

The Effect of Nutrition Education Interventions on Food Consumption Patterns Among Rural Adolescent Girls of Bijnor

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Abstract—Nutrition education plays a crucial role in facilitating dietary and behavioral changes, thereby enhancing the nutritional status of individuals. This study aims to examine the impact of nutrition education on the knowledge levels and consumption patterns of 200 rural adolescent girls in the Bijnor district of Uttar Pradesh. Data were collected both before and after the nutrition education intervention to assess its effects on the respondents. Good nutrition is a pillar of growth and development, not just because food is the most fundamental human need. Moreover, to achieve optimal physical growth and development, adolescents require adequate nutrition as well as physical activity to support muscle development and bone health and other vital function of our body. Without proper nutrition, maintaining a good health is next to impossible. Nutrition and health interventions are essential in changing dietary habits and eating patterns within populations, serving as powerful tools for promoting healthy eating practices and ensuring long-term improvements among individuals. Providing nutrition education in schools can play a pivotal role in preventing malnutrition in future generations, as students who understand correct dietary concepts are more likely to practice them as adults. Following the nutrition education intervention, there was a significant improvement in the overall health markers, indicating a positive impact on the nutritional status of adolescent girls.

Keywords: Nutrition, consumption pattern, malnutrition, dietary habits, nutritional status, nutrition education.

1. INTRODUCTION

Adolescence is a crucial stage of life marked by desire to modify the social environment, receptivity to change, and transformative growth on physical, cognitive, and emotional levels. It provides exceptional chances to make dietary and exercise adjustments that will continue into old age. Pre-existing nutritional issues, such as inadequate intake of certain nutrients, food instability, and inadequate diets, continue to exist concurrently with the fast-rising obesity epidemic among teenagers. Intervention and policy research has mostly ignored the growth and nutrition of adolescents (1).

Energy (calories) and protein are essential in pubertal development. Adolescent females require approximately 2200 calories/day, whereas male adolescents require 2500-3000 calories/day. Vitamins, fiber, iron, zinc, fat, calcium, and vitamins are additional nutrients that must be consumed. Long-term effects of nutritional inadequacies and unhealthy eating habits developed in adolescence might include obesity, osteoporosis, hyperlipidemia, delayed sexual development, and loss of final adult height. Nutritional hazards for teenage vegetarians include insufficient intake of iodine, vitamin B12, vitamin D, and certain necessary fatty acids. Adolescents who have inadequate nutrition may also be at risk for it during pregnancy. An adolescent who is pregnant has distinct nutritional requirements because to her continued grumbling (2). The body mass index may be able to provide a thorough diet history for the patient, which is the first step in the clinical evaluation of nutritional status. Growth velocity rises throughout puberty, when peak height velocity occurs and catch-up is feasible; girls reach approximately 15-25% of adult height (3).

The timing and pattern of puberty are shaped by diet during late childhood and early adolescence. This has implications for adult height, muscle, and fat mass accumulation, as well as the chance of developing non-communicable diseases later in life. Beyond musculoskeletal growth, nutrition has an impact on immunological function, neurodevelopment, cardiorespiratory fitness, and adolescent development. The growth and nutrition of female adolescents remain at risk due to high rates of early adolescent pregnancy in many countries, which has long-term effects on future generations. Adolescence is a growth phase that is sensitive to nutrition, and at this time, a healthy diet has positive effects on numerous different physiological systems (4). Unfortunately, during this phase of life especially, the tendency to involve in unhealthy dieting, meal skipping, binge eating, fast food consumption. Nowadays, it is also observed that the physical activity of adolescents has decreased

significantly due to unhealthy diet plan the health might effected (5).

Nutrition education is very much important especially in like developing countries like India. As nutrition education is helpful for those who are not able to understand the importance of proper diet plan, knowledge on correct nutrition. Nutritional education is a global medium for delivering health, diet, and nutrition information to a wide range of demographic groups.

It is commonly documented that adolescents exhibit unhealthy eating practices, such as skipping meals (6). Constant snacking on energy-dense foods (7), and engaging in unhealthy weight-loss strategies (8), (9). Furthermore, students dietary intakes appear to be high in fat, saturated fat, cholesterol, and salt (10), (11) but low in fibre, vitamins A, C, D and E, iron, folate and calcium (12), (13), (14), (15). A considerable amount of evidence shows that a diet rich in fruits and vegetables is related with a decreased risk of cancer and heart disease (16), (17), (18), (19), (20), (21), and may help with weight management (22).

2. MATERIALS AND METHOD

Place of study: The study was conducted in rural area (Timarpur) of Bijnor district, Uttar Pradesh, selected for its unique nutritional status and demographic characteristics.

Type of study: Observational study.

Sample size: A study sample was meticulously crafted by selecting government and private schools across the district. It consisted of 200 adolescent girls, with careful attention to balance: 100 participants from each school were purposively chosen as per convenience. The study utilized a quantitative research approach with a descriptive design. A purposive sampling method was employed to select adolescent girls aged 12 to 18 years.

(A) Government Girls Inter College

(B) A.N International School

Intervention Period: 22nd September 2022 to 20th November 2022

Participants underwent a thorough assessment, including a detailed history, sociodemographic evaluation, and physical examination to evaluate their baseline clinical status. Data collection was based on primary sources, and informed consent was obtained from all participants, along with permission from the school authority. The questionnaire used in the study was structured into four sections.

Section I: The proforma used for background information gathered details such as name, age, religion, family type, birth order, no. of siblings, socio-economic status, and annual income of the sample, food habit.

Section II: The nutritional assessment proforma included anthropometric data where height and weight were recorded, and BMI was calculated for each participant.

Section III: The investigator designed a knowledge-based questionnaire proforma to evaluate understanding of nutritional parameters including general health and diet, recommended dietary concepts, food-based knowledge, and nutritional deficiency disorders.

Section IV: The investigator designed a dietary pattern-based questionnaire proforma to identify dietary habits, analyze nutrient deficiencies/excesses, assess nutritional intake.

Data collection method: Primary sources were used to collect data for this study. An offline questionnaire survey method was determined to be appropriate due to the requirement for responses from a large number of participants. A detailed questionnaire with four sections that addressed each of the objectives in depth was given to the selected samples. For ease of use and efficiency, the questionnaire was designed with closed-ended questions, providing four possible answers for each knowledge-based component. The questionnaire was bilingual to ensure accessibility and allow for respondent preference for ease of comprehension. Before official data collection, all survey instruments were first written in English, translated into Hindi, back-translated, and pretested on fifty participants.

Statistical Analysis: The data analysis strategy was comprehensive and effective, utilizing a range of statistical techniques. This included percentage and frequency calculations, descriptive analysis to examine key variables, paired t-tests to assess changes over time, and cross-tabulation to explore relationships between variables.

3. RESULTS

This study mainly focus on the effect of food pattern on BMI of the adolescent girls before and after an intervention provided to them. The intervention goals seems to be to reduce meal skipping and improve overall eating habits, which could potential impact on overall health.

Table 1: Distribution of Respondents according to BMI

BMI Range	Nutritional Grade	Pre	Post	Diff	Pre	Post	Diff
	Government School			Private School			
Below 18.5	0	39	30	9	29	23	6
18.5-24.9	0	51	63	12	62	71	9
25-29.9	0	9	7	2	7	5	2
30 and above	0	1	0	1	2	1	1
Total	0	100	100	0	100	100	0

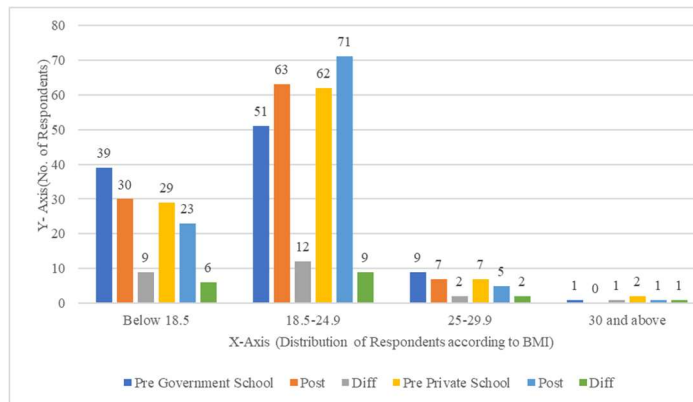


Figure 1: Distribution of Respondents according to BMI

The table presents the distribution of respondents according to BMI and nutritional grade in both government and private schools, before and after an intervention. It shows the number of individuals in each BMI category (underweight, healthy, overweight, and obese) in both types of schools before and after the intervention. The differences between pre and post-intervention numbers are also provided. Overall, there's an improvement in the healthy category post-intervention, with reductions in underweight individuals. However, there are variations in the changes between government and private schools, with private schools having a higher prevalence of obesity both before and after the intervention.

Table 2: Distribution of Respondents by meal skipping practice

Particular	Pre	Post	Diff	Pre	Post	Diff
	Government School			Private School		
Breakfast	35	19	16	28	11	17
Lunch	30	29	1	24	19	5
Dinner	16	9	7	22	18	4
Never	19	43	24	26	52	26
Total	100	100	0	100	100	0

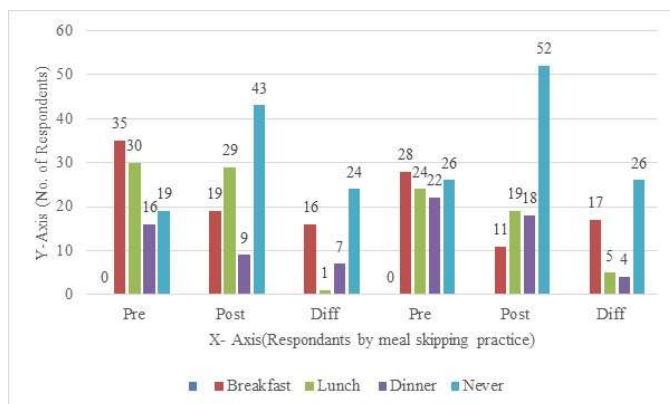


Figure 2: Distribution of Respondents by meal skipping practice

This table presents the distribution of respondents based on their practice of skipping meals before (Pre) and after (Post) an intervention in government and private schools:

Government School: The number of students skipping breakfast decreased post-intervention (-16), along with decreases in skipping lunch (-1) and dinner (-7). However, there was an increase in those who reported never skipping meals (+24).

Private School: Similar trends were observed, with decreases in skipping breakfast (-17), lunch (-5), and dinner (-4) post-intervention. There was also a notable increase in students reporting never skipping meals (+26).

Overall, the intervention led to reductions in meal skipping across all meals in both government and private schools, with more students reporting never skipping meals after the intervention.

Table 3: Distribution of Respondents by frequency of eating all five food groups in a day.

Particular	Pre	Post	Diff	Pre	Post	Diff
	Government School			Private School		
Never	14	9	5	12	3	9
Sometime	75	66	9	78	70	8
Always	11	25	14	10	27	17
Total	100	100	0	100	100	0

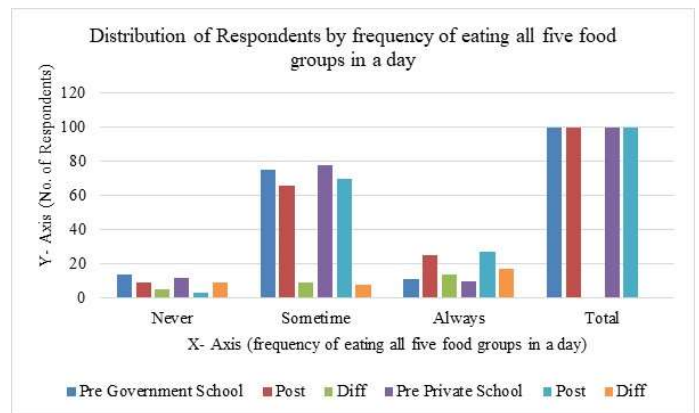


Figure 3: Distribution of Respondents by frequency of eating all five food groups in a day.

This table displays the distribution of respondents by the frequency of eating all five food groups in a day before (Pre) and after (Post) an intervention in government and private schools:

Government School: Post-intervention, there was an increase in the number of students always eating all five food groups in a day (+25), accompanied by decreases in those sometimes (-9) or never (-5) doing so.

Private School: Similarly, there was an increase in the number of students always eating all five food groups in a day (+17), while there were decreases in those sometimes (-8) or never (-9) doing so.

Overall, the intervention led to an increase in the frequency of students eating all five food groups in a day in both government and private schools, with fewer students reporting inconsistent or no consumption of all food groups after the intervention.

4. DISCUSSION

Adolescence is a critical phase marked by rapid physical growth, psychological changes, and increased nutritional needs. Proper nutrition during this duration supports optimal growth, cognitive development, and overall health. This article discusses the impact of various nutrition-sensitive interventions and their potential to improve dietary habits, which is relevant to understanding how education might influence food consumption patterns (23). Malnutrition or poor dietary habit may potentially cause acute and chronic health issues, such as PEM, stunted growth, obesity, and chronic diseases. During this time, a growth spurt is occurs, and a girl is prepares for womanhood and future motherhood. Individuals begin to make more independent food choices during this period of life. Nutrition education helps them understand the necessity of balanced diets, improve dietary habits, choose good food for themselves, and establish healthy eating habits that can last a lifetime. This education includes the benefits of consuming a variety of foods, understanding portion sizes, and recognizing the nutritional value of different food groups, identifying the ant nutritional food that are not beneficial for health.

This study discusses various strategies to change children's diets, particularly focusing on nutrition education programs. It explores what works in modifying dietary behaviors and why certain approaches are more successful. The article emphasizes that nutrition education can significantly impact children's food choices, leading to healthier eating patterns (24). Adolescents are more prone to nutritional deficiencies, such as iron, calcium, and vitamin D. Nutrition education can highlight the importance of consuming nutrient-dense foods to prevent deficiencies that can impact their growth, energy levels, and academic performance and hamper their holistic development. The rising prevalence of obesity and eating disorders among adolescents highlights the need for nutrition education to promote healthy body image and prevent harmful dieting behaviors. It helps adolescents understand the risks of high-calorie, low-nutrient foods and the importance of physical activity. With external pressures like peer influence and media, nutrition education empowers informed food choices and discourages unhealthy habits. Early intervention through comprehensive programs involving families, communities, and schools can foster lifelong healthy habits and reduce the risk of chronic diseases such as heart disease, diabetes, and osteoporosis (25).

5. CONCLUSION

The study reveals that Indian adolescents have predominantly unhealthy dietary habits, influenced by cultural norms that prioritize eating less and the growing availability of junk food. Many adolescents lack dietary diversity, with limited intake of protein-rich foods, fruits, vegetables, and dairy, essential for growth and health. Skipping meals is common, leading to nutrient deficiencies, low energy, poor concentration, and potential weight gain. The study highlights the importance of nutrition education in improving adolescent eating habits and recommends further research into interventions to enhance their health outcomes.

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