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Evaluation of the Effect of Physical Activity Programs on Self-Esteem and Body Mass Index of Overweight Adolescent Girls, based on Health Belief Model with School-Centered Approach

Leili Rabiei[1], Akbar Babaei Heydarabadi[2], Elahe Tavassoli[1], Mohammad Abbasi[3], Fereydoon Khayeri[4], *Reza Masoudi[5]

[1]Assistant Professor, Social Determinants of Health Research Center, Shahrekord University of Medical Sciences, Shahrekord, Iran. [2]Assistant Professor, Social Determinants of Health Research Center, Department of health education and health promotion, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran. [3]Assistant Professor, Department of Nursing, School of Nursing and Midwifery, Qom University of Medical Sciences, Qom, Iran. [4]Nursing and Midwifery School, Iran University of Medical Sciences, Tehran, Iran. [5]Community-oriented Nursing Midwifery Research Center, Shahrekord University of Medical Sciences, Shahrekord, Iran.

Abstract

Background: Obesity in adolescents leads to physical and mental complications. Exercise is one of the main components of weight control programs. This study aimed to evaluate the effect of physical activity programs on self-esteem and Body Mass Index of overweight adolescent girls.

Materials and Methods: This study was a semi experimental study. The subjects were 140 second grade student girls from two high schools in 5th district of Isfahan. Data collection scales included: tape measure, carriage scale, questionnaire to collect background and personal information, designed questionnaire based on Health Belief Model, weekly physical self- reported and adolescent weekly food record form, parent's nutritional performance questionnaire, teachers' attitude on adolescents' nutrition questionnaire and Cooper Smith's Standard Self-esteem questionnaire. Education based program on Health Belief Model for improving nutritional status consistent with model structures during six sessions each 60-minute was conducted with emphasis on diet to control weight in overweight and at-risk adolescents. Questionnaires were compared immediately after and two months after intervention.

Results: Average score of model structures and self-esteem of students in both groups had no significant difference at baseline, but immediately after and 2 months after the intervention, the mean component scores were significantly higher in intervention group in comparison with the control group. There was a significant difference in component scores at different times in the experimental group. Significant difference in BMI scores was seen at different times in experimental group.

Conclusion: Findings of this study showed that school based approach of physical activity training leads to increase in knowledge, sensitivity, severity and perceived benefits and eventually increase in self- esteem and physical activity in students.

Key Words: Adolescents, Body Mass Index, Health Belief Model, physical activity, Overweigh.

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Corresponding Author:

Dr. Reza Masoudi, Assistant Professor of Shahr-e-Kord University of Medical Sciences (SKUMS), Nursing Department,Rahmatieh,Shahr-e-kord,IR.Iran
Email:masoodi@skums.ac.ir

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1- INTRODUCTION

Short term ad long term complications of obesity and overweight and its relations with mortality, makes it crucial to pay attention to this issue as one of the most important children and adolescent health issues (1). Approximately, 80% of overweight adolescents will experience this issue in adulthood. As well, adolescence is known as a vital period of life in terms of extensions of complications and morbidities associated with obesity (1, 2). Esmaeelzadeh et al. study on 360 adolescent girls and boys, showed that the prevalence of overweight and obesity to be 10.7%, and 5.1% in boys and 18.4% and 8.2% in girls, respectively. This study shows that overweight and obesity prevalence in adolescents are similar to white American adolescents of their sex (Third national survey of health and nutrition) (3).

Adolescence is a very important period with many changes in behaviors (4, 5). Some of these behavioral changes are associated with health risk factors like inactivity and inappropriate nutritional habits (6). On the other hand, obesity in children and adolescents may be associated with negative physical and spiritual consequences. In the physical aspect, metabolic syndrome, type II diabetes mellitus, cardiovascular complications, and cancers can be mentioned. Moreover, obesity may cause cerebral vascular disease, osteoarthritis, gallbladder stones, dyslipidemia, sleep apnea, cataract, benign prostate hypertrophy, menstrual disorders, gestation complications, depression, and social injustice. Obesity may also negatively affect physical performance, happiness and quality of life (7, 8). In individuals and social aspects, result of a study in California University, showed that obese adolescents will experience low self-esteem, social isolation, feeling of rejection and depression. Additionally, other studies have demonstrated that low self-esteem is associated with a sense of sadness, loneliness, anxiety, and higher likelihood of smoking and alcohol consumption (10, 11). High Body Mass Index (BMI), in the adolescents increases the risk of hypertension and type II diabetes mellitus in the adulthood (11). Overweight in the adolescence is a specific health problem requiring comprehensive prevention program and effective interventions. The main strategy in weight control and obesity prevention program is physical activity or reducing sedentary life style (12). Effects of life style intervention in weight loss and overweight treatment and related health results have been proved. Life style trends resulting in overweight and obesity is the result of the confluence of various factors; including genetic, metabolic, behavioral, and environmental factors.

High speed of obesity spread suggests that environmental and behavioral factors play a more important role compared with biological changes. High energy intake, low energy expenditure, or a combination of these factors leads to positive energy balance and significant higher prevalence of overweight in the society. Life style intervention elements includes, changing to low lipid diet, smaller meals, more physical activity, cutting down sedentary activities in combination with parents engagement and behavioral change (13, 14). According to studies in 2009, 23.9% of Americans do not participate in leisure time activities, while a total of 300.000 annual deaths due to cardiovascular disease, diabetes cancer and stroke may be prevented by physical activities (15). Doing exercises is an important part in weight control programs. Randomized studies suggest that the combination of diet and exercise intervention leaded to higher weight loss compared with single interventions both short term and long term (15). Epidemiologic studies showed

that despite recommendation of physical activities, it has declined among adolescents (16). Ghaffarpasand study (2015) suggested that physical activities have significantly decreased among adolescents that were more severe among girls (17). According to studies, physical activity of adolescents decreased and this trend continues progressively in high school students, and adulthood (18). While it is thought that children are naturally highly active, their activity declines significantly in the early adolescence. Their physical activities are replaced with watching television, playing video games, and using computers. In the course of technology advancement, walking and cycling have considerably reduced. Physical activity for household works, have decreased by using machines.

Energy needed for doing jobs have fallen as a result of automation and mechanization, and jobs turned to seating activities. Sixty percent of Americans do not have regular physical activities and 25% of them nearly have mere sedentary life. Moreover, sport activates in schools have decrease. Approximately half of American youth do not have regular severe physical activities. Recent studies suggest that watching television is associated with obesity and the relation between television watching hours and obesity prevalence is nearly linear (19-21). Physical activity is an important health indicator of Healthy People 2010 (22). Increasing medium and high physical activity among adolescents to 35% to 85% is an important goal in this year (2010) (23). Five days a week of 60 minute long physical activity resulting in higher pulse rate and respiratory rate is suggested (24). School is a basic environment for education and life of children and adolescents. It is also considered a source to enhance their health and growth. Schools are key structures for general health strategies to prevent overweight and obesity, since children and adolescents spend much of their time at school. Schools have many opportunities to engage students in healthy nutrition and sports (25, 26). Many school-centered studies have been conducted to enhance physical activity and dietary programs and only several cases of these programs were effective in reducing BMI in the control group (27). Value of health education programs depends on their efficacy which itself depends on appropriate use of theories and models in health education to a great extent. In other words, proper theoretic background will enhance efficacy of health education programs (28).

The first step in planning any educational program is choosing a health education model (28). Health Belief Model (HBM) is among the oldest health behavioral theories and the first models which employ behavioral sciences to solve health issues (28). This model has been successfully used in different health issue in the past half-century, so that it can be said that it is the mother of modern health education theories. This is a comprehensive model which mostly plays role in disease prevention. According to this model, personal decision and motivation is affected by personal perception, adjusting behaviors, and the probability of doing the action or behavior.

Personal perception are factors which affecting perception of disease or illness and the consequence of a health action. Probability of performing the action is result of the interaction between effective factors on adopting an appropriate behavior. Adjusting or facilitating factors including, demographic variants, perceived threats and action guide showing their roles after the emergence of personal perception (28, 29). In this study, authors are intended to propose this program in school for student and this study is expected to enhance knowledge and action of students regarding physical active which can naturally transferred to families.

Moreover, it is expected to observe a significant reduction in BMI of overweight and obese students, as well as increasing their knowledge about doing sports. Engagement of families of control students and teacher, especially physical education teacher and health educator are among of note point of this study. So we conducted a study to evaluate the effects of physical activity education based on Health Belief Model and BMI among overweight or at risk for overweight adolescents.

2- MATERIALS AND METHODS

2-1. Study design and population

This quasi-experimental intervention study was conducted in Isfahan city, Isfahan province, Iran, during 2013 to 2014 (6 months to evaluate physical activity programs based on health belief school-centered approach based on self-esteem and BMI in overweight adolescent girls. Research subjects were 140 girl students.

2-2. Methods

Study population included girl students of the second grade public high school in one of the five district of Isfahan. The sampling method was to select a district among the five education districts of Isfahan. Then, two schools were randomly selected among girls' public high schools depending on the number of second grade high school classes and randomly one of them was considered as case and the other as control. After measuring the weight of all students in case and control groups, those who were between 85 and 95 centile according to the curve of disease control center (25), were selected as samples. Sample size was calculated to be 63 in each group:

$$(n = 2(z_1 + z_2)^2 \times s^2 / d^2).$$

Considering 10% drop in the intervention stage, 70 was considered as final sample size. Where n = 63, the total population of elementary school-age children in Isfahan, Z1 = 1.96 for confidence level 95%, Z2= 0.84 and d = 0.05 the deviation.

2-3. Intervention

Educational intervention program was as follows: after coordination with high school manager, one session with teachers for introduction and coordination, one session for identifying overweight and with overweight risk adolescents and feeling related tools, one session for coordination with parents of these adolescents.

Then, six 60-minute-long educational sessions based on health belief model were held with presence of their teachers insisting on physical activity for weight control in overweight and at risk adolescents. Two educational sessions 60-minute-long were considered for parents. Health education program based on health belief model for modification of adolescent's physical activity was as follows: first they understand the danger of the issue; overweight and obesity and other disease (perceived sensitivity), then the depth of this danger and the severity of different physical, mental, social, and economic complications (perceived severity), understand usefulness and applicably of physical activity for weight reduction (perceived benefits), and find inhibiting factors less costly than its benefits (perceived obstacles), believe that they can prevent obesity related diseases by being physically active (perceived self-efficacy), so that they finally adopt the preventive behavior.

Educational program was held using direct education, speech, and active participation of study subject (question and answer), using educational slides, as well as indirect education, by providing educational pamphlets. At the end of educational intervention, questionnaires were filled out by case and control groups, their parents and teachers. Two months later, weight

and height of the students were measured and BMI was calculated. Then 3 months after the education, questionnaires were completed again, weight and height of the students were measured and BMI was calculated and compared with the results of previous steps (**Table.**1).

Table-1: The time table of the training program

Sessions	Content	Duration	Presentation model
Session 1	Knowledge about overweight	60 minutes	Question and Answer- power point presentation- leaflet- pamphlet
Session 2	Perceived Sensitivity	60 minutes	Question and Answer
Session 3	Perceived Severity	60 minutes	Question and Answer
Session 4	Perceived Benefits	60 minutes	Question and Answer
Session 5	Perceived Obstacles	60 minutes	Question and Answer
Session 6	Perceived Self-Efficacy	60 minutes	Question and Answer

2-4. Measuring tools: validity and reliability

Anthropometric evaluation was performed by a digital scale while participants were wearing light cloths and no shoes, with 100 grams perception. Height was measured by a tape meter in standing position and without shoes while shoulders were in normal position. Body mass index (BMI): BMI= weight (kg)/squared height (m). In order to eliminate the measuring bias, all measurements were done by two people with BS degree in physical education and sport sciences. According to the international obesity task force (IOTF), overweight and obesity was defined as BMI $\leq$ 25 and BMI $\leq$ 30 respectively (30).

Questionnaire to collect background and personal information, designed questionnaire based on Health Belief Model, adolescent weekly food record form, parent's nutritional performance questionnaire, teachers' attitude on adolescents' nutrition questionnaire and Cooper Smith's Standard Self-esteem questionnaire (was designed as 5- choice Likert- scale and maximum and minimum scale score was of 35 and 140) (2). To make sure of reliability of scale and strip meter, their accuracy was measured using standard control weights and meter. Designed questionnaire based on health belief program included 6 awareness questions (was designed as 6- choice Likert- scale and maximum and minimum scale score was of 0 and 5) (α=0.78), 4 perceived sensitivity questions (α=0.88) (was designed as 4- choice Likert- scale and maximum and minimum scale score was of 0 and 3), 4 perceived severity questions (α=0.80) (was designed as 4- choice Likert- scale and maximum and minimum scale score was of 0 and 3), 5 perceived benefits questions (α=0.79) (was designed as 5- choice Likert- scale and maximum and minimum scale score was of 0 and 4), 7 perceived obstacles questions (α=0.72) (was designed as 7- choice Likert- scale and maximum and minimum scale score was of 0 and 6), and 6 perceived self-efficacy questions (α=0.84) (was designed as 6- choice Likert- scale and maximum and minimum scale score was of 0 and 5). Reliability of parent's on adolescents' physical activity performance questionnaire (α=0.83), and teachers' attitude on adolescents' nutrition questionnaire (α=0.79), was calculated. Questions of perceived sensitivity, severity, benefits, and obstacles, parents'

performance questionnaire, and teachers' attitude on adolescents' physical activity were designed as 5- choice Likert- scale (completely agree, agree, no idea, disagree, completely disagree) with the minimum and maximum scale of 0 and 4, respectively.

2-5. Data analysis

SPSS version 21.0 software was used for data analysis. To compare mean scores of concepts of health belief model, parents' performance, and teachers' attitude about adolescents' nutrition, physical activity of the adolescents during the week and BMI before and after the intervention between the two groups and within a group, independent t-test and paired t-test were used respectively. Moreover, variance analysis test with repetition of observations was used to compare mean scores before, immediately after, and 2 months after the educational intervention. Finally, Independent t-test was used to compare performance score in both case and control groups, before and 2 months after the intervention. P-value less than 0.05 were statistically significant.

2-6. Ethics

The researcher started sampling by receiving an introduction letter from the Isfahan University of Medical Sciences (ID Number: 390413) and obtained written consent from students, parents and teachers.

3- RESULTS

In this study, totally 140 students (70 people in case and 70 in control group) were observed. There was no significant difference between two groups in terms of demographic information. In terms of family size, 16.1% of students belonged to 3 member families (21 students), 50.8% to 4 member families (66 students), 30% to 5 member families (39 students), and 3.1% to 6 member families (4 students). About 13.6% of the families obeyed special diets (19 families), while 86.4% of families did not have not obeyed any diets (121 families). **Table.2** demonstrates awareness, perceived sensitivity, perceived severity, perc vied benefits, perceived obstacles and self-efficacy of score of students. According to **Table.2**, independent t-test showed that before the intervention, mean awareness score on overweight were not significantly different between case and control groups (P=0.093), while awareness scores were significantly higher than in case group immediately after the intervention (P<0.001) and 3 months after the intervention (P<0.001), compared with control groups. Moreover, variance analysis test with repetition of observations showed no significant differences in the control group at different times (before, immediately after, and 3 months after the intervention) (P=0.44), while there was a significant difference in awareness score in case group at different times (P<0.001) (**Table.2**).

Independent t-test showed that before the intervention, mean perceived sensitivity score on overweight were not significantly different between case and control groups (P=0.74), while it was significantly higher than in case group immediately after the intervention (P=0.007), and 3 months after the intervention (P=0.034), compared with control groups (**Table.3**).

Moreover, based on variance analysis test with repetition of observations, mean perceived sensitivity score showed no significant differences in the control group at different times (P=0.95), while there was a significant difference in perceived sensitivity score in case group at different times (P=0.003) (**Table.1**). Additionally, independent t-test showed that before the intervention, mean perceived severity score on overweight were not significantly different between case and control groups (P=0.60), while it was significantly higher in case group immediately after the

intervention (P=0.023) and 2 months after the intervention (P=0.016) compared with control group. Moreover, based on variance analysis test with repetition of observations, mean perceived severity score showed no significant differences in the control group at different times (P=0.99) while there is a significant difference in perceived severity score in case group at different times (P=0.027) (**Table.2**). In terms of perceived benefits, independent t-test showed that before the intervention, mean perceived benefits score of physical activities were not significantly different between case and control groups (P=0.57), while it was significantly higher in case group immediately after the intervention (P=0.009) and 3 months after the intervention (P=0.038) compared with control group. Moreover, based on variance analysis test with repetition of observations, mean perceived benefit score showed no significant differences in the control group at different times (P=0.94) while there is a significant difference in perceived benefits score in case group at different times (P=0.002) (**Table.2**).

Independent t-test showed that before the intervention, mean perceived obstacles score of physical activities were not significantly different between case and control groups (P=0.37), while it was significantly higher in case group immediately after the intervention (P=0.002) and 3 months after the intervention (P=0.015) compared with control group. Moreover, based on variance analysis test with repetition of observations, mean perceived obstacles score showed no significant differences in the control group at different times (P=0.78) while there is a significant difference in perceived obstacles score in case group at different times (P=0.003) (**Table.2**). In terms of self-efficacy, independent t-test showed that before the intervention, mean self-efficacy score of physical activities were not significantly different between case and control groups (P=0.69), while it was significantly higher in case group immediately after the intervention (P=0.005) and 3 months after the intervention (P=0.027) compared with control group. Moreover, based on variance analysis test with repetition of observations, mean self-efficacy score showed no significant differences in the control group at different times (P=0.96) while there is a significant difference in perceived self-efficacy score in case group at different times (P=0.021) (**Table.2**).

Table.3 demonstrates performance status of students in physical activities; in terms of performance status of students in physical activities, independent t-test showed that before the intervention, mean performance score of students in physical activities were 194.47 (90.83) in case group and 192.28 (91.17) in control group which were not significantly different (P=0.88), while it was significantly higher in case group (263.80 [92.13]) 3 months after the intervention compared with control group (197.04 [90.22]) (P<0.001) (**Table.3**).

Table.3 demonstrates BMI of students. Additionally in terms of students' BMI, independent t-test showed that before the intervention, mean BMI score of students were not significantly different between case and control groups (P=0.82), while it was reduced in case group 2 months after the intervention (P=0.17) and 3 months after the intervention (P=0.09) compared with control group, though it was not significant. Moreover, based on variance analysis test with repetition of observations, mean BMI score of students showed no significant differences in the control group at different times (P=0.74) while there is a significant difference in students' BMI score in case group at different times (P< 0.001) (**Table.4**). In terms of students' self-esteem, independent t-test showed that before the

intervention, mean self-esteem score of students were not significantly different between case and control groups (P=0.49), while it was significantly higher in case group immediately after the intervention (P=0.012) and 2 months after the intervention (P=0.004) compared with control group (**Table.4**). Moreover, based on variance analysis test with repetition of observations, mean students' self-esteem score showed no significant differences in the control group at different times (P=0.91) while there is a significant difference in students' self-esteem score in case group at different times (P=0.019) (**Table.4**).

Table.5 shows parents' performance regarding physical activity of their adolescent. In terms of parents' performance regarding physical activity of their adolescent, independent t-test showed no significant difference before the intervention between case and control groups (P=0.69) as well as immediately after the intervention (P=0.42) and 3 months after the intervention (P=0.52). Moreover, based on variance analysis test with repetition of observations, mean parents' performance regarding physical activity of their adolescent score showed no significant differences in the control group at different times (P=0.84) as well as case group at different times (P=0.75) (**Table.5**). **Table.6** demonstrates teachers' attitudes regarding students' physical activities. In terms of teachers' attitudes regarding students' physical activities, independent t-test showed that before the intervention, there were no significant difference between case and control groups (P=0.79), while it was significantly different immediately after the intervention (P=0.025) and 2 months after the intervention (P=0.027). Moreover, based on variance analysis test with repetition of observations, mean teachers' attitudes regarding students' physical activities score showed no significant differences in the control group at different times (P=0.89) while there is a significant difference in case group at different times (P=0.012) (**Table.6**).

Table-2: The compression of mean awareness, perceived sensitivity, and severity on overweight, before, immediately after, and 2 months after the intervention in case and control groups

Variables	Time	Case group	Control group	P-value
		Mean ± SD	Mean ± SD	
Awareness	Before Intervention	45.90 (11.07)	45.71(12.53)	0.93
	Immediately after intervention	77.78(15.88)	44.19(11.71)	<0.001
	2 months after intervention	70.94(13.36)	46.81(11.48)	<0.001
	Variance analysis test with repetition of observations	<0.001	0.44	
Perceived Sensitivity	Before Intervention	39.73(17.09)	40.80(20.48)	0.74
	Immediately after intervention	50.48(18.04)	41.41(19.45)	0.007
	2 months after intervention	47.81(19.22)	40.53(19.37)	0.034
	Variance analysis test with repetition of observations	0.003	0.95	
Perceived severity	Before Intervention	42.77(16.33)	41.33(15.61)	0.6
	Immediately after intervention	49.12(19.18)	41.88(16.89)	0.023
	2 months after intervention	48.71(16.15)	41.85(15.69)	0.016
	Variance analysis test with repetition of observations	0.027	0.99	
Perceived benefits	Before Intervention	66.17(14.70)	67.55(14.08)	0.57
	Immediately after intervention	73.88(17.22)	66.57(14.18)	0.009
	2 months after intervention	72.48(14.91)	66.93(15.29)	0.038
	Variance analysis test with repetition of observations	0.002	0.94	

Perceived obstacles	Before Intervention	41.01(15.88)	42.32(15.43)	0.37
	Immediately after intervention	51.30(17.15)	43.59(15.79)	0.002
	2 months after intervention	48.41(16.79)	41.66(14.15)	0.015
	Variance analysis test with repetition of observations	0.003	0.78	
Self-efficacy	Before Intervention	45.35(16.26)	44.28(16.44)	0.069
	Immediately after intervention	53.80(18.28)	45.05(16.80)	0.005
	2 months after intervention	54.44(18.62)	44.69(16.77)	0.027
	Variance analysis test with repetition of observations	0.021	0.96	

* Independent t-test; SD: standard deviation.

Table-3: The comparison of BMI before, 2 months after, and 3 months after intervention in case and control group

Group	Before intervention	2 months after intervention	3 months after intervention	Significance level of variance analysis test with repetition of observations
	Mean (SD)	Mean (SD)	Mean (SD)	
Case	27.15(1.21)	26.82(1.42)	26.70(1.38)	<0.001
Control	27.11(1.27)	27.19(1.55)	27.13(1.56)	
Significance level of paired T-test	0.82	0.17	0.09	

Table-4: The comparison of self-esteem before, immediately after, and 2 months after intervention in case and control group

Time	Control Group		Case Group		Significance level of independent t-test
	Mean	Standard deviation	Mean	Standard deviation	
Before intervention	60.33	6.48	61.90	5.52	0.488
Immediately after intervention	61.54	7.18	65.68	6.36	0.012
2 months after intervention	60.73	6.32	67.71	6.74	0.004
Variance analysis test with repetition of observations	0.91		0.019		

Table-5: The comparison of Mean Parents' performance on physical activity of their adolescent before, immediately after, and 2 months after intervention in case and control group

Group	Before intervention	2 months after intervention	3 months after intervention	Significance level of variance analysis test with repetition of observations
	Mean (SD)	Mean (SD)	Mean (SD)	
Case	36.64(17.52)	36.45(17.28)	36.51(18.41)	0.756
Control	35.38(18.41)	34.07(16.83)	34.59(15.62)	
Significance level of paired t-test	0.69	0.42	0.52	

SD: standard deviation.

Table-6: Determination and comparison of teacher's attitude score about physical activity of students before, immediately after and 2 months after intervention in case and control group

Group	Before intervention	2 months after intervention	3 months after intervention	Significance level of variance analysis test with repetition of observations
	Mean (SD)	Mean (SD)	Mean (SD)	
Case	54.75(10.71)	65.50(14.10)	62.50(10.82)	0.012
Control	53.75(15.83)	55.50(16.36)	54.25(14.51)	
Significance level of paired t-test	0.79	0.025	0.027	

4- DISCUSSION

We conducted a study to evaluate the effects physical activity education based on Health Belief Model and BMI among overweight or at risk for overweight adolescents. Results of this study showed that a significant difference in mean awareness score before and after the intervention in the case group (P<0.001). This result is consistent with the results of some other studies conducted on diabetes control and self-care with the application of health belief model (32, 33). Results of Leelukkanaveera and Lawang's study which was performed by using health belief model, showed the efficacy of this model in increasing the awareness of target group (34).

Significant difference between two groups after educational intervention in terms of perceived sensitivity is a good evidence of the effect of educational intervention on enhancement of perceived sensitivity in case group, so that after intervention, most students in case group believed that they me a at risk of obesity which is consistent with studies related to lack of smoking in students, osteoporosis prevention, and physical activity in among college students (35-37). In terms of perceived severity, there was a significant difference between case and control group after the educational intervention. This increase in the perceived severity was observed in other studies as well (38, 39). In this study, reminding serious complications of overweight and obesity and attracting their attention to loss of health a high therapeutic cost, are important factors to improve level of perceived severity in study subjects. Before educational intervention, students' perception of losing weight was at medium level in both groups and it increased after the educational intervention and independent t-test showed significant difference between the two groups. It seems that students' attention to the fact that losing weight reduces complications and results in more rapid resolution from disease of complication of overweight can be effective in enhancing level of perceived benefits in students.

Moreover, this study showed that students' perception of obstacles in losing weight have been similar and independent t-test showed no significant differences between case and control groups; significant difference between the two groups after educational intervention proves the effectiveness of educational intervention in removal of perceived obstacles in case group. The most common perceived obstacles in losing weight are lack of activity and desire to perform regular exercises. King et al. showed that with educating the perceived benefits to the students, the physical activity may be increased (37, 40). In the current study, after educational intervention, mean self-efficacy of case group was significantly higher than control group which can be attributed to positive effects of education which is consistent with Sullivan et al. and Kumi et al.'s studies (41, 42).

This study was conducted based on a school-centered approach to evaluate the effect of nutrition education weight control of overweight or at risk students. With considering of the school based approach of this study, the roles of the parents' and teachers were important in this study. Advice and support of the parents' and teachers for students were an important factor that affect the result of this study. In this study, physical activities have increased after school-centered approach which was consistent with Eslami et al. study (2013) (25). In current school-centered study, parents' performance and teachers' attitude was not significantly different before the intervention. After the intervention, parents' performance did not show any Significant difference while teachers' attitude on students' physical activity was significant which is consistent with Neumark et al. study (2003) (43).

Collectively, this study showed that designing and executing educational intervention, can lead to significant differences in awareness, attitude, and performance of case group regarding adoption and performing preventive behaviors form cardiovascular disease. Despite small sample size and being performed on housekeeping women, results of this study showed that in spite of the importance of cardiovascular diseases in women, their awareness, attitude, and performance was not appropriate, which multiplies the need for educational interventions for cardiovascular diseases. After this educational intervention, according to documented results, it can be stated that health education program to adopt preventive behaviors form cardiovascular diseases and performance of appropriate behaviors have brought positive effects to reduce a risk factor for cardiovascular diseases in case group.

4-1. Limitations of the study

Time limitation due to short opportunity resulted from intensive courses of students, made in impossible to perform a more long term study. To accurately evaluate these programs, longer time should be dedicated, since changes in physical behaviors of the adolescents requires more time. Moreover, physical status evaluation is especially difficult in adolescents. In a general process, according to results, no significant changes have been observed in body mass index of adolescents of case group compared with control group which was not unexpected due to short time of follow-up. Very good participation and cooperation of families, teachers, and students should be mentioned reflecting satisfaction and support for this intervention.

5- CONCLUSION

The finding of this study showed that positive effect of school based intervention on knowledge, sensitivity, severity and perceived benefits could promote the self-esteem and BMI of overweight students. Initiating school based preventive intervention can reduce the incidence of obesity in adulthood. This program is easy to use, in expensive, safe and effective. Because of its protecting and soothing features, the authors believed that it can improve the health promotion behaviors' of overweight students such as obesity preventive behaviors.

6- CONFLICT OF INTEREST: None.

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