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ANTHROPOMETRIC ASSESSMENT OF SCHOOL CHILDREN IN AGE GROUP 10-18 YEARS AT JAIPUR

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ABSTRACT

Background: To determine health status by anthropometric measurements. **Material and Methods:** A total of 720 students between 10-18 years of age, of Rajkiya Ucha Madhyamic Vidhyalaya in Jagatpura of Jaipur. Demographic details including age assessment, body height, body weight and BMI were estimated. **Results:** Mean BMI observed is higher in girls (14-18 years) as compared to boys. By BMI for age criteria <3 percentile was observed in 149 (41.16%) boys and 72 (24.49%) girls. Total 221 (33.69%) students were falling in underweight category. In the overweight (85th -97th percentile) category 6 (1.66%) boys and 4 (1.36%) girls were found. Total 10 students (1.52%) were in this category. We observed only one girl in obese category (>97th percentile). Short stature < 3 percentile was observed in 180 (27.44%) students, of these, 123 (68.4%) were boys, 57(31.6%) were girls. Tall stature (>97percentile) were observed in 8 (1.22%) students including 5 (1.38%) boys and 3 (1.02%) girls. **Conclusion:** It can be concluded that nutritional status of the study population in present study is better as compared to the rural population of other studies. We recommend that these data should be used as a growth reference for Indian children and adolescents of Jaipur zone.

Keywords: Body mass Index, anthropometry, Nutritional status

INTRODUCTION

Schools occupy a vital place in the community. According to modern concept, school health service is an economic and powerful means of raising level of community health. It has developed during past 70 years from the little bit awareness of medical examination of children to the current scenario where comprehensive concept of ample care of all content of the health i.e. Mental, physical, social and well being of the children during the school going age are being considered.^[1]

India is going through a nutritional transitional phase and is now facing the double burden of nutritional disorder among school age children. Poor rural and urban slum population have a high prevalence of under nutrition while newly

rich urban, middle, and high income population suffer from emerging problem of obesity due to changing life style and unhealthy dietary habit. Hence there is a strong need for identifying children at risk of becoming obese and children who are undernourished so that appropriate intervention can be taken.^[2]

The nutritional status during adolescent age is an important determinant of health outcome. It was well documented that short stature in adolescent indicates prolonged under-nutrition and is associated with lower lean body mass, deficiency in muscular strength and productivity. Childhood health and nutritional status is an important determinant for planning and development of future manpower.^[3]

The assessment of pattern of growth during the adolescent period is based on set of standard physical or anthropometric measurement. This measurement not only indicate the general pattern of growth during adolescent period but also reflects a population specific growth pattern, which can serve as model for nutritional assessment of the population in this age group.^[4] Reference information can play central role for monitoring growth of adolescents and it may be useful to diagnose under nutrition, overweight and obesity and other growth-related problems. Recognition of importance of overall adolescent development is vital to programming for adolescent health, so that it is important to know the actual health status of adolescent and their varied problems. Anthropometric measurement under school health surveys offers an excellent opportunity to screen a large segment of population. Adolescent health has recently drawn greater attention in India. Therefore, this study is being undertaken to evaluate Anthropometry and nutritional status of adolescents of Jaipur.

MATERIAL AND METHODS

Study Area- This study was carried out in Government Senior Secondary school, Jagatpura located in urban area of Jaipur.

Study Population-A total of 720 students between 10-18 years of age were included in the study. 400 were males and 320 were females. 56 students (38 boys and 26 girls) were not evaluated due to absence from school during the study period.

Nature of the study-This is a cross sectional study.

Selection of the study population-School was randomly selected from a list of all the schools. Children between ages 10-18 years were included.

Sampling-All the students from class V to XII were studied.

Procedure

Before starting the survey, head master of the school was contacted and nature and purpose of the study was explained in detail. Due permission was taken from the school authorities to conduct the study. Details of the students for class V to XII were taken. Verbal consent was taken from the participants, study objectives were explained to them. The study procedure was carried out during such a time that their routine study was not affected. Absent students on particular day of study were enlisted and called separately during the study period.

Demographic details were estimated -

Age assessment- Age assessment was done as per the birth data recorded in the school.

Assessment of health-

Anthropometric Measurement-Body height and body weight were measured as follows.

(A) Body Height-

The standing body height was recorded with a marked vertical measuring scale (stadiometer) with a wooden sliding head piece. Subjects were made to stand upright in erect posture, shoes removed, heels together, the buttocks, shoulders and back of head touching the wall. The head was to be held comfortably erect, with the lower border of the eye in the same horizontal plane as the external auditory meatus. The head piece of the scale was gently lowered, pressing the hairs and making contact with the top of the head. Height was recorded to the nearest 0.5 centimetre.

(B) Body weight-

Body weight of each student was recorded on a platform type of digital weighing machine with minimum clothes and shoes removed. The subject was made to stand on the weighing scale keeping both feet astride on each side of scale and weight was recorded to the nearest of 0.1 kilograms. The weighing scale was checked prior to use for its accuracy. Average of the three readings was taken.

(C)Body mass Index- It was calculated as given below

$$\frac{\text{Weight in kgs}}{\text{Height in meters}^2}$$

Statistical analysis- The findings were recorded in excel sheet and were analysed. Appropriate test of significance were applied.

RESULTS

A total of 720 students were identified in 6th to 12th class for this study. Out of these, 656 were included in the study, remaining 64 student were absent on the days of school survey. Out of these 656 student 362 (55.18%) were boys while 294 (44.82%) were girls.

Height, weight and BMI in different age group were recorded. In the present study the mean height for boys and girls was almost equal till age of 14 years subsequently the mean height in the age group 15-18 years was higher in boys as compared to girls. Mean weight observed in both sexes was almost equal in both the groups. Mean BMI is equal till age of 13 year in both the sexes; subsequently Mean BMI observed is higher in girls (14-18 years) as compared to Boys. By BMI for age criteria <3 percentile was observed in 149(41.16%) boys and 72(24.49%) girls. Total 221 (33.69%) students were falling in underweight category. In the overweight (85th -97th percentile) category 6(1.66%) boys and 4(1.36%) girls were observed. Total 10 students (1.52%) were in this category. We observed only one girl in obese category (>97th percentile).

Short stature < 3 percentile was observed in 180 (27.44%) students out of these, 123 (68.4%) were boys, 57(31.6%) were girls. Tall stature (>97percentile) were observed in 8 (1.22%) students including 5 (1.38%) Boys and 3 (1.02%) girls.

DISCUSSION

Adolescent health is one of the most challenging issues in modern era. India is undergoing a rapid epidemiological transition. The increasing

prevalence of non communicable diseases is adding to the burden of both sides of malnutrition (under nutrition and obesity). If the factors related to life style remain unnoticed during adolescence, they manifest themselves as serious medical problem in advanced stage in adult life leading to life threatening morbidities and high mortality in young age. It is agreed worldwide that the information on health status of adolescents from developing world (Particularly at community level) is grossly lacking.^[5]

In India several studies have been carried out on the Anthropometric measurement of adolescent. These studies report a wide range of data related to growth and malnutrition issues in adolescents but data are grossly inadequate. Proper understanding of physical condition of adolescent will contribute significantly towards formulating and implementing strategies to improve wellbeing in this group and inturn building healthy nation.

With this background, this cross sectional study was conducted to evaluate the health status of adolescent (10-18 years of age) on 720 student of class 5th to 12th of govt. school of Jagatpura of Jaipur, during Dec. 2011 to June 2012,

A total of 720 students were identified from 6th -12th class for this study. Out of these 656 students were included in the study, remaining 64 students were absent on the days of school survey. Out of these 656 students, 362 (55.18%) were boys while 294 (44.82%) were girls. We observed that boy: girl ratio was equal till the age of 11 years. Subsequently it was 9.45% v/s 7.45% in 12 years age group, 6.71% V/s 4.27% in 13 years age group, 7.47% v/s 6.86% in 14 years, 7.47% v/s 5.18% in 15 years, 10.52% v/s 8.69% in 16 years, the same thing is observed in 17-18 years age group also.

This indicates the female population in higher class is declining as compared with male population. Possible reasons could be that parents give more preference to males as

compared to females. Another possible reason could be that parents of girls of ≥ 14 years were hesitant to send their girls to school. This observation indicates that there is preference for male education compared to female education in this socioeconomic group.

Anthropometric Measurement

Height (Boys)

In the present study Mean height (cms) for adolescent boys at age 10–18 years were 133.0 \pm 11.20, 139.18 \pm 9.72, 143.89 \pm 8.71, 149.47 \pm 8.41, 152.37 \pm 7.49, 159.1 \pm 5.42, 158.54 \pm 4.93, 160.05 \pm 5.73, 160.09 \pm 4.87 respectively. This data when compared with Marwah *et al* ^[6] study to our study, the mean height of adolescent boys in present study are lower. Possible reasons could be that Marwah *et al* have included students of upper socioeconomic status.

Similarly when data of present study compared with study by Agarwal D K ^[7] shows similar result. The study by Agarwal D K was also done on affluent class. Present study shows similar results till age of 14 years, subsequently the mean height in present study is lower. At this age there is growth spurt; large family size and low level of education of parents possibly were responsible for this failure to gain height.

Weight (Boys)

Mean weight (Kg.) of adolescent boys at age (10-18 years) in the present study were 26.36 \pm 6.8, 30.49 \pm 6.98, 32.62 \pm 6.85, 34.75 \pm 7.28, 37.11 \pm 5.59, 43.37 \pm 5.51, 43.54 \pm 5.31, 45.25 \pm 5.81, 45.00 \pm 4.47 respectively. The mean weight in the present study were less for all ages on comparison with **Agarwal D K** and **Marwah *et al*** study. ^[6,7]

Agarwal and Marwah studies have higher mean weight compared to the present study. The possible difference could be that the present study population belongs to middle and upper lower socioeconomic strata.

Body Mass Index (BMI for Boys)

When BMI for different ages in boys was calculated in present study, it was found that Mean BMI at age 10-18 year were 14.54 \pm 1.92, 15.57 \pm 1.68, 15.61 \pm 1.97, 15.40 \pm 1.95, 15.93 \pm 1.80, 17.08 \pm 1.53, 17.29 \pm 1.62, 17.61 \pm 1.59, 17.51 \pm 0.83 respectively. **Marwah *et al*** and **Anand K** showing similar result from present study. ^[6,8]

Height (Girls)

Mean Height of girls at 10-18 year were found 133.9 \pm 7.85, 138.1 \pm 8.68, 143.57 \pm 8.00, 147.86 \pm 7.82, 152.34 \pm 9.85, 156.19 \pm 4.66, 154.23 \pm 7.38, 157.60 \pm 6.95, 155.00 \pm 6.3 cm respectively in present study. Mean Height were compared with other similar studies by Agarwal D K *et al*, Marwah *et al* and Chaturvedi S. ^[6,7,9]

In the present study the mean height is lower as compared to **Marwah and Agarwal** study which was conducted in affluent class. ^[7, 8] Mean height for girls in present study compared to study by **Chaturvedi S** ^[9] is higher. The possible explanation could be that Chaturvedi S has included study population from rural Govt. School.

Weight (Girls)

Mean Weight of adolescent girls at age 10-18 year in the present study 27.54 \pm 4.60, 22.87 \pm 4.57, 33.18 \pm 5.46, 35.04 \pm 6.53, 39.71 \pm 6.30, 42.98 \pm 5.56, 42.08 \pm 6.91, 46.00 \pm 8.26, 43.71 \pm 5.92 respectively. The mean weight in Marwah and Agarwal study is higher compared to present study. ^[6,7] Possible reasons are that both studies were performed in affluent class.

In the present study the mean weight is higher as compared to study by Chaturvedi. ^[9] The possible higher mean weight observed in the present study compared to study by Chaturvedi could be that they have included children from rural Govt. School, where nutritional status may be poor as compared to our study.

Body Mass Index (BMI for Girls)

In the present study Mean BMI (Kg/M²) at age 10-18 years were found 15.30±1.82, 15.11±1.57, 16.05±1.98, 15.88±1.82, 17.11±2.48, 17.64±2.42, 17.57±2.06, 18.44±2.71, 18.11±1.60 respectively.

Mean BMI in Marwah and Anand study is higher as compare to the present study.^[6,8] Which is related to the higher affluent class population in their study. The Mean BMI in the present study is higher as compared to Chaturevedi Study, again related to the same factors as for height and weight in boys and girls.^[9]

The Mean height increases with age in both sexes. Uniform gaining heights were observed in both sexes till age of 14 year. In the present study the mean height for male and female was almost equal till age of 14 years. Subsequently the mean height in the age group 15-18 years was higher in boys as compared to girls. In the age group 14 to 18 year boys were taller than girls. Mean weight observed in both the sexes was almost equal in all age group (except minor variation). Mean BMI was equal till age of 13 years in both the sexes, subsequently in 14 to 18 years age group the mean BMI was higher in girls as compared to boys.

CONCLUSION

By viewing the above observation, it can be concluded that nutritional status of the study population in present study is better as compared to the rural population by Chaturvedi S but less as compared to the urban affluent population study by Marwah and Agarwal. Mean BMI observed is higher in girls as compared to Boys. Malnutrition related with low weight more prevalent in study population, so there should be some awareness programme arranged in this population to combat malnutrition. Short stature < 3 percentile was observed in 27.44% students out of these, which again indicate growth failure in study population. Early identification and

timely intervention will help this adolescent population.

The limitations of this study include absence of longitudinal data. The significant differences we report compared with earlier Indian studies underscores the need for regular updating of growth charts. We recommend that these data should be used as a growth reference for Indian children and adolescents of Jaipur zone.

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Table 1. Mean Height (cm.), Weight (kg) and BMI (kg/m²) in different age group for boys and girls

Age	Boys			Girls		
	Mean Height (cm), (Mean±SD)	Mean Weight (Kg), (Mean±SD)	Mean BMI (Wt(Kg)/(Ht.(m ²)), (Mean±SD)	Mean Height (cm), (Mean±SD)	Mean Weight (Kg), (Mean±SD)	Mean BMI (Wt(Kg)/(Ht.(m ²)), (Mean±SD)
10	133.0±11.20	26.36±6.80	14.54±1.92	133.9±7.85	27.54±4.60	15.30±1.82
11	139.18±9.72	30.49±6.98	15.57±1.68	138.1±8.68	22.87±4.57	15.11±1.57
12	143.89±8.71	32.62±6.85	15.61±1.97	143.57±8.00	33.18±5.46	16.05±1.98
13	149.47±8.41	34.75±7.28	15.40±1.95	147.86±7.82	35.04±6.53	15.88±1.82
14	152.37±7.49	37.11±5.59	15.93±1.80	152.34±9.85	39.71±6.30	17.11±2.48
15	159.1±5.42	43.37±5.51	17.08±1.53	156.19±4.66	42.98±5.56	17.64±2.42
16	158.54±4.93	43.54±5.31	17.29±1.62	154.23±7.38	42.08±6.91	17.57±2.06
17	160.05±5.73	45.25±5.81	17.61±1.59	157.60±6.95	46.00±8.26	18.44±2.71
18	160.09±4.87	45.00±4.47	17.51±0.83	155.00±6.3	43.71±5.92	18.11±1.60