Nutritional Disorders among College going Adolescent Girls

C. Helen[1], Dr. Jagan Mohan[2]

[1]Food & Nutrition, Mother Teresa Women's University, Kodaikanal, India

[2]Professor & Head, Dept. of Food Product Development, IIFPT, Thanjavur, India

Abstract: *Improving nutritional status during adolescence is an opportunity to improve the lives of present and the future generation. Estimating the burden of malnutrition among adolescent girls is fundamental to target intervention for current, future, and intergenerational nutritional health. The present study was aimed to estimate the prevalence of nutritional disorders viz., under nutrition, over nutrition, obesity and anaemia among college going adolescent girls. This is cross-sectional based study carried out among 621 college going adolescent girls of age 17-19 years. Anthropometric measurements were recorded using standardized methodology as recommended by World Health Organization (WHO). Haemoglobin estimation was done using cyanmethaemoglobin method. Standard operational definitions were used. Various statistical applications like percentiles, mean, standard deviation and chi-square were used for analysis of the data. The findings of the present study confirm that the mean weight of the adolescent girls of 17, 18 and 19 years were 47.5 ± 3.45, 49.2 ± 4.72 and 51.2 ± 5.54 kg respectively which were higher than the ICMR standard but lesser than the NCHS standards. It was also observed that the mean height of the adolescent girls was ranged from 149.5 ± 5.12 to $154.65\pm54cm$. Thus the mean height of adolescent girls in all age groups was in close proximity to NCHS and ICMR standards. The prevalence of overweight, underweight and obesity among adolescent girls were 42.4%, 18.4% and 1.1% respectively. Findings of the present study show that only 17.2 % of the adolescent girls had normal haemoglobin whereas majority (82.8%) were anaemic. Regarding the severity of anaemia a higher percentage (47.1%) of adolescent girls had moderate anaemia. About 31.7% of adolescent girls had mild anaemia and only a minimum percentage (3.8%) had severe anaemia. Therefore the study highlights the complexity of nutritional disorders among adolescent girls and emphasizes their nutritional disorders as major public health concern.*

Keywords: Adolescent girls, Undernutrition, Overnutrition, Obesity, Anaemia

1. Introduction

Adolescence is a crucial period in the lifecycle for its nutritional vulnerability. During this period, adolescents achieve 15%-20% of their adult height, up to 60% of their skeletal mass, and half their adult body weight. This rapid growth and development of adolescents leads to an increased need for energy, protein, iron, and other micronutrients (Spear 2002). Good nutrition during adolescence is critical to cover the deficits suffered during childhood and should include nutrients required to meet the demands of physical and cognitive growth and development and prevent adult onset of nutrition-related diseases (WHO, 2006). Inadequate nutrition during this time can result in adverse health conditions and intergenerational malnutrition. The major public health problems among adolescents are over-nutrition and under-nutrition with the former increasing the risk for non-communicable diseases such as diabetes and cardiovascular disease, and the latter resulting in damage to tissue and organs (NCD Risk Factor Collaboration 2017; WHO 2013). Adequate nutrition during adolescence may be a window of opportunity for catch-up growth from nutritional deficiencies suffered during early childhood (Prentice et al. 2013). For girls, low BMI and short stature during childbearing years increase the risk of adverse birth outcomes and obstetric complications. Adolescent girls are also at increased risk of developing iron deficiency and anaemia, for several reasons. Regular blood loss that occurs with menstruation increases iron losses and thus iron requirements. Periods of high growth and development during adolescence and pregnancy incur significant additional iron needs (WHO, 2015). The nutritional anaemia in this group attributes to high MMR, high incidence of low-birth weight babies, high perinatal mortality and fetal wastage and consequent high fertility rates. Anaemia also has a negative effect on the cognitive performance in adolescents (Savita etal., 2014). Thus nutritional disorders of adolescent girls have major consequences on human health as well as social and economic development of the nation. It is therefore in the interests of policy makers to carry out necessary investments in prevention of nutritional disorders as a means to promote human capital development, economic growth and long-term health. Better understanding of the prevalence of nutritional disorders among adolescent girls is needed to initiate policy discussions on addressing at country level and to inform context-specific adaptations of recommendations. Therefore, the present study was aimed to investigate the nutritional disorders of adolescent girls in terms of undernutrition, overnutrition, obesity and anaemia.

2. Materials and Methods

A random population of 621 adolescent girls in the age group of 17-19 years studying in a private college, Madurai was selected to screen for nutritional disorders. An interview schedule was developed to collect the background information of the subjects. The study was approved by the institutional ethical committee (MMHRC-IEC) and written consent for participation in the study was obtained from the parents of the adolescent girls. Anthropometric measurements like height and weight of the subjects were measured. The anthropometric measurements were then compared with the standards of Indian Council of Medical

Research (ICMR,1984) and National Council Health Statistics (NCHS, 1974). Body Mass Index (BMI) was computed using the standard equation: $BMI(kg/m2) = Weight (kg/height2 (m2))$. For the comparison of anthropo-metric data, National Centre for Health Statistics and National Health and Nutrition Examination Survey standards were used. The cut-off value for thinness was the <5th percentile of NCHS-CDC standards and for overweight, it was > 85th of NCHS-CDC standards. The statistical analysis was done using SPSS statistical software applying chi-square test. Haemoglobin estimation was done using cyanmethaemoglobin method. According to WHO standards, for interpretation of anaemia, cut-off point for haemoglobin level taken was 12 g/dl. The severity of anaemia was graded as mild (11-11.9 gm/ dl), moderate (8-10.9 gm/dl) and severe (<8 gm/dl). The collected data was analyzed statistically using Statistical Package for Social Sciences Version 16.0 for Windows. Chi-Squared test ($X2$) was used to determine significant differences between the categorical variables ($P<0.05$).

3. Results and Discussion

Table 1 represents the age wise distribution of adolescent girls. Among the selected adolescent girls 49 and 43 per cent of them belonged to 17 and 18 years respectively. About 6 of them belonged to 19 years of age.

Table 1: Distribution of adolescent girls according to their age

Age (in years)	Study Participants (n=621)	
	Number	Percentage
17	307	49.4
18	272	43.8
19	42	6.8

The age-wise mean body weight was presented in Table 2 which was compared with NCHS and ICMR standards. The mean weight of the adolescent girls of 17, 18 and 19 years were 47.5±3.45, 49.2±4.72 and 51.2±5.54 kg respectively. When the values were compared with NCHS standards it was revealed that the mean weight was lowered by 83.7, 86.1 and 89.9 % respectively. These observed values were found to be higher than the ICMR standards being 110%, 114% and 118% respectively. These findings revealed that an average Indian build is probably poorer than that considered in the NCHS population.

Table 2: Age-wise mean body weight of adolescent girls in comparison to NCHS and ICMR standards

Age (yrs)	Observed Values	NCHS Standard	% NCHS Standard	ICMR Standard	% ICMR Standard
17	47.5±3.45	56.7	83.7	43.0	110
18	49.2±4.72	56.9	86.1	43.1	114
19	51.2±5.54	56.9	89.9	43.1	118

Table 3: Age-wise mean body height of adolescent girls in comparison to NCHS and ICMR standards

Age (yrs)	Observed Values	NCHS Standard	% NCHS Standard	ICMR Standard	% ICMR Standard
17	149.5±5.12	163.4	91.4	151.8	98.4
18	151.7±6.23	163.3	92.8	152.2	99.6
19	154.65±54	163.3	94.6	152.1	101.6

From the findings of table 3 it was observed that the mean height of the adolescent girls was ranged from 149.5±5.12 to 154.65±54. Thus the mean height of adolescent girls in all age groups was in close proximity to NCHS and ICMR standards. Poonam Bakhetia and Rita Jain (2007) also reported that the mean height and weight of school children was more than the ICMR standards and were lower than the NCHS standards. Research conducted by National Monitoring Bureau (Naidu et al, 1994) from rural areas of nine states in South India showed that 39% of the adolescents were stunted. In the present study, weight and height seem to be increasing over time and the adolescent girls exhibited better nutrition status.

Table 4: Age-wise mean Body Mass Index of adolescent girls

Age group	BMI
17 years	19.3±1.1
18 years	21.5±3.6
19 years	22.9±3.2

Body Mass Index is an age independent anthropometric criteria. It is an indicator of acute under nutrition, the result of more recent food deprivation and/or illness (WHO, 1998). The mean body mass index of the adolescent girls aged 17, 18 and 19 years were 19.3±1.1, 21.5±3.6 and 22.9±3.2 respectively.

In the present study it was observed that prevalence of overweight, underweight and obesity were 42.4%, 18.4% and 1.1% respectively. Research conducted among school-going adolescents (12–18 years) in Delhi shows that combined prevalence of overweight and obesity was shown to be 16.6%. (Stigler M.H et al 2011). This probably puts the community at a greater risk as these adolescent girls were approaching the marriageable age and would be expected to bear children within a year or two. The poor nutritional status of the then mothers would definitely reflect on the health of their children.
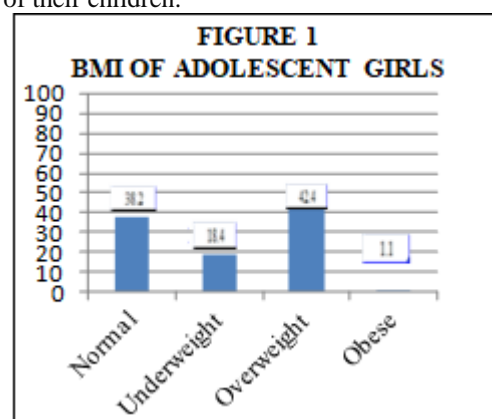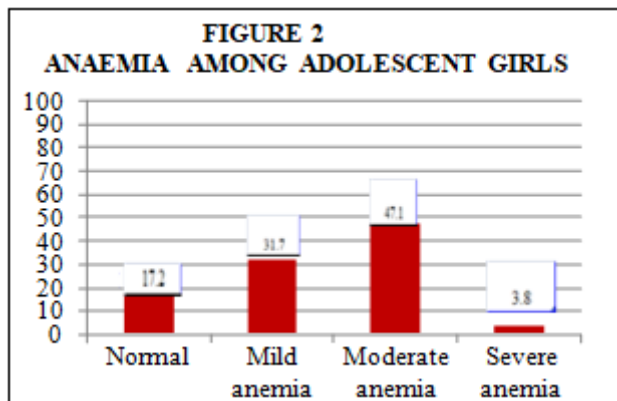

FIGURE 1
BMI OF ADOLESCENT GIRLS

Table 5: Distribution of adolescent girls in relation to the severity of anaemia

Degree of anaemia	Mean Hb g/dL	Adolescent girls (n=621)		F value
		No	%	
Normal	12.2±0.26	107	17.2	
Mild anaemia	10.9±0.51	197	31.7	
Moderate anaemia	8.6± 0.70	293	47.1	1454.118*

Severe anaemia	6.5± 0.39	24	3.8	

FIGURE 2
ANAEMIA AMONG ADOLESCENT GIRLS

Rajaratnam J et al in Tamil Nadu found that the prevalence was 90.1%. Tuteja GS et al, found 90.1% prevalence of anemia among adolescent girls from 16 districts of India. Findings of the present study show that only 17.2 % of the adolescent girls were normal whereas majority (82.8%) were anaemic. Regarding the severity of anaemia a higher percentage (47.1%) of adolescent girls had moderate anaemia. About 31.7% of adolescent girls had mild anaemia and only a minimum percentage (3.8%) had severe anaemia. Therefore the present study showed a high prevalence of mild and moderate anaemia among the adolescent girls which cannot be under emphasized. This group if not treated could easily get into the severe anaemia.

4. Conclusion

Findings of the present study revealed that adolescent girls face many contrasting nutrition situations, underweight and overweight. This study also indicates that adolescent girls are a vulnerable group for nutritional anaemia. The high prevalence of mild and moderate anaemia demands appropriate emphasis on covering high risk adolescents group to improve their iron status. Early and prompt recognition of these nutritional problems can prevent severe ones. It is very important to develop a database on the nutritional problems of the adolescents from different parts of Tamilnadu, to enable the governments and other non-governmental agencies to formulate policies and initiate strategies for the well-being of adolescent girls

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