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## Research Article



### Nutritional Status Assessment of Adolescents - A Gender Perspective

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#### Abstract

A community based cross sectional study was conducted to assess the anthropometric and nutritional status of adolescents. The subjects of the study comprised of boys and girls aged 10-12 yrs attending to schools in Tirupati, Chittoor district of Andhra Pradesh. The tools used in the study were well structured and pretested interview schedule for recording demographic and socio economic status of the individuals; Anthropometric measurements for height, weight, and BMI; 24 hr recall method to assess the nutrient intakes. Appropriate statistical techniques were used to analyse the data. The results of the study reveal that the height and weight of both boys and girls were below the standards of the NCHS. The diets were deficient in calories and protein which are essential nutrients required for proper growth and development. The study concluded that nutrition intervention strategies are needed to address the nutrition issues of adolescents. More nutritional education programmes has to be carried out in schools and colleges to improve their nutritional status.

**Keywords:** Adolescents, Nutritional status, Anthropometric measurements, Nutrition education

#### Introduction

Adolescence is a period of peak growth for boys and girls. The phenomenal growth that occurs in adolescence creates increased demands for energy and nutrients. Total nutrient needs are higher during adolescence than any other time in the life cycle. Nutrition and physical growth are integrally related, optimal nutrition is a requisite for achieving full growth potential (Story, 1992). Failure to consume an adequate diet at this time can result in delayed sexual maturation and can arrest or slow linear growth. Nutrition is very important during this time to help prevent adults diet related chronic diseases, such as cardiovascular disease, cancer and osteoporosis.

Prior to puberty, nutrient needs are similar for boys and girls. It is during puberty that body composition and biological changes emerge which affect gender specific nutrient needs. Nutrient needs for both boys and girls increased sharply during adolescence. Nutrient needs parallel to the rate of growth, with the

greatest nutrient demand, occurring during the peak velocity of growth. At the peak of the adolescent growth spurt, the nutritional requirements may be twice as high as those of the remaining period of adolescence (Forbes, 1992).

Age, gender, height and weights largely determine the nutrient requirement of an individual. Body height and weights of adolescents reflects their status of health, nutrition and growth rate. It has now been well established that the body mass index (BMI) is the most appropriate variable for determining nutritional status among adolescents and adults. Anthropometric measurements of adolescents from well-to-do-families having access to good health care with no nutritional constraints. On the other hand, in families with poor socioeconomic status, where most adolescents are affected by poverty and dietary constraints, meeting the nutrient requirements become a challenge. A majority of the adolescents hence do not attain

anthropometric measurements corresponding to reference standards.

The growth and prosperity of a nation depend heavily on the nutrition status and development of adolescents as they not only constitute one tenth of its population but also influence the growth and development of nation in future. Several studies have investigated nutritional status of adolescents from different parts of India (Kanade et.al.,1999; Singh and Mishra, 2005,Venkaiah et.al., 2002). However there is scanty information on the nutritional status of adolescents in a gender perspective in Rayalaseema region of Andhra Pradesh which is developmentally backward region of Andhra Pradesh.

## Methods

The present study was carried out in Tirupati, Chittoor district of Andhra Pradesh, India. Adolescent boys and girls aged 10-12 yrs from five schools located in Tirupati urban area composed the sample for the present study. Necessary approval was obtained from the school authorities prior to the commencement of the study. The students were mostly belongs to lower middle income group while a few represented the middle income group. It is generally true that strong analysis will be possible by choosing the participants based on the family economical and educational status, because they strongly influences on the nutritional status. The study

was cross sectional in nature and the subjects were selected through random sampling procedures.

The primary tools for this study were well structured and pretested interview schedule for collecting demographic and socio economic profile of the samples. Anthropometric measurements were made by trained investigators following the standard techniques recommended. Body Mass Index (BMI) was computed using the standards equation:  $BMI (Kg/m^2) = Weight (kg) / Height^2 (cm^2)$ . Diet survey is an essential part of any complete study of nutritional status of individuals. A diet survey provides information about dietary intake patterns of specific foods consumed and estimated nutrient intakes. In the present study, food consumption patterns and intakes of the sample were collected using Food frequency questionnaire and 24hr recall method. Intakes in terms of energy, protein, and fat were computed as per nutritive value of Indian foods and nutritive value of common Indian food calculations. The averages were compared with corresponding RDAs recommended by ICMR. Statistical analysis performed in this study includes proportions, mean  $\pm$  SD, t-test and ANOVA.

## Results

The age and sex wise distribution of adolescents according to their anthropometric measurements is given in Table 1

**Table 1** Anthropometric Status of Adolescents.

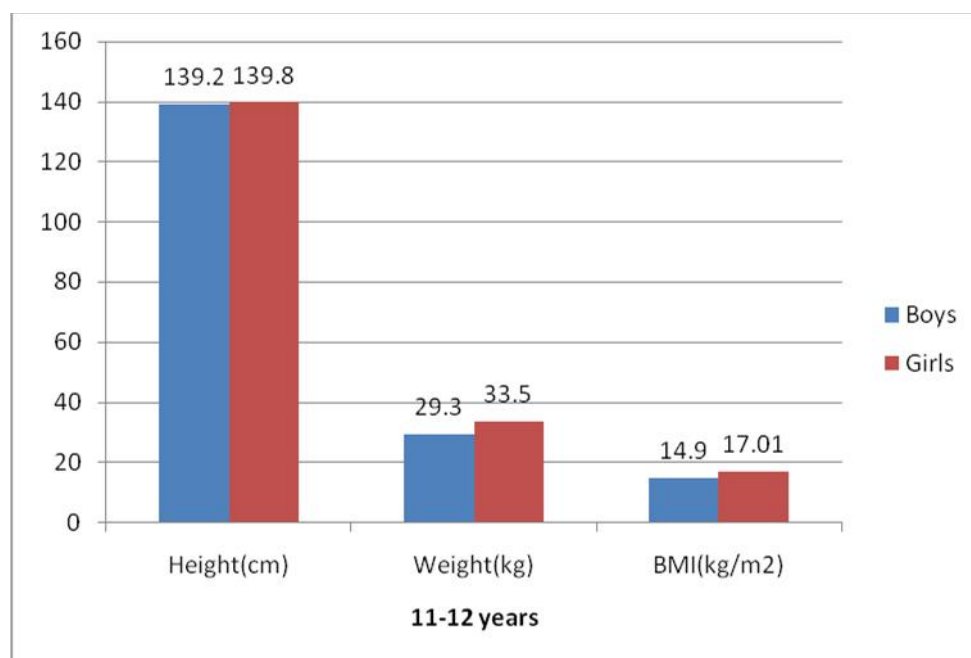
Age (yrs)	Height(cm) Mean $\pm$ SD		Weight(kg) Mean $\pm$ SD		BMI(kg/m <sup>2</sup> ) Mean $\pm$ SD	
	Boys	Girls	Boys	Girls	Boys	Girls
10-11	136.9 $\pm$ 6.2	136.6 $\pm$ 5.06	26.4 $\pm$ 3.4	27.1 $\pm$ 5.5	14.02 $\pm$ 0.8	14.3 $\pm$ 2.08
11-12	139.2 $\pm$ 7.3	139.8 $\pm$ 6.1	29.3 $\pm$ 5.4	33.5 $\pm$ 6.4	14.9 $\pm$ 1.6	17.01 $\pm$ 2.4

It was observed that the mean height of adolescent boys during 10-11 and 11-12 years was 136.9 $\pm$ 6.2 cm and 139.2 $\pm$ 7.3 cm respectively. The mean height of adolescent girls at 10-11 and 11-12 years was 136.6 $\pm$ 5.06cm and 139.8 $\pm$ 6.1cm respectively. The mean body weight of adolescent boys during 10-11 and 11-12 years was 26.4 $\pm$ 3.4 kg and 29.3 $\pm$ 5.4 kg respectively where as the weight of adolescent girls at

the same age was 27.1 $\pm$ 5.5kg and 33.5 $\pm$ 6.4 kg respectively.

The BMI defined as weight (kg)/height<sup>2</sup> (m<sup>2</sup>) was used to assess the nutritional status of adolescent boys and girls. Adolescents with BMI values less than 18.5 were considered to be suffering from chronic energy deficiency (CED). In the present investigation, it was observed that BMI of all the subjects was below 18.5. The BMI of boys at 10-11 and 11-12yrs was

14.02±0.8 and 14.9±1.6 kg/m<sup>2</sup> and the BMI of girls at the same age groups was 14.3±2.08 and 17.01±2.4kg/m<sup>2</sup> respectively.



**Fig 1** Anthropometric Status of Adolescents.

The nutrient intakes in terms of calories, protein and fat intakes of adolescent boys and girls at 10-11 and 11-12 yrs were presented in Table 2 and 3

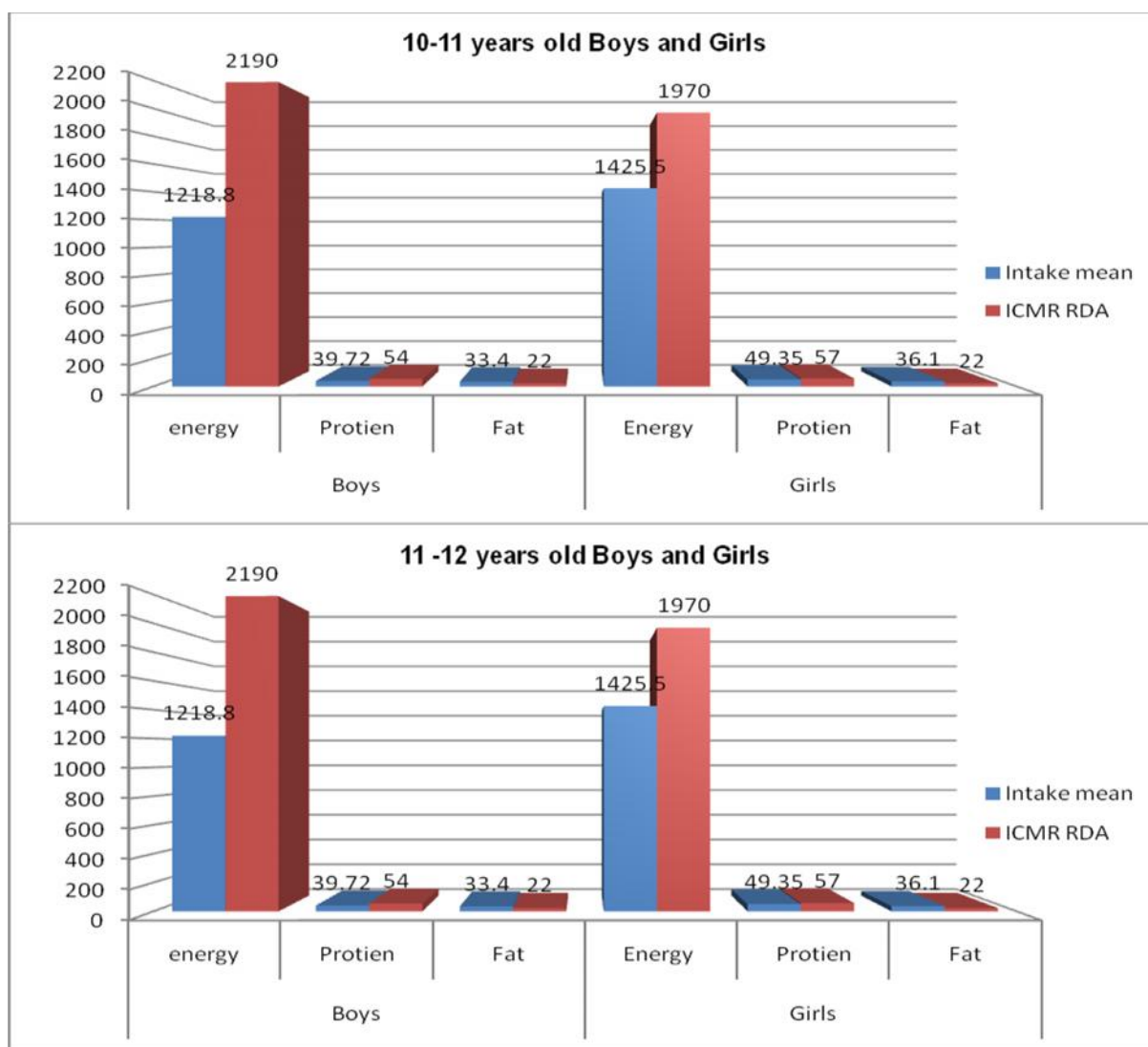
respectively. The nutrient intake was compared to recommend dietary allowances (RDA) laid down by the Indian Council of Medical Research (ICMR).

**Table 2** Nutrient intakes of the adolescent boys and girls

10 – 11 Years						
Macro nutrients	Intake mean± SD	Boys ICMR RDA	t-value	Intake mean± SD	Girls ICMR RDA	t-value
Energy	1107.4±444.2	2190	7.88*	1151.7±256.5	1970	18.60*
Protein	39.90±13.041	54	9.75*	37.0±10.54	57	14.46*
Fat	33.54±15.735	22	6.73*	27.76±16.46	22	9.46*
11 – 12 Years						
Energy	1218.8±252.9	2190	20.44*	1425.5±206.7	1970	28.42*
Protein	39.72±9.18	54	18.35*	49.35	57	21.0*
Fat	33.4±7.91	22	17.93*	36.1±7.72	22	19.26*

The mean calorie consumption per day of boys at 10-11 was 1107.4±444.2 and 1151.7±256.5 kcal respectively. The mean protein intake of boys and girls was 39.9±13.041 and 37.0±10.54 where as fat intakes were 33.54± 15.735 and 27.76±16.46 respectively. The mean calorie consumption per day of boys and

girls at 11-12 was 1218.8±252.9 and 1425.5±206.7 respectively. The protein intake of boys and girls was 39.72±9.18 and 49.35±10.54 respectively. The fat intakes were 33.4±7.91 and 36.1±7.72 by the boys and girls of 11-12 yrs respectively.



**Fig 2 & 3** Macronutrient intakes of the adolescent boys and girls

## Discussion

Adolescence is a period of increased nutritional requirements, and adolescent anthropometry varies significantly worldwide (WHO, 1995. Bhadra et.al.2001) previous studies among adolescents have observed that the height, weight, MUAC etc. were significantly lower in those from the poor socio economic strata than the well-to-do groups (Agarwal et.al.,1992).

In the present study, it was observed from the data that the height and weight of both boys and girls are low when compared with NCHS standards. It is well recognized worldwide that the Body Mass Index (BMI) is most appropriate variable for determining

nutritional status among adolescents (WHO, 1995; Himes and Bouchard; Must et.al.,1999). In the present study the BMI of adolescent girls was high compared to boys of the same age group. Higher gain in body mass index (BMI) during childhood is related to an earlier onset of puberty. This earlier onset of puberty may result from attainment of a minimal requisite body mass at a younger age. Other possible explanations for the perceived trend in timing and progression of puberty are environmental factors, including socio-economic conditions, nutrition and access to preventive health care.

Diet survey has its own importance because food gap is the principle contributor to under nutrition in India. The nutrient intakes of both boys and girls of age group 10-11 and 11-12 yrs were assessed

and compared with ICMR's recommended dietary allowances (Table 2 and 3). In the present study it was observed that the average diet calorie and protein intakes of both boys and girls were inadequate when compared with the RDA's. Earlier diet surveys in Indian adolescent population have also shown that the diets are inadequate in all nutrients including calories and protein (Chaturvedi et. al, 1996; Kapil et.al, 1993). In the present study the dietary pattern of adolescent boys and girls was based on cereal based and rice is the staple food. The intake of legumes and animal foods are inadequate and the major proportion of calories as well as protein was met from the cereals.

## Conclusion

Malnutrition interms of undernutrition which refers to an impairment of health from deficiency of nutrients is of public health significance among adolescents in India. It creates lasting effect on the growth, development, physical fitness and productivity of individuals. Nutrition promotion is to be the pillar of the sustainable strategies to address nutrition issues in adolescence. The dietary practices and behaviours of this particular group need to be addressed. Nutritional awareness and education programmes have to be carried out in schools and colleges along with mass media to choose foods wisely and adopt sound dietary practices in adolescence.

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