NUTRITIONAL STATUS OF SCHEDULED CASTE AND SCHEDULED TRIBE GIRLS OF CHHATTISGARH(INDIA)

Anthropology

D.K.Verma   Department of Anthropology Govt. J. Y.Chhattisgarh College, Raipur

ABSTRACT

BMI is generally considered a good indicator of not only the nutritional status but also the socio-economic condition of the population especially adult population of developing countries. Scheduled Caste and Scheduled Tribe population of Chhattisgarh are known for their unique culture and socio-economic condition. In present study an attempt has been made to assess the nutritional status among SC/ST girls aged 16 to 22 years studying is different colleges of Raipur city. The mean BMI among SC girls varies from 19.58 ±0.68 to 20.93 ±2.01 as compared to that of tribal girls which varies from 19.19 ±0.10 to 21.39 ±1.23. However SC girls are observed to be taller (152.51±1.09 to 155.52 ±0.39cm) than ST girls (148.83 ±3.34 to 153.23 ±1.49cm) and also the same trend has been observed for body weight (SC: 46.42 ±1.54 to 50.50 ±5.31 kg; ST: 44.33 ±0.27 to 49.00 ±2.49 kg). The proportion of normal girls are found to be higher in Scheduled Tribes (75.86%) than Scheduled Caste (67.50%). However about 31.25% of SC girls and 24.14% of ST girls are observed to be undernourished. Over weight is found to be more prevalent among Scheduled Tribe (1.69%) than Scheduled Caste (1.25%). A significant association between under nutrition and socio-economic variables and also with their anthropometric measurement has been observed.

KEYWORDS

Body Mass Index. Scheduled Caste. Scheduled Tribe. Anthropometric Measurement.

INTRODUCTION :

World Health Organization (1995) has recommended that anthropometry could be used to assess the nutritional and health status of an adult. Body Mass Index(BMI) was attempted by the mathematician Lambert Adolphe Jacques Quetelet to describe the relation between body weight and height vertex in human(1). A low BMI and high level of under nutrition is major public health problem specially among rural under privileged adult of developing countries (2). Nutrition is a fundamental human right and it plays a key role in health (3). However body mass index is a measure of heaviness that reflects both lean and fat tissue (4). Nutritional status is an indicator of living standard (5). Better nutrition means stronger immune system. Less illness and better health (6). Nutritional status is an indicator of good health and indicates correlation with different socio-economic variable of population (7, 8, 9, 10). BMI is positively and significantly associated with socio-economic level (11).

In India poor nutrition, early bearing and reproductive health complication compound the difficulties of physical development in adolescent girls (12). Different nutritional studies showed that reproductive health of adolescent girl is very poor and suffer from various deficiencies (13) and mal:nutrition such as low birth weight, stunted growth and shorter expectancy of life are common among girls of Scheduled caste and Scheduled tribe population. Studies carried out by National Monitoring Bureau(NNMB) in the rural population revealed that the prevalence of under nutrition as assessed by weight for age is about 40-50% and that of iron deficiency anaemia is about 70%(14-15). In India about 65% of girls are identified to be at obstetric risk (by height and weight criteria) in their 15th year compared to 20% in their 19th year (16).

Scheduled caste and Scheduled tribe people constitute about 43.40 % of the total population of Chhattisgarh and most of them are inhabited in rural area. They differ from each other on the basis of living standard and food habits. The objective of the present study is to evaluate the nutritional status of aged SC/ST girls aged between 16-22 studying in different colleges of raipur city and also to examine the degree of relationship among them with their anthropometric measurements and other socio-economic variables.

MATERIAL AND METHODS

The present study is based on the cross-sectional study conducted in Raipur city during 2015. A total of 139 girls (Scheduled Caste: 80, Scheduled Tribe: 59) were measured cross-sectionally for height vertex, sitting height vertex and body weight along with their age, menarcheal age and their parental educational status. Raipur is capital of Chhattisgarh state containing 4063872 population(Census , 2011). Population density in the district is 328 person per sq. km^2 while female literacy is 70.20%(Census, 2011).

Standardized measurement of height, weight and sitting height vertex were obtained from each individual of both groups using standard anthropological technique of Weiner and Laurie. Height was measured to the nearest 1mm with anthropometer and body weight was measured to the nearest 0.05 kg by using weighing machine. The body mass index (BMI) was computed by using the following formula :

BMI = Weight in kg/Height in (M2)

Whereas the nutritional status of the girls of both groups was evaluated by following the internationally accepted BMI guide line(WHO, 1995)

Underweight = BMI < 18.5
Normal weight = 18.5 – 24.90
Overweight = BMI > 24.90

On the basis of BMI, the nutritional status of SC/ST girls was also evaluated with their height vertex, body weight and sitting height vertex. Besides these, the nutritional status of girls of both groups was measured according to their parental education. Scheduled caste and Scheduled tribe girls were compared on the basis of age, menarcheal age and anthropological measurements.

RESULT AND DISCUSSIONS

The Mean and standard deviation along with their standard errors for height vertex of SC and ST girls according to their age are presented in *Table 1*. The mean height vertex varies from 152.62 ±1.04cm to 155.52 ±0.30cm in SC girls as compared to 148.83 ±3.34 to 153.23 ±1.49 cm among ST girls. The mean height of SC girls is found to be higher than ST girls in all age groups. However, the trend of increasing height vertex is not significant among the girls of both the groups. The distribution of mean height vertex according to the age of girls indicates that SC girls are taller than ST girls. t-values for intergroup variation indicate significant differences at 18 to 19 years among girls of both groups. Distribution of girls according to their height vertex is shown in

fig. 1   **Table 1 : Mean Height Vertex among SC/ST girls of Chhattisgarh State**

Age in Year	Scheduled Caste Girls			Scheduled Tribes Girls			
	No.	Mean ± S.E	S.D ± S.E	No.	Mean ± S.E	S.D ± S.E	t-values
16	05	155.52 ± 0.03	0.07 ± 0.02	03	152.83±4.54	7.86±3.09	0.59
17	12	153.81 ± 0.02	0.06 ± 0.01	15	153.23±1.49	5.78±1.05	0.39
18	16	154.97 ± 0.02	0.06 ± 0.01	10	151.79±1.11	3.52±0.78	2.86***
19	10	154.15 ± 0.02	0.05 ± 0.01	12	151.29±0.81	2.81±0.57	3.53****

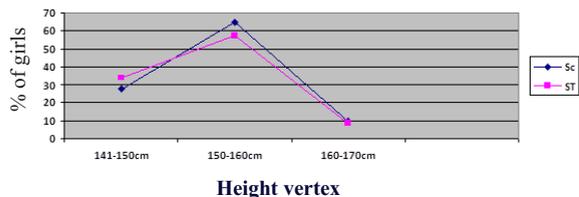| 20 | 18 | 152.62 ± 1.04 | 4.41 ± 0.74 | 12 | 152.55±1.45 | 5.03±1.03 | 0.04 |
| 21 | 17 | 152.51 ± 1.09 | 4.50 ± 0.77 | 03 | 151.43±1.57 | 2.72±1.11 | 0.57 |
| 22 | 02 | 155.20 ± 0.71 | 1.00 ± 0.50 | 03 | 148.83±3.34 | 5.78±2.36 | 1.87 |

fig 1. Percentile distribution of girls according to their height vertex

Table 2 indicates the distribution of mean body weight and t-values for intergroup variation according to the age of SC and ST girls. The mean body weight varies from 46.42±1.54 kg to 50.50±5.31 kg among SC girls and from 44.33 ±0.27 to 49.00±2.49 kg among ST girls. However the trend of increment in mean body weight is not significant among both the groups. The mean body weight increases from 17 to 19 years of age among SC girls and from 19 to 21 years of age among ST girls. The distribution of mean body weight according to age of girls indicates that SC girls are heavier than ST girls t-value for intergroup variation indicate insignificant differences between SC and ST girls at all age groups **fig. 2** show distribution of girls with their body weight.

Table 2 : Mean body weight among SC/ST girls of Chhattisgarh State.

| Age in Year	Scheduled Caste Girls			Scheduled Tribes Girls			
	No.	**Mean ± S.E**	**S.D ± S.E**	**No.**	**Mean ± S.E**	**S.D ± S.E**	**t-values**
16	05	47.60 ±3.07	6.88 ±2.18	03	45.00 ±2.94	5.09 ±2.08	0.61
17	12	46.42 ±1.54	5.36 ±1.09	15	45.73 ±1.53	5.95 ±1.08	0.32
18	16	47.81 ±1.66	6.67 ±1.17	10	45.60 ±1.71	5.41 ±1.21	0.93
19	10	49.50 ±1.69	5.37 ±1.20	12	44.83 ±1.41	4.91 ±1.00	1.62
20	18	46.83 ±1.09	4.65 ±0.77	12	46.50 ±1.25	4.33 ±0.88	0.31
21	17	47.41 ±1.29	5.32 ±0.91	03	49.00 ±2.49	4.32 ±1.76	0.57
22	02	50.50 ±5.31	7.50 ±1.87	03	44.33 ±0.27	0.47 ±0.19	1.16
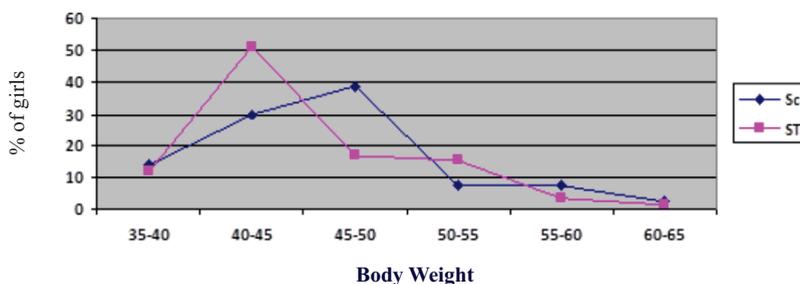
Body Weight

fig 2. Percentile distribution of girls according to their body weight

The mean height vertex and body weight are also compared to the menarcheal age of SC and ST girls. *Table 3* exhibits the mean height vertex and t-values for intergroup variation. The proportion of girls at menarche age 14 years are found to be 48.75% among SC girls as 47.46% among ST girls. The mean height vertex is found to be highest among those girls who experienced first menstruation at 15 years of age among SC girls and at 12 years of age among ST girls. The mean

height of SC girls at almost all menarcheal age is found to be higher that ST girls. The trend of mean height vertex according to their menarcheal age indicates that menarcheal age influenced height vertex however t-values of intergroup variation indicate significant differences among SC/ST girls who experienced first menstruation at 15 years. **fig. 4** illustrates distribution of girls with their menarcheal age.

Table 3 : Mean height vertex of SC/ST girls according to their menarcheal age

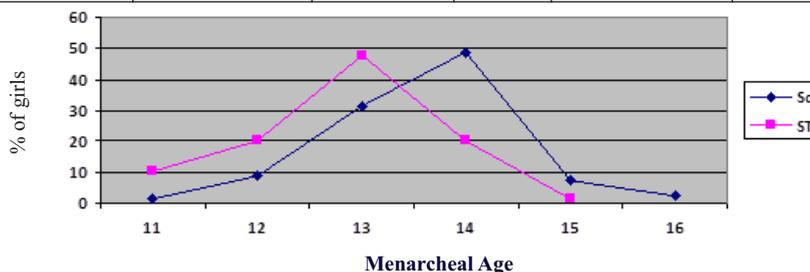| Menarcheal Age	Scheduled Caste Girls			Scheduled Tribes Girls			
	No.	**$\bar{x}$ ± S.E**	**± S.E**	**No.**	**$\bar{x}$ ± S.E**	**± S.E**	**t-values**
11	01	151.80±	σ -	-	-	σ -	-
12	07	152.73±1.62	4.30±1.14	06	154.68±2.27	5.58±1.61	0.70
13	25	152.38±0.68	3.42±0.48	12	150.68±1.53	5.30±1.08	1.02
14	39	154.23±1.10	5.79±0.65	28	152.17±0.86	4.59±0.61	1.48
15	06	158.57±2.85	6.99±2.02	12	151.24±0.66	2.29±0.46	2.51*
16	02	151.25±1.73	2.45±1.22	01	164.40±	-	-

Menarcheal Age

fig 4. Percentile distribution of girls according to their menarcheal age.

Table 4 revels the mean body weight and t-values for intergroup variation according to menarcheal age of SC and ST girls. The mean body weight is found to be highest among those girls who experienced first menstruation at the age of 15 years (49.17 2.28 kg) among SC group as compared to 12 years (50.50 ± 3.52kg) among ST group. The mean body weight is observed to be higher in ST girls as compared to SC girls at menarcheal age 12 years, 13 years and 16 years. However the mean body weight does not increase according to increase of menarcheal age among the girls of both groups. t–values indicate intergroup difference between SC and ST girls. who experienced first menstruation at the age of 14 years.

Table 4 : Mean body weight of SC/ST girls according to their menarcheal age.

Menarcheal Age	Scheduled Caste Girls			Scheduled Tribe			
	No.	$\bar{x} \pm$ S.E	$\sigma \pm$ S.E	No.	$\bar{x} \pm$ S.E	$\sigma \pm$ S.E	t-values
11	01	38.00±	-	-	-	-	-
12	07	48.86±1.72	4.58±1.22	06	50.50±3.52	8.64±2.49	0.42
13	25	45.16±0.91	4.57±0.64	12	45.33±1.47	5.10±1.04	0.09
14	39	48.85±1.00	6.26±0.70	28	45.50±0.94	5.01±0.66	2.45*
15	06	49.17±2.28	5.60±1.61	12	45.08±0.96	3.33±0.68	1.66
16	02	43.00±2.12	3.00±1.50	01	53.00±	-	-

The mean height vertex and t-values for intergroup variation according to their mother's educational status is shown in *Table 5*. The mean height vertex is highest among those SC/ST girls. whose mothers are educated up to higher secondary and lowest among those girls whose mother are educated up to primary level among ST girls (151.66±87cm) and educated up to middle level among ST girls (153.11±0.93cm). The mean height vertex according to their mother's educational attainment indicates that SC girls are taller than ST girls in all levels. However the t-values indicate non-significant difference between SC and ST girls when compared to educational attainment of their mother's.

Table 5 : Mean height vertex of SC/ST girls according to educational status of their mother.

Educational Status	Scheduled Caste Girls			Scheduled Tribes Girls			
	No.	$\bar{x} \pm$ S.E	$\sigma \pm$ S.E	No	$\bar{x} \pm$ S.E	$\sigma \pm$ S.E	t-values
Illiterate	02	156.05±1.38	1.95±0.97	-	-	-	-
Primary	35	153.69±0.83	4.96±0.59	32	151.66 ± 0.87	4.93±0.61	1.68
Middle	28	153.11±0.93	4.97±0.66	14	152.82±1.23	4.61±0.87	0.19
High School	13	153.52±1.77	6.39±1.25	09	151.87±1.28	3.85±0.90	0.75
Higher Secondary	02	160.15±4.29	6.05±3.02	03	155.30±3.78	6.55±2.67	0.85

Table 6 exhibits the mean body weight and t-values for intergroup variation among SC/ST girls according to the mother's educational status. The mean body weight of girls is found to be highest among those whose mothers are educated upto higher secondary level among both groups while lowest among girls of illiterate mother (46.00. ±2.14kg) among SC girls and girls of primary educated mother (44.84±0.79) among ST girls. The mean body weight increases according to increase in educational level of their mothers among ST girls, while among SC girls such trend have not been seen. The SC girls are found to be heavier than ST girls. Whose mothers are educated up to primary and higher secondary level. Intergroup difference is found to be significant between those SC and ST girls who are nourished by primary educated mother.

Table 6 : Mean body weight of SC/ST girls according to their mother's educational status.

Educational Status	Scheduled Caste Girls			Scheduled Tribes Girls			
	No.	$\bar{x} \pm$ S.E	$\sigma \pm$ S.E	No.	$\bar{x} \pm$ S.E	$\sigma \pm$ S.E	t-values
Illiterate	02	46.00±2.14	3.00±1.50	-	-	-	-
Primary	35	48.22±0.97	5.75±0.68	32	44.84±0.79	4.47±0.55	2.69***
Middle	28	46.32±1.14	6.07±0.81	14	47.07±1.75	6.57±1.24	0.36
High School	13	47.15±1.46	5.29±1.03	09	47.45±2.00	6.02±1.41	0.12
Higher Secondary	02	52.50±5.31	7.50±3.75	03	48.33±2.68	4.64±1.89	0.70

The mean height vertex of SC/ST girls according to their father's educational status is shown in *Table 7.* The mean height vertex is found to be highest among those SC girls(156.05±1.38cm) whose father's are illiterate, while among those ST girls (155.29±1.36cm) whose fathers are educated up to undergraduate level. However the SC girls are observed to be taller than ST girls when compared to educational status of their father. t-values for intergroup variation indicate non-significant differences at all educational levels of their father.

Table 7 : Mean height vertex of SC/ST girls according to their father's education.

Educational Status	Scheduled Caste Girls			Scheduled Tribes Girls			
	No.	$\bar{x} \pm$ S.E	$\sigma \pm$ S.E	No.	$\bar{x} \pm$ S.E	$\sigma \pm$ S.E	t-values
Illiterate	02	156.05±1.38	1.95±0.97	-	-	-	-
Primary	05	154.28±2.88	6.46±2.04	12	152.05±0.81	2.81±0.57	0.74
Middle	05	154.60±1.63	3.67±1.16	08	150.91±1.94	5.50±1.37	1.45
High School	19	154.94±1.11	4.85±0.78	14	152.10±1.18	4.43±0.83	0.19
Higher Secondary	30	152.99±0.93	5.12±0.66	10	152.09±1.48	4.68±1.04	0.51
Under Graduate	14	152.99±1.24	4.66±0.88	08	155.29±1.36	3.86±0.96	1.25
Post Graduate	05	152.48±3.84	8.62±2.72	06	150.28±2.94	7.22±2.08	0.45

Table 8 revels the mean body weight and t-values for intergroup variation among SC/ST girls according to their father's educational attainment. The mean body weight indicates its highest magnitude among those girls whose fathers are educated upto high school level among SC group (49.58± 1.63kg) and among those ST girls (50.38±2.62 kg) whose father's are educated upto undergraduate level. No positive relationship of mean body weight of girls with educational attainment of their father is observed among both groups. t-values indicate non-significant variation between SC/ST girls. When compared to educational attainment of their father.

*Table 8 :*Mean body weight of SC/ST girls according to their father's education.

Educational Status	Scheduled Caste Girls			Scheduled Tribes Girls			
	No.	$\bar{x} \pm$ S.E	$\sigma \pm$ S.E	No.	$\bar{x} \pm$ S.E	$\sigma \pm$ S.E	t-value
Illiterate	02	46 ±2.12	3.00±1.50	-	-	-	-
Primary	05	48. 80±2.37	5.31±1.68	12	44.92±1.38	4.80±0.98	1.41
Middle	05	48. 60±2.32	5.20±1.64	08	43.67±1.72	4.88±1.22	1.70
High School	19	49.58 ±1.63	7.12±1.15	14	46.00±1.18	4.43±0.83	1.81
Higher Secondary	30	46.77 ±0.92	5.07±0.65	10	45.80±1.51	4.77±1.06	0.55
Under Graduate	14	46.86 ±1.36	5.11±0.96	08	50.38±2.62	7.43±1.85	1.19
Post Graduate	05	45.00 ±1.99	4.47±1.41	06	46.33±2.15	5.28±1.52	0.45

NUTRITIONAL STATUS
Nutritional status of SC/ST girls are determined by BMI and BMI of SC/ST girls are calculated according to different parameters of thim. *Table 9* indicated the mean BMI of SC/ST girls according to their age. The mean BMI varies from 19.58 ±0.68 to 20.93±2.01 among SC girls and from 19.19±0.10 to 21.39±1.23 among ST girls. In general the mean BMI increases from 16 to 22 years among girls of both groups. The mean BMI indicates its higher magnitude among SC girls than ST girls when compared to age of girls between 16 to 22 years except 21 years. t-values indicate non-significant intergroup variation among girls of all age groups. *Fig 5* indicates the distribution of girls according to BMI.
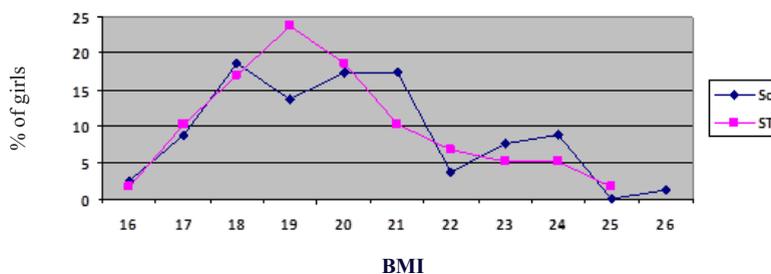
fig 5. Percentile distribution of girls according to their BMI

Table 9 : Mean BMI according to age the SC/ST girls.

Age in Year	Scheduled Caste Girls			Scheduled Tribes Girls			
	No.	$\bar{x} \pm$ S.E	$\sigma \pm$ S.E	No.	$\bar{x} \pm$ S.E	$\sigma \pm$ S.E	t-value
16	05	19.58±0.68	1.53±0.48	03	19.19±0.10	0.18±0.07	0.56
17	12	19.73±0.87	3.02±0.62	15	19.28±0.37	1.42±0.26	0.47
18	16	19.89±0.62	2.47±0.44	10	19.76±0.60	1.91±0.43	0.15
19	10	20.79±0.43	1.36±0.30	12	19.57±0.55	1.91±0.39	1.75
20	18	20.14±0.48	2.06±0.34	12	20.03±0.60	2.09±0.43	0.14
21	17	20.39±0.49	2.02±0.35	03	21.39±1.23	2.13±0.87	0.76
22	02	20.93±2.01	2.84±1.42	03	20.12±1.06	1.84±0.75	0.36

The mean BMI of SC/ST girls according to their menarcheal age is shown in *Table 10.* The mean BMI varies from 18.77±0.49 to 21.16 ±0.74 among SC girls and from 19.61 to 20.97± 1.04 among ST girls and indicates its highest value among those girls, who experienced first menstruation at the age of 12 years in both SC (21.16±0.74) and ST (20.97±1.04)group However, lowest mean BMI is observed among those girls who experienced first menstruation at the age of 16 years, t-values indicate non-significant intergroup variation when compared to menarcheal age of girls from 12 to 15 years.

Table 10 : Mean BMI of SC/ST girls according to their menarcheal age.

Menarcheal Age	Scheduled Caste Girls			Scheduled Tribes Girls			
	No.	$\pm$ S.E	$\sigma \pm$ S.E	No.	$\pm$ S.E	$\sigma \pm$ S.E	t-values
11	01	16.49	-	-	-	-	-
12	07	21.16±0.74	1.96±0.52	06	20.97±1.04	2.56±0.73	0.15
13	25	19.44±0.35	1.75±0.24	12	19.97±0.60	2.08±0.42	0.77
14	39	20.56±0.41	2.61±0.29	28	19.64±0.39	2.09±0.27	1.64
15	06	19.15±0.61	1.51±0.43	12	19.69±0.36	1.26±0.25	0.78
16	02	18.77±0.49	0.70±0.35	01	19.61	-	-

Table 11 reveals the mean BMI of SC/ST girls according to educational status of their mother. The mean BMI indicates its highest magnitude among those girls, whose mother are educated upto primary level (20.44±0.43) in SC groups and are educated up to high school level in ST groups. The mean values of BMI are observed to be higher in SC girls as compared to ST girls except in category of mothers of educated upto higher secondary level. t-values indicate non-significant intergroup variation in all education level of mother.

Table 11 : Mean BMI of SC/ST girls according to the educational status of their mother.

Educational Status	Scheduled Caste Girls			Scheduled Tribes Girls			
	No.	$\bar{x} \pm$ S.E	$\sigma \pm$ S.E	No.	$\bar{x} \pm$ S.E	$\sigma \pm$ S.E	t-values
Illiterate	02	18.87±0.53	0.76±0.38	-	-	-	-
Primary	35	20.44±0.43	2.58±0.30	32	19.61±0.31	1.80±0.22	1.54
Middle	28	19.59±0.39	2.09±0.27	14	19.84±0.63	2.36±0.44	0.34
High School	13	20.01±0.53	1.93±0.37	09	20.33±0.84	2.53±0.59	0.32
Higher Secondary	02	20.34±0.98	1.39±0.69	03	20.01±0.65	1.13±0.46	0.28

The distribution of mean BMI of SC/ST girls according to their father's educational status is shown in **Table 12**. The mean BMI is found to be lowest among those SC girls whose fathers are observed illiterate (18.87± 0.53) and among ST girls it is observed lowest in middle educated fathers. The mean value of BMI of SC girls are found to be higher than that of ST girls when compared to educational status of their father.

Table 12 : Mean BMI of SC/ST girls according to their father's education.

Educational Status	Scheduled Caste Girls			Scheduled Tribes Girls			
	No.	$\bar{x} \pm$ S.E	$\sigma \pm$ S.E	No.	$\bar{x} \pm$ S.E	$\sigma \pm$ S.E	t-value
Illiterate	02	18.87±0.53	0.76±0.19	-	-	-	-
Primary	05	20.78±1.83	4.12±1.30	12	19.43±0.57	1.99±0.40	0.69
Middle	05	20.32±0.83	1.88±0.59	08	19.19±0.75	2.13±0.53	1.01
High School	19	20.62±0.55	2.43±0.39	14	19.88±0.40	1.53±0.28	1.07
Higher Secondary	30	19.97±0.32	1.80±0.23	10	19.79±0.54	1.72±0.38	0.28
Under Graduate	14	20.02±0.53	1.99±0.37	08	20.84±0.91	2.59±0.64	0.78
Post Graduate	05	19.47±1.10	2.47±0.78	06	20.51±0.77	1.89±0.54	0.77

PHYSICAL PARAMETERS & NUTRITIONAL STATUS
In the present study an attempt has been also made to evaluate nutritional status of SC/ST girls according to their physical features viz; height vertex, body weight and sitting height vertex. Table 13 exhibits the distribution of mean BMI and proportion of SC/ST girls according to their height vertex. The mean BMI indicates its higher value among SC girls than that of ST girls. When compared to height vertex of girls. In present study the SC/ST girls are classified into three groups according to their height vertex. SC girls having 141 to 150 cm height indicate highest mean BMI (20.77± 0.59) compared to ST girls having 150-160cm height(20.12 ±0.37).

Table 13 : Nutritional status of SC/ST girls according to their height vertex

Height in cm	Scheduled Caste Girls					Scheduled Tribes Girls				
	No.	BMI ± SE	Under weight	Normal weight	over weight	No.	BMI ± SE	Under weight	Normal weight	over weight
141-150	22	20.77 ± 0.59	31.82	63.64	4.54	20	19.57± 0.38	25.00	75.00	-
150-160	52	19.75 ± 0.27	30.77	69.23	-	34	20.12± 0.37	20.59	76.47	2.94
160-170	06	20.74 ± 1.08	33.33	66.67	-	05	19.16 ± 0.86	40.00	60.00	-
	80		31.25	67.50	1.25	59	23.7	23.73	74.58	1.69

The proportion of girls of normal weight is observed to be highest is almost all height vertex categories among girls of both groups. However ST girls are observed to more normal than that SC girls. When compared to their height vertex, the proportion of underweight girls is observed to be lowest in 150-160 cm height vertex category. However, according to the proportion of underweight SC girls (31.25%) overweight girls are found to be higher in ST girls than SC girls(1.25%). Percentile distribution of girls with under nutritional status is shown in **fig 6**.
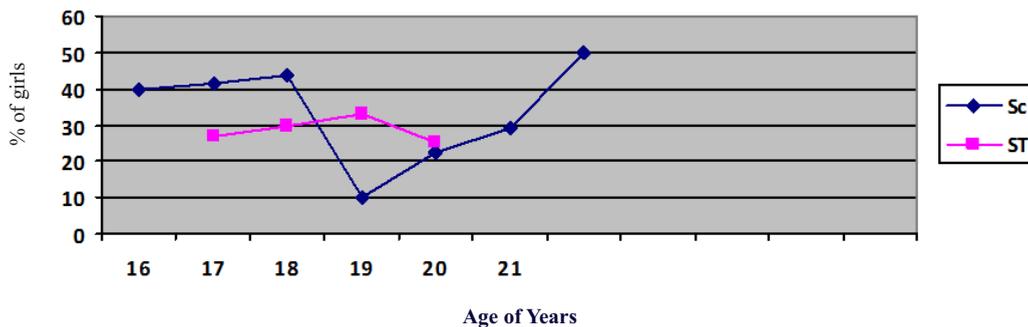
fig 6. Percentile distribution of girls according with under nutritional status.

Table 14 reveals the distribution of mean BMI and proportion of nutritional status of SC/ST girls according to their body weight. The mean BMI increases according to increase in body weight among both groups. Mean BMI is found to be highest among those SC/ST girls who are classified under 60-65 kg. Body weight and lowest under there with 35-40 kg body weight. Underweight is most prevalent among girls belonging to 35-40 kg body weight category. However, normal weight is most prevalent among both SC/ST girls, when compared to their body weight except in 35-40 body weight categories. Percentile distribution on of girls with normal nutritional status is shown in **fig 7**
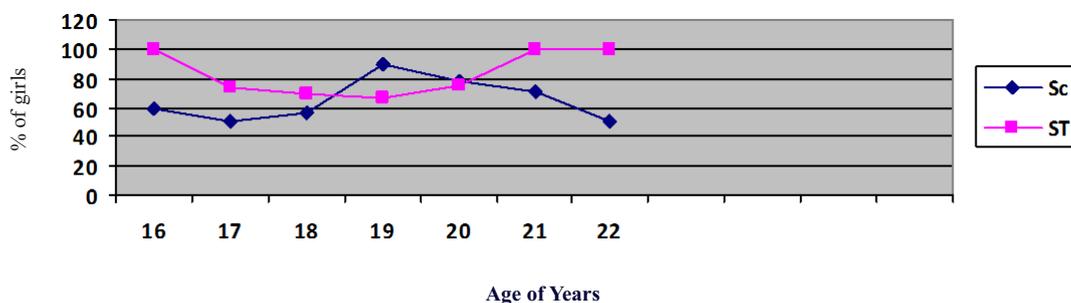
Fig 7. Percentile distribution of girls according with normal nutritional status.

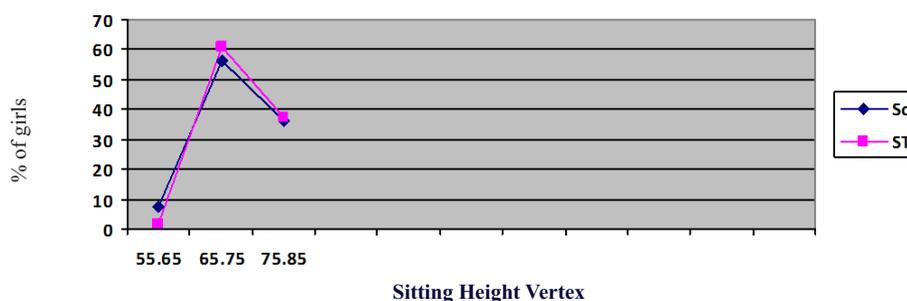**Table 14 :** Nutritional status of SC/ST girls according to their body weight

weight in Kg	Scheduled Caste Girls					Scheduled Tribes Girls				
	No.	Mean BMI	Under weight	Normal weight	over weight	No.	Mean BMI	Under weight	Normal weight	over weight
35-40	11	17.41 ± 0.24	90.91	9.09	&	07	17.77± 0.39	71.43	28.57	&
40-45	24	18.91 ± 0.25	41.67	58.33	&	30	18.98± 0.21	30.33	70.00	&
45-50	31	20.44 ± 0.25	9.68	90.32	&	10	20.98 ± 0.39	&	100.00	&
50-55	06	22.29± 0.60	16.67	83.33	&	09	21.77 ± 0.52	&	100.00	&
55-60	06	24.37 ± 0.88	16.67	66.66	16.67	02	23.24 ± 0.62	&	100.00	&
60-65	02	24.35 ± 0.31	&	100.00	&	01	25.67	&	&	100.00
	80		31.25	67.50	1.25	59	23.-	23.73	74.58	1.69

The distribution of mean BMI and proportion of girls according to their sitting height vertex is presented in **Table 15.** The mean BMI increases with the increase in sitting height vertex among SC girls while reverse trend has been observed in ST girls. The mean BMI indicate its highest value among those girls. whose sitting height vertex is 75 to 85 cm in SC group and 55-65 cm in ST group. Normal weight is prevalent among SC & ST girls having sitting height vertex 65 to 75 cm and 75 to 85 cm and varies from 64.44% to 79.31% in SC girls and 72.73% to 77.78% in ST girls. However problem of underweight` is more prevalent among SC girls having sitting height vertex 55 to 65 cm. **Fig 3** represents the distribution of girls according to their sitting height vertex.

Table 15 : Nutritional status of SC/ST girls according to their sitting height vertex

Sitting Height Vertex in cm	Scheduled Caste Girls					Scheduled Tribes Girls				
	No.	BMI ± SE	Under weight	Normal weight	over weight	No.	BMI ± SE	Under weight	Normal weight	over weight
55-65	06	19.95 ±1.06	66.67	33.33	-	01	25.67	&	&	100.00
65-75	45	20.11 ±0.36	33.33	64.44	2.22	36	19.85±0.31	22.22	77.78	-
75-85	29	20.23 ±0.38	20.69	79.31	-	22	19.61±0.42	27.27	72.73	&
	80		31.25	67.50	1.25	59	23.73	23.73	74.58	1.69

fig 3. Percentile distribution of girls according to their sitting height vertex.

Nutritional Status of SC/ST girls according to their age is presented in Table 16. Normal weight is more prevalent among girls of all age groups in both SC and ST groups. However the proportion of normal girls is found to be higher in ST group than SC groups except in girls of 19 to 20 years age group. Under weight is more prevalent among 18 years old SC girls (43.75%) and among 19 years old, ST girls (33.33%). Over weight is found to be prevalent among 8.33% of 17 years old SC girls.

Table 16 : Nutritional status of SC/ST girls according to their age.

Age in year	Scheduled Caste Girls				Scheduled Tribes Girls			
	No.	Under weight < 18.5	Normal weight 18.5-24.9	Over Weight 25.00-29.9	No.	Under weight < 18.2	Normal weight 18.5-24.9	Over Weight 25.00-29.9
16	05	40.00(2)	60.00 (3)	-	03	-	100.00(03)	-
17	12	41.67(05)	50.00(06)	8.33(01)	15	26.67(4)	73.33(11)	-
18	16	43.75(07)	56.25(09)	-	10	30.00(3)	70.00(07)	-
19	10	10.00(01)	90.00(09)	-	12	33.33(04)	66.67(08)	-
20	18	22.22(04)	77.78(14)	-	12	25.00(03)	75.00(09)	-
21	17	29.41(05)	70.59(12)	-	03	-	100.00(03)	-
22	02	50.00(01)	50.00(01)	-	03	-	100.00(03)	-
	80	31.25(25)	67.50(54)	1.25(01)	58	24.14(14)	75.89(44)	-

Table 17 reveals the distribution of nutritional status by SC/ST girls according to their menarcheal age Normal weight is more prevalent among girls of both groups. The proportion of normal weight is found 75.00% among SC girls who experienced first menstruation before 13 years. while among ST girls, it is observed to be 76.92% experienced who first menstruation after 14 years. The proportion of normal weight increases with the increase in menarcheal age, while ST girls show reverse trend. Underweight is more prevalent in SC girls that of ST girls when compared to their menarcheal age. However overweight observed in 1.56% of SC girls who experienced first menstruation in the age 13 to 14 years and in 16.67% of ST girls experienced first menstruation before age of 13.

Table 17 : Nutritional status of SC/ST girls according to their menarcheal age.

Menarcheal Age (in Yrs)	Scheduled Caste Girls				Scheduled Tribes Girls			
	No.	Under weight < 18.5	Normal weight 18.5-24.9	Over Weight 25.00-29.9	No.	Under weight < 18.2	Normal weight 18.5-24.9	Over Weight 25.00-29.9
< 13	08	25.00(02)	75.00(06)	-	06	16.67(01)	66.66(04)	16.67(01)
13-14	64	29.69(19)	68.75(44)	1.56(01)	40	25.00(10)	75.00(30)	-
>14	08	50.00(04)	50.00(04)	-	13	23.08(3)	76.92(10)	-
	80	31.25(25)	67.50(54)	1.25(01)	59	23.73(14)	74.58(44)	1.69(01)

Table 18 exhibits the proportion of distribution of SC/ST girls according to educational status of their mother. In general the proportion of normal girls increase by increasing educational status of their mothers in both SC/ST groups. Underweight is more prevalent among those girls of both groups whose mother are educated up to primary level. Table 19 reveals the distribution of SC/ST girls according to the nutritional status of their father and illustrates the same result as found for their mother.

Table 18 : Nutritional status of SC/ST girls according to educational status of their mother.

Educational Status	Scheduled Caste Girls				Scheduled Tribes Girls			
	No.	Under weight	Normal weight	Over Weight	No.	Under weight	Normal weight	Over Weight
Illiterate	02	50.00(01)	50.00(01)	-	-	-	-	-
Primary	36	25.00 (09)	72.22(26)	2.78(01)	33	27.27(9)	72.73(24)	-
Middle	28	42.86(21)	57.14(16)	-	14	14.29(2)	78.57(11)	7.14(01)
High + Higher Secondary	14	21.43(03)	78.57(11)	-	12	25.00(3)	75.00(9)	-
	80	31.25(25)	67.50(54)	1.25(01)	59	23.73(14)	74.58(44)	1.69(01)

Table 19 : Nutritional status of SC/ST girls according to educational status of their father.

Educational Status	Scheduled Caste Girls				Scheduled Tribes Girls			
	No.	Under weight	Normal weight	Over Weight	No	Under weight	Normal weight	Over Weight
Illiterate	02	50.00(01)	50.00(01)	-	-	-	-	-
Primary	05	20.00 (01)	60.00(03)	20.00(01)	12	33.33(04)	66.67(08)	-
Middle	05	20.00 (01)	80.00(04)	-	09	55.56(5)	44.44(04)	-
High+Higher Secondary	49	28.57(14)	71.43(35)	-	24	12.50(3)	87.50(21)	-
UG+PG	19	42.10(08)	57.90(11)	-	14	14.28(02)	78.57(11)	7.14(01)
	80	31.25(25)	67.50(54)	1.25(01)	59	23.73(14)	74.58(44)	1.69(01)

Conclusion :

The Scheduled caste and Scheduled tribes may be categorized under lower socio-economic level. The tribal population is at high risk of under nutrition due to their socio-economic condition. It is well known that the period of Adolescence contributes to more than 20% of total growth in stature and upto 40-50% of body weight with respect to somatic growth. In India about 65% of girls are identified to be at obstetric risk (by height and weight criteria) in their 15th year compared to 20% in their 19th year. The present study indicated that age anthropometric features and socio-economic characterctics have a significant influence on nutritional status of SC and ST girls. The sitting height vertex, height vertex and body weight affects the nutritional status and education status of their parents and their menarcheal age are also determinant of their nutritional status. The height vertex and body weight found among SC/ST girls embarrass that due to relatively high socio-economic condition. SC girls are taller and heavier than that of ST girls. However the mean BMI is also found to be higher in SC girls than ST girls. A significant association between body weight and BMI is observed among girls of both group having body weight 55-60 kg and height vertex 141-150cm associated with BMI among SC girls and 150-160 cm among ST girls. Sitting height vertex ranks 65 to 85 cm also show the association with normal nutrition among both SC/ST girls. However under nutrition is found to be prevalent among girls of 55 to 65 cm sitting height vertex. In general educational status of parents affects the nutritional status of girls which is illustrated by this study. Menarcheal age affects the height vertex and body weight and it can be said that menarcheal age at 12 years is associated with higher magnitude of BMI and they are relatively normal than other age of menarch. However under nutrition is associated with higher age of menarch. National Family Health Statistics-3 report (2006) reveals that the prevalence of under nutrition in India is 28.1% among females and 33.1% among women of rural area. However the present study reveals that this situation is relatively better in tribal girls (23.73%) than SC girls (31.25%). In conclusion, it can be suggested that educational level of individual improves their nutritional status, however the ecological condition and food habits also play important role in maintaining normal nutritional status because of that tribal girls are observed relatively more normal than SC girls.

REFERENCES

1. Lambert Adolphe J. Quetelet. A Treatise on man and the development of his faculties : tr.(under the superintendence of R.Knox) (Edited by T.Smibert people's ed. Lambert Adlophe J. Quetelet.1942
2. World Health Organization (WHO). Physical status, the use and interpretation of anthropometry. WHO Tech. Rep. Series No. 584 WHO. 1995.
3. Obaid T.Ahmed, UNFPA. Thirty first session of the standing committee on Nutrition Newyork 2004.
4. Garn, SM. Leonard,WR. Hawthorne,VM. Three limitations of body mass index. Am. J. Clin. Nut. 1986; 44:996-7
5. Nube,M. Asenso-O. kyere,WK & Vanden Broom, G.J.M. Body mass index as an indicator of standard of living in developing countries. European Journal of clinical nutrition, 1998. 52:136-144.
6. Rotimi,C. Okosun,I. Johnson,L. Owoaje,E. Lawoyin,T. Asuzes,M. Kaufman,J. Adeyemo,A. Cooper,R. The distribution and mortality impact of chronic energy deficiency among adult Nigerian men and women. European Journal of Clinical Nutrition, 1999.53:734-739.
7. Adak,DK. Gautam,RK. Bharti,S. Gharami,AK. Pal,M. and Bharati,P. Body mass index and chronic energy deficiency of adult males of Central Indian Populations. Human Biology, 2006.78(2):201-218
8. Bharti,P. Variation in adult body dimensions in relation to economic condition among the mahishyas of Horwan district West Bengal. India Annals of Human Biology, 1989.16:529-541.
9. Osmani,SR. Nutrition and Poverty. Clarendon Press Oxford, 1992.
10. Naidu,AN. and Rao,NP. Body Mass Index: A measure of nutritional situation in Indian Populations. European Journal of Clinical Nutrition, 1994.48(Supplement 3) : 131-140.
11. Delpeuch, et.al.. Urbanization and nutrition in low income countries. Food and Nutrition Bulletin, . 1994: 10(1): 3-4.
12. Manford and Pecciano. Nutrition for teenage girls nutrition, 2000.56:86-89.
13. Parimalavallis,R. Sangeetha,M. Shanmugapriya, VP. Nutrition education on reproductive biology in posts pubescent girls belonging to shum area. Research highlight, 2007: 69-73
14. National Nutrition Monitoring Bureau. Prevalence of Micronutrient deficiencies. NNMB Technical Report 22. National Institute of Nutrition ICMR. Hyderabad, 2003.
15. Agrawal,KN. Saxena,A. Bansal,AK. Agrawal,DK. . Physical growth assessment in adolescence. Indian Pediatrics, 2001:35:1217-1235.
16. Gopalan,C.. Motherhood in early adolescence in combating under nutrition. Special Publication Series. Nutrition Foundation of India. New Delhi; 1987.
17. Weiner,JS. Lourie,JA. . Practical Human Biology. New York Academic Press, 1981.
18. Report on diet and Nutritional status of Adolescents MMB. Technical Report No.20, NIN ICMR Hyberabad, 2000:20:1-25.
19. National Family Health Survey (NFHS-3): 2005-06 India.