A study of growth pattern of school going children of Guwahati city of India.

Himadri Das[1], Rukeya Begum[2], Gautam Medhi[3], Caroline D Shira[4]

[1] *(Resident Physician, Department of Pediatrics, Gauhati Medical College & Hospital, India)*
[2] *(Associate Professor, Department of Pediatrics, Gauhati Medical College and Hospital, India)*
[3] *(Assistant Professor, Department of Pediatrics, Gauhati Medical College and Hospital, India)*
[4] *(Resident Physician Department of Pediatrics, Assam Medical College and Hospital, India)*

Abstract: *The studies on growth and physical development of children are important as they provide determinants of nation's health. This study was carried over a period of one year with the objective to study the growth pattern of school children (10-18 years) of Guwahati city of India. A total of 1000 school children between 10-18 years were taken randomly and their weight, height measured and BMI calculated.500 children were taken from government school and 500 from private school. The mean height, weight and BMI of the children of both government and private school were seen to increase with age. The mean height and mean weight of the children of private school was the found to be significantly higher (p<0.05) than that of government school. The prevalence of underweight was found to be higher in the children of the government school than the private school, whereas the prevalence of overweight and obesity was found to be higher in the children of the private school than the government. By using the CDC 2000 growth standards, more children were likely to be regarded as underweight and many children with overweight or obesity were likely to be regarded as normal as compared to growth standards compiled by Agawal et al, 2001.The differences noticed in the growth parameters between government and private school children might be due to the socioeconomic disparity between the two.*
Keywords*: Obesity, overweight, under nutrition , body mass index.*

I. Introduction

The studies on growth and physical development of children and adolescents are important as they provide determinants of nation's health. Both malnutrition and obesity is a public health problem. Obesity in childhood is associated with an increased incidence of hypertension, diabetes, coronary artery disease, osteoarthritis and overall increase in morbidity and mortality during adult life. Malnutrition on the other hand causes a lot of morbidities, growth faltering, developmental retardation and significant mortality. Growth is determined by biological determinants including sex, birth weight and genetic constitution. Socioeconomic and environmental factors seem to produce their effects by the presence of nutritional deficiencies, parasitic infections and psychosocial illnesses. The two most important factors that contribute to a sudden increase in the incidence of obesity are changes in dietary practices and urbanization. Apart from dietary changes, sedentary lifestyles and lack of adequate physical activity have also been observed, which in turn have contributed to the increased incidence of obesity. Under this backdrop this study was undertaken to study the growth pattern of school children of Guwahati.

II. Materials And Methods

It was an Analytical cross-sectional study carried out in four schools in Guwahati, two private and two government school. It was carried out from 1st June 2012 to 31st July 2013.
Study population inclusion criteria was as follows*:* Children (10-18) years were selected randomly from two government schools and two private schools. Children with any systemic disease or any major surgical problem which is likely to affect growth were excluded. A total of 1000 students, of both sexes were taken from the above mentioned school. Follow up was not done.
Data collection methods: The data was collected by providing a standard proforma to the students. Date of birth was taken as per information provided in the standard proforma and has been counted as a rounded year. Height (in centimeters) was taken with a stadiometer. The subject was made to stand with bare feet, minimum standard clothing, with feet parallel on an even platform stretching upwards to the fullest, arms hanging on the sides; heels, buttocks, shoulder and occiput in contact with the vertical support. One hand was used to support the head in Frankfurt plane (the line joining the lower border of the orbit to the external auditory meatus should be in parallel to the ground) with upward pressure on the chin. The other hand moved the head board. Weight, was taken using an electronic weighing machine. The subjects were weighed in minimal clothing (standard

weight). The weight scale was checked for zero error each time the subject was weighed. It was checked periodically against known weights.

Body mass index(BMI) was calculated by the formula weight in kilogram/height in (meters)^2 and compared with the percentile charts given by CDC 2000[1] and Agarwal, et al, 2001[2]. BMI more than 95th percentile was taken as obesity and that between 85th and 95th as overweight and below 5th was taken as underweight. The data collected were scrutinized individually and analyzed manually. Percentile Charts were made using the following formula-

1. Standard deviation (SD) = $(\sum \frac{x^2 - n\bar{x}^2}{n})^{1/2.}$

2. Percentile $P_n = \left\{ (x \frac{n}{100} - f_o)/f_m \right\} + b$

p value was obtained by performing t-test test at 0.05 level of significance . Statistical software SPSS version 20 was used.Written consent was taken from the concerned school authorities and legal guardians. The study was passed by the Ethical Committee of Gauhati Medical College and Hospital.

III. Results And Observations

The present study was carried out at four schools of Guwahati-(two government schools and two private schools). The mean height, weight and BMI of the children of both government school and private school was seen to increase with age.

The mean height and mean weight of the children of private school was the found to be significantly higher (p<0.05) than that of government school. The prevalence of underweight was found to be higher in the children of the government school than the children of the private school , whereas the prevalence of overweight and obesity was found to be higher in the children of the private school than the children of the government school.

The prevalence of overweight and obesity in the boys of private school was 15.6% and 2.43% respectively whereas it was 14.9% and 2.23% respectively in the boys of government school using the growth standards compiled by Agarwal, et al, 2001.

The prevalence of overweight and obesity in the girls of private school was 8.2% and 2.7% respectively whereas it was 7.3% and 0.49% respectively in the girls of government school using the growth standards compiled by Agarwal, et al, 2001.

The prevalence of underweight in the boys of private school was 3.5% whereas it was 4.2% in the boys of government school using the growth standards compiled by Agarwal ,et al, 2001.The prevalence of underweight in the girls of private school was 1.03% whereas it was 2.4% in the girls of government school using the growth standards compiled by Agarwal et al,2001.

The prevalence of overweight and obesity in the boys of private school was 6.9% and 2.08% respectively using the CDC2000 growth standard whereas it was 15.6% and 2.43% respectively using the growth standards compiled by Agarwal, et al, 2001.
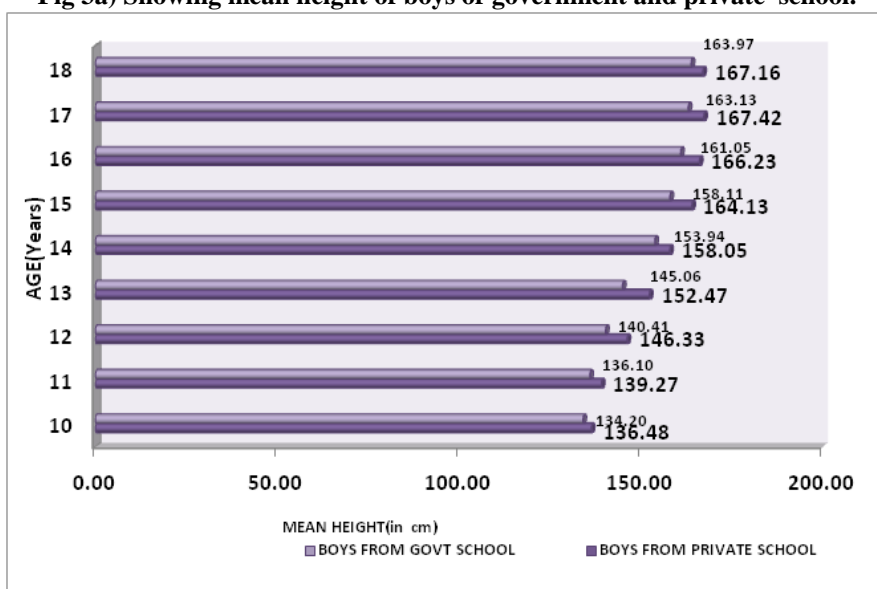
The prevalence of overweight and obesity in the boys of government school was 6.7% and 1.86% respectively using the CDC2000 growth standard whereas it was 14.9% and 2.23% respectively using the growth standards compiled by Agarwal, et al, 2001.The prevalence of overweight and obesity in the girls of private school was 6.1% and 2.3% respectively using the CDC2000 growth standard whereas it was 8.2% and 2.7% respectively using the growth standard compiled by Agarwal et al, 2001. The prevalence of overweight and obesity in the girls of government school was 2.5% and 0.43% respectively using the CDC2000 growth standard whereas it was 7.3% and 0.49% respectively using the growth standard compiled Agarwal et al,2001.

The prevalence of underweight in the boys of private school was 15.1% using the CDC2000 growth standard whereas it was 3.5% using the growth standard compiled by Agarwal , et al,2001. The prevalence of underweight in the boys of government school was 16% using the CDC2000 growth standard whereas it was 4.2% using the growth standard compiled by Agarwal et al, 2001.

The prevalence of underweight in the girls of private school was 4.7% using the CDC2000 growth standard whereas it was 1.03% using the growth standard compiled by Agarwal et al, 2001.The prevalence of underweight in the girls of government school was 6.8% using the CDC2000 growth standard whereas it was 2.4% using the growth standard compiled by Agarwal et al, 2001. In the present study, according to growth standards compiled by Agarwal, et al,2001 the prevalence of underweight is 2.8%, overweight 10.2% and obesity 1.9% in the whole study population.
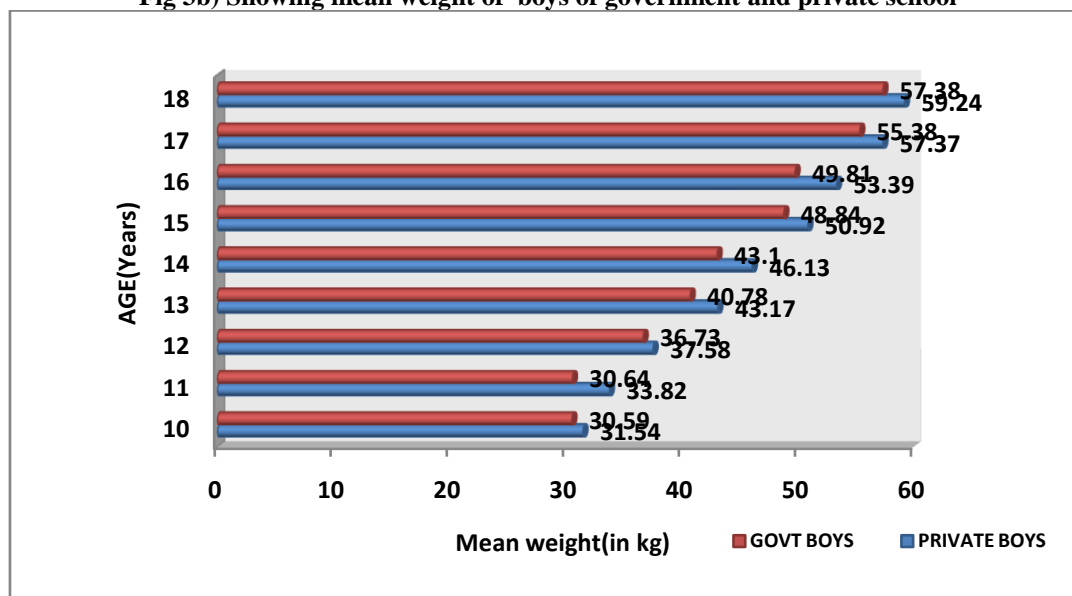
Therefore using the CDC 2000 growth standards, more children are likely to be regarded as underweight and many children with overweight or obesity are likely to be regarded as normal in the school children of Guwahati as compared to growth standards compiled by Agarwal et al, 2001.

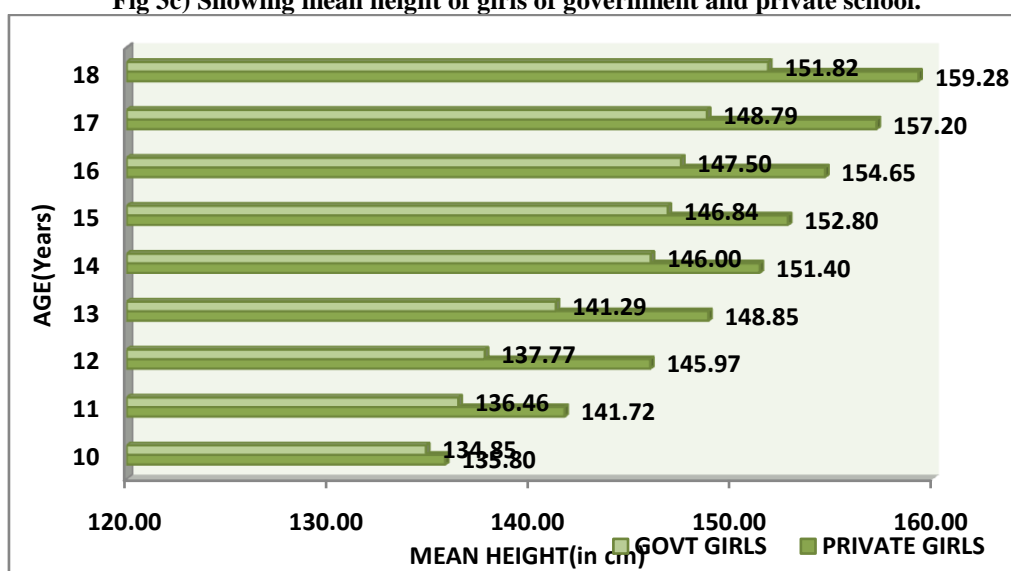**Fig 3a) Showing mean height of boys of government and private school.**

The figure shows that the mean height of boys of private school is higher than the boys of government school at all ages .This is statistically significant (p<0.05).

Fig 3b) Showing mean weight of boys of government and private school
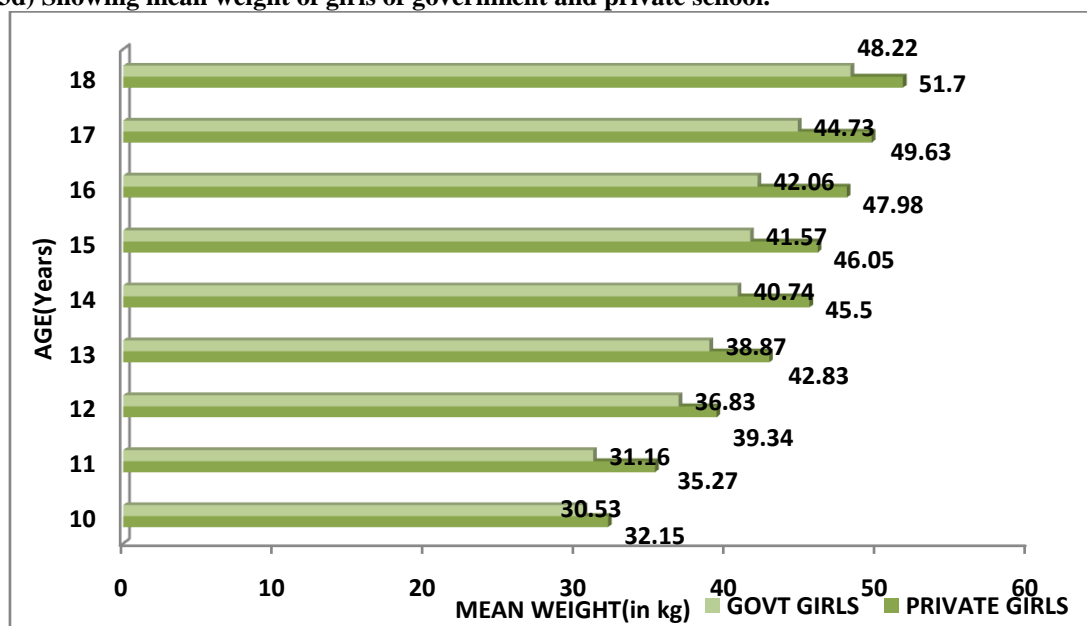

The figure 3b) shows that the mean weight of boys of private school is greater than the boys of government school at all the ages. This is statistically significant (p<0.05).

Fig 3c) Showing mean height of girls of government and private school.

The figure shows that the mean height of the girls of private school is higher than the girls of government school at all age group. This is statistically significant ($p < 0.05$).

Fig 3d) Showing mean weight of girls of government and private school.

The figure shows that the mean weight of the girls of private school is greater than the girls of government school at all age group. This is statistically significant ($p < 0.05$).

IV. Discussion

Raman K Marwaha et al 2006[3] found that the subjects of private school was significantly taller and heavier compared to those of government school (P-value < 0.05).

Sunil M Kolekar and Sunita N Sawant, 2013[4] found that height and weight of urban school children were significantly higher than rural children (P-value < 0.05). This was due to difference in socio-economic environment in urban and rural areas.

In the present study 2013, the mean height and mean weight of the private school children (both boys and girls) were significantly higher than the government school children (both boys and girls) (P value < 0.05)

Bener A and Kamal A, 2005[5] found that the mean value of height, weight and BMI of Qatari children increased with age but there was slight decrease in BMI in the age group of 17-18 years. Hunshal et al 2010[6], also found that age was significantly and positively related to height and weight. In the present study

also, the mean weight and mean height increased with age at all categories but some variations were observed in the mean BMI values in the subjects. However the mean BMI of the private school girls was found to increase with increasing age. The variation could be due to small sample size at each age group. M Premanath et al, 2010[7] found that according to IAP growth standard, the prevalence of underweight are found to be 17.2%, overweight 8.5% and obesity 3.4% in the study population.In the present study, 2013 according to growth standards compiled by Agarwal, et al,2001 the prevalence of underweight is 2.8%, overweight 10.2% and obesity 1.9%.

V. Conclusion

It is seen from various literature available on growth that there is significant disparity in anthropometric parameters of children belonging to the upper and lower socioeconomic strata with upper socioeconomic strata children being significantly taller and heavier. Thus growth of an individual, besides genetic factors, is affected by different environmental, cultural, nutritional, economic factors and all of them act together on growth of an individual. There is a need to create awareness among school children and their parents about physical growth and physical health which can be improved by providing proper care and nutrition right from early childhood period. There is also an urgent need to tackle the burgeoning prevalence of childhood obesity with a concerted national effort. The present study shows the growth pattern of school children of Guwahati. The differences noticed in the growth parameters between government and private school children might be due to the socioeconomic disparity between the two. However more growth studies with larger sample size are required to establish it.

References

[1]. Kliegman, Stanton,St Geme,Schor,Behrman, Nelson Textbook of Pediatrics, 19th ed. Elsevier Saunders,Philadelphia 2012,179-182
[2]. Agarwal KN, Saxena A, Bansal AK, Agarwal DK. Physical growth assessment in adolescence. Indian Pediatrics, 2001;38:1217-1235.
[3]. Marwaha RK, Tandon N, Singh Y, Aggarwal R, Grewal K, Mani K. A study of growth parameters and prevalence of overweight and obesity in school children from Delhi. Indian Pediatrics, 2006;43:943–52.
[4]. Kolekar M S, Sawant U S, A comparative study of physical growth in urban and rural school children from 5 to 13 years of age. International journal of recent trends in science and technology,2013;6(2):89-93.
[5]. Bener A, Kamal A. Growth pattern of Qatari school children and adolescents aged 6-18 years, J Health popul nutr. 2005;23(3):250-258.
[6]. Hunshal SC, Pujar L, Netravati HS, Physical growth status of school going children, Karnataka. J. agri. sci. 2010;23(4):625 -627.
[7]. Premanath M, Basavanagowdappa H, Shekar MA, Vikram SB, Narayanappa, Mysore childhood obesity study. Indian pediatrics, 2010;47:171-173.