### **Original Research Article**

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# Study of nutritional status of adolescent girls in a rural area of a district of Maharashtra

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#### **ABSTRACT**

**Background:** Adolescence is the transition period between childhood and adulthood where rapid physical, mental, emotional and social development takes place. Adolescent girls are at greatest risk for nutrient deficiency and it badly affects their overall development. With this background this study was conducted to study some aspects of the sociodemographic profile and to assess the nutritional status of adolescent girls by anthropometry in a rural area of a district.

**Methods:** It was a community based cross sectional study conducted during January 2015 to June 2015 in 10 villages of a district. 583 adolescent girls were interviewed using pre designed, pretested questionnaire and anthropometric examination was done. Results were analyzed with the help of Microsoft Excel 2007 and SPSS version 16.0 statistical software.

**Results:** Mean age of the study population was 13.95±2.48 years. Majority (63.12%) were Hindu and belonged to nuclear family (54.72%). 45.63% were educated up to high school level. Most of the girls belonged to socio economic class IV (45.46%). The prevalence of underweight and stunting in this study was 36.54% and 48.37% respectively. Statistically significant association was found between underweight and marital status of adolescent girls (p=0.029). The association of age group, religion and educational status with stunting was statistically significant (p<0.05). Mean BMI of the total 583 study subjects was 17.66±2.42 kg/m2. The prevalence of thinness was 18.87% in this study, significantly associated with religion, type of family and socioeconomic status (<0.05).

**Conclusions:** Since the prevalence of under nutrition was high among adolescent girls in our study, appropriate health education and nutrition intervention should be directed towards them to improve their nutritional status.

**Keywords:** Adolescent, Girls, Nutritional status, Rural area, Anthropometry

#### INTRODUCTION

Adolescent is the period of life between ages of 10-19 years. It is variously described as "neither children nor adults" or as "growing-up years". The term adolescence is derived from Latin word 'adolescere' meaning 'to grow, to mature'.<sup>1</sup>

Adolescence is a transitional period between childhood and adulthood in which many interrelated physical, social and psychological changes take place.<sup>2</sup>

Currently the adolescents are classified into three groups:

- a) The early adolescents having the age of 10 to 13 years,
- b) The middle adolescents with the age of 14 to 16 years and
- c) The late adolescents of the age of 17 to 19 years.

This classification is based on biological, psychological and developmental basis.<sup>3</sup>

Adolescence is a vulnerable period in human life cycle characterized by rapid growth and development coupled with innumerous physiological and psychological changes (NNMB, 2000).<sup>4</sup> This phase of life is marked by special attributes. These include rapid physical growth and development, physical, social and psychological maturity along with sexual maturity.<sup>5</sup>

Adolescents constitute over 21.4% of the population in India and adolescent girls constitute about 10 percent of the Indian population.<sup>3</sup> Adolescence in girls is a turbulent period of development, which includes stressful events like menarche, which is considered as the landmark of female puberty. Some of the special problems of adolescents are nutritional problems, menstrual disorders, leucorrhoea and psychological problems.<sup>6</sup>

Precise estimates of under-nutrition of adolescent girls seem to receive little attention from any quarter especially in rural India. With this background kept in mind present community-based cross sectional study was undertaken with the objectives to study the sociodemographic profile of adolescent girls in rural area of a district and to assess their nutritional status by anthropometry in the light of scarcely available literature for this high risk.

#### **METHODS**

It was a community based cross sectional study conducted during January 2015 to June 2015 in 10 villages included under Primary Health Centre area of a district. The study population comprised of all the girls of age in range 10-19 years in the selected rural area of a district.

Girls with age <10 years and >19 years and whose parents were not willing to give consent for the study were excluded. Those who were not permanent residents of the study area (Permanent residents are those who lived in the study area for the period of 6 months or more) and those who could not be traced even after 3 visits were excluded from the study.

The prevalence of under nutrition using BMI for age  $<5^{th}$  percentile by NCHS/WHO standards was 43% in one of the studies on rural adolescent girls in India, which was taken into consideration for sample size estimation.<sup>7</sup> The sample size (N) was calculated by the Cochran's formula,  $N=Z^2P(1-P)/E^2$ .

where Z=1.96 for 95% of confidence interval (approx.≈2), P=estimated prevalence in study population, E=acceptable margin of error, here taken as 10% of prevalence.

 $N=4\times43\times57/4.3\times4.3=530$ 

10% margin was taken as dropouts/non-responsive. Finally 583 adolescent girls were selected from the study area.

As per the data obtained from the District Health Office of the district in December 2014, the adolescent girl's population of the study area was 1,759. Out of these 1,759 adolescent girls, we selected the desired sample size of 583 by systematic random sampling. From the list of adolescent girls of every village, one girl was randomly selected using random number table, and then we selected every 3<sup>rd</sup> adolescent girl till we got our calculated sample size of 583 adolescent girls.

House to house visit of all the selected girls was done. They were contacted, interviewed and anthropometric examination done after taking informed consent from their parents. The collected data was numerically coded and entered in Microsoft Excel 2007, and then transferred to the SPSS 16 (version). Data was analysed by applying appropriate statistical tests like Chi-square test.

#### **RESULTS**

Out of total 583 adolescent girls in the study, maximum (47.34%) belonged to category of early adolescence and least (18.01%) to late adolescence. (Figure 1) Majority of adolescent girls (63.12%) were Hindu, more than half (54.72%) were from nuclear family and 2.40% were married. 45.63% were educated up to high school level, and most of the girls belonged to socio economic class IV (45.46%) and V (42.02%) respectively of Modified BG Prasad classification.

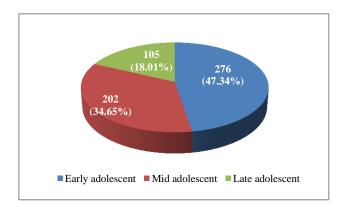


Figure 1: Distribution of adolescent girls according to their age group.

The mean weight of 583 adolescent girls in the study was 37.58±8.33 kg. The prevalence of underweight in this study was 36.54% with 213 out of 583 girls with weight for age <3<sup>rd</sup> percentile of NCHS/WHO standard 2007. Underweight was seen more in late adolescent age group (40.00%), in Hindus (38.32%), girls belonging to nuclear families (39.81%), illiterate (50.00%), married females (64.29%) and those belonging to socio economic class I of modified BG Prasad classification (50.00%). The association of none of these socio-demographic characteristics of adolescent girls with prevalence of underweight among them was statistically significant except their marital status (p=0.029) (Table 1).

Table 1: Association between some socio demographic variables and underweight among adolescent girls.

Variables	Underweight		T-4-1	Chi square, degree of freedom
	Present	Absent	Total	and p value
Age group				
Early adolescent	102 (36.95)	174 (63.05)	276 (47.34)	_
Mid adolescent	69 (34.16)	133 (65.84)	202 (34.65)	$\chi^2$ =1.057, df=2, p=0.590
Late adolescent	42 (40.00)	63 (60.00)	105 (18.01)	
Religion				
Hindu	141 (38.32)	227 (61.68)	368 (63.12)	
Muslim	23 (28.05)	59 (71.95)	82 (14.07)	$\chi^2$ =3.645, df=3, p=0.302
Sikh	0 (00.00)	1 (100.00)	1 (00.17)	χ =3.043, d1=3, p=0.302
Buddhist	49 (37.12)	83 (62.88)	132 (22.64)	
Type of family				
Nuclear	127 (39.81)	192 (60.19)	319 (54.72)	_
Joint	43 (34.40)	82 (65.60)	125 (21.44)	$\chi^2$ =3.603, df=2, p=0.165
Three generation	43 (30.94)	96 (69.06)	139 (23.84)	
<b>Educational status</b>				
Illiterate	1 (50.00)	1 (50.00)	2 (00.34)	
Primary	30 (35.71)	54 (64.29)	84 (14.40)	
Middle	69 (38.33)	111 (61.67)	180 (30.88)	$\chi^2$ =2.881, df=4, p=0.578
High school	90 (33.83)	176 (66.17)	266 (45.63)	
Intermediate	23 (45.10)	28 (54.90)	51 (08.75)	
Marital status				
Unmarried	204 (35.85)	365 (64.15)	569 (97.60)	$\chi^2$ =4.764, df=1, p=0.029
Married	9 (64.29)	5 (35.71)	14 ((02.40)	
Socio economic class				
I	3 (50.00)	3 (50.00)	6 (01.03)	χ <sup>2</sup> =9.110, df=4, p=0.058
II	6 (27.27)	16 (72.73)	22 (03.77)	
III	17 (37.77)	28 (62.23)	45 (07.72)	
IV	82 (30.94)	183 (69.06)	265 (45.46)	
V	105 (42.86)	140 (57.14)	245 (42.02)	
Total	213 (36.54)	370 (63.46)	583 (100)	

Table 2: Association between some socio demographic variables and stunting among adolescent girls.

Variables	Stunting			Chi square, degree of freedom
	Present	Absent	Total	and p value
Age group				
Early adolescent	159 (57.60)	117 (42.40)	276 (47.34)	$\chi^2$ =18.871, df=2, p<0.05
Mid adolescent	85 (42.08)	117 (57.92)	202 (34.65)	
Late adolescent	38 (36.19)	67 (63.81)	105 (18.01)	
Religion				
Hindu	190 (51.63)	178 (48.37)	368 (63.12)	$\chi^2$ =11.791, df=3, p=0.008
Muslim	26 (31.70)	56 (68.30)	82 (14.07)	
Sikh	1 (100.00)	0 (00.00)	1 (00.17)	
Buddhist	65 (49.24)	67 (50.76)	132 (22.64)	
Type of family				
Nuclear	147 (46.08)	172 (53.92)	319 (54.72)	χ <sup>2</sup> =2.413, df=2, p=0.299
Joint	60 (48.00)	65 (52.00)	125 (21.44)	
Three generation	75 (53.96)	64 (46.04)	139 (23.84)	
<b>Educational status</b>				
Illiterate	0 (00.00)	2 (100.00)	2 (00.34)	χ <sup>2</sup> =12.540, df=4, p=0.014
Primary	50 (59.52)	34 (40.48)	84 (14.40)	
Middle	96 (53.33)	84 (46.67)	180 (30.88)	
High school	111 (41.73)	155 (58.27)	266 (45.63)	
Intermediate	25 (49.02)	26 (50.98)	51 (08.75)	

Marital status				
Unmarried	278 (48.86)	291 (51.14)	569 (97.60)	$\chi^2$ =2.252, df=1, p=0.133
Married	4 (28.57)	10 (71.43)	14 (02.40)	χ –2.232, d1–1, p=0.133
Socio economic class				
Ι	2 (33.33)	4 (66.67)	6 (01.03)	
II	9 (40.91)	13 (59.09)	22 (03.77)	$\chi^2$ =9.110, df=4, p=0.058
III	19 (42.22)	26 (57.78)	45 (07.72)	
IV	125 (47.17)	140 (52.83)	265 (45.46)	
V	127 (51.84)	118 (48.16)	245 (42.02)	
Total	282 (48.37)	301 (51.63)	583 (100)	

Table 3: Association between some socio demographic variables and thinness among adolescent girls.

Variables	Thinness		Total	Chi square, degree of freedom
	Present	Absent	Total	and p value
Age group				
Early adolescent	55 (19.93)	221 (80.07)	276 (47.34)	
Mid adolescent	36 (17.82)	166 (82.18)	202 (34.65)	$\chi^2$ =0.388, df=2, p=0.824
Late adolescent	19 (18.09)	86 (81.91)	105 (18.01)	χ =0.388, u1=2, p=0.824
Religion				
Hindu	57 (15.49)	311(84.51)	368 (63.12)	
Muslim	17 (20.73)	65 (79.27)	82 (14.07)	
Sikh	0 (00.00)	1 (100.00)	1 (00.17)	$\chi^2$ =9.254, df=3, p=0.026
Buddhist	36 (27.27)	96 (72.73)	132 (22.64)	
Type of family				
Nuclear	73 (22.88)	246 (77.12)	319 (54.72)	
Joint	19 (15.20)	106 (84.80)	125 (21.44)	$\chi^2$ =7.640, df=2, p=0.022
Three generation	18(12.95)	121 (87.05)	139 (23.84)	$\chi = 7.040$ , di=2, p=0.022
<b>Educational status</b>				
Illiterate	0 (00.00)	2 (100.00)	2 (00.34)	
Primary	17 (20.24)	67 (79.76)	84 (14.40)	
Middle	35 (19.44)	145 (80.56)	180 (30.88)	
High school	48 (18.05)	218 (81.95)	266 (45.63)	$\chi^2$ =0.743, df=4, p=0.946
Intermediate	10 (19.61)	41 (80.39)	51 (08.75)	
Marital status				
Unmarried	109 (19.16)	460 (80.84)	569 (97.60)	$\chi^2$ =1.288, df=1, p=0.256
Married	1 (07.14)	13 (92.86)	14 (02.40)	χ =1.288, d1=1, p=0.230
Socio economic class				
I	2 (33.33)	4 (66.67)	6 (01.03)	
II	5 (22.73)	17 (77.27)	22 (03.77)	
III	12 (26.67)	33 (73.33)	45 (07.72)	
IV	36 (13.58)	229 (86.42)	265 (45.46)	$\chi^2$ =9.706, df=4, p=0.046
V	55 (22.45)	190 (77.55)	245 (42.02)	
Total	110 (18.87)	473 (81.13)	583 (100)	

Height for age <3<sup>rd</sup> percentile of NCHS/WHO standard 2007 was used as stunting in the present study. Mean height of the total 583 study subjects was 145.03±9.90 cm. The prevalence of stunting was 48.37% in this study. Stunting was seen more in early adolescent age group (57.60%) and in primary school girls (59.52%) and this association was highly significant statistically (p<0.05). The association of religion with stunting was statistically significant (p=0.008). Majority girls (53.96%) of three generation family and those who were unmarried (48.86%) were stunted, but this was not statistically

significant association (p>0.05). According to modified BG Prasad classification, prevalence of stunting increased as we proceed from class I to V but this association was not statistically significant (p=0.058) (Table 2).

BMI for age <5<sup>th</sup> percentile of NCHS/WHO standard 2007 was used as thinness in the present study. Mean BMI of the total 583 study subjects was 17.66±2.42 kg/m<sup>2</sup>. The overall prevalence of thinness was 18.87% in our study. Highest prevalence of thinness was observed in early adolescent (19.93%), girls with primary level of education (20.24%) and also among unmarried girls (19.16%), but these three associations were not statistically significant (p>0.05). Thinness was more prevalent among Buddhist girls (27.27%), those belonging to nuclear family (22.88%) and class I (33.33%) of modified BG Prasad classification with statistically significant association (p<0.05) (Table 3).

#### DISCUSSION

In the present community based cross sectional study, total 583 adolescent girls of age 10-19 years were studied to assess the nutritional status along with the sociodemographic profile in a rural area of a district.

Maximum girls (47.34%) in our study population belonged to category of early adolescence and least (18.01%) were late adolescent similar to a study conducted by Kaur et al.<sup>8</sup> Dutt et al and Kumar in their study found out that majority of the girls were Hindu by religion similar to our study.<sup>9,10</sup> In our study, more than half (54.72%) were from nuclear family similar to other studies.<sup>10-12</sup> In our study only 02.40% were married. Similarly 0.98% and 3.75% adolescent girls were married in the studies conducted by Dutt et al and Baliga et al respectively.<sup>9,13</sup> In contrast, a higher percentage (16%) of adolescent girls were married in the study conducted by Kollur et al.<sup>14</sup>

The prevalence of underweight in this study was 36.54%. The probable reason for this high prevalence of underweight in our study may be an over-estimation of underweight among these rural adolescent girls when compared with NCHS/WHO standards. Similarly Venkaiah et al in their study concluded that the prevalence of underweight was significantly associated with all the variables (p<0.05) except with ownership of house. <sup>15</sup>

The prevalence of stunting was much higher in this study (48.37%). Das et al in their study found that 37.8% of them were found stunted based on height for age less than 5th percentile of NCHS standard. Similar to our study, Bhattacharyya et al in their study concluded that the prevalence of stunting was higher among early adolescents and in socio-economic class IV, but it was not statistically significant.

Similar to the prevalence of 18.87% in our study, Das et al in their study found that overall prevalence of thinness was 14.7%, without any significant difference between early and late adolescent age group. <sup>16</sup> Prevalence of thinness was more in socioeconomic class I and least in class IV in our study and this association was statistically significant (p=0.046). In contrast, Bhattacharyya et al in their study showed that the prevalence of thinness was highest in socio-economic class IV with no statistically significant association. <sup>17</sup> These variations in prevalence of thinness by BMI grading may be due to variations in

the age group, sample size, methods of assessment, and other socio demographic factors.

It can be concluded that majority of these factors influencing nutritional status of adolescent girls are preventable and modifiable. There is a need of positive attitude towards the health of adolescents in rural areas of India through primary health care approach and establishment and proper functioning of adolescent health clinics in these areas.

The sample for our study was drawn from one limited geographic area. So, the results cannot be generalized. Because of the cross-sectional study design, this study had a limited extrapolative value.

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