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To Study the Effect of Imparting Nutrition Education on Nutrient Intake of 10-11 Year old Girls of Government Schools in Mumbai

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Abstract

Background: Quality of life of girls continues to be poor, more so in urban slums which can be solved by imparting nutrition education. *Objectives*: To assess the nutritional status of school going girls (10-11years), to provide nutrition education to the participants and to assess the efficacy of nutrition education on their nutritional status.*Method*: This interventional study was conducted in 100 girls in which anthropometric measurements and 24 hour dietary recall were taken. A self-designed questionnaire was administered which included general information and dietary habits. It also tested the nutritional knowledge of the participants and was scored. Multiple nutrition education sessions were imparted in each school through group discussion. Post- intervention nutritional knowledge was again tested along with anthropometric measurements & 24 hour dietary recall. Knowledge Increment percent was calculated. Statistical analysis was performed using SPPSS software for Windows version 20. $P < 0.05$ was considered to be statistically significant. *Results*: Dietary habits like skipping meals, eating junk food were recorded. Average weight was 29.4±6.06 kg which significantly increased to 29.8± 6.03 kg (p=0.00) and BMI had increased from 15.6± 2.33 kg/m2 to 15.8± 2.27kg/m2 (p=0.00). The pre-intervention nutritional knowledge score had significantly increased to 22.1± 3.22 (p=0.00) with 78.4% knowledge increment. Calorie consumption had significantly increased from 1461±238kcal/day to 1536±210kcal/day post intervention (p=0.00). A significant difference was also seen in the carbohydrate, protein, fats, iron and calcium (p=0.00). *Conclusion*: Nutrition education impacted positively on weight, BMI, level of nutritional knowledge and nutrient intake amongst the school going girls.

Keywords: Nutrition education; Anthropometric measurements; Knowledge increment; Dietary habits; Height; Weight; Energy; Junk food; School going girls; Iron; Calcium; Protein; Fats.

Introduction

Nutrition and health are important for everyone, but they are especially significant for children as it is directly linked to their growth and development; factors which will have a direct impact on their health as adults.[2] Children are the most vital human resource a country possesses. They hold the potential and set the limits of future development.[13] Global evidence suggests that under-nutrition continues to affect millions of children.[5] Every third child born is under weight. About half of the preschool and school age children suffer from under nutrition. [16] Children are the major sector of population suffering from nutrient deficiency. According to National Family Health Survey about 45.5 per cent of children are malnourished in India.[11]

Hence, a proper diet is essential from the very early stages of life for growth, development and active life. Nutrition focuses on the promotion of normal growth and development of infants, school going children, adolescence, and maintenance of adults including special need of pregnant women, lactating mothers and other vulnerable section of the community.[8]

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The school age period is nutritionally significant because this is the prime time to build up body stores of nutrients in preparation for rapid growth of adolescence.[12] The school going girls is in a state or process of growing up from puberty to maturity. They have to encounter a series of serious nutritional challenges not only affecting their growth and development but also their livelihood as adults. Thus it is not surprising that girl population who are "mother to be" is considers as the most important section on which the future of nation depends.[17]

Quality of life of school children, by all standards continues to be poor more so in rural areas and urban slums.[15] Urban slum dwellers are exposed to poor environmental conditions (overcrowding, poor quality drinking water and sanitation, no removal of waste). Ignorance and difficult conditions of life in the slums are likely to result in improper food habits, low health care use and hygiene awareness and lack of knowledge of the origin of sickness and proper measures for the cure. The situation is further worsened due to lack of necessary health centers, medicines, and health care personnel. Children living under such conditions are at especially high risk for health and nutritional problems.[19]

This can be solved by imparting nutrition and health education to gain the knowledge and develop the confidence and skills needed for establishing good dietary and health practices at various levels like family, school and national levels.[17] Nutritional knowledge is perceived as encouraging healthy eating habits hence, increase in nutritional knowledge is likely to influence eating behavior.[2] Health promotion from early stages in life has a major impact on health and well-being during childhood and later stages of life.[18] The nutrition education to the adolescent girls helps them to be decision makers about their food. Nutrition education can bring changes in their anthropometric measurements.[6]

There is a need to assess the impact of nutrition educational intervention on bringing about knowledge improvement of the group in relation to each of the individual topics covered in the educational intervention.[20] Therefore, the present investigation was carried out to check the impact of nutrition education on school going girls belonging to 10-11years of age using nutritional games, charts, leaflets, posters etc.

Methodology

The research proposal was approved by Inter System Biomedica Ethics Committee (ISBEC), Mumbai. This was an interventional study conducted in two government schools of Mumbai, Maharashtra with the consent of the Principal of the schools. The schools chosen for the study were Mahila Mandal's Kanya Vidyalay, Kurla and Mula Mulinche Samarth Vidhyalaya, Santacruz. 100 girls were selected from the age group 10-11 year belonging to fifth and sixth standard. Girls with a history of prolonged medical disorder within the past 12 months and any major systemic disease were excluded.

The data was collected pre and post intervention.

Pre-Intervention

The anthropometric measurements were taken which included height, weight & body mass index. Height was measured using non stretchable measuring tape and weighing scale was used to measure the weight of the participants using the WHO guidelines. BMI was calculated to measure weight status of participants and BMI cut-off for adolescent girls was referred from 2007 WHO cut off. One day 24-hour dietary recall was taken which evaluated the macronutrient intake of the participants. A self designed questionnaire, which included questions, related to their general information (age) and dietary habits was given to the participants. To evaluate the level of nutritional knowledge, the questionnaire also included questions about balanced diet, food practices, junk food, physical activity, hygiene and importance of nutrients and scoring was done.

Multiple nutrition education sessions were imparted to all the participants in each school through group discussion using charts, leaflets, posters etc. In this study there were some participants who were too young to understand words like balanced diet, vitamins and minerals. Hence, easy nutrition games were used to explain them the meaning of these words.

Post-intervention

The questionnaire was given again to participants, which only tested their nutritional knowledge along with anthropometric measurements and 24-hour dietary recall to assess the change in their overall nutritional status.

Formula used for the calculation of knowledge increment percent (KI %) using pre and post intervention scores was:

$$KI\% = \frac{\text{Post intervention score-Pre intervention score}}{\text{Pre intervention score}} \times 100$$

Statistical analysis

Statistical analysis was performed using SPPSS software for Windows version 20. All descriptive data was represented as mean ± SD and percentages. Paired T test was applied to analyze the significant difference in anthropometry, nutrient intake and post nutrition education knowledge. The frequency distribution was tabulated for various parameters used to test nutrition knowledge. $P < 0.05$ was considered to be statistically significant.

Results

Effect of nutrition education on 100 school-going girls with the mean age 10.62±0.48 years was presented in the current study. From the total participants 86% of them were non-vegetarian and 14% were vegetarian. 32% of the girls were skipping meals and 83% of the girls were eating junk food

Table 1: Pre & Post Intervention Anthropometric measurements of the study population

Anthropometric measurements	Intervention (Mean± SD)		t value	Significance (p)
	Pre-assessment	Post-assessment		
Average Height (cm)	136.8 ± 7.29	136.8 ±7.30	1.00	0.32
Average Weight (kg)	29.4 ± 6.06	29.8 ± 6.03	-6.08	0.00
Average Body Mass Index (kg/m^2)	15.6 ± 2.33	15.8 ± 2.27	-8.06	0.00

Table 2: Pre and post intervention nutritional knowledge of the participants

Nutrition Topics		Percentage of participants who answered correctly (%)	
Pre-Intervention		Post- intervention	
Basic nutrition knowledge			
Balanced diet	Definition of balanced diet	24	73
	Composition of healthy meal	87	95
	Plate concept	49	68
Food Practices	Serving of fruits per day	34	84
	Serving of vegetables per day	26	58
	Importance of small frequent meals	52	68
Junk Food	Harmful effects of junk food	20	70
	Unhealthy drinks	71	88
	Healthy snacks	52	87
Physical Activity & Hygiene			
Physical Activity	Importance of exercise	90	96
	Benefits of outdoor games	87	95
Hygiene	Awareness about washing hands before eating food	100	100
	Awareness about washing hands after using toilet	99	100
Importance of Nutrients			
Energy	Sources of energy giving food	24	57
Protein	Awareness about protein	55	94
	Rich source of protein	31	84
	Function of protein	6	68
Fat	Healthy sources of fat	2	54
Vitamin A	Importance & sources	64	87
Calcium	Importance in health	36	77
Water	Daily requirement of water	12	73

Table 3: Pre and Post Intervention Nutrient Intake

Nutrient Intake		Intervention (Mean± SD)		t value	Significance (p)
		Pre-assessment	Post-assessment		
Energy	Kcal	1461 ± 238	1536 ± 210	-9.51	0.00
Carbohydrate	Grams	222.0 ± 30.55	236.6 ± 28.18	-9.48	0.00
	Percentage	61.0 ± 2.97	61.8 ± 2.67	-4.08	0.00
Protein	Grams	40.8 ± 9.75	44.1 ± 9.31	-17.10	0.00
	Percentage	11.1 ± 1.35	11.43 ±1.35	-7.21	0.00
Fats	Grams	41.9 ± 8.70	41.1 ± 7.49	2.81	0.00
	Percentage	25.7 ± 1.93	24.0 ± 1.92	13.6	0.00
Iron	Milligrams	14.9±1.44	17.1±1.57	-16.59	0.00
Calcium	Milligrams	693±87.74	781±56.09	-14.49	0.00

on regular basis. Fig. 1 show that only 2% of the students consumed meat and poultry on daily basis and less than 50% of participants consumed milk or milk products daily which indicate towards the lack of protein in children's diet at this age. Whereas foods like chips, biscuits and candies were consumed on daily basis by 47% of the participants. Fried food was consumed sometimes by 76% of the girls. Grains and vegetables had the highest level of consumption by this age group (92% & 88% respectively).

Studying the Effect of Nutrition Education

Effect of nutrition education was seen on anthropometric measurements, nutritional knowledge and nutrient intake of the participants. According to table 1 there was no significant change in the height of the participants (p=0.32). The mean height pre-intervention was 136.8± 7.29 cm and post intervention the height was 136.6± 7.30cm. Whereas, there was an overall significant improvement in weight and body mass index (BMI) post intervention (p=0.00). Average weight was 29.4±6.06 kg which was significantly increased to 29.8± 6.03 kg and the BMI had increased from 15.6± 2.33 kg/m2 to 15.8± 2.27kg/m2.

The major components like balanced diet, food practices, junk food, physical activity, hygiene and importance of nutrients were included to test the level of nutritional knowledge of the participants before and after imparting nutrition education. The pre-intervention mean nutritional knowledge score was 13.2±2.83 which increased to 22.1± 3.22 post intervention (Fig. 2).The t paired test showed a significant improvement in the scores of the participants (p=0.00). Pre and post intervention, average knowledge increment of the participants was 78.4±44.47%.

Table 2 shows that there was almost a three times increase in the percentage of students who answered questions correctly regarding balanced diet. Post-intervention 73% students answered question correctly based on balanced diet. Knowledge about healthy snacks was also increased, as the percentage of correct answers was increased from 52 to 87%. Concept of harmful effects of junk food had the maximum increase in the percentage of students who answered correctly post intervention; three times increase was found. Knowledge based on importance of nutrients amongst the participants had a tremendous progress in the study. Only 55% of participants were aware about protein which was increased to 94% post intervention. Amongst them 68% of the students retained the knowledge of function of protein. Information about healthy source of fat increased from 2% participants to 54% (twenty-seven times increase in number of students). Improvement in knowledge about other micronutrients was also found.

Nutrient intake was assessed by taking 24-hour recall pre and post intervention. Pre intervention the mean energy was found to be 1461±238 kcal, which was significantly increased to 1536±210 kcal post intervention (p=0.00). But the energy intake by the participants was less than the recommended dietary allowance of ICMR (2010) that is 2010 kcal/ day. The table 3 shows that there was a significant improvement in the intake of all the macronutrients and micronutrients (p=0.00). After imparting nutrition education, the mean carbohydrate consumption was significantly increased from 222± 30.55grams to 236.6± 28.18 grams. 3.3 gram increase was seen in mean protein intake post intervention. Whereas, the mean fat intake was decreased by 0.8 grams. A significant difference was also seen in the percent energy from carbohydrate, protein and fats (p=0.00). The mean intake of iron had increased from 14.9mg to 17.1mg. There was almost 200mg increase in the calcium intake post intervention. But the average intake of both calcium and iron was found to be less than RDA of ICMR (2010)

Discussion

School age is considered as a dynamic period of growth and development because children undergo physical, mental, emotional and social changes. In other words the foundations of good health and sound mind are laid during the school age period.[5] Hence the present study was formulated with the objective, to assess the impact of nutrition education on the nutritional status of school age girls.

The present study showed overall poor nutritional status of the participants along with poor dietary habits. Dietary habits of the school going girls of 10-11 year age group showed skipping meals and consumption of junk food by more than 80% of the girls on daily basis. Habit of consuming healthy foods like dairy products, fruits, eggs and poultry was less. Similar results were seen by Kumar and Mishra (2019) who reported poor consumption of food groups like milk and fruits in adolescent girls (10-19 years). They found that extreme poverty, low status of girls and lack of awareness were the main causes of under nutrition conditions in adolescent girls.[9] Study done by Puri et al (2008) reported high consumption of junk food in adolescents similar to our findings.[14] Das et al. (2016) also reported high intake of fried food amongst adolescent girls and intake of most nutrients was below Recommended Dietary Allowances (RDA) of Indian Council of Medical Research.[4]

This study showed improvement in overall nutritional status and nutritional knowledge of the school going girls by imparting multiple nutrition education sessions. Improvement in their nutritional knowledge score with knowledge increment was recorded. Similarly, there was 24% knowledge increment seen in adolescent girls in a study done in 2013 and there was a significant improvement in the test scores after imparting nutrition education to the students.[18] Also, Mittal et al. (2016) studied that in the age group of 7-10 years and 11-14 years, after playing nutritional knowledge games there was a definite improvement in the nutritional knowledge of children, while the amount may vary from child to child.[10]

Access of nutritional knowledge was poor in the participants. Majority of them were not aware about balanced diet, food practices and importance of macro and micronutrients. Nutrition education was an attempt to bring a significant change in the health status of the girls as they need special attention due to increased demand of their physiological growth. Study done by Vijyapushpam et al. (2010) reported improvement in the overall nutrition and health knowledge of the student volunteers after the intervention as there was an increase in the mean score of the students. The study also stated that post intervention, the percentage of students who answered questions correctly based on energy and protein doubled.[20] Puri et al. (2008) reported that health education resulted in increase in awareness about balanced diet from 42.4% to 82.2% and there was a significant increase in the consumption of calories post intervention.[14] Whereas, Choudhary et al. (2008) reported that there was no differential gain in the scores regarding nutritional messages like balanced diet, food intake pattern and dietary habits, only significant gain was seen in hygiene practice related question.[3]

Significant increase in energy intake was observed in all subgroups of rural and urban areas to which nutrition education was imparted through different methods belonging to urban area amongst participants belonging to early adolescent group. Before imparting nutrition education the energy intake by the subjects was much lower than recommendations by ICMR. They also found that imparting nutrition education had a significant increase in the intake of proteins in the subjects of early adolescence period.[1] Hence, it is suggested that nutrition education can be inducted in the school curriculum to bring about important modifications in the dietary pattern of school going children.

Conclusion

Findings of the study showed that exposure to nutrition education impacted positively on anthropometric measurements like weight and BMI, level of nutritional knowledge and nutrient intake amongst the school going girls. Special attention should be given to meet the nutritional needs of children, as they constitute one fifth of the country's population. Imparting nutrition education through group discussion using charts, leaflets, posters can help children to consume appropriate food. "What to eat and why" is an essential aspect of child's education. It is expected that the nutrition education improves nutritional knowledge, eating behavior of adolescent girls, foster their eating habits in their daily lives and improve their nutritional status and health.

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