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Effects of the Educational Intervention on some Health Belief Model Constructs regarding the Prevention of Obesity in Students

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Abstract

Background

Obesity causes depression and undermines mental health in adolescents. It is also related to adulthood diseases and mortality. The current study drew upon an educational intervention to modify some Health Belief Model constructs to preventing overweight and obesity among adolescents.

Materials and Methods: In this quasi-experimental study 100 boy students recruited from selected boys junior high schools in Isfahan. They were randomly assigned to intervention (n=50) and control (n=50) groups. In 4 training sessions, a nutritionist introduced different types of healthy foods and explained how to consume them. A sports coach also taught how to do physical exercises well in 4 sessions (each one 90 minutes in terms of nutrition and physical activity). Data of pretest and posttest gathered from demographic and a valid questionnaire were fed into the SPSS software, version 20.0 and analyzed using relevant statistical tests.

Results: The independent t-test revealed that, before the intervention, there was no significant difference between the two groups in the mean scores of knowledge, perceived benefits, perceived barriers, physical activity, and nutrition behavior ($P>0.05$); but, after the intervention, this difference between the two groups was significant ($P<0.05$). The multiple linear regression analysis indicated that, from among the scores of knowledge, perceived benefits, and perceived barriers, the score of knowledge ($r= 0.643$, $P<0.001$) was the best predictor of the behavior scores of physical activity and nutrition ($P< 0.05$).

Conclusion

Considering the positive effect of model base education to improve obesity related life style in adolescents, it seems that planning and implementing these kinds of interventions in schools will be useful to promote healthy life style in students.

Key Words: Educational Intervention, Knowledge, Nutrition, Obesity, Physical activity, Students.

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1- INTRODUCTION

Adolescence is a biological process during which a child develops into an adult. This process begins with physiological changes and includes the growth of the entire body. A person gains approximately 20% of adulthood stature and 50% of adulthood weight during this period. This growth continues for about five to seven years (1). According to haghani et al's study, the prevalence of overweight and obesity is 10.7% and 5.1% among boys and 18.4% and 2.8% among girls, respectively (2). In order to understand nutritional needs in each period of life, it is necessary to be familiar with growth and development stages. A large number of studies consider acquired abnormal eating behaviors to be the crucial factor behind malnutrition, including nutritional short stature, obesity, emaciation, and overweight.

In recent years, children and adolescents in the community have lost taste for healthy traditional foods and snacks and have indulged their taste in foods lacking in nutritional value and high-calorie foods. Over the past three decades, there has been a reduction in adolescent energy expenditure due to the advent of computer games and the Internet, the promotion of a sedentary culture, a decrease in the physical activity duration in schools, and the weakness in school sports programs, which have turned adolescence into a critical period of upsurge in obesity and overweight (3). The modification of such adjustable behaviors could have a potential role in reducing the obesity epidemic and bring about important short-term or long-term healthy protective effects.

Hence, before designing effective and preventive strategies toward the improvement of the two health-related behaviors (namely, nutrition and physical activity), it is a high priority for adolescents to break themselves of habits such as unacceptable dietary behaviors and inappropriate physical activities. According to researchers in Nutrition and Sports Science, the beginning of puberty opens up a golden opportunity for performing any intervention program on health improvement. Therefore, it seems necessary to consider the prominent roles of balancing the energy intake, preventing obesity, and improving relevant habits among adolescents (4). A study in Thailand revealed that obesity increased by 12 to 16% since there was no childhood and adolescence obesity prevention program or training intervention program for two years (5). A study in Turkey demonstrated that omitting breakfast or consuming low-quality foods and, generally speaking, the absence of a healthy diet would result in poorer school performance and a higher body mass index (BMI) in students (6).

A large number of nationwide studies have been conducted on obesity and the prevalence of overweight. For the most part, they have considered effects of training intervention programs with regard to BMI changes before and after the study; however, studies indicate that the BMI rises with an increase in age. Furthermore, puberty could bring about fundamental changes in an individual (7). Owing to this, researchers of the current study selected the study population from among elementary-school graduates. Studies show that physical activities cause an increase in the fat-free mass index (FFMI) and a decrease in the body fat percentage (BFP) (8). Long-term studies have confirmed that regular physical activities can control obesity by maintaining energy expenditure and preventing weight gain (9).

In addition, the physical activity level (PAL) might result from obesity and overweight (10). Given that physical activity is regarded as one of the most flexible components of energy expenditure, it is likely to take a step toward the improvement of other dietary

behaviors by modifying it. Results of most studies illustrate effects of regular physical exercise on balancing the energy intake (11). It is also said that when adolescents do physical exercise, they consume fruit, vegetables, and protein more; hence, it is possible to establish good dietary habits through appropriate physical activities (12). Regular physical activities and healthy eating plans based on the food pyramid will prevent overweight among adolescents on condition that necessary changes are made in their diet, taste, and physical activity on a gentle gradient, otherwise the plans will turn into a predicament or barrier to them.

Yale University researchers recommend that the gradient of changes in nutrition and physical activity be between 2 to 20 % (13). Lack of knowledge about outcomes of a sedentary lifestyle and the regular intake of fast food and ready-made food not only affects the food basket negatively but also forms distorted perceived benefits and barriers in adolescents' mind. In contrast to once a week, eating out twice a week increases the risk for overweight by 86% (11). It is much easier to change life style including physical activity habit and nutrition behavior in adolescence period than in adulthood (14).

An overwhelming majority of studies have explicitly referred to nutrition modifications and physical activity as two pillars for confronting obesity. A study by Cao et al. revealed that the best way to control obesity is to note down and give an account of all physical activities and food consumed daily (15). Given the significance of adolescent obesity, the present study was carried out to explore effects of an educational intervention on knowledge, perceived benefits, perceived barriers, diet modification, and physical activity with regard to the prevention of overweight and obesity among boy adolescents.

2- MATERIALS AND METHODS

2-1. Study Design and Population

This is a pretest-posttest quasi-experimental study. It drew on multistage sampling. In fact, first, 10 schools with similar social contexts, cultural diversity, and economic conditions were randomly selected from among District 3 all-boys junior high schools in Isfahan. Next, two schools were randomly chosen from among them. Then, 50 junior high school students were selected from each school. They were randomly assigned to either of the two groups, namely intervention and control. The sample size (n) was calculated at 44 minimum in each group using the following equation:

$$n = \frac{(Z1 + Z2)^2 (2S^2)}{d^2}$$

In the above equation, z_1 (95% confidence level) = 1.96, z_2 (80% test power) = 84%, s (the standard deviation of the students' behavior scores in each group which was set at 0.6, and d was the least difference in the students' behavior score means between the two groups that shows difference significant. Considering 12% attrition, 50 students were selected for each group.

2-2. Measuring tools and methods

The student's weight and height were measured by the first author of current study. The students had minimum clothing on and had taken their shoes off. The devices used in the study were a set of Seca scales (precision = 100 gr, manufactured by Taiwan) and a Stadiometer (precision = 0.1 cm, manufactured by Iran). They were of standard kinds and were being reset using a stone and a rod before beginning measurement and also every 10 times measurement was performed. Based on the Centers of Disease Control and Prevention (CDC) Growth Charts issued in the United States in 2000, BMI age- and gender-

specific percentiles and Z scores (three percentile curves, namely 5th, 85th, and 95th), were used. According to the Charts, the weight status categories and the corresponding percentiles are as follows: underweight as less than the 5th percentile, normal weight between the 5th and 85th percentiles, overweight between the 85th and 95th percentiles, and overweight as the 95th percentile or greater (16). The sample was chosen from among students with a normal BMI.

In order to collect data, a demographic data questionnaire and an obesity prevention questionnaire were used. The latter questionnaire inquired about the students' knowledge, perceived barriers, and perceived benefits relative to nutrition and physical activity, including nutrition and health, effects of exercise on temperament, the preference for traditional dishes over junk food such as pizza and innutritious snacks, benefits of eating fruit and vegetables, benefits of having breakfast, consequences of eating French fries, potato chips, cheese puffs, fried foods, reasons for skipping breakfast, the time-consuming ness of regular physical activities, and the high cost of sports equipment.

Knowledge was assessed by 10 multiple choice questions ranged from 0 to 10. In terms of perceived benefits and barriers there were 20 questions (10 questions about benefits and 10 questions about barriers) was considered in questionnaire. Each question was based on a five-point Likert scale ("Totally agree = 5", "Agree = 4", "Don't know = 3", "Disagree = 2", and "Totally disagree = 1") and the score range was from 0 to 50 in each construct. The total score in each construct was determined and scored from 0 to 100 using the change- of- variables technique. This questionnaire had been validated in a study by Rahimi et al. in Iran (17). Its validity was established as face and content validity and after collecting feedback from 10 professors of Health Education and Nutrition. Its reliability was confirmed using a test-retest methodology in a pilot study on 10 students (r = 0.900). As for the behavior score, it should be mentioned that the minimum behavior (the avoidance of fast food and doing physical activity for 60 minutes a day) was scored 2 and anything less than that was scored 0 and the acquisition of skills (any behavior greater than the minimum) in preventing obesity was scored 3. In order for a high degree of precision in scoring the behavior, after the students were inquired of, the intervention trainers and the target group' mothers, who had been briefed on the above-mentioned assessment, were asked to share their own opinions, which were sought through three choices ("Yes", "No", and "Don't know") to approve or reject the students' reports.

2-3. Intervention

The education for the students of the intervention group was conducted in selected high school through group discussions, questions and answers, the invitation of sports champions (to provide a model for the students to copy), lectures, pamphlets, and CDs during eight 90-minute sessions and considering cognitive, motivational, and psycho-motor domains. Under a nutritionist's supervision, nutrition trainings available in similar studies, were used to discuss nutrition and define components of healthy nutrition (the type of food, breakfast, and nutritious snacks). For example, a list of healthy foods which could be eaten as breakfast was drawn up and the students were asked to share their opinions about benefits of having breakfast and barriers to it and participate in group discussions. In this regard, the nutritionist tried to increase knowledge of foods required at a particular age and fattening foods, enumerate the benefits of consuming fruit and vegetables, explore the barriers to healthy behaviors such as having breakfast, and hold question-and-answer sessions.

Furthermore, a traditional food festival was held to show the benefits of traditional foods, in contrast to fast food which is detrimental to health. Physical activity programs including familiarity with physical activity classification (aerobic and anaerobic), intensity grading (light, moderate, vigorous), timing (20 minutes minimum), heart-rate counting, prohibition, limitation, and minimum effective activity in preventing obesity were carried out under the supervision of an exercise technician. Also, the effect of educational intervention was assessed using mentioned questionnaire, two months after the last session.

2-4. Ethical consideration

Approval to conduct the study was obtained from the Research Ethics Committee of Isfahan University of Medical Sciences (ID- number: 395776). Written informed consent was obtained from the parents of the participating students. Furthermore, the students and their parents were informed that they had the right to withdraw from the study at any time, and were assured of the confidentiality of the study.

2-5. Data analyses

In order to compare data, a pretest was used and, two months after the intervention, a post-test was applied. Data derived from the questionnaires was fed into the SPSS program, version 20.0. The Chi-square and Mann-Whitney tests were used to compare demographic data in the two groups. The paired t-test was used for comparing pre-intervention and post-intervention scores of knowledge, perceived benefits, perceived barriers, and behavior in each group. The independent t-test was applied to compare the mean scores of the above-mentioned constructs between the two groups at different time points. Significant level was considered as $P<0.05$.

3- RESULTS

The subjects were in the 11-15 age range with a mean of 12.9 ± 0.7 years (12.9 ± 0.8 years for the intervention group and 12.8 ± 0.6 years for the control group). The Chi-square test showed that there was no significant difference in the mean age between the two groups ($P = 0.33$). The Mann-Whitney test indicated that there was no significant difference in terms of the fathers' education ($P = 0.59$) and the mothers' ($P = 0.54$) between two groups. Chi-square test also showed that there was no any significant difference between two groups in terms of father's and mother's job, respectively (**Table.1**).

The paired t-test revealed that, in the comparison group, the mean scores of knowledge ($P = 0.46$), perceived benefits ($P = 0.38$), perceived barriers ($P = 0.44$), physical activity ($P = 0.72$), and nutrition behavior ($P = 0.83$), were not significantly different before and after the intervention; but, in the intervention group, the mean scores of knowledge, perceived benefits, physical activity and nutrition behavior after the intervention were significantly much more than those before the intervention ($P < 0.001$) and the mean score of perceived barriers had significantly decreased after the intervention ($P < 0.001$) (**Table.2**).

The independent t-test demonstrated that, before the intervention, there was no significant difference between the two groups in the mean scores of knowledge ($P = 0.73$), perceived benefits ($P = 0.36$), perceived barriers ($P = 0.57$), physical activity ($P = 0.72$), and nutrition behavior ($P = 0.35$); however, after the intervention, this difference between the two groups became significant ($P < 0.001$) (**Table.2**).

The multiple linear regression analysis showed that, from among the knowledge, perceived benefits, and perceived barriers, the knowledge was the best predictor of the physical activity and nutrition behavior

(P < 0.001) and, when this variable is available, the scores of perceived benefits and barriers are not effective predictors of the behavior scores (P > 0.05) (**Table.3**). Another finding in the present study was the difference in the mean of the BMI between the two groups. The independent t-test revealed that there was no significant difference in the mean of the BMI between the two groups before the intervention (P = 0.83); but, after the intervention, it was significantly less in the intervention group than in the control group (P = 0.04) (**Table.4**).

Table-1: Demographic variables of two groups in participated students

Variables		Intervention group		Control Group		P-value
		Number	Percent	Number	Percent	
Father's education	Illiterate	0	0	0	0	0.59*
	Primary school	11	22	10	20	
	Junior high school	11	22	13	26	
	High school	19	38	21	42	
	University degree	9	18	6	12	
Mother's education	Illiterate	5	10	4	8	0.54*
	Primary school	8	16	11	22	
	Junior high school	10	20	9	18	
	High school	22	44	18	36	
	University degree	5	10	8	16	
Father's job	Unemployed	1	2	0	0	0.25**
	Employee	19	38	22	44	
	Worker and farmer	7	14	5	10	
	Self-employed	21	42	18	36	
	Retired	2	4	5	10	
Mother's job	Housewife	39	78	35	70	0.64**
	Employed	11	22	15	30	
Age (year)	Mean± SD	12.09 ± 0.8		12.8 ± 0.6		0.33

*Mann-Whitney; **Chi- square test; SD: Standard deviation.

Table-2: The mean scores of studied variables before and two months after education in intervention and control groups

Variable	Intervention group Mean (SD)	Comparison group Mean (SD)	P-value*
Pre-intervention Knowledge	41.3 (16.4)	40.2 (13.9)	0.73
Post-intervention	93.2 (13.3)	42.1 (14.4)	<0.001
P value**	<0.001	0.46	
Pre-intervention Perceived benefits	81.3 (12.2)	79.1 (10.6)	0.36
Post-intervention	94.8 (3.5)	80.9 (12.5)	<0.001
P value**	<0.001	0.38	
Pre-intervention Perceived barriers	39.5 (15.4)	37.7 (14.9)	0.57
Post-intervention	26.8 (7.9)	39.5 (13.8)	<0.001
P value**	<0.001	0.44	

Pre-intervention	40.7 (15.9)	37.5 (17.2)	0.35
Nutrition behavior			
Post-intervention	56.04 (12.7)	36.7 (18.2)	<0.001
P value**	<0.001	0.83	
Pre-intervention	36.1 (21.2)	34.7 (16.2)	0.72
Physical activity			
post-intervention	64.3 (11.5)	35.9 (17.5)	<0.001
P value**	<0.001	0.72	

SD: Standard deviation; * Independent t-test; ** Paired t-test.

Table-3: Results of the linear regression analysis for predicting physical activity and nutrition behavior in students

Scores	Raw coefficient	Standardized coefficient	t-test	P-value
Knowledge	0.363	0.643	5.78	<0.001
Perceived benefits	0.066	0.045	0.45	0.65
Perceived barriers	-0.016	-0.012	0.14	0.89

Table-4: The BMI before the intervention and two months after it in the two groups

Time	Intervention group		Control group		P-value*
Status	Mean	SD	Mean	SD	
Pre-intervention	21.5	1.9	21.6	2.02	0.83
Post-intervention	21.2	1.9	22	2	0.04

SD: Standard deviation; ***** Independent t-test**.**

4- DISCUSSION

This study aimed to examine effects of structured education on physical activity and nutrition behavior of boy adolescents. In the present study, the students were in the 11-15 age range. In 2000, Cavadini et al. reported that the calorie intake rate was higher in 11-15 year-old adolescents who did more physical exercise than in others (18). Despite this, there are studies, such as the one by Jago et al. in 2011, which provide different reports (10) and this might be because physical exercise and activity hold appeal or adolescents enter puberty in this age range.

Results of the present study demonstrated that, in the intervention group, the mean scores of knowledge, perceived benefits, physical activity and nutrition behavior were significantly more after the intervention than those before the intervention. Nevertheless, the mean score of perceived barriers decreased significantly after the intervention, which could be justified on the grounds that there is an inverse relationship between the scores of perceived benefits and barriers. Before the intervention, the mean scores of knowledge, perceived benefits, perceived barriers, physical activity and nutrition behavior had no significant difference, between the two groups; but, this difference became significant between the two groups after training sessions. In a study on effects of knowledge, perceived benefits, and perceived barriers on adopting desirable healthy behaviors, Alizadeh et al. indicated that the relationship of knowledge and perceived barriers to the appropriate behavioral response was significant but the

relationship of perceived benefits to healthy behavior was statistically more significant (19). In fact, the results of the study is in line with those of the present study because a low score for perceived barriers is regarded somewhat as an increase in perceived benefits. In the present study, from among the knowledge, perceived benefits, and perceived barriers, the knowledge was the best predictor of the physical activity and nutrition behavior. Moreover, in a study by Plow et al., subjects' knowledge increased more significantly right after the intervention and also one year after the intervention and was a strong predictor of behavior (20).

In most educational interventions, the construct of knowledge has a positive trend, particularly in the present study where education was in the cognitive field for the most part. Apparently, with knowledge, it is possible to provide and modify the insight based on benefits of and barriers to a behavior and the prognosis of its continuance. Furthermore, in most cases, a tendency to gain benefits reduces or removes barriers. According to the findings of the present study, the mean of the BMI after the educational intervention in the intervention group was significantly less than that in the comparison group. Results of a study on high-school girls in Tarom- Iran in 2015, showed that there was a significant relationship between physical inactivity and a high BMI so that underweight students' physical activity was significantly more and obese and overweight ones' physical activity was significantly less than that of students with healthy weight (21).

Based on results of a study by Alborzy Manesh et al., there is a significant inverse relationship between the mean time span of walking from home to school and back and overweight and obesity (22). These results are consistent with those of the present study. Since a walk is a moderate physical activity, its daily intensity could affect energy metabolism and therefore prevent obesity in adolescents. Similar to the present study, a study by Kelishadi et al. in 2007 categorized subjects' physical activity into light, moderate, and vigorous (23). Similar to a study by Dan et al., it indicated that the relationship of the moderate and vigorous intensity levels to the BMI was an inverse one (24). Findings of a study by Canadian and American researchers show that there is no significant relationship between the BMI and the intake of energy and fat (25). Kim et al. in 2010 reported that the energy intake rate in adolescents of the active group was higher than that in adolescents of the inactive group (26).

Studies by Azadi et al. and Azarbayani et al., have drawn this conclusion, too (27, 28). Apart from economic and cultural ones, these differences could have been in the time and type of the educational intervention and the fact that the studies were cross-sectional. Additionally, the type of physical activity and the minimum time devoted to it for the desired effect are not taken into account in some studies.

4-1. Limitations of the study

Using a self –reported tool for collecting data can be considered as a limitation of this study.

5- CONCLUSION

In the current study, knowledge was the most important construct in predicting preventive behaviors regarding obesity in students. Physical activity and nutrition behavior also have improved after implementing educational sessions. Hence, it appears necessary to hold education classes in promoting students' knowledge of diverse health domains. Though insufficient, continuing this method in family education classes with different functional forms and content will suffice for students' parents.

6- CONFLICT OF INTEREST

The authors declare that they have no conflict of interests.

7- REFERENCES

1. Becker PJ, Nieman Carney L, Corkins MR, Monczka J, Smith E, Smith SE, et al. Consensus statement of the Academy of Nutrition and Dietetics/American Society for Parenteral and Enteral Nutrition: indicators recommended for the identification and documentation of pediatric malnutrition (undernutrition). J Acad Nutr Diet. 2014; 114(12):1988-2000.

2. Haghani S, Shahnazi H, Hassanzadeh A. Effects of Tailored Health Education Program on Overweight Elementary School Students' Obesity-Related Lifestyle: A School-Based Interventional Study. Oman Med J. 2017; 32(2):140-47.

3. Janssen I, Katzmarzyk PT, Boyce WF, King MA, Pickett W. Overweight and obesity in Canadian adolescents and their associations with dietary habits and physical activity patterns. J Adolesc Health 2004; 35(5):360-7.

4. Ottevaere C, Huybrechts I, Béghin L, Cuenca-Garcia M, De Bourdeaudhuij I, Gottrand F, et al. Relationship between self-reported dietary intake and physical activity levels among adolescents: the HELENA study. Int J Behav Nutr Phys Act. 2011; 6(8):8.1-9.

5. Shoup JA, Gattshall M, Dandamudi P, Estabrooks P. Physical activity, quality of life, and weight status in overweight children. Qual Life Res. 2008; 17(3):407-12.

6. Unusan N, Sanlier N, Danisik H. Comparison of attitudes towards breakfast by Turkish fourth graders living in Turkey and Germany. Appetite 2006; 46(3):248-53.

7. Peltzer K, Pengpid S. Leisure Time Physical Inactivity and Sedentary Behaviour and Lifestyle Correlates among Students Aged 13-15 in the Association of Southeast Asian Nations (ASEAN) Member States, 2007-2013. Int J Environ Res Public Health 2016; 13(2):217.

8. Hu G, Barengo NC, Tuomilehto J, Lakka TA, Nissinen A, Jousilahti P. Relationship of physical activity and body mass index to the risk of hypertension: a prospective study in Finland. Hypertension 2004; 43(1):25-30.

9. Sherwood NE, Jeffery RW, French SA, Hannan PJ, Murray DM. Predictors of weight gain in the Pound of Prevention study. Int J Obes Relat Metab Disord 2000; 24(4):395-403.

10. Jago R, Baranowski T, Yoo S, Cullen KW, Zakeri I, Watson K, et al. Relationship between physical activity and diet among African-American girls. Obes Res. 2004; 12: 55s-63s.

11. Davison KK, Marshall SJ, Birch LL. Cross-sectional and longitudinal associations between TV viewing and girls' body mass index, overweight status, and percentage of body fat. J Pediatr. 2006; 149(1):32-7.

12. Yarahmadi H, Haghighi AH, Hamedinai MR, Zaree M. Relationship Physical Activity level and sedentary behaviors with diet patterns among 12-14 year-old students boys in Sabzevar.2013; 19(4):371-81. [In Persian]

13. Lau DC, Douketis JD, Morrison KM, Hramiak IM, Sharma AM, Ur E. 2006 Canadian clinical practice guidelines on the management and prevention of obesity in adults and children. Cmaj. 2007; 176(8):S1-13.

14. Warschburger P, Kröller K, Jahnke D. Preventing Obesity in Children: Which Factors Impede and Which Facilitate the Parental Access to Prevention Programmes? Gesundheitswesen. 2015; 77(1): S23-4.

15. Cao Z, Wang S, Zheng W, Guo J, Qu S. Evaluation on the effectiveness of intervention comprehensive program on child obesity, using Generalized Estimating Equation. Zhonghua Liu Xing Bing Xue Za Zhi. 2014; 35(7):773-8.

16. Kuczmarski RJ, Ogden CL, Guo SS, Grummer-Strawn LM, Flegal KM, Mei Z et al. 2000 CDC Growth Charts for the United States: methods and development. Vital Health Stat 11. 2002; 246:1-190.

17. Rahimi R, Fesharaki M, Sahebolzamani M, Rahmani A. The efficacy of a lifestyle modification course in overweight female elementary school students in Urmia. J Isfahan Med Sch. 2012; 30(188):599-607 [In Persian].

18. Cavadini C, Decarli B, Grin J, Narring F, Michaud PA. Food habits and sport activity during adolescence: differences between athletic and non-athletic teenagers in Switzerland. Eur J Clin Nutr. 2000; 54 1:S16-20.

19. Alizadeh H. The effects of Health Education based on Health Belief Model on nutrition behaviors in primary school in TorbatHeidarieh city in 2011[MD thesis]. Torbate heydariyeh University of Medical Science, 2013.

20. Plow M, Moore SM, Sajatovic M, Katzan I. A mixed methods study of multiple health behaviors among individuals with stroke. PeerJ. 2017; 5: e3210.

21. BashiriMoosavi F, Farmanbar R, Taghdisi MH, AtrkarRoshan Z. Level of Physical Activity among Girl High School Students In Tarom County and Relevant Factors. Iranian Journal of Health Education and Health Promotion 2015; 3(2):133-40. [In Persian]

22. Alborzy manesh M, Kimyagar M, Rashidkhani B,Atefi S. Relation between obesity &overweight and life style of girl student in third to fifth grade of elementary school. Iran nutrition journal 2013; 6(3):75-84. [In Persian]

23. Kelishadi R, Ardalan G, Gheiratmand R, Majdzadeh R, Hosseini M, Gouya MM, et al. Thinness, overweight and obesity in a national sample of Iranian children and adolescents: CASPIAN Study. Child Care Health Dev. 2008; 34(1):44-54.

24. Dan SP, Jr., Mohd Nasir MT, Zalilah MS. Sex and ethnic differentials in physical activity levels of adolescents in kuantan. Malays J Nutr. 2007; 13(2):109-20.

25. Gillis LJ, Kennedy LC, Gillis AM, Bar-Or O. Relationship between juvenile obesity, dietary energy and fat intake and physical activity. Int J Obes Relat Metab Disord. 2002; 26(4):458-63.

26. Kim Y, Kim HA, Kim JH, Kim Y, Lim Y. Dietary intake based on physical activity level in Korean elementary school students. Nutr Res Pract. 2010; 4(4):317-22.

27. Azadi A, Anoosheh M, Alhani F, Hajizadeh E. The effect of implementation of Health promotion program in school to control risk factors for obesity in adolescents. Iran South Med J.2007; 11:62-153.

28. Azarbayani B, Nemati A, Sagha M, Nouzad Charvadeh H, Dehghan M. Evaluation of eating breakfast among elementry girl students in Ardabil 1999-2000. Ardabil Uni Med Sci. 2003; 2(7):39-46. [In Persian]