

The Impact of Nutrition Education and Dietary Counselling on Anthropometric Measurements of Adolescent Girls belonging to different Socio-economic Backgrounds, Bihar

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ABSTRACT: Several recent studies have reported that adolescent girls from every corner of India particularly from rural areas had poor health status and the roots of this problem was found that most of the adolescents were not aware about proper dietary pattern and also lack of nutritional knowledge. In Bihar, adolescent girls are suffering from serious health problem due to socio economic conditions, nutrition and gender discrimination. According to National Nutrition Monitoring Bureau (2003), in the rural area more than 40-50 per cent girls have been reported to be undernourished. The study was carried out on 100 adolescent girls belonging to 15-19 years age group and categorized them into three socio-economic groups *i.e.* lower class, middle class and upper class. Their pre and post anthropometric measurements were taken in order to find out the impact of education intervention and counselling on their health status. It was noticed that most of the girls from lower class background were malnourished as compared to middle class and upper class family but after exposure of nutrition intervention and dietary counselling it was slightly decreased the range of malnourished and most of the girls were obtained normal BMI. It was showed that after nutrition intervention and dietary counselling, positive changes were showed in every income group (Lower, middle and upper class) of adolescent girls.

Keywords: Adolescent girls, anthropometric measurement, socio-economic background, nutrition intervention, dietary counselling.

INTRODUCTION

Nutritional status of adolescent girls is very essential since they are future mothers, and their nutritional requirements increase tremendously compared to the preceding years of growth (Das *et al.*, 2022). Adolescence period is described as “neither children nor adult” or as “growing-up years”. The global adolescent population was about 1.8 million and 90% of the adolescent community living in low and middle income countries (Santhanam and Maheswari 2022). Under nutrition is one of the serious health problems among adolescents in India where 253 million adolescents are in the age group of 10–19 years (Parida *et al.* 2022). Adolescent girls are vulnerable to many problems, under nutrition being the most common. This results in growth restriction resulting in stunting, wasting, underweight and last but not the least iron-deficiency anaemia. Nutritional needs are high during puberty which later leads to complications during pregnancy and its outcomes (Mohanty and Panda 2022). According to the national nutrition monitoring bureau (2012), 38 per cent to 81 per cent thinness was found among tribal adolescent (Maiti *et al.*, 2012). The national family health survey-3 data showed that almost

half of the adolescent girls (46.8 per cent) suffered from malnutrition (Joshi *et al.* 2014).

The national food corporation survey conducted in 2001-2003, revealed that among girls the prevalence of thinness was 10.5 per cent (Kelishadi *et al.*, 2007). Singh *et al.* (2014) observed that the adolescent girls suffered from underweight (32.8%), stunting (19.5%) and thinness (26.7%). They showed that early adolescents had the maximum prevalence of malnutrition ranging from 28 per cent to 47 per cent (Singh *et al.* 2014).

Freedom from poor health and nutritional status is a basic human right for every individual (Choudhary *et al.*, 2015). Proper knowledge of health related issue and also dietary pattern could be a significant step towards breaking the vicious cycle of intergeneration under nutrition, obesity, anaemia and also various chronic diseases of adolescent girls (Hussain and Khan 2015). Poor socio economic status and low literacy level is a significant aspect which often leads to under nutrition in adolescent girls (Doustmohammadian *et al.*, 2013).

MATERIAL AND METHODS

Out of 38 districts in Bihar, Samastipur district was chosen purposively for the study. As per census 2011,

Samastipur district spans over an area of 2904 sq.kms with a population density of 1465 per sq.km. Approximately 4.25 million populations are residing in Samastipur (22, 28,432 male and 20, 26,350 female) (Source: Government of Bihar 2011).

Study was carried out on 15-19 years age group of adolescent girls. Total number of adolescent girls was 100 and they were classified into three different groups' i.e. upper class, middle class and lower class by the use of Kuppaswami socioeconomic status (SES) scale Performa modernized by Kumar *et al.* (2013). Out of total 100 respondents, 78 respondents from lower class families, 14 respondents from middle class families and 8 respondents from upper class families were selected for this present study.

Kuppaswami socioeconomic status was originally proposed in 1976. Socio economic scale is based on the three items- family income, education and occupation of head of the family's. Information of these items was collected using SES scale (Kumar *et al.*, 2013).

Their pre and post anthropometric measurements were taken in order to find out the impact of education intervention and counselling on their health status. In this present study, the weight of the selected adolescent girls was measured using digital weighting machine with minimum clothing. Weights of respondents were noted three times and average of the three readings was taken as the final measurement and mean value for weight were compared with reference value of ICMR (2010). Height of the selected subjects was taken in light clothing and barefoot to the nearest millimetre with a stadiometer. Stadiometer is a device used for height measuring purpose. Heights were recorded thrice and then average was taken for the final measurement. These average values for height were compared with standard value of ICMR (2010). BMI is accepted as the standard index for determination of normal weight, under weight, over weight and obesity and its ability for the identification of excess body fat in adolescents (Rodriguez, 2004). BMI is calculated by dividing weight in kg by the square of height in meters (Mondal and Sen 2010).

BMI = weight (kg)/ height (m²)

BMI (Body Mass Index) Weight Status

Below 18.5- Underweight

18.5-24.9 -Normal

25.0-29.9 - Overweight

30.0 and Above- Obese

Nutrition education package were delivered with the help of various education methods namely lectures, storytelling, drama and videos. The frequency of lectures was once in a week. In this current study, individualized dietary counselling was conducted for the selected adolescent girls. Respondents were asked about dietary habits and nutrition related various question. To assess the impact of nutrition knowledge of adolescent girls, pre and post test were conducted and respondents obtained 'yes' or 'no' categories. The scoring of each component was done on two points i.e. whether correct or incorrect. Right response was allocated with a score i.e. one while wrong response was given score zero. Total score obtained of each selected subject was summed up for each aspect separately. Percentage and frequency were used to analyse the data for grades of malnutrition of respondents. Mean \pm standard deviation were calculated for the values of anthropometric measurement and t test was used to compare the mean height, weight of different socio-economic group and also to find significant difference among all group of adolescent girls (Horibe, 1990).

RESULTS AND DISCUSSION

Data on effect of nutrition intervention and dietary counselling on anthropometric measurements of adolescent girls from different socio-economic group presented in Table 1-3.

After perusal of (Table 1) it was found that the initial height of different age group of lower class respondents before imparting education and counselling was 153 cm (15 years), 155 cm (16 years), 157 cm (17 years) and 158 cm (18-19 years) which remain unchanged after nutrition education and counselling and that may be because of short time period of study.

Table 1: Effect of nutrition education and dietary counselling on anthropometric measurement of respondents belonging to lower class.

Lower class N=78					
Parameters	Reference value#	Initial value	Final value	% change	t-value
Height (cm)					
15 years n=9	158	153 \pm 0.01 (96.84)	153 \pm 0.01 (96.84)	-	-
16 years n=13	159	155 \pm 0.02 (97.48)	155 \pm 0.02 (97.48)	-	-
17 years n=17	160.2	157 \pm 0.01 (98.00)	157 \pm 0.01 (98.00)	-	-
18-19 years n=39	161.1	158 \pm 0.007 (98.08)	158 \pm 0.007 (98.08)	-	-
Weight (kg)					
15 years n=9	49.4	42 \pm 2.34 (85.02)	42.5 \pm 1.93 (86.03)	+1.01	0.49 ^(NS)
16 years n=13	51.3	42.3 \pm 3.79 (82.46)	42.61 \pm 3.52 (83.06)	+0.6	0.21 ^(NS)
17 years n=17	52.8	44.22 \pm 4.39 (83.75)	44.48 \pm 4.04 (84.24)	+0.49	0.18 ^(NS)
18-19 years n=39	53.8	46.87 \pm 4.33 (87.12)	46.93 \pm 4.25 (87.23)	+0.11	0.06 ^(NS)
BMI (kg/m²)					
15 years n=9	19.6	17.78 \pm 0.95 (90.71)	17.99 \pm 0.74 (91.79)	+1.08	0.51 ^(NS)
16 years n=13	20.1	17.62 \pm 1.75 (87.66)	17.75 \pm 1.62 (88.31)	+0.65	0.19 ^(NS)
17 years n=17	20.6	17.9 \pm 1.59 (86.89)	18.00 \pm 1.44 (87.38)	+0.49	0.2 ^(NS)
18-19 years n=39	20.7	18.75 \pm 1.72 (90.58)	18.77 \pm 1.68 (90.68)	+0.1	0.06 ^(NS)

#ICMR 2010; Values are mean \pm SD; n- Indicates the number of respondents; Figure in parentheses indicate per cent of reference value; t- values indicated comparison of pre and post scores; NS-Non-significant.

Before nutrition education and counselling, the initial body weight of different age group of lower class respondents was 42 kg (15 years), 42.3 kg (16 years), 44.22 kg (17 years) and 46.87 kg (18-19 years). After one month of education and counselling it was observed that the mean weight of different age group of lower class respondents was slightly increased and the mean body weight was 42.5 kg (15 years), 42.61 kg (16 years), 44.48 kg (17 years) and 46.93 kg (18-19 years). The initial mean body mass index of different age group of lower class adolescent girls before education

and counselling was 17.78 (15 years), 17.62 (16 years), 17.9 (17 years) and 18.75 (18-19 years) and it increased to 17.99 (15 years), 17.75 (16 years), 18.00 (17 years) and 18.77 (18-19 years) after nutrition training and counselling. It was noticed that most of the girls from lower class groups were malnutrition but after exposure of one month to nutrition intervention and dietary counselling it was slightly decreased the range of malnourished and most of the girls were obtained normal BMI.

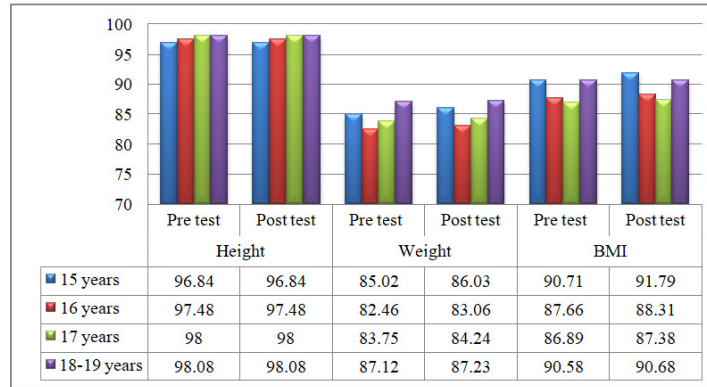


Fig. 1. Comparison between pre and post test of weight and BMI of lower class respondents (15-19 years).

Analysis of data (Table 2) indicates that the initial height of different age group of middle class respondents before imparting education and counselling was 152 cm (15 years), 155 cm (16 years), 156 cm (17 years) and 157 cm (18-19 years) which remain unchanged after nutrition education and counselling. Before nutrition education and counselling, the initial body weight of different age group of middle class

respondents was 41.5 kg (15 years), 43.25 kg (16 years), 44.25 kg (17 years) and 46.91 kg (18-19 years). After one month of education and counselling it was observed that the mean weight of different age group of middle class respondents was slightly increased and the mean body weight was 42 kg (15 years), 43.75 kg (16 years), 44.75 kg (17 years) and 47.16 kg (18-19 years).

Table 2: Effect of nutrition education and dietary counselling on anthropometric measurement of respondents belonging to middle class.

Middle class N=14					
Parameters	Reference value#	Initial value	Final value	% change	t-value
Height (cm)					
15 years n=2	158	152±0.007 (96.20)	152±0.007 (96.20)	-	-
16 years n=4	159	155±0.005 (97.48)	155±0.005 (97.48)	-	-
17 years n=2	160.2	156±0.007 (97.38)	156±0.007 (97.38)	-	-
18-19 years n=6	161.1	157±0.02 (97.45)	157±0.02 (97.45)	-	-
Weight (kg)					
15 years n=2	49.4	41.5±4.94 (84.00)	42±4.24 (85.02)	+1.02	0.1 ^(NS)
16 years n=4	51.3	43.25±5.05 (84.31)	43.75±4.5 (85.28)	+0.97	0.14 ^(NS)
17 years n=2	52.8	44.25±8.13 (83.81)	44.75±0.007 (84.75)	+0.94	0.06 ^(NS)
18-19 years n=6	53.8	46.91±4.67 (87.19)	47.16±4.3 (87.66)	+0.47	0.09 ^(NS)
BMI (kg/m²)					
15 years n=2	19.6	17.83±1.96 (90.97)	18.05±1.65 (92.09)	+1.12	0.11 ^(NS)
16 years n=4	20.1	17.87±1.96 (88.91)	18.08±1.73 (89.95)	+1.04	0.15 ^(NS)
17 years n=2	20.6	18.08±3.48 (87.77)	18.28±3.19 (88.74)	+0.97	0.06 ^(NS)
18-19 years n=6	20.7	19.02±2.22 (91.88)	19.12±2.1 (92.37)	+0.49	0.08 ^(NS)

ICMR 2010 ; Values are mean±SD; n- indicates the number of respondents; Figures in parentheses indicate per cent of reference value; t-values indicated comparison of pre and post scores; NS- Non-significant

The initial mean body mass index of different age group of middle class adolescent girls before education and counselling was 17.83 (15 years), 17.87 (16 years), 18.08 (17 years) and 19.02 (18-19 years) and it

increased to 18.05 (15 years), 18.08 (16 years), 18.28 (17 years) and 19.12 (18-19 years) after nutrition education and counselling.

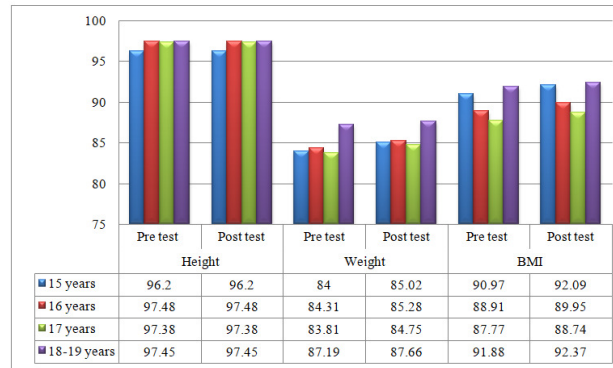


Fig. 2. Comparison between pre and post test of weight and BMI of middle class respondents (15-19 years).

Data in (Table 3) showed that before imparting education and counselling the initial height of 16 and 17 years age group of upper class respondents were 154 cm and 18-19 years age group of girls was 156 cm which remain unchanged after nutrition education and counselling.

Before nutrition education and counselling, the initial body weight of different age group of upper class respondents was 43.16 kg (16 years), 44.25 kg (17 years) and 48.33 kg (18-19 years). After one month of education and counselling it was observed that the

mean weight of different age group of upper class respondents was slightly increased and the mean body weight was 44.16 kg (16 years), 44.75 kg (17 years) and 48.66 kg (18-19 years).

The mean body mass index of different age group of upper class adolescent girls before education and counselling was 18.12 (16 years), 18.53 (17 years) and 19.71 (18-19 years) and these increased to 18.54 (16 years), 18.74 (17 years) and 19.84 (18-19 years) after nutrition education and counselling.

Table 3: Effect of nutrition education and dietary counselling on anthropometric measurement of respondents belonging to upper class.

Upper class N=8					
Parameters	Reference value #	Initial value	Final value	% change	t-value
Height (cm)					
16 years n=3	159	154±0.05 (96.86)	154±0.05 (96.86)	-	-
17 years n=2	160.2	154±0.007 (96.13)	154±0.007 (96.13)	-	-
18-19 years n=3	161.1	156±0.005 (96.83)	156±0.005 (96.83)	-	-
Weight (kg)					
16 years n=3	51.3	43.16±0.76 (84.13)	44.16±0.28 (86.08)	+1.95	2.12 ^(*)
17 years n=2	52.8	44.25±3.18 (83.81)	44.75±3.18 (84.75)	+0.94	0.15 ^(NS)
18-19 years n=3	53.8	48.33±10.11 (89.83)	48.66±9.86 (90.45)	+0.61	0.04 ^(NS)
BMI (kg/m²)					
16 years n=3	20.1	18.12±0.37 (90.15)	18.54±0.01 (92.24)	+2.09	1.94 ^(NS)
17 years n=2	20.6	18.53±1.16 (89.95)	18.74±1.61 (90.97)	+1.02	0.18 ^(NS)
18-19 years n=3	20.7	19.71±4.2 (95.06)	19.84±4.18 (95.85)	+0.79	0.03 ^(NS)

ICMR 2010 ; Values are mean±SD; n- indicates the number of respondents; Figures in parentheses indicate per cent of reference value; t- values indicated comparison of pre and post scores; * Significant at 5% ; NS- Non-significant

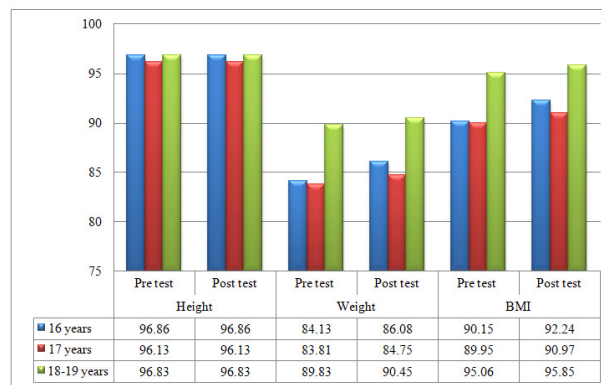


Fig. 3. Comparison between pre and post test of weight and BMI of upper class respondents (15-19 years).

The results of current study are supported by Bi and Samantaray (2022), they conducted a study on the Association Between Body Mass Index (BMI) and Nutritional Knowledge among Adolescent Girls. It was found that 15% of girls from underweight group followed healthy eating habits and 13.7% of girls followed unhealthy eating habits. Under the normal BMI group – 16.25% of girls pursued healthy eating habits and 8.7% of the girls still pursued unhealthy eating pattern. It is observed that majority of the girls lacked knowledge regarding nutrition, balanced diet, dietary pattern, health and hygiene, which could adversely impact their health and pave the way for various deficiency diseases. It was resulted that after adequate counseling about the importance of nutrition, balanced food; healthy food improvement in knowledge and attitude of most of the respondents. Increase in height, and weight as well as changes in external appearance and body contour usually occur during adolescence. Therefore, inadequate level of nutrients in the diet could eventually lead to deficiency diseases, thereby hampering the growth and development in individuals. After counseling and discussion with girls, they realized the importance of healthy and home-made food, balanced diet, impacts of fast food on health. Therefore “Nutrition Education programmed” was beneficial to create awareness among the adolescents’ girls.

The results of current study are also supported by Roza *et al.* (2019), they conducted a study in Southern Ethiopia and the main objective of study was to improve pulses consumption by adolescent school going girls. The study were divided into two groups, one group received bi-monthly lessons while another was control group. The study showed that after education intervention the rate of prevalence of underweight decreased from 13.6 per cent to 3 per cent, while control group scores remained low and unchanged.

CONCLUSION

It can be concluded that respondents those were belonging to lower class their weight and BMI was less as compared to middle class and upper class. But it was showed that after nutrition intervention and dietary counselling, weight and BMI of respondents of each socio-economic group was slightly increased. But heights of respondents were remaining unchanged. Positive changes were showed in every income group of adolescent girls.

FUTURE SCOPE

In the future it can focus on nutritional assessment of pregnant women, lactating women as well as school going children with reference to socio-economic background.

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Conflict of Interest. None.

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