoy G. Obesity and Physical Activity, 1st edn. Klasmat Printing: Ankara, Turkey, 2008.
13. Ağca Ö, Koçoğlu G. Effects of regular exercise on body composition in overweight and obese adolescent girls. Dirim Medicine Journal 2010; 85:17-23.
14. Nemet D, Geva D, Pantanowitz M, Igbaria N, Meckel Y, Eliakim A. Healtpromotion intervention in Arab- Israeli kindergarten children. Journal of Pediatric Endocrinology and Metabolism 2011; 24: 1001-7.
15. Tucker S. Parents as agents of change for childhood obesity prevention: a clinical nursing research programme. Pediatrics and Child Health 2009; 19:189-193.
16. Frenn M, Malin s, Bansal NK. Stage- based interventions for low- fat diet with middle school student. Journal of Pediatric Nursing 2003; 18: 36-45.
17. Kang R, Zhong Y, Luo H, Jiang Y, Liu K, You C. Epidemiologic status and influencing factors of simple obesity in preschool children. Chinese Journal of Child Health Care 2008: 6.
18. Yosmaoğlu B. Baltacı G. The Effects of 12 - Week Aerobic Exercise Training in Obese Adolescents I. Adolescent Health Congress Book, Ankara, 2006: 256-257
19. Muller MJ, Asbeck I, Mast M, Langnase K, Grund A. Prevention of obesity- more than an intention: Concept and first results of Kiel Obesity Prevention Study (KOPS). International Journal of Obesity and Related Metabolic Disorders 2001; 25: 66-74.
20. Törüner EK. Implementation of weight management programme to school-aged children with obesity. İstanbul University, Health Sciences. Child Health and Disease Nursing Department Publishing, İstanbul, Turkey, 2009.
21. James J, Thomas P, Cavan D, Kerr D. Prevention childhood obesity by reducing consumption of carbonated drinks: Cluster randomized controlled trial. British Medical Journa, 2004; 328: 1237- 1239.
22. Katzer L, Bradshaw AJ, Horwath CC, Gray AR, O'Brien S, Joyce J. Evaluation of a "nondieting" stress reduction program for overweight women: A randomized trial. American Journal of Health Promotion 2008; 22: 264-74.
23. Sousa, Pedro, et al. Internet-based intervention programme for obese adolescents and their families (Next. Step): research protocol of a controlled trial. Journal of Advanced Nursing 2013; 1-11.

24. Geçkil E, Yıldız S. The effect of nutrıtıon and copıng wıth stress educatıon on adolescents' health promotıon. Cumhuriyet University The Journal of School Nursing 2006; 10: 19-28.
25. Alıcı M, Pınar R. Evaluation of the effectiveness of education given to obese patients. Journal of Research and Development in Nursing 2008; 2: 32-47.
26. Berry D, Mary S, Gail M, Margaret G. An intervention for multiethnic obese parents and overweight children. Applied Nursing Research 2007; 2:63-71.
27. Poeta, Lisiane S., Duarte MFS., Giuliano ICB, Mota J. Interdisciplinary intervention in obese children and impact on health and quality of life. Jornal de Pediatria, 2013, 89:499-504.
28. Hofsteenge GH, Weijs PJM, Waal HAD, Wit M, Chinapaw MJM. Effect of the Go4it multidisciplinary group treatment for obese adolescents on health related quality of life: a randomised controlled trial. BMC public health, 2013, 13: 939.
29. Yackobovitch GM, Nessia N, Moshe P, Liat AH, Eli H,Shlomit S. The influence of diet and/or exercise and parental compliance on health-related quality of life in obese children. Nutrition Research, 2009, 29: 397-404.
30. Modi AC, Guilfoyle SM, Zeller MH. Impaired health-related quality of life in caregivers of youth seeking obesity treatment. Journal of Pediatric Psychology, 2009, 34: 147–155.
31. Pender NJ, Murdaugh CL, Parsons MA. Health-Promotion in Nursing Practice, 4th ed. New Jersey, Pearson, 2011: 44-51.
32. Erci B (ed). Public Health Nursing, 1st edn. Göktuğ Publishing: Amasya, Turkey, 2009, pp 104-117, 193-200.
33. Turan T, Ceylan SS, Çetinkaya B, Altundağ S. Researching of obesity prevelance and dietary pattern in vocational high school students. TAF Preventive Medicine Bulletin 2009; 8: 5-12.
34. Baltacı G, Ersoy G, Karaağaoğlu N, Derman O, Kanbur N. Healthy in adolescents nutrition and movıng lıife, 2nd edn. Sinem Matbaacılık, Ankara, Turkey, 2012, pp: 1-40.
35. Crawford MA. Marathoners. A Childhood Obesity Preventıon Program. The Unıversıty Of Arizona Faculty of the college of nursing. A Masters Project, Arizone, 2008.
36. Gupta DK, Shah P, Misra A, Bharadwaj S, Gulati S, Gupta N, Sharma R, Pandey RM, Goel K. Secular trends in prevalence of overweight and obesity from 2006 to 2009 in urban Asian Indian adolescents aged 14-17 years. PLoS ONE, 2011, 6: 1-6.
37. Ranzenhofer LM, Columbo KM, Tanofsky-Kraff M, Shomaker LB, Cassidy O, E-MathesonB, L-Kolotkin R, Checchi JM, Keil M, McDuffie JR, Yanovski JA. Binge eating and weight-related quality of life in obese adolescents. Nutrients, 2012, 4: 167-180.
38. Al-Hazzaa HM, Abahussain NA, Al-Sobayel HI, Qahwaji DM, Musaiger AO. Physical activity, sedentary behaviors and dietary habits among Saudi adolescents relative to age, gender and region. International Journal of Behavioral Nutrition and Physical Activity, 2011, 8 (140): 2-14.
39. Shrewsbury VA, O'Connor J, Steinbeck KS, Stevenson K, Lee A, Hill AJ, Kohn MR, Shah S, Torvaldsen S, Baur LA. A randomised controlled trial of a community-based healthy lifestyle program for overweight and obese adolescents: the Loozit study protocol. BMC Public Health, 2009, 9: 119.
40. Öncü İ. The Relationship Ship Between Diet, Exercise And Metabolic Parameters In Childhood Obesity. Çukurova University, Health Sciences Institute, Department of Child Health and Diseases Publishing, Adana, Turkey, 2009.
41. Yılmaz D. The methods for defining childhood obesity and their relationship with obesity in children. Adnan Menderes University, Health Sciences Institute, Department of Child Health and Diseases Publishing, Aydın, Turkey, 2006.
42. Aksoydan E, Çakır N. Evaluation of nutritional behavior, physical activity level and body mass index of adolescents. Gülhane Medical Journal 2011; 53: 264-270.
43. Neyzi O, Günöz H, Furman A, Bundak R, Gökçay G, Darendeliler F, Baş F. Body weight, height, head circumference and body mass index reference values of Turkish children. Journal of Child Health and Diseases, 2008; 51: 1-14.
44. Potecha L. A School-Based Intervention of Adolescent Obesity Prevention in At-Risk Youth. A Senior Acceptance of Senior Honors Thesis. Liberty: Liberty University, 2012.
45. Aydın B. Child and Adolescent Psychology, 2nd ed. Atlas Publishing and Distribution, İstanbul, Turkey, 2005.
46. Hendricks C, Murdaugh C, Pender N. The Adolescent Lifestyle Profile: development and psychometric characteristics. Journal of National Black Nurses Association 2006; 17: 1-5.
47. Ardıç A. Healthy Lifestyle Behaviors of Adolescents. İstanbul University, Health Sciences Institute, Department of Public Health Nursing Publishing, İstanbul, Turkey, 2008.
48. Varni JW, Seid M, Kurtin PS. The pedsQLTM 4.0: reliability and validity of the pediatric quality of life ınventory TM version 4.0 generic core scales in healthy and patient populations. Medical Care 2001; 39: 800-812.
49. Memik NC, Ağaoğlu B, Coşkun A, Üneri OS, Karakaya I. The validity and reliability of the Turkish pediatric quality of life ınventory for children 13-18 years old. Turkish Psychiatry Journal 2007; 18: 1- 12.
50. Varni JW, Bruwinkle TM, Seid M. The pedsQLTM 4.0 as a pediatric population health measure: feasibility, reliability and validity. Ambulatory Pediatrics 2003; 3:329-341.
51. Varni JW, Seid M, Knight TS. The pedsQL TM 4.0 generic core scales: sensitivity, responsiveness and impact on clinical decision-making. Journal of Behavioral Medicine, 2002; 25: 175-193.
52. Varni JW, Burwinkle TM. The pedsQL™ in pediatric cancer. Cancer 2002; 94: 2090- 106.
53. Caballero B, Clay T, Davis SM, Ethelbah B, Rock BH, Lohman T. Norman J, Story M, Stone EJ, Stephenson L, Stevens J. Pathways: a school- based, randomized controlled trial fort he prevention of obesity in American Indian school children. American Journal of Clinical Nutrition, 2003, 78: 1030-1038.
54. Baysal A, Baş M. Weight Management for Adults, 1st end. Ekspress Printing: İstanbul, Turkey, 2008.

55. Sousa, Pedro, et al. Internet-based intervention programme for obese adolescents and their families (Next. Step): Research protocol of a controlled trial. Journal of Advanced Nursing 2013; 1-11.
56. Pratt KJ, Lazorick S, Lamson AL, Ivanescu A, Collier DN. Quality of life and BMI changes in youth participating in an integrated pediatric obesity treatment program. Health and Quality of Life Outcomes 2013; 11: 116.

Correspondence:
Dr. Ayten Yılmaz Yavuz
Recep Tayyip Erdoğan University
School of Health, Department of Public Health Nursing, Rize, Turkey
E-mail: ayte55@gmail.com