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A Study to Assess the Effect of Nutrition Education Programs on Knowledge Regarding Healthy Dietary Habits among Adolescent Girls in Selected Schools

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Abstract:- **Background:** Adolescence is a vital stage marked by increased nutritional needs, especially for girls. Poor dietary habits and lack of awareness often lead to health issues such as anemia and malnutrition. Nutrition education programs can play a key role in improving knowledge and promoting healthy eating behaviors.

Objective: This study aims to assess the effect of nutrition education program on knowledge regarding healthy dietary habits among adolescent girls in selected schools.

Methods: Pre-experimental, One Group Pre-test and Post-test design was adopted for this study. 200 adolescent girls studying in selected schools meeting the inclusion criteria were selected using non-probability - purposive sampling.

Results: The result showed that in Pre-Test, Majority 51.5% of subjects had poor level of knowledge score, 48% had good level of knowledge score and 0.5% had very good level of knowledge score. In Post-Test, Majority 96.5% of subjects had very good level of knowledge score, 3.5% had good level of knowledge score and 0% had poor level of knowledge score.

Conclusion: The study concluded that the that nutrition education programs about knowledge regarding Healthy dietary habits among adolescent girls in selected schools was effective.

Keywords*: Assess, Effect, Nutrition Education Program, Healthy Dietary Habits, Adolescent Girls*

1. Introduction

Adolescence is a critical period of rapid physical, emotional, and hormonal growth. During this stage, maintaining healthy dietary habits becomes essential to ensure proper development and prevent long-term health issues. However, many adolescent girls today tend to skip meals, consume junk food, and lack awareness about balanced nutrition — leading to multiple health concerns.[1]

Adopting healthy eating habits can help prevent many of the difficulties that come with adolescents and later years. Meal patterns and nutrient intake define dietary habits and nutrient intake; eating habits can impact bone density, body fat, and many other factors. Eating meals rich in healthy fats, complex crabs, proteins, vitamins, and minerals is a must to maintain a balanced diet. Many of the problems related to youth and later life can be avoided by adopting good eating habits. Fruits and vegetables, meat and eggs, milk and milk products, starchy meals, grains, fats and oils, and sugary foods are a few food groups that show dietary patterns. It was expected

that male and female students would have different eating patterns. In addition, it had been expected that female students would be more aware of their diet than male students.[1]

The Structured Teaching Programme was effective in significantly enhancing adolescent girls' knowledge regarding eating disorders. It is recommended as a practical intervention to be integrated into college health programs to promote awareness, healthy lifestyle practices, and early identification of disordered eating behaviors. Individual quality of life has a direct connection with dietary habits, and adolescence is a time of rapid growth and maturity that calls for foods high in energy and additional nutrients. Adolescents' eating habits have evolved recently in terms of their nutritional requirements and intake, including frequent fast food consumption and meal skipping.[2]

When education programs involve a significant number of children and adolescents, the school environment is the primary focus. Similarly, a nutrition education program that highlights the advantages of nutrition might help kids establish and maintain healthy eating habits. Any program that aims to promote healthy eating habits and change behavioral requires nutrition education. It's critical to provide school children the tools they need to manage this large burden and close the knowledge gap about the growing problem of falsification, teenage eating habits, and the ensuing health effects. Only by educating children about nutrition, encouraging healthy snacking practices, and altering their general perspectives on eating well can this be accomplished. The School Health Nutrition Program (SHNP) is administered by the government to enhance school-age children's nutritional and general health. Adolescent snacking habits are often linked to diet and weight status, including the consumption of energy-dense foods, the frequency of snacks prepared away from home, and nibbling while watching TV. Adolescent girls' curricula should include health education about nutrition and a balanced diet.[3]

Teenage females are more susceptible to unhealthy eating habits because of things like insufficient nutritional understanding, peer pressure, sociocultural effects, body image issues, and easy access to junk food and fast food. Adolescent girls frequently experience nutritional issues such iron-deficiency anemia, under nutrition, and vitamin deficiencies in many developing nations, including India. These issues can have a negative impact on their health, scholastic performance, and future maternal outcomes (UNICEF, 2019).Programs for nutrition education have been found to be a successful tactic for enhancing teenagers' understanding, attitudes, and behaviors' around healthy eating. Nutrition education programs at schools and colleges offer a perfect way to reach teenage girls since these environments enable structured learning and the reinforcing of healthy habits. These programs can provide teenage females with the necessary information and abilities to make wise food decisions, encouraging lifelong healthy eating practices. Nutrition is very important during adolescence. However, it was found that between 45% and 60% of teenage schoolgirls consumed insufficient amounts of food, which led to a number of micronutrient deficiencies. Anemia was found to affect 29% of teenage females in Ethiopia, which could lead to a decline in the well-being and productivity of teenage schoolgirls. Teenage girls who are malnourished experience delayed puberty, a constricted pelvis, and poor birth results. Girls' education may be impacted by a number of avoidable issues, including cultural norms, parental illiteracy, a bad attitude towards food consumption, and a lack of basic amenities. Menstrual hygiene habits may also have a detrimental impact on girls' academic performance and attendance.[4]

This age group's nutritional intake is influenced by media exposure, pressure, and parents' eating patterns. Impact assessments revealed inadequate coverage despite the long-term implementation of numerous National Nutrition Programs at the community level. This was due to low awareness among beneficiaries as a result of the programs' poor implementation of IEC (Information, Education, and Communication) components Just 14% of teenagers were exposed to nutrition instruction, according to the NNMB Report. Therefore, a study was conducted to evaluate the dietary habits and nutrition knowledge levels of adolescent girls from various Hyderabad schools. Additionally, the study examined the effectiveness of two different nutrition education tools (traditional and CD Rom-based) in raising the adolescent girls' nutrition knowledge levels in a classroom setting.[5]

A study concluded that although adolescents have some nutritional knowledge, it does not translate into healthy eating habits. Their diets are generally imbalanced, with low intake of nutritious foods and high consumption of

fats and sugars. This highlights the need for practical, behavior-focused interventions beyond simple nutrition education.[6]

2. Objectives

1. To assess the existing knowledge of adolescent's girls regarding healthy dietary habits

before administering the program.

2. To evaluate the effectiveness of nutrition education program on improving knowledge regarding health dietary habits among adolescent girls.

3. A determines the association between pre-test knowledge scores of adolescent girls selected demographic variables. (Age, class, family type, type of diet).

3. Methods

Hypothesis

H0 - There is no significant difference knowledge scores

H1 - There is significant difference knowledge scores.

Research Design

Pre-experimental, One Group Pre-test and Post-test design was adopted for this study.

Study Setting: The study was conducted in selected schools where adolescent girls were studying and who meet the inclusion criteria of the research.

Sample Size & Sampling Technique

200 adolescent girls studying in selected schools meeting the inclusion criteria were selected using non-probability - purposive sampling.

Sampling Criteria

Inclusion Criteria

1. Girls who are willing to participate in the study.
2. Girls studying in selected schools

Exclusion Criteria

1. Girls unwilling to participate in the study.
2. Girls with chronic conditions or illnesses affecting dietary habits.

Data Collection Tools

The tool used for data collection consisted of two sections:

Section I: Demographic variables of adolescent girls such as age, educational status, class, dietary habits, and other relevant background information.

Section II: Structured knowledge questionnaire on dietary habits for adolescent girls.

Ethical Considerations

Approval was obtained from the Institutional Ethics Committee. Informed consent was obtained from all participants.

Data Collection Process

The data collection process followed following steps:

1. Selection of 200 adolescent girls using purposive sampling technique.

2. Pre-test using a structured questionnaire was administered to assess existing knowledge about healthy dietary habits.

3. Implementation of the nutrition education programme.

4. Post-test was administered using the same questionnaire to evaluate the effectiveness of the programme.

Data Analysis

Data were analyzed using SPSS (v25). Descriptive statistics were used to summarize demographic data and knowledge scores. A paired t-test evaluated the effectiveness of the intervention. Fisher's exact tests assessed associations between demographic variables and knowledge gain.

4. Results

Section I: Distribution of subjects in relation to their demographic variables.

Table 1: Distribution of subjects in relation to their demographic variable. (n=200)

Demographic Variables	Frequency (f)	Percentage (%)
Age in Years		
10 – 12 Years	26	13
13 – 15 Years	80	40
16 – 18 Years	46	23
19 and Above Years	48	24
Class Studying in		
6^{th} – 7^{th}	25	12.5
8^{th} – 9^{th}	106	53
10^{th} – 11^{th}	21	10.5
Above 12^{th}	48	24
Type of School		
Government	109	54.5
Private	85	42.5
Aided	05	2.5
Residential	01	0.5
Medium of Instructions		
English	103	51.5
Marathi	89	44.5
Hindi	05	2.5
Others	03	1.5
Religion		

Hindu	126	63
Muslim	37	18.5
Christian	29	14.5
Others	08	04
Number of Family Members		
Less than 4 Members	57	28.5
4 – 6 Members	106	53
6 – 8 Members	30	15
More than 8 Members	07	3.5
Father's Occupation		
Farmer	66	33
Business	52	26
Government Employee	36	18
Private Employee	46	23
Mother's Occupation		
Housewife	116	58
Private Employee	45	22.5
Government Employee	25	12.5
Business	14	07
Monthly Family Income		
10000	22	11
15000	32	16
20000	66	33
Above 30000	80	40
Place of Residence		
Urban	130	65
Rural	57	28.5
Semi-Urban	12	06
Slum Area	01	0.5
Source of Information on Nutrition		
School / Teachers	158	79
Parent's	21	10.5
Health Professionals	13	6.5

Others	08	04

Section II: Assessment of pre-test and post-test knowledge regarding healthy dietary habits among adolescent girls in selected schools.

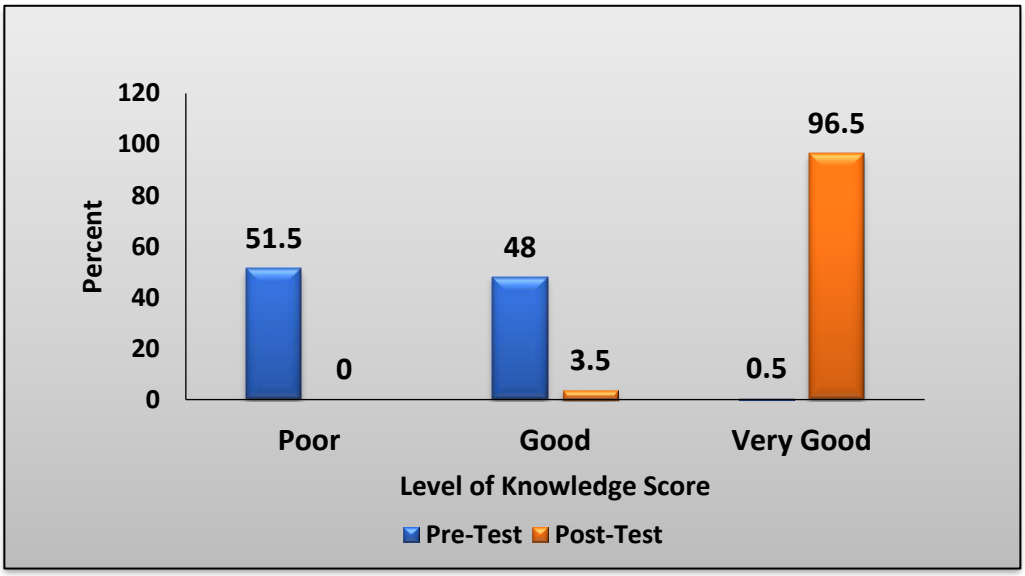

Figure 1: Distribution of subjects in relation to their pre-test and post-test knowledge regarding Healthy dietary habits among adolescent girls in selected schools.

Fig 1 shows the frequency and percentage wise distribution of subjects in relation to their pre-test and post-test level of knowledge regarding Healthy dietary habits among adolescent girls in selected schools.

In Pre-Test, Majority 51.5% of subjects had poor level of knowledge score, 48% had good level of knowledge score and 0.5% had very good level of knowledge score.

Mean knowledge score in pre-test of the subjects was 10.32 $\pm$ 3.619.

Minimum knowledge score in pre-test was 00 and

Maximum Knowledge score in pre-test was 21.

While in Post-Test, Majority 96.5% of subjects had very good level of knowledge score, 3.5% had good level of knowledge score and 0% had poor level of knowledge score.

Mean knowledge score in post-test of the subjects was 26.57 $\pm$ 3.501.

Minimum knowledge score in post-test was 18 and

Maximum Knowledge score in post-test was 30.

Section III: Analysis of effectiveness of nutrition education programs on knowledge regarding healthy dietary habits among adolescent girls in selected schools.

Table 2: Significance of difference between knowledge scores in pre-test and post-test. (n=200)

Overall	Mean	SD	Mean Difference	t-value	p-value
Pre-Test	10.32	3.619	16.26 $\pm$ 4.831	47.586	0.0001
Post-Test	26.57	3.501			S.P<0.05

P<0.05 level	*significant

Table 2 depicts the overall mean pre-test and post-test knowledge scores of subjects which reveals that post-test mean knowledge score was higher 26.57 with SD of ±3.501 when compared with mean pre-test knowledge score which was 10.32 with SD of ±3.619.

The statistical Student's paired 't' test was applied at 5% level of significance. The tabulated value for n = 200-1 i.e. 199 Degree of freedom was 199 is that 1.984. The calculated value i.e. 47.586 was much higher than the tabulated value at 5% level of significance. For overall knowledge score of subjects which was statically acceptable level of significance.

Hence it was statistically interpreted that nutrition education programs about knowledge regarding Healthy dietary habits among adolescent girls in selected schools was effective.

Thus, H1 is accepted and H0 is rejected.

Section IV: Association of pre-test knowledge score regarding healthy dietary habits among adolescent girls in selected schools with selected demographic variables.

Table 3: Association of knowledge score in relation to their age in years n=200

Age in Years	No. of subjects	Poor	Good	Very Good	ϰ2-value p-value
10 – 12 Years	26	12	14	0	6.441
13 – 15 Years	80	45	34	1	df=6
16 – 18 Years	46	27	19	0	0.376
19 and Above Years	48	19	29	0	NS, P>0.05
S- Significant	NS- Non-Significant		df-degree of freedom		

Table 3 shows the association of knowledge scores with the age in years. The tabulated 'chi square ($ϰ^2$)' value was 12.592 (df=6) which is higher than the calculated 'chi square ($ϰ^2$)' i.e. 6.441 at 5% level of significance. Also, the calculated 'p'=0.376 which was higher than the acceptable level of significance i.e. 'p'=0.05. Hence it is interpreted that the age in years is not Significant with their knowledge scores.

Table 4: Association of knowledge score in relation to their class studying in. n=200

Class Studying in	No. of subjects	Poor	Good	Very Good	ϰ2-value p-value
6^{th} – 7^{th}	25	12	13	0	7.950
8^{th} – 9^{th}	106	63	42	1	df=6
10^{th} – 11^{th}	21	10	11	0	0.242
Above 12^{th}	48	18	30	0	NS, P>0.05
S- Significant	NS- Non-Significant		df-degree of freedom		

Table 4 shows the association of knowledge scores with the class studying in. The tabulated 'chi square ($ϰ^2$)' value was 12.592 (df=6) which is higher than the calculated 'chi square ($ϰ^2$)' i.e. 7.950 at 5% level of significance. Also, the calculated 'p'=0.242 which was higher than the acceptable level of significance i.e. 'p'=0.05. Hence it is interpreted that the class studying in is not Significant with their knowledge scores.

Table 5: Association of knowledge score in relation to their type of school. n=200

Type of School	No. of subjects	Poor	Good	Very Good	ϰ2-value p-value
Government	109	56	52	1	4.138
Private	85	46	39	0	df=6
Aided	05	1	4	0	0.658
Residential	01	0	1	0	NS, P>0.05
S- Significant	NS- Non-Significant		df-degree of freedom		

Table 5 shows the association of knowledge scores with type of school. The tabulated 'chi square ($ϰ^2$)' value was 12.592 (df=6) which is higher than the calculated 'chi square ($ϰ^2$)' i.e. 4.138 at 5% level of significance. Also, the calculated 'p'=0.658 which was higher than the acceptable level of significance i.e. 'p'=0.05. Hence it is interpreted that type of school is not Significant with their knowledge scores.

Table 6: Association of knowledge score in relation to their medium of instructions. n=200

Medium of Instructions	No. of subjects	Poor	Good	Very Good	ϰ2-value p-value
English	103	50	52	1	1.826
Marathi	89	48	41	0	df=6
Hindi	05	3	2	0	0.935
Others	03	2	1	0	NS, P>0.05
S- Significant	NS- Non-Significant		df-degree of freedom		

Table 6 shows the association of knowledge scores with the medium of instructions. The tabulated 'chi square ($ϰ^2$)' value was 12.592 (df=6) which is higher than the calculated 'chi square ($ϰ^2$)' i.e. 1.826 at 5% level of significance. Also, the calculated 'p'=0.935 which was higher than the acceptable level of significance i.e. 'p'=0.05. Hence it is interpreted that the medium of instructions is not Significant with their knowledge scores.

Table 7: Association of knowledge score in relation to their religion. n=200

Religion	No. of subjects	Inadequate	Moderate	Adequate	ϰ2-value p-value
Hindu	126	68	57	1	2.096
Muslim	37	17	20	0	df=6
Christian	29	15	14	0	0.911
Others	08	3	5	0	NS, P>0.05
S- Significant	NS- Non-Significant		df-degree of freedom		

Table 7 shows the association of knowledge scores with religion. The tabulated 'chi square ($ϰ^2$)' value was 12.592 (df=6) which is higher than the calculated 'chi square ($ϰ^2$)' i.e. 2.096 at 5% level of significance. Also, the calculated 'p'=0.911 which was higher than the acceptable level of significance i.e. 'p'=0.05. Hence it is interpreted that religion is not Significant with their knowledge scores.

Table 8: Association of knowledge score in relation to their number of family members. n=200

Number of Family Members	No. of subjects	Poor	Good	Very Good	⨯2-value p-value
Less than 4 Members	57	35	22	0	5.069
4 – 6 Members	106	48	57	1	df=6
6 – 8 Members	30	17	13	0	0.535
More than 8 Members	07	3	4	0	NS, P>0.05
S- Significant	NS- Non-Significant		df-degree of freedom		

Table 8 shows the association of knowledge scores with number of family members. The tabulated 'chi square (χ^2)' value was 12.592 (df=6) which is higher than the calculated 'chi square (χ^2)' i.e. 5.069 at 5% level of significance. Also, the calculated 'p'=0.535 which was higher than the acceptable level of significance i.e. 'p'=0.05. Hence it is interpreted that number of family members is not Significant with their knowledge scores.

Table 9: Association of knowledge score in relation to their father's occupation n=200

Father's Occupation	No. of subjects	Poor	Good	Very Good	⨯2-value p-value
Farmer	66	32	33	1	5.492
Business	52	32	20	0	df=6
Government Employee	36	19	17	0	0.482
Private Employee	46	20	26	0	NS, P>0.05
S- Significant	NS- Non-Significant		df-degree of freedom		

Table 9 shows the association of knowledge scores with the father's occupation. The tabulated 'chi square (χ^2)' value was 12.592 (df=6) which is higher than the calculated 'chi square (χ^2)' i.e. 5.492 at 5% level of significance. Also, the calculated 'p'=0.482 which was higher than the acceptable level of significance i.e. 'p'=0.05. Hence it is interpreted that the father's occupation is not Significant with their knowledge scores.

Table 10: Association of knowledge score in relation to their mother's occupation n=200

Father's Occupation	No. of subjects	Poor	Good	Very Good	⨯2-value p-value
Housewife	116	62	53	1	4.542
Private Employee	45	26	19	0	df=6
Government Employee	25	9	16	0	0.604
Business	14	6	8	0	NS, P>0.05
S- Significant	NS- Non-Significant		df-degree of freedom		

Table 10 shows the association of knowledge scores with mother's occupation. The tabulated 'chi square (χ^2)' value was 12.592 (df=6) which is higher than the calculated 'chi square (χ^2)' i.e. 4.542 at 5% level of significance. Also, the calculated 'p'=0.604 which was higher than the acceptable level of significance i.e. 'p'=0.05. Hence it is interpreted that mother's occupation is not Significant with their knowledge scores.

Table 11: Association of knowledge score in relation to their monthly family income. n=200

Monthly Family Income	No. of subjects	Poor	Good	Very Good	ϰ2-value p-value
10000	22	17	5	0	8.839
15000	32	17	15	0	df=6
20000	66	31	34	1	0.183
Above 30000	80	38	42	0	NS, P>0.05
S- Significant	NS- Non-Significant		df-degree of freedom		

Table 11 shows the association of knowledge scores with the monthly family income. The tabulated 'chi square ($ϰ^2$)' value was 12.592 (df=6) which is higher than the calculated 'chi square ($ϰ^2$)' i.e. 8.839 at 5% level of significance. Also, the calculated 'p'=0.183 which was higher than the acceptable level of significance i.e. 'p'=0.05. Hence it is interpreted that the monthly family income is not Significant with their knowledge scores.

Table 12: Association of knowledge score in relation to their place of residence. n=200

Place of Residence	No. of subjects	Poor	Good	Very Good	ϰ2-value p-value
Urban	130	71	58	1	3.108
Rural	57	27	30	0	df=6
Semi-Urban	12	5	7	0	0.795
Slum Area	01	0	1	0	NS, P>0.05
S- Significant	NS- Non-Significant		df-degree of freedom		

Table 12 shows the association of knowledge scores with place of residence. The tabulated 'chi square ($ϰ^2$)' value was 12.592 (df=6) which is higher than the calculated 'chi square ($ϰ^2$)' i.e. 3.108 at 5% level of significance. Also, the calculated 'p'=0.795 which was higher than the acceptable level of significance i.e. 'p'=0.05. Hence it is interpreted that place of residence is not Significant with their knowledge scores.

Table 13: Association of knowledge score in relation to their source of information on nutrition. n=200

Source of Information on Nutrition	No. of subjects	Poor	Good	Very Good	ϰ2-value p-value
School / Teachers	158	89	69	0	22.600
Parent's	21	9	12	0	df=6
Health Professionals	13	2	10	1	0.001
Others	08	3	5	0	S, P<0.05
S- Significant	NS- Non-Significant		df-degree of freedom		

Table 13shows the association of knowledge scores with the source of information on nutrition. The tabulated 'chi square ($\aleph^2$)' value was 12.592 (df=6) which is lower than the calculated 'chi square ($\aleph^2$)' i.e. 22.600 at 5% level of significance. Also, the calculated 'p'=0.001 which was lower than the acceptable level of significance i.e. 'p'=0.05. Hence it is interpreted that the source of information on nutrition is Significant with their knowledge scores.

5. Discussion

A pre-experimental study was conducted to evaluate the impact of nutrition education programme college student's dietary habits in terms of knowledge and attitude in the year 2022 in Nadiad, Gujarat. The aim of the study is assess the effectiveness of Nutrition Education Programme on Dietary Habits in terms of Knowledge and Attitude among Students of Mahila Arts College Nadiad, Gujarat. A quasi-experimental (pretest-posttest control group) design was usedin these study. They use random sampling technique and consisted of 60 college students as sample. A structured pretested knowledge assessment questionnaire consisting of 25 questions and Five Point Likert Attitude Scale (20 items) on healthy dietary habits was used. Lesson plan along with appropriate flipbook had been utilized for teaching. The total sample size was 60 college students. According to the result, shows that Nutrition Education Program was imparted and knowledge and attitude regarding dietary habits was assessed. Knowledge on dietary habits was assessed pre and post-intervention, the mean score of knowledge on dietary habits during pre-intervention was 7.78-1.59 and post-intervention was 10.28-2.92. There was significant ($p<0.05$) improvement observed regarding knowledge on dietary habits after intervention. Similarly, mean score of attitude on diet habits before intervention and post intervention were 49.82-4.94 and 54.55-6.74 respectively. Significant ($p<0.05$) improvement was observed also in the attitude of the subjects post-intervention. The conclusion of the study was Nutrition Education Programme improved healthy dietary habits among college students. Results suggest that a scaled-up initiative using existing colleges and health resources could change dietary habits in a large population over time. The nutrition education programme also provided lessons for implementing and evaluating similar nutrition programmes.[7]

6. Recommendations

1. Formal education program should be conducted in ward, ICU, college and department of child health, etc. regarding healthy dietary habits.
2. The study can be replicated on large subjects; and on various settings, so that findings can be generalized to a large population.
3. Such studies can be carried out using other teaching strategies like video assisted teaching, computer-assisted instruction, demonstration method on healthy dietary habits.
4. An experimental study can be carried on effectiveness of structured teaching program on knowledge regarding healthy dietary habits.

7. Acknowledgments

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8. Conflict of Interest

The authors declare no conflict of interest.

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