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Impact study on nutritional status of adolescent girls through nutrition education programe in YSR Kadapa district of Andhra Pradesh, India

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Abstract

Nutrition education at school level can provide the knowledge and skills to improve the dietary attitudes and behaviors of the children. The present study was conducted with the objective to assess impact of Nutrition Education Programme on Nutritional Status of Adolescent girls in four welfare hostels. 200 girls in the age group of 13-15 years were enrolled from four residential welfare schools of YSR Kadapa, Andhra Pradesh. Different aspects of nutrition were selected *i.e.*, food, food groups, functions of food, nutritional deficiency disorders. Food intake was calculated using 24 hour recall method. Anthropometric measurements height and weight were measured and Body Mass Index (BMI) was also calculated for each girl. Lean has been assessed among adolescent girls using BMI for age. Results of this study Anthropometric measurement revealed that maximum percentage of subjects belonging to underweight, followed by ideal BMI. According to the z-score moderate malnutrition was found in 93% respondents at base line and after Nutrition Education Programme, (NEP) it was found in 72.5%. At base line 7% of the respondents were lying in normal category, after NEP this percent was increased up to 27.5% respectively. The Adequacy of Food and nutrient intake data showed that the mean nutrient intake of all the nutrients (Vitamins A, B and minerals Calcium, Iron) were lower than the Recommended Dietary Allowance (RDA). Their diet was found grossly inadequate at base line in cereals, pulses, milk and milk products, green leafy vegetables, fruits, other vegetables and fats and oils, whereas adequacy for only carbohydrate was found more than Recommended Dietary Intake. The results of the study thus conclude that Nutrition Education Programme made a significant impact in improvement of nutritional status of adolescent girls.

Keywords: Anthropometric, body mass index, dietary intake, malnourished and RDA

Introduction

Health is a fundamental human right and is central to the concept of quality of life (David R *et al.* 2010) [1]. Adolescence is a period of second decade of life and constitute over one fifth of India's population adolescence begins when the secondary sex characteristics appear and ends when somatic growth is completed and the individual is psychologically mature, capable of becoming a contributing member of society. Adolescents are in the age group of 12 to 18 years. Girls begin to menstruate at this age. The adolescent girl should have a weight approximately 42-64 kg and height approximately 155-169 cm. Total nutrient requirements are increased during adolescence age to support a period of drastic growth and development (Hurlock, Eelizabeth B, 2000) [2]. Eating right food at right time will prevent the nutritional deficiencies especially Iron deficiency disorders.

Nutritional status is one of the indicators of the overall well-being of population. Health and nutrition are the most important contributory factors for human resource development in the country. India has been classified by the World Bank as a country with a lower middle income, with per capita GNP of US \$ 996-39451. It ranks 160th in terms of human development among 209 countries (National Nutrition Monitoring Bureau Technical Report No. 20, 2011) [4]. Among the Indian population, about 28% in the rural and 26% in the urban areas are estimated to be below the poverty line, which is defined as the expenditure needed to obtain, on an average of 2400 Kcal per capita per day in the rural areas where as 2100 Kcal in urban areas. Long-term malnutrition leads to stunting and wasting, non-communicable chronic diet related disorders, increased morbidity and mortality and reduced physical work output. Nutritional awareness is important today in India, many young girls and women are malnourished and anemic, due to lack of accurate information and proper guidance, adolescents are prone

to various nutritional morbidities. The nutritional status of adolescent girls, the ‘future mothers’ contributes significantly to the nutritional status of the community. The efforts to include adolescent girls as beneficiaries in some of the health and nutrition intervention programs like Weekly Iron Folic acid Supplementation (WIFS), Mid Day Meal (MDM) programmes *etc.*, are taken by the girls, Therefore, it is needed to educate and train these adolescent girls regarding health and nutritional awareness. The present study has been carried out with following objectives:

- To assess the existing nutritional status of adolescent girls enrolled.
- To develop educational material for nutrition education programme.
- To assess the impact of nutrition education on nutritional status of the target group.

Materials and Methods

200 adolescent girls from four residential welfare schools (13-15 years) were enrolled for the study. Different aspects of nutrition and health were selected *i.e.*, food, food groups, functions of food, nutritional deficiency disorders. A pre structured tool was used under nutritional assessment *i.e.*, Anthropometric measurements, food intake (24 hr recall method). A questionnaire was developed to assess nutritional knowledge of adolescent girls.

Nutritional Anthropometry

Anthropometric measurements height and weight were measured and compared as per the guidelines suggested by Indian Council for Medical Research (ICMR-2011) standards (Table 1 & 2). Height was measured by using a height scale nearest to 0.1 cm. A portable personal weighing scale was used to measure the weight in kilograms nearest to 0.1 kg, with ordinary casual clothing and without shoes.

Table 1: The International Classification of BMI based on WHO

| Classification | BMI (kg/m ²) | |
|-------------------|--------------------------|---------------------------|
| | Principal cut-off points | Additional cut-off points |
| Underweight | < 18.50 | < 18.50 |
| Severe thinness | < 16.00 | < 16.00 |
| Moderate thinness | 16.00 - 16.99 | 16.00 - 16.99 |
| Mild thinness | 17.00 - 18.49 | 17.00 - 18.49 |
| Normal range | 18.50 - 24.99 | 18.50 - 22.99 |
| | | 23.00 - 24.99 |
| Overweight | ≥ 25.00 | ≥ 25.00 |
| Pre-obese | 25.00 - 29.99 | 25.00 - 27.49 |
| | | 27.50 - 29.99 |
| Obese | ≥ 30.00 | ≥ 30.00 |
| Obese class I | 30.00 - 34.99 | 30.00 - 32.49 |
| | | 32.50 - 34.99 |
| Obese class II | 35.00 - 39.99 | 35.00 - 37.49 |
| | | 37.50 - 39.99 |
| Obese class III | ≥ 40.00 | ≥ 40.00 |

Table 2: WHO BMI for age (Z scores)

| | |
|-----------------------------|--------------------------|
| > Median - 2 SD to < + 1 SD | Normal |
| Median < - 2 SD to > - 3 SD | Moderate under nutrition |
| < Median-3 SD | Sever under nutrition |
| Median > + 1 SD to < + 3 SD | Overweight |
| > + 3 SD | Obesity |

Body Mass Index (BMI): BMI is a simple index of weight-for-height that is commonly used to classify underweight,

overweight and obesity. It is defined as the weight in kilograms divided by the square of the height in meters (kg/m²).

$$BMI = \text{Weight (kgs)} / \text{Height (m}^2\text{)} \times 100$$

An information package was developed using selected messages and for this in depth content was collected from the relevant and available literature. For each selected aspect flash cards, slides and posters were developed. The content was delivered through lecture. Supplemented with audio-visual aids in the form of videos, charts, flashcard and slides. In Present study nutrition education package was delivered to the target group by the investigator visited the school at least once in a 5 days for 90 days continuously. The knowledge test was administered twice *i.e.*, before the delivery of training to know the initial knowledge and after 15 ± 2 days of completion of the training to find out retention in knowledge. After data collection, analyzed with the help of statistical tools for adequate conclusion. Percentage, mean percent score, were used to analyze general background information and knowledge of respondents before and after ±15 days of training.

Results

All the respondents (100 %) were belonging to Hindu family. Majority of respondents (58%) were from Other Backward Caste (OBC) 22% were from schedule caste (SC) and 20 % were belongs to Economically Back word Caste. 72% adolescent girls had nuclear type of family structure with big family size (four or five children). Majority (90%) of them were non-vegetarian. Only 10 % were from ovo vegetarian. Their main family occupation was farming and laborer work. 90% of respondents had ₹ 5000 - 10,000 per month as their family income.

Adequacy of food intake

Food intake was calculated using 24 h recall method for one day. Type of food consumed was assessed and quantity of raw food was reported in grams. Percentage adequacy of food intake was assessed by balance diet for adolescent girls (13-15 years) recommended by National Institute of Nutrition and Indian Council for Medical Research (NIN and ICMR.) below the given.

$$\% \text{ Adequacy of food intake} = \frac{\text{Food take}}{\text{Recommended dietary intake (RDI)}} \times 100$$

Table 3: Mean and percent Adequacy of food intake (Food intake of adolescent girls N = 200)

| Food group | RDI | Mean | | Percentage of Food intake | |
|------------------------|-----|----------|-----------|---------------------------|-----------|
| | | Pre test | Post test | Pre test | Post test |
| Cereals and millets | 330 | 117.64 | 201.6 | 35.64 | 61.09 |
| Pulses | 60 | 30.67 | 42.2 | 51.11 | 70.33 |
| Milk & products | 500 | 244.84 | 291.4 | 48.96 | 58.28 |
| Roots & tubers | 100 | 61.54 | 86.1 | 61.54 | 86.1 |
| Green leafy vegetables | 100 | 20.7 | 41.5 | 20.7 | 41.5 |
| Other vegetables | 200 | 61.4 | 86.1 | 30.7 | 43.05 |
| Fruits | 100 | 43.7 | 60.3 | 43.7 | 60.3 |
| Sugars | 25 | 8 | 10 | 32.00 | 40.00 |
| Fats/oil | 35 | 9.5 | 22.4 | 27.14 | 64.00 |

Data in Table 3 revealed that at base line adequacy of roots tubers, and pulses were high in both pre and post test 61.54% and increased to 86.1% due to menu plan of the schools. The adequacy of Cereals, Green leafy vegetables and other vegetables intake was inadequate i.e., 35.64%, 20.7% and 30.7%. After the programme it was increased by 61.09%, 41.5% and 43.05% in target group respectively. Regular consumption of pulses in moderate quantity 51.11% raised up to good 70.33% The adequacy of milk and milk products at base line was 48.96% in group it was 58,28% after the programme. Twice in a week fruits supply (banana) by the hostel but also consumption of fruits is low 43.7% and the adequacy of fruits is increased to 60.3%. The adequacy of sugars is increased from low 32% to moderate 40% and fats also low in consumption but after the training programme were moderately consuming 27.14% to 64% respectively.

Adequacy of Nutrient intake: Nutrient intake was calculated using food composition table and Mean nutrient intake for one day was compared with recommended dietary allowances (NIN) and percent adequacy was calculated as follows.

$$\% \text{ Adequacy of Nutrient intake} = \text{Nutrient in take/RDA} \times 100$$

Table 4: Mean and percentage Adequacy of Nutrient Intake (Food intake of adolescent girls N=200)

| Nutrient | RDI | Mean | | % Nutrient intake | |
|---------------|-------|----------|-----------|-------------------|-----------|
| | | Pre test | Post test | Pre test | Post test |
| Energy | 2330 | 1136.7 | 1361.1 | 48.75 | 58.41 |
| Protein | 51.9 | 23.5 | 34.3 | 45.27 | 66.08 |
| Carbohydrate | 349.5 | 232.7 | 225.1 | 66.58 | 64.40 |
| Fat | 40 | 9.1 | 21.5 | 22.75 | 53.75 |
| Calcium | 800 | 240.7 | 354.1 | 30.08 | 44.25 |
| Iron | 27 | 7.9 | 11.1 | 29.25 | 41.11 |
| β carotene | 4800 | 661.1 | 818.6 | 13.77 | 17.05 |
| Ascorbic acid | 40 | 8.8 | 13.2 | 22.00 | 33.00 |

Data in Table 4 revealed that protein intake in group was found inadequate i.e., 45.27% and rose up to 66.08%. Intake of fat was also inadequate i.e., 22.75% after NEP it was

Table 6: Percent distribution of BMI at baseline and after NEP survey as per BMI

| Variables | Underweight | | | Normal range | Overweight | Obese | | |
|-----------|-----------------|-------------------|---------------|--------------|------------|---------------|----------------|-----------------|
| | Severe thinness | Moderate thinness | Mild thinness | Normal range | Pre-obese | Obese class I | Obese class II | Obese class III |
| Pre test | 8(16) | 37(74) | 48(96) | 7(14) | - | - | - | - |
| Post test | 3(6) | 4(8) | 65.5(131) | 27.5(55) | - | - | - | - |

Conclusion

This study affirms that the growing youth malnutrition epidemic is due to multiple influences on children’s food consumption patterns. This study revealed that school-based nutrition education program is has its own importance because food gap is the principal contributor to under-nutrition in India. Nutrients intake was assessed by 24 hour recall method, deficiencies of all nutrients in adolescent girls were observed. Base line survey indicated that lack of awareness, poor socio economic background, dietary inadequacy, poor quality of diet the main factors associated with low dietary intake of these girls. But after imparting nutrition education food intake was significantly increased but it was also less than RDA. Their school menu was also found to be inadequate compare to RDI for adolescent girls. The requirement of nutrients was not adequate even after implementation of the programme but the intake of energy,

increased to moderate levels i.e., 53.75%. The adequacy of carbohydrate in the diets of adolescents was 66.58% but it was decreased 2% from previous consumption i.e., 64.40% while the adequacy of energy was 48.75% is increased to 58.41%. The adequacy of calcium intake for adolescent was 30.08% and it was after NEP 44.25%. At base line the adequacy of carotene in the diets of girls was only 13.77% after the programme it was 17.05 %, the iron intake of group was 29.25% adequately increased up to moderate level 44.25%. After the programme adequacy of iron was increased but it was found that adequacy of iron was half of the RDI may be because of low inclusion of iron rich foods in daily diet. Intake of ascorbic acid was very low i.e., 13.2 at base line survey and increased to 33% after the NEP. The adequacy of all the nutrients (except carbohydrate) was increased after nutrition education programme but they all were inadequate when compared to RDI.

Data regarding anthropometric measurements (table 5) showed that the mean height of adolescent girls at base line was 1.43 m and after imparting nutrition education it was 1.49 m., the mean weight of the adolescent girls at baseline and after NEP 35.8 and 39.1 units respectively.

Table 5: Anthropometric data of adolescent girls N=200

| Variables | Pre test | Post test | t value |
|------------------|----------|-----------|---------|
| Mean height (m) | 1.43 | 1.49 | 1.34 |
| Mean weight (Kg) | 35.8 | 39.1 | 3.4 |
| BMI | 17.3 | 18.9 | 2.8 |

Percent distribution of BMI at baseline and after NEP (Table 6) Maximum percentage of subjects belonged to malnutrition (8% severe thinness) (37% moderate thinness) (48% mild thinness and 7% was at normal range) at baseline of NEP. None of the subjects belonged to over-weight and obese grade category. After NEP 3% respondents were severe thinness, 70.5% found as Moderate and mild thinness. Base line survey indicated that 7% of respondents were in lying in normal category. After imparting nutrition education, the percent of normal category children were increased up to 27.5%.

fat, and protein has increased.

The results of the present investigation revealed that nutrition education was effective in increasing the level of nutrient intake. Further because of their curiosity in learning new things and potential learning power, gain in knowledge was high. Therefore, there is a great need for school-based nutrition education and consistent health education programs to be included in schools to promote healthy nutrition and improve children dietary behaviors. It is hope that this study can serve as a reference point for future research in the field of nutrition education in schools.

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