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Original Article

The Effect of an Educational Intervention on Knowledge, Attitude and Behavior about Healthy Dietary Habits among Adolescent Females

Ebtisam M. Fetohy [1], Samira M. Mahboub [2 ¥], Howeida H. Abusalih [2]

[1] Health Administration and Behavioral Sciences Department, High Institute of Public Health, Alexandria University, Egypt

[2] Health Sciences Department, College of Health and Rehabilitation Sciences, Princess Nourah Bint Abdulrahman University, Riyadh, Saudi Arabia

Abstract

Background: Dietary patterns are influenced by behavioral factors in early adulthood. Nutritional education has a major role in improving health status of adolescents.

Objective (s): This study aimed at assessing the knowledge, attitude and behavior about healthy dietary habits among adolescent females before and after a nutrition education program in Riyadh, KSA.

Methods: An intervention study was conducted in two schools among 105 students (57 from intermediate school and 48 from high school). Nutrition-related knowledge, attitude and behavior were assessed pre-intervention and one week post-intervention using the same instrument. The nutrition education program consisted of three sessions This study was approved by Institutional Review Board (IRB) of Princess Nourah bint Abdulrahman University.

Results: After the intervention, there was significant improvement in students' attitude (from 21.6±5.4 to 23.7 ± 3.2) and behavior towards healthy dietary habits (from 48±12.1 to 51.5 ± 7.2) with a P-value of 0.02 and 0.006 respectively. Knowledge score did not improve after the intervention. There was a significant decrease in the total barrier score from 12.2 ± 2.7 to 11.2 ± 2.7 with a p-value of 0.01, and significant change in the consumption of daily breakfast, fresh food and whole grain (p-value 0.01, 0.05 & 0.02 respectively) and in checking expiry date of food (p-value 0.03) The Avoidance of fatty meals also improved significantly (p-value 0.03) .

Conclusion: This nutrition education program was effective in improving adolescents' attitude and behavior in relation to healthy diet.

Keywords: Adolescents, Nutrition, Intervention, Knowledge, Attitude

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¥*Correspondence*:
Email: smmarey@pnu.edu.sa

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INTRODUCTION

Health and dietary patterns, which are shaped during young ages, are influenced by behavioural choices and environmental factors. In general, young adults are frequently identified as being at risk of malnutrition, largely because of their very high nutrient demands, which often appear incompatible with their range of food choices, and eating patterns. Ensuring that healthy behaviors are deepened in them during this transition phase is therefore very critical for their overall adult health life and well-being.[1] Diet has a tremendous importance in maintaining health and preventing diseases.[2] Among the factors that play an important role in increasing the obesity rate in Saudi Arabia is unhealthy school canteen.[3] Obesity in adolescents leads to many chronic health conditions such as diabetes and high blood pressure that has been previously reported more among older people.[4] It has been documented In Saudi Arabia that there is a significant rise in the prevalence of obesity among adolescents.[5]

Adolescents are responsible for their eating behaviors.[6] This behavior seems to be established in the mid-teens and is closely associated with lifestyle. Behaviors established in young people have significant long-term effect on health. The Knowledge about healthy food choices is considered as predisposing cause for successful adoption of a healthy diet.[7]

Nutritional knowledge, as well as some dietary behaviors and lifestyle of adolescents, improved greatly after a nutrition education program, changing students' unhealthy living attitudes and dietary habits.[8] Factors

inducing eating behaviors have to be better understood in order to develop effective nutrition interventions.[9] Barriers to healthy eating in adolescents include a lack of time, limited availability of healthy foods lack of concern about for eating healthy food.[10] Chen et al. (2015) recommended that interventions are needed to assist adolescents in adopting healthy eating behaviour.[10]

In Saudi Arabia there are very little researches investigating barriers to healthy eating. Almost no previous study was conducted in Riyadh to assess the impact of a nutrition education program on practicing healthy dietary habits among adolescent girls. This study was conducted to assess the knowledge, attitude and behavior about healthy dietary habits among adolescent females before and after a nutrition education program and to determine barriers to healthy eating in Riyadh, KSA.

METHODS

The study was conducted among female students aged 11-18 years using an intervention approach (one group pre-test post-test design).

Total sample size was calculated to be 50 individuals using n4studies software for sample size calculation.[11] Data entered the equation according to results of the intervention study of Naserpoor 2018.[12] These data were: mean score of healthy nutrition behavior after the intervention in that study among intervention group and control group (15.29 ± 2.4 *vs* 12 ± 3.48 respectively) with Alpha = 0.01 and Beta = 0.10. The study was conducted in two schools in Riyadh, Saudi Arabia (one intermediate and one high school). The two schools were randomly selected from a list with all schools in Riyadh city. All students in both schools were invited to participate in the study, 105 out of 160 agreed to participate from both schools (57 students from intermediate school and 48 from high school). Response rate was 65.5%.

Data collection was done using a self-administered questionnaire which consisted of four main sections: The first section composed of questions that assess the characteristics of the participants such as age, residence, family size, family income, weight, height, working and educational status of both parents. The second section was about the attitude towards healthy diet and its related motivating factors and barriers. Attitude was assessed using 6 questions and reliability was assessed using Cronbach's Alpha which was 0.7. Barriers and motivating factors were also assessed such as price, taste and availability of healthy foods. The responses were agree, neutral and disagree. Score of 3 was given to agree, 2 for neutral and 1 for disagree. The total score for both barriers and motivating factors were calculated based on these scores. The third part of the questionnaire was about behavior and consumption pattern of healthy diet; it included food frequency table about consumption of fruits, vegetables, fish, water, breakfast and whole grains. Responses for this part were: daily (scored by 5 points), 4-5 times per week (scored by 4 points), 1-3 times per week (scored by 3 points), 1-3 times per month (scored by 2 points), and not at all (scored by 1 point). It also included 10 questions about healthy dietary habits such as consuming fresh foods, low fat products, avoidance of salty food or sweets and examining food labels and expiry dates of food before purchasing. Responses for this part were always (scored by 5 points), often (scored by 4 points), sometimes (scored by 3 points), rarely (scored by 2 points), and never (scored by 1 point). The mean score for each item was calculated as well as total attitude; barrier and behavior score for each individual. The last section assessed score of knowledge about healthy diet and it consisted of 10 questions with right or wrong answers. Each right answer scored 1 and wrong answers scored 0. Total knowledge score for each individual was calculated.

The Intervention Program

An intervention program was designed and implemented by the researchers. The program was composed of 3 phases:

- The first phase: Need assessment: The questionnaire was distributed aiming to collect base line data before intervention, then the findings were analysed to detect barriers, motivating factors and cues to action. The second phase was determining program key elements: This was done based on results of analysis of first phase findings. The analysis demonstrated that the lowest scores were as followings: For attitude: the belief that healthy diet has good taste. For consumption of healthy food: fruits consumption. For healthy dietary habits: Examining food label. For knowledge: Benefits of healthy diet. Regarding barriers against healthy food consumption, the barriers with highest scores were Unavailability in restaurants and requiring long time for preparation. Motivating factors enhancing selection of a food item: the highest scores were good taste and good smell.
- The third phase: Planning and implementation of the program. An intervention program was designed to improve the overall attitude, knowledge and behavior of adolescent girls with special emphasis on areas with lowest score in attitude, knowledge and healthy behavior. The design of the program considered barriers and motivating factors revealed in the analysis in phase two. The program consisted of the following sessions: The first session was a theoretical lecture conducted for 1 hour followed by questions assessing certain points mentioned in the lecture regarding benefits of healthy diet and deleterious effects of unhealthy diet. Right answers were awarded by simple prizes and wrong answers received immediate feedback for correction. The second session consisted of an activity titled “pick up your meal” in which multiple food items (either healthy like fruits, vegetables and low fat diet or unhealthy such as burger, full fat diet and sweets) were verified and students were asked to go and pick up their

meal items. After finishing making their dish, students were discussed to reveal benefits or harms of food items they selected and possible healthy alternatives. The discussion highlights the facts that healthy food can be easily prepared and gained so it is not unavailable. At the end of this session fresh fruit juice was distributed with water to encourage them to utilize fresh fruits and discover their favourite flavour. This was specifically done to reveal good taste and smell of healthy diet. The third session comprised of an activity titled "read me!", in which various food items were demonstrated and explanation of their food labels was done to reveal the importance of examining it before purchasing.

- Post-intervention phase: After one week, the knowledge, attitude and behavior were reassessed using the same data collection tool.

Statistical analysis

Data were coded and tabulated using SPSS V. 23.0. Analysis of data was done. Descriptive statistics in form of frequency tables for categorical variables and mean and standard deviation for continuous variables were calculated. Inferential statistics were calculated using paired sample t test to compare pre- and post-values of attitude, barriers, knowledge and behavior and p-value of 0.05 or less was considered significant.

Ethical approval

This study was approved by Institutional Review Board (IRB) and Ethics Committee of Princess Nourah bint Abdulrahman University. The researchers complied with the International Guidelines for Research Ethics. The participants were informed that their answers and their information collected from questionnaire will be completely confidential and will be used only for research purposes. All participants were assured that only the study team will have access to the information provided, which will remain anonymous.

RESULTS

Table 1 demonstrates the characteristics of the study population. The mean age was 16 years ± 1.0 and 39% of the participants aged 15 to 16 years .Most of the participants lived in the Northern sector of Riyadh (89.5%) As regards education of the mother, only 3.9% had illiterate mothers and 43.6% had highly educated mothers. However, more than two thirds of mothers were house-wives. Regarding the father, only 2% of participants had a non-working father and three quarter of them their fathers were employees. Only 11.1% of students had a family income less than 6000 SR/month and about half of participants belonged to families of five to seven members. Regarding the body mass index (BMI) of adolescents involved, about one fourth of them were either overweight or obese.

Figure 1 demonstrates attitude towards healthy food before the intervention among the studied sample. Nearly two thirds of them believed that healthy food is delicious and 62% were concerned about the quality of their food. The majority of the sample believes that healthy food protects against diseases (93%). The knowledge about healthy food before the intervention is demonstrated in Table 2, where it was obvious that the least percentages of correct answers were for knowledge about health benefits of healthy foods. Only 11% answered correctly about the impact of healthy food on constipation and 15% about its protective effect against cancer.

Table 1: Characteristics of the studied adolescent females in Riyadh, KSA

Characteristics	Adolescent females (n= 105)	
	No.	%
Age		
Less than 15 years	18	17.1
15 to 16 years	41	39.1
More than 16 years	46	43.8
Residence		
North	85	89.5
South	2	2.1
East	7	7.4
West	1	1.0
Father's job		
Not working	2	2.0
Employee	72	72.0
Profession	6	6.0
others	20	20.0
Mother's job		
Not working	73	71.6
Working	29	28.4
Mother's education		
Illiterate	4	3.9
Preparatory school or less	21	20.7
Secondary school	32	31.7
University or post graduate	44	43.6
Family income		
4000-	9	11.1
6000-	27	33.3
10,000-	24	29.6
More than 20,000	21	25.9
Family size		
3-4	1	1.0
5 to 7	49	48.5
8 to 10	45	44.6
More than 10	6	5.9
BMI		
Under weight	11	12.5
Average	54	61.4
Overweight	13	14.8
Obese	10	11.4

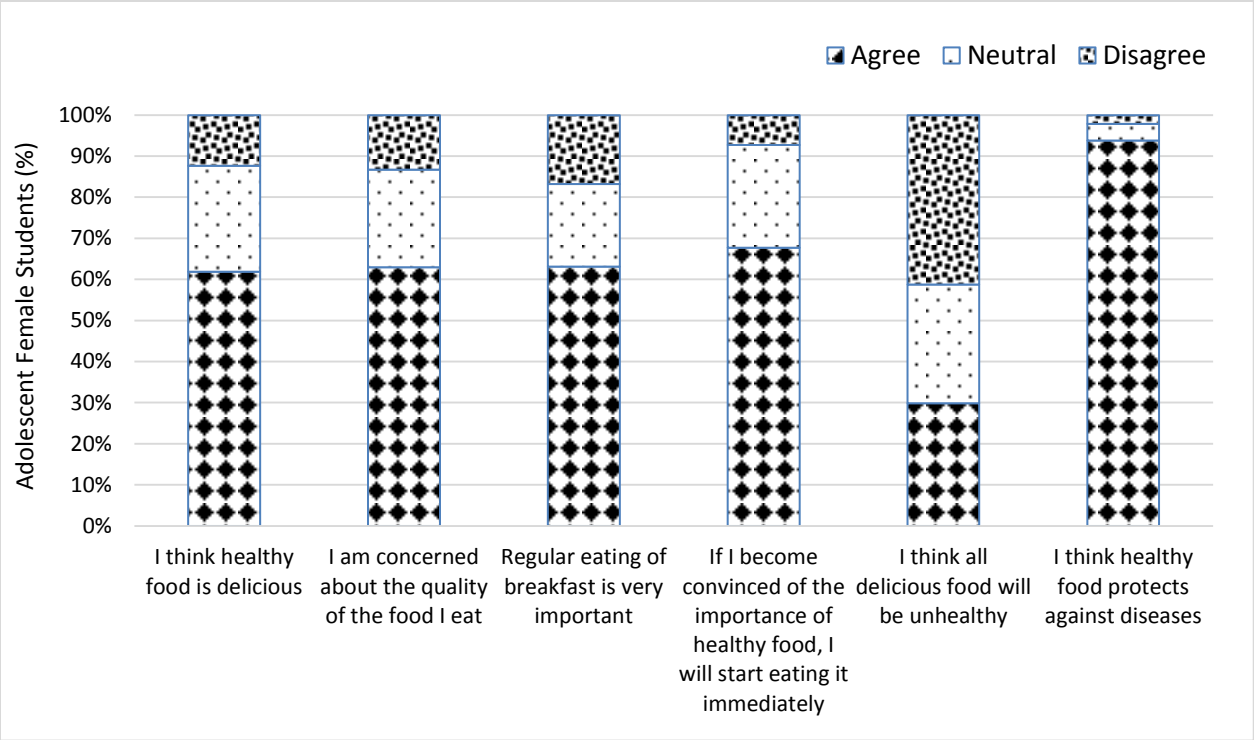

Figure 1: Attitude towards healthy food before the intervention among adolescent females

Table 2: Knowledge about healthy food before the intervention among adolescent females

Question	Adolescent females (n=105)	
	Yes	No
	No. (%)	No. (%)
Processed meat such as hamburgers are unhealthy	81 (77.1)	24 (22.9)
Canned vegetables are considered unhealthy food	60 (57.1)	45 (42.9)
Fresh vegetables are healthy	74 (70.5)	31 (29.5)
Healthy food helps reduce constipation	12 (11.4)	93 (88.6)
Foods rich in carbohydrates such as pancakes are considered unhealthy	101 (96.2)	4 (3.8)
Healthy food helps reduce heart disease	31 (29.5)	74 (70.5)
Healthy food helps reduce the incidence of cancer	16 (15.2)	89 (84.8)
Full-fat dairy products are unhealthy	89 (84.8)	16 (15.2)
Healthy food helps reduce diabetes	89 (84.8)	16 (15.2)
Healthy foods strengthen the human immunity	34 (32.4)	71 (67.6)

Table 3 demonstrates pre and post intervention scores of healthy dietary knowledge, behavior, attitude and total barriers, about healthy diet among adolescent girls. It was found that there was significant increase in the scores of both healthy behavior and attitude towards healthy diet after intervention (from 48 ± 12.1 to 51.5 ± 7.2 for behavior score and from 21.6 ± 5.4 to 23.7 ± 3.2 for attitude score). Regarding knowledge, despite the increase in its score after intervention (from 6.3 ± 1.7 to 7.6 ± 1.2), this increase was not statistically significant. The total scores of barriers decreased significantly after intervention (from 12.2 ± 2.7 to 11.2 ± 2.7).

Table 3: Pre- and post-intervention scores of knowledge, behavior, attitude and barriers about healthy diet among adolescent females

Variable	Pre-intervention (mean ± SD)	Post-intervention (mean ± SD)	Paired *t*-test	Sig. (2-tailed)
Knowledge about healthy diet score	6.3 ± 1.8	7.6 ± 1.2	-1.77	0.12
Healthy dietary behavior score	48.0 ± 12.2	51.5 ± 7.2	-2.39	0.02*
Attitude towards healthy diet score	21.6 ± 5.5	23.7 ± 3.3	-2.88	0.006*
Total Score of barriers	12.2 ± 2.7	11.2 ± 2.7	2.62	0.01*

*$p \leq 0.05$

Table 4 demonstrates pre and post intervention scores of some dietary habits of adolescent girls. Obviously, all investigated variables showed improved mean scores after intervention program and there was significant increase ($p \leq 0.05$) in the scores of consumption of whole grain (from 2.9 to 3.4), daily breakfast intake (from 4.2 to 4.7), avoidance of fatty meals (from 2.8 to 3.3) and chick of expiry date of food (from 3.3 to 4) and fresh food consumption from (from 3.5+1.2 to 3.8+1). On the other hand, there was no significant change in the consumption of fruits, vegetables, water and avoidance of sweet as well as reading labels of food.

Table 4: Healthy dietary habits scores of food consumption pre- and post-intervention among adolescent females

Healthy dietary habits	Pre-intervention (mean ± SD)	Post-intervention (mean ± SD)	Paired *t*-test	Sig. (2-tailed)
Fruit consumption	3.1 ± 1.4	3.3 ± 1.2	-1.6	0.1
Vegetables consumption	3.6 ± 1.4	3.9 ± 1.3	-1.7	0.09
Whole grain consumption	2.9 ± 1.5	3.4 ± 1.2	-2.3	0.028*
Daily breakfast intake	4.2 ± 1.3	4.7 ± 0.9	-2.7	0.010*
Avoidance of sweets	2.4 ± 1.3	2.6 ± 1.1	-0.7	0.49
Consumption of fresh food	3.5 ± 1.2	3.8 ± 1.00	-1.9	0.05*
Avoidance of fatty meals	2.8 ± 1.2	3.3 ± 1.1	-2.1	0.038*
Check expiry date of foods	3.3 ± 1.5	4.0 ± 1.2	-3.1	0.003**
Read food label	2.3 ± 1.3	2.4 ± 1.2	-0.6	0.58
Adequate daily water intake	3.00 ± 1.4	3.1 ± 1.2	-0.8	0.45

*$p \leq 0.05$ **$p < 0.01$

DISCUSSION

There are several emerging health issues that matter specifically for young adults. Firstly, increasing overweight prevalence is a concern since longitudinal epidemiological studies provide evidence that obesity, hypercholesterolemia, and hypertension track from early lifestyle choices into adulthood.[2] Furthermore, overweight adolescents are likely to remain as overweight adults.[6] BMI is an important indicator of health status. In the present study, obesity was 11.4%, overweight 14.8%, normal weight 61.4 and underweight12.5%. Slightly similar results were obtained by Epuru & Shammary (2014) who found that 11.11 % of the studied adolescent female students were obese, 14.75 % were overweight, 22.2% were normal weight and 9.2% were underweight.[5] In contrast Çitozi *et al.* (2013) reported that only 2.6% of the Albanian female school students were obese and 14.7% were overweight, and 3.8% of females were underweight.[9]

In the present study, there was significant increase in total scores of attitude and behavior of healthy dietary habits after the intervention, but not in total knowledge score. Also, this intervention has led to significant decrease in the mean scores of barriers. The Knowledge level did not change after the intervention may be because the re-assessment was one week after the intervention sessions and not immediately. In agreement with the present study, Goh *et al.* (2017) who reported significant improvement in the dietary habits and behavior after an educational intervention, where 95.7 % of the participants were willing to make healthy changes after the intervention. However, the participants in that study also reported increase in their awareness and knowledge about healthy food after the

intervention.[13] The difference in the impact of the intervention on level of knowledge between the present study and that of Goh *et al.*, can be attributed to the difference in the assessment methods of level of knowledge in both studies. In the present study, we used a questionnaire of 10 questions, while in the other study the authors used a self-rating question about "whether they felt that their awareness and knowledge of creating healthier meals and choosing healthier foods had increased". The self-rating question can be less accurate in assessing knowledge level.

Pem*et al.* (2016) investigated the effectiveness of a nutrition educational intervention program on Knowledge and attitude towards consumption of healthy diet. In that study there was significant increase in both knowledge and attitude scores after the intervention. This contradiction in the impact of the intervention program on knowledge score can be explained by the difference in the study population in both studies. Pem *et al.* (2016) studied the impact on adults who have higher concern with rising level of diabetes and obesity that are associated with unhealthy diet.[14] However, in the present study, the study population was adolescents. Another study was conducted in 2018 by Naserpoor investigated the impact of a nutrition intervention on perceived barriers and healthy behavior among adolescent girls. Similar to the present study, it revealed that the mean score of perceived barriers significantly decreased and the healthy nutrition behavior significantly increased after the intervention.[12]

This study showed significant change of the consumption of fresh food, whole grain, breakfast intake, avoidance of fatty meal and check expiry of the food. Similarly, in a study by Fathi *et al* (2017) who concluded that there was a significant reduction in consumption of unhealthy diet in the sixth grade primary school girls after nutrition education program that was designed following health belief model.[15] Another study by Çitozi R, Bozo D, Pano (2013) showed that the worst eating habits are skipping breakfast (about 24% of the sample).[9] In the present study, the change was not significant for consumption of vegetables, fruits, water, avoidance of sweet, and reading the food labels. Similar results of lack of improvement in sugar intake among children were reported by Griffin *et al* (2015) study In which a nutrition education intervention was conducted in two sessions and re-assessment of sugar intake was done after 10 and 34 weeks, the result showed no change in sugar intake after the intervention.[16] A study conducted by Baldasso *et al* (2016) showed different results in term of increase intake of fruits, and vegetables food labels. This may be because study population were slightly older than this study population (age 16-19) as well as the nutritional education intervention that lasted for longer duration (six months).[17]

Limitations of the study

The post intervention was carried one week after the intervention, thus might affect the recall of the students.

CONCLUSION AND RECOMMENDATIONS

Nutritional education program was found to be effective in changing the behavior and attitude towards healthy food consumption. Regarding specific food items, the change was significant for consumption of fresh food, whole grain, breakfast, avoidance of fatty meal and check expiry of the food. Change is not significant for consumption of vegetables, fruits, water, avoidance of sweet, and reading the food labels.

CONFLICT OF INTEREST

The authors have no conflict of interest to declare.

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