

Effectiveness of an Educational Intervention to Improve Dietary Behavior of School-going Adolescent Girls: A Quasi-experimental Study in District Gujrat

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Abstract

Background: Adolescence is the transitional phase of age that links childhood to adulthood. Adolescence constitutes about one-sixth of the world's population today. Among adolescents, girls are vulnerable, as it is a period of rapid growth & development and their dietary behaviors are not as per their requirements.

Objectives: To assess the effectiveness of educational intervention for improving dietary behavior and perceptions on nutrition of school going adolescent girls.

Study type, settings & duration: This was a Quasi Experimental study conducted in a private school in district Gujrat Punjab Pakistan from May to August 2019.

Methodology: A quasi experimental study design was conducted on school going adolescent girls aged 10-18 years. Convenient sampling technique was used to enroll 168 students (for baseline as well as follow up). A standard tool adapted from WHO, contextualized for the study population and pretested was used to assess the adolescent girls' knowledge on nutrition and improving dietary practices. After a baseline assessment (pre-test), an educational workshop was conducted and post-test was carried after a span of one month. Using SPSS, the differences in knowledge attitude and practices were determined in by undertaking paired T-test.

Results: Among 168 students, only 5.4% (n=9) knew at baseline about the expert's advice of servings of fruits and vegetables people ate at a minimum in one day, while in follow up-test a significant increase was shown in 47.6% (n=80) students, p -value (<0.001). For weekly recommended breakfast; "every day option", an increase was observed from 30.4% (n=51) to 74.4% (n=125). Moreover, food label reading knowledge was enhanced from 38% (n=64) to 72% (n=121). The results were statistically significant for knowledge (p -value= <0.001), slightly significant for attitude (p -value= 0.097) and not significant for practice (p -value=0.413), means after delivering the workshop the knowledge of the students was improved for improving behavior patterns related to food choices and dietary intake. According to food frequency questionnaire (FFQ), fruit and milk consumption also increased from 22.6% to 33.9% whereas raw vegetable consumption increased from 8.3% at baseline to 19.6%.

Conclusion: In order to raise the health indicators of the adolescent girls in Pakistan, nutrition education is plays important role in shaping their perceptions and behaviors towards healthy eating choices. More research should be conducted on school-based interventions with longer intervention periods for higher sustainability.

Key words: Nutrition, dietary behavior and practices, adolescent girls, educational intervention.

Introduction

Nutrition, across the whole life span of a human being is an essential pillar of a person's life, development and health. Good nutrition as well as complete and proper food is mandatory at all life course approaches i.e. fetal development, at birth time, through infancy, childhood, adolescence, adulthood and at geriatric age, for survival, physical & mental growth and development, productivity and performance along with health and wellbeing. It is basic foundation of human and National

development and progress. Nutritional status of any human depends equally upon his dietary & lifestyle practices. Learning of new habits in early life are the prediction towards food choices in later life. Adolescence is the mirror of one's health and wellbeing. In order to prepare them for a nutritionally healthy adult life, it might represent a "window of opportunity".

The second Lancet Series on adolescent health concluded that a "Failure to invest in the health of the largest generation of adolescents in the world's history jeopardizes earlier investments in

maternal and child health, erodes future quality and length of life, and escalates suffering, inequality, and social instability".¹

Around 85% of Adolescents are living in developing countries and they are considered as tomorrow's adults.² Conventionally, in developing countries, reproductive age women along with under five age broods have been nutritionally as vulnerable groups, whereas in industrialized realms the main focus is upon nutrition related chronic diseases of geriatric population. Adolescent group comes in between of these two groups with some common nutrition problems of broods and adults. Among young people, Obesity is one of the major growing problem having irregular dietary patterns along with sedentary lifestyles. Nevertheless, pregnancy in teenage is also considered as a major problem. Moreover, inadequacies in having micronutrients are also found in adolescent girls of developing countries.³

In Pakistan, the burden of malnutrition is very high, covers around 03% of GDP annually. Adolescents comprises of 1/4th of the population (approx. 40 million). Among Pakistani adolescents, Iron-deficiency anemia is the 5th leading cause of disability-adjusted life years. For interventions to improve adolescents' mental, physical and social health, while till 2030, annually there must the Investment of US\$4.6 per capita, would yield around 10 times more benefits. Such kind of investments yield a triple dividend benefitting current adolescents, future adults, and the next generations.⁴

Technically, malnutrition is currently a National challenge in Pakistan. Nutritional needs of adolescent girls, being future mothers, bear special significance. According to Pakistan National Nutrition Survey 2018, almost one in eight adolescent girls was underweight. Although studies on the assessment of nutritional status of adolescents are adequate. However less studies have focused upon IMB model implementation in

Pakistan. The results of the current study can be useful for policy makers and stakeholders in their endeavor to formulate various developmental and nutrition related programs, specifically for adolescents. The aim is to improve nutritional status of school going adolescent girls.

Methodology

The study was a quasi-experimental study, pretest-post-test design. It was conducted in a private school all girl's campus in District Gujrat. Private school setup was selected based upon the convenience and ease of access. Gujrat is an ancient district located in between two famous rivers, the Jhelum and Chenab. According to 2017 census, the population of the district had reached to 2,756,110. It was the 18th largest city of Pakistan. Main language of the natives was Punjabi.¹ Study was of 3 months duration. The tool for data source was a structured questionnaire, and had been self-administrated.

The study population was from 7-10th classes, including 40 students from 7th class (age group of 10-12), 52 from 8th class, while from 9th the sample was 38 students and 34 girls from 10th class.

Convenient sampling method was used to get desired sample size.

Following was excluded

- Those girls who had any self-reported clinical problems such as comorbidities (physical disabilities) and/or learning difficulties defined by the teachers.
- Previously diagnosed with an eating disorder or with any dietary restriction.

The data was collected through filling questionnaire by student approach, both in pretest & posttest.

Primary data collection was done using a three-part questionnaire. First part contained participants' personal information. The second part was consisting of a questionnaire about IMB model (a behavior change model) in which individuals must be improved, motivated and behaviorally skilled to initiate and maintain a prevention behavior having three parts i.e. information, motivation and behavior; adapted from FAO publication guidelines, also known as KAP manual. Third part contained questions about dietary practices, including food frequency questionnaire; adapted from Epic food questionnaires, that described their dietary patterns. Workshop was conducted by us following pre and post intervention. WHO's Epic food questionnaire, KAP manual, Food Frequency questionnaires were used as reference tools for data collection.

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Authors Contribution

TA & SM conceptualized the project and performed the statistical analysis. TA did the data collection. TA & HKNB did the literature search. and literature search. Drafting, revision & writing of manuscript were done by HKNB.

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Workshop was conducted as an intervention that delivered information about good and bad carbohydrates, proteins and fats as well as life style modifications at adolescent's age level. Workshop was conducted in school premises. A post-test was conducted after one month of workshop conduction.

The Ethical approval was obtained from Internal Review Committee of Health Services Academy, Islamabad.

Results

Out of 168 students, 36.3% (n=61) students were in age group from 10-12 years, while most of the students aged 13-15 years, (57.1%).

Among 54 students from 7th grade 46.3% (n=25) had normal weight, while 41% (n=22) students were underweight. In 8th grade of the total 52 students, 44.2% (n=23) students were underweight while obesity was observed in 23% (n=12). In 8th grade only 27% (n=14) students were in normal range of body weight. In 9th grade, 53.1% (n=17) students had normal weight, 6 (18.8%) were underweight, 12.5% (n=4) were over weighted, while 15.6% (n=5) were obese. In 10th grade mostly students were in normal range i-e. 76.7% (n=23), only 16.7% (n=5) students were underweight, while no student was obese.

The majority of the students in the study were from middle socioeconomic group i-e 70.2% (n=118).

Among 168 students, only a few students (n=9) 5.4% knew about the expert's advice regarding minimum recommended servings of fruits and vegetables, while in post intervention observation there was a remarkable increase in knowledge (p-value= <0.001) i-e 47.6% (n=80). With regards to the daily breakfast recommendation increase in knowledge was also noticed from 30.4% (n=51) to 74.4% (n=125).

The knowledge of starchy foods in diet according to "Eat-Well Plate" was also observed at the baseline which was 18.5% (n=31), while follow up was 50% (n=84), For the minimally processed foods, the consumption of processed foods was observed in 22.6% (n=38) students at baseline, while 52.4% (n=88) reported at follow up. For the fat content medium fat consumption was reported at baseline in 36.2% (n= 61) of the study participants which increased upto 56% (n=94). Knowledge about significance of low calories food also increased from 68.5% (n=115) to 78.6% (n= 132) at follow up.

Food label reading knowledge was significantly high in follow up test as compared to baseline test i-e. 38.1% (n= 64) to 72%(n=121).

Knowledge related to healthy weight management, protein and fiber intake varies both at baseline test as well as follow up test. Some agree while some students disagree i-e. 32.7% (n=55) to 37.5% (n= 63) for healthy weight people cut fat completely. For maintaining weight by having high protein diet, 61.3% (n= 103) students agreed on baseline evaluation while 58.3% (n=98) at follow up, almost no significant differences were their both in pre & post-test.

Table 1: Variable score results.

Variable Score	Mean	SD	t-test	p-value
Knowledge				
Baseline Score	2.262	3.375	8.686	<0.001
Follow-up Score				
Attitude				
Baseline Score	0.982	7.625	1.670	0.097
Follow-up Score				
Practice				
Baseline Score	0.268	4.232	0.820	0.413
Follow-up Score				

Table 2: Pre and post comparison of KAP study.

Variable Level	Pre-test N (%)	Post-test N (%)
Knowledge		
Low	115 (68.5)	98 (58.3)
High	53 (31.5)	70 (41.7)
Mean ± SD	3.74 ± 2.019	6 ± 2.550
(min-max)	(0-9)	(0-11)
Attitude		
Negative	82 (48.8)	79 (47)
Positive	86 (51.2)	89 (53)
Mean ± SD	67.33 ± 6.622	66.35 ± 5.509
(min-max)	(50-83)	(46-83)
Practice		
Bad	66 (39.3)	93 (55.5)
Good	102 (60.7)	75 (44.6)
Mean ± SD	35.27 ± 3.024	35.01 ± 3.024
(min-max)	(27-42)	(27-42)

It was hypothesized that knowledge regarding improving dietary behavior would be positively associated with improved behavioral skills (improving attitude) related to food choices and dietary behavior intake having complete nutrition. Paired t-test was performed. The results indicated that mean of baseline & follow up score was 2.262 and standard deviation must be 3.375, its value of t test was 8.686, p-value was significant, that means knowledge was significantly improved by educational intervention i-e workshop. Attitude scoring p-value was also significant, means that attitude for improving dietary behavior and perceptions was also influenced by workshop delivery. Whereas, practice scoring p-value was not

significant, which means that modification in practice changing was very less (Table 1 & 2).

Table-3 shows that possibility of the availability of the snacks during school timings. Around 54 (32.1%) adolescent girls had to buy unhealthy snacks during school timings at baseline test while at follow up test, significant decline was seen after educational intervention i-e. 16% (n=27). Same decline was observed for the consumption of soft drinks during recess i-e. from 22.6% (n=38) to 6.5% (n=11). The percentage of fruit consumption also increased slightly; from 6% (n=10) to 7.1% (n=12).

Among the subjects 17.90% adolescent girls already heard about the food guide pyramid at the baseline test, while awareness was raised to 39.30% girls after educational intervention. Whereas 37.5% (students reported to have made an effort to follow healthy diet in follow up. Moreover, around 30.4% tried to keep the overall sugar intake down in post-test. While number of respondents who never ate 3 servings of fruits on most days increased up to 48 (28.6%) from 40 (23.8%). This means that slight improvement in practices were shown during the time period of one month.

Table 3: Comparison of student's attitude regarding snacking at school timings.

Attitude Variables		Baseline- (Pre-test) Test	Follow up- (Post test)Test
Possibility to buy unhealthy snacks at school during recess/lunch break *Positive	Strongly disagree	17 (10.1)	20 (11.9)
	Disagree	18 (10.7)	19 (11.3)
	Neutral/ NA	13 (7.7)	19 (11.3)
	Agree	66 (39.3)	83 (49.4)
	Strongly Agree	54 (32.1)	27 (16.1)
Possibility to buy soft drinks at school during recess/lunch break *Positive	Strongly disagree	34 (20.2)	50 (29.8)
	Disagree	45 (26.8)	57 (33.9)
	Neutral/ NA	7 (4.2)	16 (9.5)
	Agree	44 (26.2)	34 (20.2)
	Strongly Agree	38 (22.6)	11 (6.5)
Possibility to buy fruit at school or get it for free during recess/lunch break *Positive	Strongly disagree	83 (49.4)	71 (42.3)
	Disagree	56 (33.3)	51 (30.4)
	Neutral/ NA	12 (7.1)	14 (8.3)
	Agree	7 (4.2)	20 (11.9)
	Strongly Agree	10 (6)	12 (7.1)

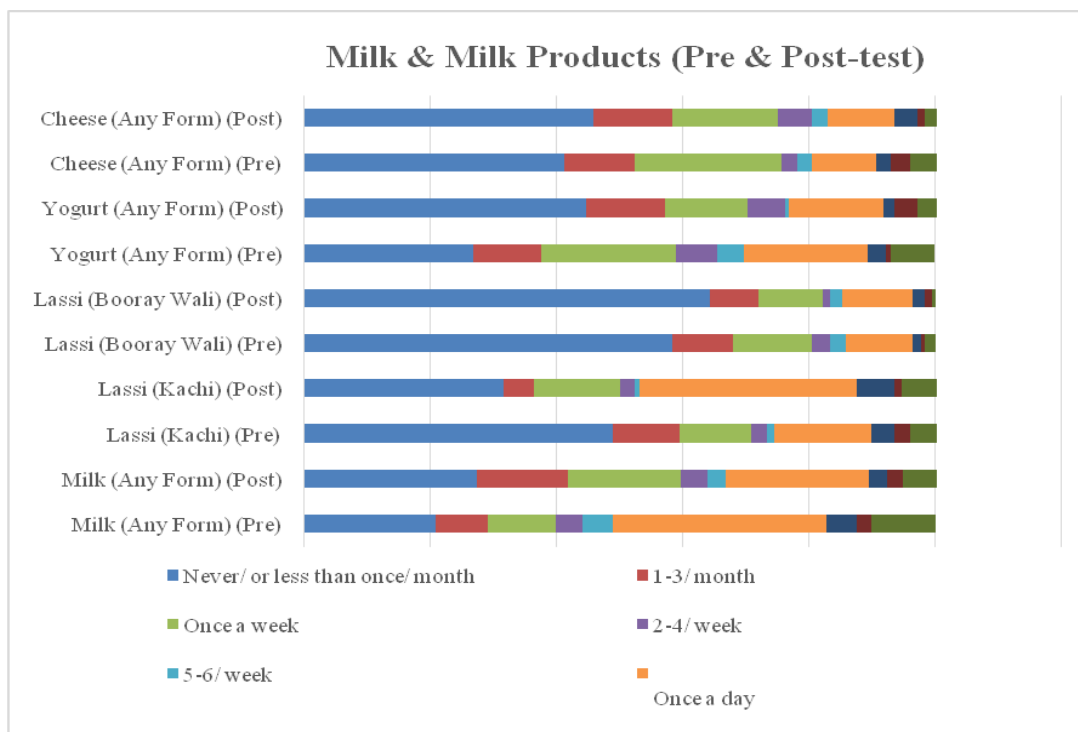


Figure 1: Consumption of milk & milk products both at baseline & follow up level.

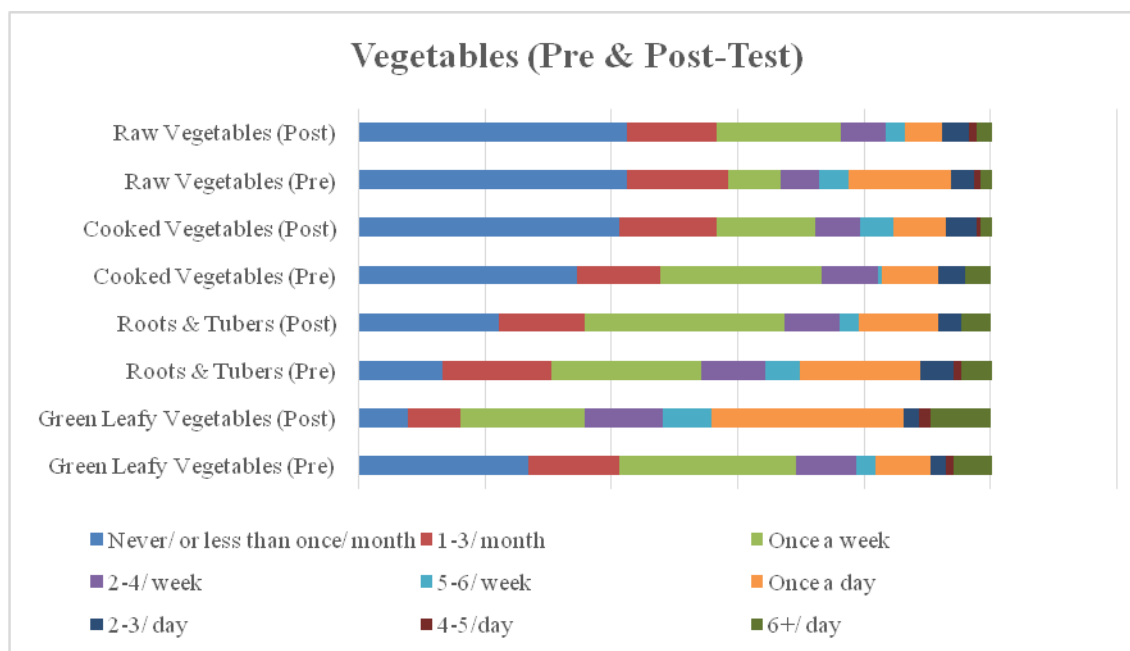


Figure 2: Consumption of vegetables both at baseline & follow up level.

About 19.6% participants reported consumption of eggs at least 1 time per week at baseline-test, whereas 26.2% consumed at post-test. Moreover, meat consumption was 28.6% one times per week at baseline, decreased to 25.6% at follow up-test. Around 33.9% consumed milk on daily basis at baseline, whereas it decreased to 22.6% at follow up. 21.4% consume yogurt 1 times per week at baseline, and only 13.1% consumed it at follow up. Milk and yogurt consumption went slightly low in progressive test (Figure-1).

About 35.7% consumed fresh fruits on daily basis at baseline, whereas 28% consume at post-test, which is the slightly decrease in the consumption. Even though 8.3% consumed 2 times/week at pre-test whereas 6.0% at post-test.

About 28% consumed green leafy vegetables 1 times per week at baseline, whereas 19.6% consumed at follow up. While raw vegetable consumption was half at baseline-test i.e. 8.3% as compared to the follow up-test i.e. 19.6%, means after educational intervention the consumption of raw vegetables increased (Figure-2).

French fries' consumption was 22% one times per week at baseline, whereas 32.1% at follow up. Moreover, pizza consumption was 25% at baseline, rater 29.2% at follow up level.

Discussion

Nutrition behaviors of adolescent girl is a serious public health issues. Adolescence being a very crucial period in a person's life cycle,

throughout which almost 15% of adult height and 45% of adult bone mass are gained.⁵ The present study showed that educational intervention based upon health promotion model i.e. IMB model (information-motivation & behavior model) can lead to improved knowledge in post study test but in pre-test of the study even student's knowledge regarding this aspect was not improved.

BMI is a very important indicator for the assessment of malnutrition. According to WHO, it has 4 categories, i.e. underweight, normal weight, overweight and obese. According to Pakistan National Nutrition Survey 2018, almost one in eight adolescent girls are underweight, 11.7% in urban sector, while 11.8% in rural sector.⁶ The present study reported that around 33% students were underweight, while 11.9% fall under the category of obese, while only 7.7% were overweight. The results were similar with the study conducted in School of Public Health, Boston, USA, that is, in Africa 15% of adolescents were overweight and obese and at particular risk for noncommunicable diseases in later life.⁷

Some studies conducted in multiple schools in different talukas and districts in India depicts poor knowledge and practices concerning about health and menstruation among teenagers.⁸ The results of this study were also comparable, in terms of practices, rather, knowledge and perceptions to improve dietary behavior was improved means contradiction was there according to post-test of the study.

The present study also showed that almost 30% of the study participants had breakfast on daily basis in pre-test study while the frequency increased to 74.4% after intervention. Only 40.5% of girls were consuming breads and cereals on daily basis, 8.3% girls consumed egg on daily basis, 8.3% consumed meat, while post intervention bread consumption remained almost same 8.7%, eggs increased up to 20.2% and meat consumption increased up to 11.3%. The results are similar to other study conducted by Alavi¹ et al. (2013) which revealed that that 48.4% of the students were not taking regular breakfast, 67.4% of girls were consuming bread and cereals and 27.7% meat and eggs on daily basis. Our study showed an improvement in dietary patterns after workshop, which was not shown in the above-mentioned study.⁹ The current study showed that fruit consumption was very low 28% and improved up to 35.7%. Only 9.5% consume vegetables while post intervention it was observed that the frequency increased to 12.5%.

The mean daily intake of roots and tubers by the subjects of experimental and control group before and after counseling were 80g & 91g and 88.3g & 92 g respectively. The current study findings were almost similar with the study conducted in India, that 12.5% participants consumed roots & tubers in baseline test, while at follow up 19% start consuming it. During educational intervention (workshop sessions), the participants were counseled to increase the intake of fiber in the form of salads, cabbage, peas which are high in fiber and provide more satiety at a time.¹⁰

This finding is almost similar with the study conducted in South Africa, for Southeast Asian countries, found that about 28% consumed less fruit less than once per day while 13.8% indicated for having vegetables.¹⁰

According to a study, conducted in India, the consumption of milk and milk products were in the form of milk, yogurt, Lassi, cheese and as sweet dishes(kheer and gajrela). The mean daily intake of milk and milk products was 213.2g & 246g and 252g & 244g in experimental and control group before and after nutrition counseling respectively. It was observed that the subjects who were not in the habit of taking milk started consuming milk at least once a day.⁸ The results of the present study were different from the above-mentioned study i.e. 33.9% consume milk on daily basis at baseline, whereas 22.6% at follow up. Moreover, yoghurt consumption also declined from 21% to 13% and cheese was not consumed at all by 46% respondents probably due to low socioeconomic status.

According to a study conducted in Iran, the data exhibited that girls liked to dine out weekly and

fortnightly. But after nutrition counseling, maximum number of participants preferred homemade nutritious foods and less likely to dine out.¹¹ The results of current study were also comparable to study mentioned above.

Keeping in view the changes observed over time in our study it is argued that any form of health promotion or educational intervention is effective and plays a strong impact on adolescent girls healthy eating knowledge, making healthy food choices, food timings and reduction in junk foods. Brochures, as a take home message also played a very important role in improving knowledge and changing their behaviors.

Hence it is concluded that the interactive education and improving awareness among parents through brochures and educational materials is especially important for the adolescent girl's nutrition and health improving their dietary behavior and improved behavioral skills related to food choices.

It was academic research and the study conducted in a single school so the results of the study cannot be generalized to other schools. As the study was pre-post study design, and the time span was only one month between these two steps, therefore, substantial improvement in attitude & practices were not shown. This also raises the issue of generalizability. This study focused only on private sector school and the results of the study cannot be generalized public sector schools. Recall bias can be seen as another limitation in filling food frequency questionnaire.

However, findings of current study may help us to utilize it as a baseline data for future research in order to sort out the gaps, may help the improvement of dietary knowledge, attitude and practices. It may also provide a platform to policy makers and may also help the health personals like dietitians and nutritionists, for parents who are visiting the health facility for the treatment of a malnourished girl. Nutritional education programs are recommended to be arranged in schools on regular basis with efforts to educate parents, teachers as well as students at parent teacher meetings. Government should initiate healthy food provision programs for students in schools. Future research should test the effectiveness of intervention with control arm.

Conflict of interest: None declared.

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