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RESEARCH ARTICLE

A COMMUNITY BASED STUDY ON NUTRITIONAL STATUS OF RURAL ADOLESCENT GIRLS

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ABSTRACT

Background: Adolescence is the period of transition from childhood to adulthood. This critical period of transition is identified by a range of ages. World Health Organization has defined adolescence as a period between the age group of 10 to 19 years. Around 1 in 6 persons in the world is an adolescent: that is 1.2 billion, most of them in the developing countries. Current nutritional status of adolescent girls will decide the well being of the present as well as the future generations. Under-nutrition among girls is associated with reduced lean body mass, lack of muscular strength and decreased work capacity. In the absence of effective nutritional interventions, the low birth weight girls become the next generation of stunted mothers, thus, perpetuating the vicious cycle of malnutrition. Adolescence provides a second opportunity for girls to attain 'catch up growth' and break the intergenerational cycle of malnutrition provided there is a significant increase in their nutrient intake. However, the state of rural adolescent girls in India is quite dismal. **Objectives:** 1. To assess the nutritional status of adolescent girls 2. To determine the association between socio-demographic characteristics and nutritional status **Methods:** The present study was a cross sectional study, conducted in Keregodu, PHC, the rural field practice area of Department of Community Medicine MIMS, Mandya. The data was analyzed by percentages and descriptive statistics. Chi-square test was used to determine the association between socio demographic factors and nutritional status of adolescent girls **Results:** Total adolescent girls included in our study were 302. Mean age of the adolescent girls was 14.3 (+ 2.12) years. The prevalence of malnutrition was 65.3%. Around 34.8% were having normal BMI, 59.3% were underweight, and 6.0% were overweight. There was significant association between nutritional status with education status and SES of adolescent girls **Conclusion:** The prevalence of malnutrition among adolescent girls was high and there was significant association between Socio demographic characteristics like SES and literacy status.

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INTRODUCTION

Adolescents contribute to major part of the population. This is the period of transition from childhood to adulthood and is being identified by range of ages. World health Organization has defined adolescence as a period between 10-19 years. One in six persons in the world is a adolescent, contributing to 1.2 billion and most of them in the developing countries. As per 2011 census there are about 25.3 million adolescents in India which accounts for 20.9% of the population (<http://www.who.int/mediacentre/factsheets/fs345/en/>; http://www.censusindia.gov.in/2011census/Age_level_data/Ag_e_level_data).

This is a critical period of life because there is dramatic increase in physical growth, nutritional requirement, and second opportunity for catch up growth, physiological changes and development of their own personality (<http://apps.searo.who.int/>). Malnutrition denotes impairment in health either due to deficiency/excess/imbalance of nutrients in the body. It is a major public health problem worldwide having impact on socio economic development of population and increase in mortality and morbidity among children and adolescents (Use and interpretation of anthropometric indicators of nutritional status, 1986; Black *et al.*, 2003; https://www.unicef.org/publications/index_24432.html). Prolonged duration of malnutrition lead to physical growth and impaired motor and cognitive development, diminished cognitive performance, lower intellectual quotient (IQ), poor social skills, greater behavioral problems and vulnerability to contracting diseases and also having impact on health status

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during adulthood leading to intergenerational cycle of malnutrition and increase mortality and morbidity (Mengistu *et al.*, 2013; Park, 2005). Considering the nutritional status of adolescent girls various services have been initiated by the government but the burden is continuing to be high. The studies in relation to nutritional status of rural adolescent girls are sparse. This study is intended to assess the nutritional status of the rural adolescent girls and add information regarding the same which will be useful to take measures to improve the nutritional status of rural adolescent girls.

Objectives

- To determine the prevalence of malnutrition among rural adolescent girls
- To determine the association between socio-demographic factors and malnutrition

MATERIALS AND METHODS

The present study was conducted in Keregodu, Primary Health Centre, the rural field practice area of the Department of Community Medicine, MIMS, Mandya. It was a cross sectional study conducted between August 2014 – July 2015. Adolescent girls in the age group of 10-19 years under the purview of RHTC, Keregodu were included in the study by simple random sampling of the villages under the purview of RHTC. RHTC has 18 villages under its purview and total population is 14,303. The sample size was calculated considering prevalence of malnutrition as $p = 57\%$ (Maliya, 2010) based on the previous literature, q is $(100 - 57)$. The permissible error of the estimate (l) was set at 10%. The villages were listed and were selected randomly for inclusion in our study. House to house visit was done in the selected villages till the required sample size of 302 was met. Where more than one adolescent girl were found in the house one of them were selected randomly and included in our study. The adolescent girls and their parent/guardian were explained about the study and those who gave informed consent for the study; data regarding socio-demographic characteristics was obtained by interview method using a pre-designed and pretested semi structured questionnaire.

The height was measured with stadiometer and weight was measured in kilograms using standardized bathroom weighing machine. Nutritional status was assessed by anthropometric measurements (weight and height), BMI and growth charts using methodology as recommended by WHO. Height was recorded to nearest 0.1 centimeters and weight was recorded to nearest 0.5 Kg. According to WHO growth chart individual who had height for age within $+2SD$ were considered normal, less than $-2SD$ as having stunting. Weight for age within $+2SD$ were considered normal and $<-2SD$ as having wasting and weight for age $>+2SD$ were considered as overweight. BMI less than $<18.49 \text{ kg/m}^2$ were taken as underweight, between $18.5 - 24.99 \text{ kg/m}^2$ as normal, BMI $25 - 29.99 \text{ kg/m}^2$ as overweight and BMI of $>30 \text{ kg/m}^2$ were classified as obese (W.H.O, 1995; http://www.who.int/growthref/who2007_weight_for_age/en/; http://www.who.int/growthref/who2007_height_for_age/en/; <http://www.who.int/growthref/tools/en/>). Data was analysed for frequency and chi-square test was applied to determine association between nutritional status and socio-demographic factors.

RESULTS

Table 1 Among 302 adolescent girls maximum number of adolescent girls were in the group of 13 to 15 years (45.3%), followed by 16-19 years (37.1%) and 10-12 years (17.6%) respectively. Most of the adolescent girls were Hindu by religion (97.4%). Maximum number of adolescent girls belonged to nuclear family (58.9%). Socio economic status (SES) was assessed by modified B G Prasad's classification. Three fourth of the adolescent girls belonged to SES class III and IV i.e. 126 (41.7%) and 101 (33.7%) respectively. Less than 10% belonged to SES class II (7.6%) and SES class I (0.3%). Half of the adolescent girls were in their high school 152 (50.3%). Out of 302 adolescent girls, all of them were either doing or had completed primary schooling, 4 (1.3%) of the adolescent girls had discontinued high school and had rejoined after a year or more. 7 (1.9%) who were in college had similarly discontinued their studies in between. 15 (5.1%) adolescent girls were presently not pursuing their studies. More than half of the adolescents girls belonged to nuclear family (58.9%), one fourth of them were from three generation and very few from joint family (12.6%). Around half of the adolescent girls were of birth order less than two (46.0%).

Figure 1 Prevalence of malnutrition among adolescent girls was assessed by anthropometric measurements (height and weight) and compared with the WHO classification of nutritional status according to body mass index (kg/m^2).

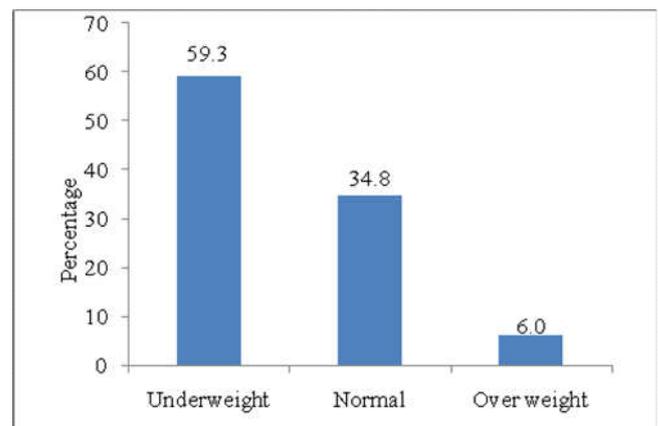


Figure 1. Distribution of adolescent girls according to Body Mass Index

Study subjects who had BMI less than $<18.49 \text{ kg/m}^2$ were taken as underweight, individual who had BMI between $18.5 - 24.99 \text{ kg/m}^2$ were considered as normal, BMI between $25 - 29.99 \text{ kg/m}^2$ were overweight and BMI of $>30 \text{ kg/m}^2$ were classified as obese. Among the study participants the prevalence of malnutrition was 65.3% (underweight-59.3% and overweight-6.0%). Table 2 Adolescent girls were assessed for nutritional status. Weight for age of the participants was compared with the WHO growth chart for each age. According to WHO growth chart participants weight for age within $+2SD$ were considered normal, less than $-2SD$ as having wasting and $>+2SD$ as overweight. Out of 302 adolescents, around $1/4^{\text{th}}$ (20.5%) had wasting, Wasting was more in 10-12 years age group compared to 13-19 years of age and 27 (8.9%) were overweight. Mean weight among study subjects was $42.9 + 8.4 \text{ kg}$ and mean height was $150 + 8.8 \text{ cm}$. Around $1/5^{\text{th}}$ of adolescent girls were stunted and were more in the age group of 10-12 years (39.6%).

Table 1. Socio demographic characteristics of study subjects

Socio demographic Variables		Number	Percentage
Age group in years	10-12	53	17.6
	13-15	137	45.3
	16-19	112	37.1
Education	Primary school	61	20.2
	High school	152	50.3
	College	89	29.5
Socio-economic status	Class II	23	7.6
	Class III	126	41.7
	Class IV	101	33.7
	Class V	51	16.7
Type of family	Nuclear	178	58.9
	Joint	38	12.6
	Three generation	86	28.5
Total family members	3 - 4	120	39.7
	5 or 6	136	45.0
	≥ 7	46	15.2
Birth order	< 2	139	46.0
	≥ 2	163	53.9

Table 2. Distribution of adolescent girls according to nutritional status (Weight forage)

Nutritional Status Age in years	Mean weight in KG ± 2 SD	Weight for age			Height		Mean height in CM ± 2 SD
		Wasting < - 2SD	Normal Within + 2SD	Overweight > + 2SD	Normal Within + SD	Stunting < - 2SD	
		No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	
10-12	37.1 \pm 8.8	14 (27.4)	34 (66.7)	03 (5.9)	32 (60.4)	21 (39.6)	145 \pm 9.2
13-15	44.0 \pm 7.4	26 (18.7)	93 (66.9)	20 (14.3)	109 (79.6)	28 (20.4)	149 \pm 7.9
16-19	43.8 \pm 8.5	22 (19.6)	85 (75.9)	05 (4.5)	83 (74.1)	29 (25.9)	152 \pm 8.9
Total	42.9 \pm 8.4	62 (20.5)	212 (70.2)	28 (9.3)	224 (74.2)	78 (25.8)	150 \pm 8.8

Table 3. Association between socio demographic factors and nutritional status of adolescent girls

Variables		Body mass index			P value
		Underweight	Normal	Overweight	
Education	Primary school	51 (83.6)	9 (14.8)	1 (1.6)	<0.05
	High school	82 (53.9)	56 (36.8)	14 (9.2)	
	College	46 (51.7)	40 (44.9)	3 (3.3)	
Socio-economic status	Class II	17 (73.9)	2 (14.3)	5 (21.7)	<0.05
	Class III	74 (58.7)	45 (35.7)	7 (5.6)	
	Class IV	61 (60.4)	35 (34.7)	5 (5.0)	
	Class V	27 (52.9)	23 (45.0)	1 (2.0)	
Type of family	Nuclear	106 (59.6)	63 (35.4)	9 (5.1)	0.53
	Joint	25 (65.8)	12 (31.6)	1 (2.6)	
	Three generation	48 (55.8)	30 (34.9)	8 (9.3)	
Total family members	3 - 4	64 (53.3)	47 (39.2)	9 (7.5)	0.24
	5 or 6	86 (63.2)	42 (30.9)	8 (5.9)	
	≥ 7	29 (63.0)	16 (34.8)	1 (2.2)	
Birth order	< 2	164 (59.4)	95 (34.4)	17 (6.2)	0.23
	≥ 2	15 (58.3)	10 (37.5)	1 (33.3)	

Table 3 Nutritional status of adolescent girls was assessed for its association with socio-demographic characteristics. Chi square test was applied to determine statistical association between nutritional status and socio-demographic factors. We found no significant association between nutritional status with type of family, birth order and total family members but significant association was found with education and socio-economic status of adolescent girls ($p < 0.05$).

DISCUSSION

Socio-demographic characteristics: According to census 2011 more number of adolescent girls in rural area are in the early adolescence period (39.4%), followed by middle adolescence (26.9%) and late adolescence (23.5%).² A study done by Wasnik *et al.* on adolescent girls in Andhra Pradesh found that maximum number of adolescent girls were in the age group of 13 to 15 yrs (37.4%) (Wasnik *et al.*, 2012).

Susmitha *et al.* 2012 conducted a study on morbidity pattern among the adolescent girls in Nellore revealed that 56% were in high school, 35.79% were in middle school, and 8.1% in college (Susmitha, 2012). The findings of these studies are similar to the findings in our study where very few adolescents belonged to late adolescence (Susmitha, 2012). In our study maximum (around 95%) number of adolescent girls were unmarried and school going. 5.1% of them were school dropouts doing domestic chores and 0.9% were married and were of 19 years of age. Similar findings were seen in a study by Baliga S S among rural adolescent girls showed that more than 95% of the adolescent girls were unmarried and only around 1% of the adolescent girls were illiterates (Baliga *et al.*, 2014). Out of 302 adolescent girls maximum number belonged to Hindu religion i.e. 294 (97.4%) and nuclear family (58.9%). Similar findings were found in study by H Jyothi in rural area of Dharwad (Hallad, 2011). A study done by Deka *et al* among adolescents on dietary pattern and nutritional deficiencies

among adolescents showed that maximum number of adolescents belonged to SES class III (53.3%) and class IV (20.8%) the findings are similar to our study (Deka *et al.*, 2015).

Nutritional status: In our study the prevalence of malnutrition among adolescent girls was 65.3% (underweight was 59.3% and adolescent girls who were obese were 8.0%). A community based, cross-sectional study was conducted on 143 adolescent girls in West Bengal by Das and Biswas. Overall prevalence of 'thinness' and 'stunting' was found to be 14.7% and 37.8% respectively. Similarly a study by Goyle Anuradha et al found that wasting and stunting, was 72% and 37% respectively. About 72% of the young girls were malnourished as per weight for age and 37% were short in stature as per height for age which is similar to our study (Das, 2005; Anuradha, 2009). The prevalence of malnutrition among rural adolescent girls has ranged from as low as 30.1% to as high as 93.5% in different parts of the country using same methodology for assessment of malnutrition (Goyle, 2009; Kalhan *et al.*, 2010; Kumar, 2012; Medhi *et al.*, 2007).

Association between nutritional status and socio-demographic characteristics: In present study we found that there was significant association between nutritional status of adolescent girls and education of the adolescent girls and socio economic status ($p < 0.05$) but no significant association was found between nutritional status and birth order, religion, education of the parents, type of family and total family member ($p > 0.05$). A study by Venkaiah et al. and Kumkum Kumari among rural adolescent girls in 8 districts found significant association between nutritional status of adolescent girls and socio demographic factors, education of the study subjects, education of parents, religion, and type of family and birth order. There was no significant association between family size, possession of own house and nutritional status of the study subjects which was contrast to the findings in our study. But a study by Sumedha Joshi and Santosh Walgankar in rural area of Navi Mumbai no significant association between other socio demographic factors like religion, type of family, education of father which is similar to the findings of present study (Kumari, 2011; Singh, 2012; Joshi, 2004).

Conclusion

Prevalence of malnutrition among adolescent girls is high which is depicted in many studies conducted in different parts of the country including ours. Adolescent's especially adolescent girls are at higher risk of malnutrition as they are the future mothers need measures for early assessment of nutritional status and take appropriate measures for its correction and progression. Nutritional status may be improved by assessing their awareness about nutrition, healthy habits and services available and educating them regarding the same.

Conflict of interest: none

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