

## **Investigation of nutritional status of adolescent girls in a rural area of Aligarh district of Uttar Pradesh (India)**

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### **ABSTRACT**

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. This study was conducted to some aspects of the socio- demographic profile and to assess the nutritional status of adolescent girls by anthropometry in a rural area of Aligarh district It was a community based cross sectional study conducted during January 2019 to June 2019 in 10 villages of a district. Adolescent girls 583 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. Mean age of the study population was  $13.95 \pm 2.48$  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 Body Mass Index (BMI) of the total 583 study subjects was  $17.66 \pm 2.42$  kg/m<sup>2</sup>. The prevalence of thinness was 18.87% in this study, significantly associated with religion, type of family and socio-economic status ( $<0.05$ ). 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, Aligarh district)

## INTRODUCTION

Adolescent is the period of life between ages of 10-19 years. It is variously described as neither children nor adults. The term adolescence is derived from Latin word "Adolescere" meaning to grow to or 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. Currently the adolescents based on biological, psychological and development condition<sup>[2]</sup>. are classified into three groups:

1. Early adolescents having the age of 10 - 13 years,
2. Middle adolescents with the age of 14 - 16 years and
3. Late adolescents of the age of 17 - 19 years

Adolescence is a vulnerable period in human life cycle characterized by rapid growth and development coupled with innumerable physiological and psychological change<sup>[3]</sup>. These include rapid physical growth and development, social and psychological maturity along with sexual maturity<sup>[4]</sup>.

Adolescents constitute over 21.4% of the population in India and adolescent girls constitute about 10 % of the Indian population. Adolescence 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>[5,6]</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 socio-demographic profile of adolescent girls in rural area of a Aligarh district of Uttar Pradesh (India).

## MATERIALS AND METHODS

It was a community based cross sectional study conducted during January 2019 to June 2019 in 10 villages included under Primary Health Centre area of a Aligarh district of Uttar Pradesh (India). The study population comprised of all the girls of age in range 10-19 years in the selected rural area . Girls with age <10 years and >19 years and whose parents were not willing to give consent for the study were excluded. The prevalence of under nutrition using Body Mass Index (BMI) for age <5th 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,  $N = Z^2 P (1-P) / E^2$ . where,  $Z=1.96$  for 95% of confidence interval (approx.  $\approx 2$ ),  $P$ =estimated prevalence in study population,  $E$ =acceptable margin of error, here taken as 10% of prevalence.  $N=4 \times 43 \times 57 / 4.3 \times 4.3 = 530$  about 10% margin was taken as dropouts/nonresponsive. Finally 583 adolescent girls were selected from the study area.

As per the data obtained from the District Health Office of Aligarh district in December 2014<sup>[8]</sup>, the adolescent girls 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 3rd adolescent girl till we got our calculated sample size of 583 adolescent girls.

### RESULTS AND DISCUSSION

Total 583 adolescent girls were carried out in the study, maximum (47.34%) belonged to category of early adolescence and least (18.01%) to late adolescence. 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. The mean weight of 583 adolescent girls in the study was  $37.58 \pm 8.33$  kg. The prevalence of underweight in this study was 36.54% with 213 out of 583 girls with weight for age <3rd 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 ( $p=0.029$ ) are results are shown in Table-1.

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

Variables	Underweight		Total	Chi square, degree of freedom and p value
	Present	Absent		
<b>Age group</b>				
Early adolescent	102 (36.95)	174 (63.05)	276 (47.34)	$\chi^2=1.057$ , df=2, p=0.590
Mid adolescent	69 (34.16)	133 (65.84)	202 (34.65)	
Late adolescent	42 (40.00)	63 (60.00)	105 (18.01)	
<b>Religion</b>				
Hindu	141 (38.32)	227 (61.68)	368 (63.12)	$\chi^2=3.645$ , df=3, p=0.302
Muslim	23 (28.05)	59 (71.95)	82 (14.07)	
Sikh	0 (00.00)	1 (100.00)	1 (00.17)	
Buddhist	49 (37.12)	83 (62.88)	132 (22.64)	
<b>Type of family</b>				
Nuclear	127 (39.81)	192 (60.19)	319 (54.72)	$\chi^2=3.603$ , df=2, p=0.165
Joint	43 (34.40)	82 (65.60)	125 (21.44)	
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)	$\chi^2=2.881$ , df=4, p=0.578
Primary	30 (35.71)	54 (64.29)	84 (14.40)	
Middle	69 (38.33)	111 (61.67)	180 (30.88)	
High school	90 (33.83)	176 (66.17)	266 (45.63)	
Intermediate	23 (45.10)	28 (54.90)	51 (08.75)	
<b>Marital status</b>				
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)	
<b>Socio economic class</b>				
I	3 (50.00)	3 (50.00)	6 (01.03)	$\chi^2=9.110$ , 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		Total	Chi square, degree of freedom and p value
	Present	Absent		
<b>Age group</b>				
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)	
<b>Religion</b>				
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)	
<b>Type of family</b>				
Nuclear	147(46.08)	172 (53.92)	319 (54.72)	$\chi^2=2.413$ , 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)	$\chi^2=12.540$ , 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)	
<b>Marital status</b>				
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)	
<b>Socio economic class</b>				
I	2 (33.33)	4 (66.67)	6 (01.03)	$\chi^2=9.110$ , df=4, p=0.058
II	9 (40.91)	13 (59.09)	22 (03.77)	
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 and p value
	Present	Absent		
<b>Age group</b>				
Early adolescent	55 (19.93)	221 (80.07)	276 (47.34)	$\chi^2=0.388$ , df=2, p=0.824
Mid adolescent	36 (17.82)	166 (82.18)	202 (34.65)	
Late adolescent	19 (18.09)	86 (81.91)	105 (18.01)	
<b>Religion</b>				
Hindu	57 (15.49)	311(84.51)	368 (63.12)	$\chi^2=9.254$ , df=3, p=0.026
Muslim	17 (20.73)	65 (79.27)	82 (14.07)	
Sikh	0 (00.00)	1 (100.00)	1 (00.17)	
Buddhist	36 (27.27)	96 (72.73)	132 (22.64)	
<b>Type of family</b>				
Nuclear	73 (22.88)	246 (77.12)	319 (54.72)	$\chi^2=7.640$ , df=2, p=0.022
Joint	19 (15.20)	106 (84.80)	125 (21.44)	
Three generation	18(12.95)	121 (87.05)	139 (23.84)	
<b>Educational status</b>				
Illiterate	0 (00.00)	2 (100.00)	2 (00.34)	$\chi^2=0.743$ , df=4, p=0.946
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)	
Intermediate	10 (19.61)	41 (80.39)	51 (08.75)	
<b>Marital status</b>				
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)	
<b>Socio economic class</b>				
I	2 (33.33)	4 (66.67)	6 (01.03)	$\chi^2=9.706$ , df=4, p=0.046
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)	
V	55 (22.45)	190 (77.55)	245 (42.02)	
Total	110(18.87)	473 (81.13)	583 (100)	

Height for age <3rd 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 ( $p = 0.058$ ) and results are shown in (Table 2). BMI for age <5th percentile of NCHS/WHO standard 2007 was used as thinness in the present study. Mean BMI of the total 583 study subjects was  $17.66 \pm 2.42 \text{ kg/m}^2$ . 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 ( $p < 0.05$ ) results are given in Table - 3.

Present investigation mainly on the community based cross sectional study, total 583 adolescent girls of age 10-19 years were studied to assess the nutritional status along with the socio- demographic profile in a rural area of a Aligarh district of Uttar Pradesh (India). 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<sup>[8]</sup> found out that majority of the girls were Hindu by religion similar to our study<sup>[9]</sup>. In our study, More than half (54.72%) were from nuclear family similar to other studies<sup>[10]</sup>. In our study only 02.40% were married. Similarly 0.98% and 3.75% adolescent girls were married in the studies<sup>[11]</sup> In contrast, a higher percentage (16%) of adolescent girls were married in the study<sup>[12]</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>[13]</sup>. The prevalence of stunting was much higher in this study (48.37%). Study found that 37.8% of them were found stunted based on height for age less than 5th percentile of NCHS standard<sup>[14]</sup>. Similar to our 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, found that overall prevalence of thinness was 14.7%, without any significant difference between early and late adolescent age group<sup>[14]</sup>. Prevalence of thinness was more in socio economic class I and least in class IV in our study and this association was statistically significant

( $p=0.046$ ). Study showed that the prevalence of thinness was highest in socio economic class IV with no statistically significant association<sup>[14]</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.

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