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Effectiveness of an Educational Program on Eating Habit among Overweight and Obese Female Students in Preparatory Schools in Sulaimani City /Kurdistan Region - Iraq.

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Abstract:

Overweight and obesity has become a global problem. This is typically a complex problem pandemic in many countries**.** The aim of this study is to find the effectiveness of education program concerning pattern of diet among female adolescent in preparatory schools in Sulaimani city. Data was collected between October 2020-January 2021 by which 360 students among 5 preparatory schools checked their BMI and Hip Waist Circumference. 90 students found to be overweight and obese. Researcher divided these students into 45 students as interventional and 45 control group, pre- posttest applied for both group.12weeks of healthy food nutritional educational provided to case group and then same as pre-test , post-test re applied for both group to identify the effect of educational program on student's dietary habit. After the intervention the median BMI decreased from 27.06 Kg/m^2 before the intervention to 24.38 Kg/m^2 after the intervention($p < 0.001$). The median waist circumference significantly decreased from 86 cm to 83 cm ($p < 0.001$). The median waist/hip ration also decreased from 0.8 to 0.78 ($p < 0.001$). The median dietary habit score increased significantly from 19 before the intervention to 60 after the intervention ($p < 0.001$).

Keyword: adolescent overweight and obesity, dietary habit, healthy and unhealthy diets, nutritional program.

Introduction:

Overweight and obesity has become a global problem. This is typically a complex problem pandemic in many countries. It has been identified as a major public health issue in the recent years and it can occur in any age. Among European countries 20% are at risk of being obese while 40% are complaining from obesity (Obesity and overweight, 2021)In the Middle East, especially in Qatar obesity is one of the top issues that rank the highest rate among health conditions which is due to fast socio-economic growth (Al-Thani, 2015).

Iraq is classified as one of the highest prevalence of obesity among global obesity rank and 30.4% of Iraqi population is suffering from obesity.(Global Obesity Levels - Obesity - ProCon.org, 2021) Sedentary life style and unhealthy diet seems to be the basic modifiable leading factor of obesity and other non-communicable disease such as diabetes mellitus and cardiovascular disease (Derrick Ssewanyana 2018)

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Adolescent is a sensitive period of life. Many contributing factors found to play an important role in driving pattern of diet in this period such as physical, social and psychological development. As a result of increase growth rate in this period, youth require more calories and they will be unprotected from consuming extra energy and unbalanced diet (Jinan C. et al 2016)

Another problem is that adolescents will be in a time of self-determination and they are selecting their food independently such as low-nutrient density as a result of that they consume extra unhealthy food such as sugar, carbohydrates and fat (Lachat C et al 2012). Unbalanced and unhealthy food intake behavior seems to be the major problem among adolescents which put them at risk of non-communicable diseases in the future. One way to manage this problem is to implement appropriate nutritional education program and provide them with better nutritional information to help them correct their eating habits (Velazquez et al., 2011). The aim of this study is to find the effectiveness of education program concerning pattern of diet among female adolescent in preparatory schools in Sulaimani city.

Material and methods

Study design: Quantitative design (Quasi-experimental study) was carried out through the present study with the application of pre and post-test approach for both case and control groups to examine the effectiveness of nutritional program concerning eating habit among overweight and obese female students at preparatory schools in Sulaimani city.

Population and sample size:

A probability, random sample of five preparatory schools out of 37 (14% of total sample of schools) were selected. 90 overweight and obese female students from literary branch recruited (45 cases and 45 controls) from all previously selected schools.

Sampling and data collection:

Sampling was performed in 5 public female preparatory schools in Sulaimani city. Students with inclusion criteria have been included in this study. Students enrolled in 12^{th} stage literary were selected. Prior to data collection written informed consent was taken from the participant and the data were collected by the researcher.

Tools in data collection:

A questionnaire was developedto assess dietary habit among students, the questionnaire consist of two main parts of socio-demographic characteristics and 18 questions about eating habit. The first three questions regarding eating habit (1- eating breakfast at home 2- eating snacks at school 3- eating snack outside ofschool). Each item is scored as never=0, rarely= 1, sometimes =2, often =3, always=4. The other15 questions regarding frequency of types of foods , scores calculated for the participants based on their responses to a sets of 15 questions and overall calculated from 0 to 4(never eat =0, almost never=1, occasionally =2, frequently eat=3, almost every time=4). Pre-posttest reliability was done using the Wilcoxon signed rank test. Its result showed no significant differences between the pre and post test results for all variables.

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Procedure of data collection:

360 students measured their Body Mass Index BMI and Waist- hip ratio (HWR) for finding overweight and obese students.BMI and waist-hip circumference have been measured for all students enrolled in 12th stage in all selected schools.The researcher randomly selected 45 overweight and obese students among as a case group (intervention)and 45 overweight and obese students from the as a control group. The researcher established contact with the principle of all 5 schools aimed to explain the objectives of the study and to make an arrangement for data collection procedure. The students in the experimental (intervention) group were given appointment including date, time and setting where the program is being implemented.

Ethical consideration:

The current study was presented to the ethical committee of University of Sulaimani, College of Nursing and College of Medicine. Ethical approval was guaranteed by the ethical committee of medical college issue no.7, on 9/1/2020.A permission letter was guaranteed from General Education Director in Sulaimani City with issue no. 5810 on 28/6/2020 for collecting data from preparatory schools in Sulaimani city. Participants in the study were informed about the objectives of the study then verbal and written informed consent was taken from the students. Researcher also offered the right of withdraws from the study, student's right, data protection and confidentiality were highly considered.

Inclusion and exclusion:

According to the inclusion criteria of the study, Female students who enrolled in stage12th in preparatory schools were included. While Student with morbid obesity BMI ≥ 40 (morbid obese), those who suffer from obesity and overweight related to a specific disease and students who are using medications resulting in increasing body weight were excluded from this study.

Result:

Data were analyzed using the Statistical Package for Social Sciences (SPSS, version 25). Fisher's exact test and Chi square was used when the expected frequency and to compare proportions. Wilcoxon signed rank test was used to compare the medians of scores before and after the intervention. Mann Whitney test was used to compare the means ranks of two groups.

Table 1. Basic characteristics of the study groups:

		Intervention		Non intervention	
		No.	(%)	No.	(%)
Age	17	4	(8.9)	10	(22.2)
	18	41	(91.1)	35	(77.8)
Income	Sufficient	23	(51.1)	29	(64.4)
	Barely sufficient	20	(44.4)	16	(35.6)
	Insufficient	2	(4.4)	0	(0.0)
Mother's education	Illiterate	12	(26.7)	5	(11.1)
	Basic school	23	(51.1)	26	(57.8)
	Preparatory school	4	8.9	4	(8.9)

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	Institute	4	(8.9)	7	(15.6)
	College	2	(4.4)	3	(6.7)
Father's education	Illiterate	2	(4.4)	5	(11.1)
	Basic school	28	(62.3)	10	(22.2)
	Preparatory school	9	(20.0)	14	(31.1)
	Institute	2	(4.4)	12	(26.7)
	College	4	(8.9)	4	(8.9)
BMI (Kg/m^2)	25-29	41	(91.1)	31	(68.9)
	≥ 30	4	(8.9)	14	(31.1)
Waist circumference (cm**)**	< 80	8	(17.8)	8	(17.8)
	≥ 80	37	(82.2)	37	(82.2)
Total		45	(100.0)	45	(100.0)

*By Fisher's exact test. †By Chi square test.

Ninety students participated in the study. They were divided into two equal groups, 45 students in each. Group I received an education program (intervention group) and Group II didn't receive such a program (control group). The majority of the students of both groups were aged 18 years old 91.1% intervention and 77.8% in non-intervention group, as presented in Table 1. The table shows that 22.2% of the students of the 'no intervention group' were aged 17 years, compared with8.9% of the students of the intervention group. Regarding the majority of mothers graduated from basic school in both intervention and non-intervention was high as (51.1% and 57.8%) respectively while only 4.4% of intervention and 6.7% in non-intervention group graduated from college.

The proportions of fathers who are graduates of basic schools and institutes in the 'no intervention group' were significantly higher than the proportions of the intervention group. The prevalence of obesity (BMI ≥ 30 Kg/m^2) was 31.1% among students of the 'no intervention group' compared with 8.9% of the students of the intervention group as presented in Table 1.

Table 2:Dietary habits of both groups at the start of the study

Dietary habits		**Intervention No. (%)**	**Non-intervention No. (%)**	**Total No. (%)**	**p**
Eating breakfast at home	Never/rarely	20 (44.4)	26 (57.8)	46 (51.1)	0.257*
	Sometimes	21 (46.7)	18 (40.0)	39 (43.3)	
	Often/always	4 (8.9)	1 (2.2)	5 (5.6)	
Eating snack at school	Never/rarely	2 (4.4)	0 (0.0)	2 (2.2)	0.346*
	Sometimes	18 (40.0)	15 (33.3)	33 (36.7)	
	Often/always	25 (55.6)	30 (66.7)	55 (61.1)	
Eating snack outside of school	Never/rarely	1 (2.2)	0 (0.0)	1 (1.1)	0.291*
	Sometimes	18 (40.0)	24 (53.3)	42 (46.7)	
	Often/always	26 (57.8)	21 (46.7)	47 (52.2)	0.008

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Eating red meat	Never/ almost never eat	39 (86.7)	28 (62.2)	67 (74.4)	
	Occasionally	6 (13.3)	17 (37.8)	23 (25.6)	
Chewing gum	Occasionally	20 (44.4)	10 (22.2)	30 (33.3)	0.025
	Frequent/ almost every time	25 (55.6)	35 (77.8)	60 (66.7)	
Eating fish and sea food	Never /almost never eat	42 (93.3)	34 (75.6)	76 (84.4)	0.020
	Occasionally	3 (6.7)	11 (24.4)	14 (15.6)	
Potatoes chips/ popcorn and packed food	Occasionally	20 (44.4)	4 (8.9)	24 (26.7)	< 0.001
	Frequent /almost every time	25 (55.6)	41 (91.1)	66 (73.3)	
Eating pizza and fast foods	Occasionally	12 (26.7)	3 (6.7)	15 (16.7)	0.011
	Frequent /almost every time	33 (73.3)	42 (93.3)	75 (83.3)	
Eating bread and another bakery	Occasionally	10 (22.2)	10 (22.2)	20 (22.2)	> 0.999
	Frequent /almost every time	35 (77.8)	35 (77.8)	70 (77.8)	
Drinking milk, eating cheese and another dairy	Never or almost never eat	26 (57.8)	12 (26.7)	38 (42.2)	0.003
	Occasionally	19 (42.2)	33 (73.3)	52 (57.8)	
Eating cooked vegetables	Never /almost never eat	39 (86.7)	39 (86.7)	78 (86.7)	> 0.999
	Occasionally	6 (13.3)	6 (13.3)	12 (13.3)	
Drinking soft drinks	Occasionally	11 (24.4)	7 (15.6)	18 (20.0)	0.292
	Frequent /almost every time	34 (75.6)	38 (84.4)	72 (80.0)	
Eating rice and other cereals	Occasionally	4 (8.9)	6 (13.3)	10 (11.1)	0.502
	Frequent/ almost every time	41 (91.1)	39 (86.7)	80 (88.9)	
Eating cakes/cookies/doughnut/ biscuits	Never/ almost never eat	1 (2.2)	2 (4.4)	3 (3.3)	0.730*
	Occasionally	15 (33.3)	12 (26.7)	27 (30.0)	
	Frequent/ almost every time	29 (64.4)	31 (68.9)	60 (66.7)	
Eating poultry (chicken, turkey and duck)	Never /almost never eat	0 (0.0)	0 (0.0)		0.642
	Occasionally	14 (31.1)	12 (26.7)	26 (28.9)	
	Frequent /almost every time	31 (68.9)	33 (73.3)	64 (71.1)	
Eating chocolate	Occasionally	8 (17.8)	7 (15.6)	15 (16.7)	0.777
	Frequent/ almost every time	37 (82.2)	38 (84.4)	75 (83.3)	
Eating vegetables	Never /almost never eat	33 (73.3)	31 (68.9)	64 (71.1)	0.642
	Occasionally	12 (26.7)	14 (31.1)	26 (28.9)	
Eating fruits of high sugar	Occasionally	5 (11.1)	8 (17.8)	13 (14.4)	0.368
	Frequent /almost every time	40 (88.9)	37 (82.2)	77 (85.6)	
Total		45 (100.0)	45 (100.0)	90 (100.0)	

*By Fisher's exact test.

Table 2 compares the dietary habits of both groups at the start of the study. No significant differences were detected between both groups regarding the following habits: Eating breakfast at home (p = 0.257), eating snack at school (p = 0.346), eating snack outside of school (p = 0.291), eating bread or other bakery (p >0.999), eating cooked vegetables (p >0.999), drinking soft drink (p = 0.292), eating rice and other cereals (p = 0.502), eating cakes/cookies/doughnut/ biscuits (p = 0.730), eating poultry (p = 0.642), eating chocolate (p = 0.777), eating vegetables (p = 0.642), and eating high sugar fruits (p = 0.368).

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While significant differences were detected between the groups regarding the following habits: eating red meat (p = 0.008), chewing gum (p = 0.025), eating fish and sea food (p = 0.020), eating potatoes chips, popcorn and packed food (p <0.001), eating pizza and fast food (p = 0.011), and drinking milk, eating cheese and other dairy (p = 0.003). It is clear in the table that students of the 'non- intervention group' eat the mentioned items more frequently than the students of the intervention group (Table 2).

Table 3: Dietary habits of both groups at the end of the study:

Dietary habits		**Intervention No. (%)**	**Non-intervention No.(%)**	**Total No. (%)**	**p**
Eating breakfast at home	Never/rarely	0 (0.0)	19 (42.2)	19 (21.1)	< 0.001
	metimes	3 (6.7)	26 (57.8)	29 (32.2)	
	Often/always	42 (93.3)	0 (0.0)	42 (46.7)	
Eating snack at school	Never/rarely	36 (80.0)	0 (0.0)	36 (40.0)	< 0.001
	Sometimes	9 (20.0)	24 (53.3)	33 (36.7)	
	Often/always	0 (0.0)	21 (46.7)	21 (23.3)	
Eating snack outside of school	Never/rarely	41 (91.1)	0 (0.0)	41 (45.6)	< 0.001
	Sometimes	4 (8.9)	22 (48.9)	26 (28.9)	
	Often/always	0 (0.0)	23 (51.1)	23 (25.6)	
Red meat	Never/ almost never eat	0 (0.0)	25 (55.6)	25 (27.8)	< 0.001
	Occasionally	3 (6.7)	20 (44.4)	23 (25.6)	
	Frequent / almost every time	42 (93.3)	0 (0.0)	42 (46.7)	
Chewing gum	Never/ almost never eat	43 (95.6)	0 (0.0)	43 (47.8)	< 0.001*
	Occasionally	2 (4.4)	5 (11.1)	7 (7.8)	
	Frequent/ almost every time	0 (0.0)	40 (88.9)	40 (44.4)	
Fish and sea food	Never /almost never eat	0 (0.0)	36 (80.0)	36 (40.0)	< 0.001
	Occasionally	6 (13.3)	9 (20.0)	15 (16.7)	
	Frequent/ almost every time	39 (86.7)	0 (0.0)	39 (43.3)	
Potatoes chips/ popcorn and packed food	Never /almost never eat	43 (95.6)	0 (0.0)	43 (47.8)	< 0.001*
	Occasionally	2 (4.4)	4 (8.9)	6 (6.7)	
	Frequent/ almost every time	0 (0.0)	41 (91.1)	41 (45.6)	
Pizza and fast foods	Never / almost never eat	42 (93.3)	0 (0.0)	42 (46.7)	< 0.001*
	Occasionally	3 (6.7)	3 (6.7)	6 (6.7)	
	Frequent/ almost every time	0 (0.0)	42 (93.3)	42 (46.7)	
Bread and another bakery	Never / almost never eat	44 (97.8)	0 (0.0)	44 (48.9)	< 0.001*
	Occasionally	1 (2.2)	7 (15.6)	8 (8.9)	
	Frequent / almost every time	0 (0.0)	38 (84.4)	38 (42.2)	
Milk, cheese and another dairy	Never / almost never eat	0 (0.0)	16 (35.6)	16 (17.8)	< 0.001
	Occasionally	4 (8.9)	29 (64.4)	33 (36.7)	
	Frequent/ almost every time	41 (91.1)	0 (0.0)	41 (45.6)	

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Cooked vegetables	Never / almost never eat	0 (0.0)	39 (86.7)	39 (43.3)	< 0.001*
	Occasionally	3 (6.7)	6 (13.3)	9 (10.0)	
	Frequent /almost every time	42 (93.3)	0 (0.0)	42 (46.7)	
Soft drink	Never /almost never eat	42 (93.3)	0 (0.0)	42 (46.7)	< 0.001*
	Occasionally	3 (6.7)	6 (13.3)	9 (10.0)	
	Frequent /almost every time	0 (0.0)	39 (86.7)	39 (43.3)	
Rice and other cereals	Never /almost never eat	24 (53.3)	0 (0.0)	24 (26.7)	< 0.001
	Occasionally	21 (46.7)	4 (8.9)	25 (27.8)	
	Frequent /almost every time	0 (0.0)	41 (91.1)	41 (45.6)	
Cakes/cookies/doughnut/ biscuits	Never /almost never eat	41 (91.1)	0 (0.0)	41 (45.6)	< 0.001
	Occasionally	4 (8.9)	10 (22.2)	14 (15.6)	
	Frequent /almost every time	0 (0.0)	35 (77.8)	35 (38.9)	
Poultry (chicken, turkey and duck)	Never /almost never eat	0 (0.0)	21 (46.7)	21 (23.3)	< 0.001
	Occasionally	4 (8.9)	24 (53.3)	28 (31.1)	
	Frequent /almost every time	41 (91.1)	0 (0.0)	41 (45.6)	
Chocolate	Never/ almost never eat	45 (100.0)	0 (0.0)	45 (50.0)	< 0.001*
	Occasionally	0 (0.0)	1 (2.2)	1 (1.1)	
	Frequent / almost every time	0 (0.0)	44 (97.8)	44 (48.9)	
Vegetables	Never /almost never eat	0 (0.0)	27 (60.0)	27 (30.0)	< 0.001
	Occasionally	0 (0.0)	18 (40.0)	18 (20.0)	
	Frequent /almost every time	45 (100.0)	0 (0.0)	45 (50.0)	
High sugar fruits	Never /almost never eat	42 (93.3)	0 (0.0)	42 (46.7)	< 0.001*
	Occasionally	3 (6.7)	6 (13.3)	9 (10.0)	
	Frequent / almost every time	0 (0.0)	39 (86.7)	39 (43.3)	
Total		45 (100.0)	45 (100.0)	90 (100.0)	

*By Fisher's exact test

It is evident in Table 3 that, after the intervention program, the majority of the students in the intervention group was following healthy dietary habits, and was eating the healthy foods frequently. Regarding the unhealthy foods, the majority of the students in the intervention program was either not eating them, or they rarely or occasionally eat them. On the contrary, the majority of the students in the 'non- intervention group' were not following healthy dietary habits. The difference between the groups was significant ($p < 0.001$) considering all the food types.

Table 4: Nutritional parameters and dietary scores before and after the intervention in each of the study groups:

	Pre-intervention			**Post-intervention**			
	Mean	**(±SD)**	**Median**	**Mean**	**(±SD**	**Median**	**P***
<u>Intervention group</u>							
BMI (Kg/m^2)	27.41	(±1.96)	27.06	24.54	(±1.94)	24.38	< 0.001
Waist (cm)	85.40	(±6.27)	86.00	83.27	(±5.79)	83.00	< 0.001
Waist/hip ratio	0.79	(±0.03)	0.80	0.78	(±0.04)	0.78	< 0.001

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Dietary habits score	18.91	(±2.81)	19.00	59.13	(±3.93)	60.00	< 0.001
No intervention group							
BMI (Kg/m^2)	28.84	(±3.29)	28.38	28.87	(±3.27)	28.38	0.180
Waist (cm)	84.93	(±6.92)	84.00	84.93	(±6.92)	84.00	>0.999
Waist/hip ratio	.8167	(±0.05)	0.81	.8167	(±0.05)	0.81	>0.999
Dietary habits score	20.13	(±3.63)	20.00	18.16	(±3.07)	19.00	0.002

*By Wilcoxon signed rank test

It is evident in Table 4 that, in the *intervention group*, the median BMI decreased from 27.06 Kg/m^2 before the intervention to 24.38 Kg/m^2 after the intervention($p < 0.001$). The median waist circumference significantly decreased from 86 cm to 83 cm ($p < 0.001$). The median waist/hip ration also decreased from 0.8 to 0.78 ($p < 0.001$). The median dietary habit score increased significantly from 19 before the intervention to 60 after the intervention ($p < 0.001$).

In the '*no intervention group'*, table 4 shows that there were no significant differences detected between the medians of the parameters measured before the time of the intervention (at the start of the study) and the medians measured later regarding BMI ($p = 0.180$), waist circumference ($p > 0.999$), and waist/hip ratio ($p > 0.999$). The medians of the dietary habits score, $p = 0.002$.

The differences between the pre-intervention and the post-intervention values of the studied parameters (BMI, waist circumference, and waist/hip ratio) had been calculated (the pre minus post-intervention values had been measured). It is evident in Table 4 that the intervention program was beneficial for the students considering the studied parameters. There was a decrease of 2.87 Kg/m^2in the mean difference of BMI in the intervention group compared with -0.03 Kg/m^2 of the 'no intervention group' ($p < 0.001$) indicating that the BMI of some of the students in the 'no intervention group' had increased at the end of the study. The intervention was effective also in decreasing the waist circumference and the waist hip ratio, and the differences were significant between the groups ($p < 0.001$).

Discussion:

Many studies of short- and long-term nutritional program among students found significant improvement regarding nutritional knowledge and student's eating habit after the program (Franciscato et al., 2019, Marcano-Olivier et al., 2021, Leme et al., 2016, Briggs, 2010).

In the beginning of the program in this study, both groups were following unhealthy dietary habits while taking healthy foods were low. Several studies in their results found positive relations between skipping breakfast and increasing body weight.) For example, adolescents that skip breakfast have a greater possibility to intake unhealthy snack moreover, they tend to overeat and they are more likely to consume unhealthy food such as junk food. (Rachmi et al., 2020)(Ishida et al., 2020). Al-Hazzaa et al.in 2011 in their result reported thata great proportion oftheir sample displayed recurrent unhealthy dietary habits. (Youth Risk Behavior Surveillance in United States, 2009, 2021) they found that 78% of students from high schools preferred drinkingSoda at least twice a day. (Sogari, Velez-Argumedo, Gómez and Mora, 2018**)** Stated that usually students do not take healthy food into account, their choice offood depends on pleasure and good taste

At the end of the program in this study, the majority of students in intervention group understood the importance of eating breakfast at home none of the students were skipping breakfast at home this habit dramatically changed from only 8.9% to 93.3% after intervention.

The majority of the students never ate snacks at school after the study in contrast, more than half of this group was eating snacks during school time before the program.Eating habit improved significantly p-value 0.001, consumption of healthy food increased. In contrast the consumption of unhealthy foods group either (non-intervention) remained the same or became worse in some cases.

Nutritional parameters and scores during intervention of case group indicate a great improvement in dietary habit and reduction of both BMI and HWR. The medians of BMI decreased from 27.06 Kg/m^2 to 24.38 Kg/m^2 BMI shows 2.87 Kg/m^2 decrease among intervention group and -0.03 Kg/m^2 among no intervention group. A significant reduction in waist circumference was observed as it reduced from 86cm to 83cm. While in non-intervention group no changes in BMI and waist circumference was detected.(Soini, Mustajoki and Eriksson, 2016), (Bashan, Bakman, Uysal and Mert, 2018) and a randomized control trial study among Brazilian girls in 2016 have the same result of significant change in BMI and HWR among intervention group after implementation of nutritional program, (Leme et al., 2016).

Conclusion:

In the current study, 12 weeks of nutritional educational program of a healthy diet was beneficial and it led to a change in eating and dietary habits as well as decreasing in BMI and HWR among intervention group. It achieved a significant improvement in raising students' awareness regarding healthier food choices and better eating habit. This suggests that education program can make substantial effects on reducing weight among students. It can prevent adolescents from obesity among this sensitive age group and they do not require followingunhealthy and ineffective diets, drugs and surgical treatment to manage their weight in the adulthood.

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