

Original Research Article

Analysis of school children's height from two different socioeconomic status in rural area of Wardha District of Maharashtra, India

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ABSTRACT

Background: Anthropometry is widely recognized as one of the useful technique to assess the growth and nutritional status of an individual as population. The present study was carried out with the aim to study the growth parameter of the school going children and to find association of socioeconomic status and height.

Methods: School children from age 6 to 14 years are examine for weight. There socioeconomic status is decided on the basis of ration card. A total 1520 school children aged 6 to 14 years were randomly selected from the 5 different schools.

Results: Significant difference between the height was found among the upper and lower socioeconomic groups children.

Conclusions: Statistically significant difference is found between two socioeconomic groups in the age group of 6, 7, 10, and 14 years of male and 6, 8, 11, and 12 years in female between two socioeconomic groups.

Keywords: Anthropometry, Nutritional Status, Poverty, Socioeconomic factors

INTRODUCTION

The study of human growth is more than 300 years old. It offers a measure of human condition.^{1,2} Children are the wealth of any nation, constituting one of the important segments of the population. The high level of nutritional deprivation combined with heavy burden of diseases at young age has negative consequences on growth and development which will be expressed during adult life.³

Anthropometry is widely recognized as one of the useful technique to assess the growth and nutritional status of an individual as population.⁴ Growth assessment best defines the health and nutritional status of children as the disturbance in nutrition affects the child growth, mental

as well as physical. Periodic weight recording is one of the cheapest and most easy way of assessing the growth and nutritional status.⁵ It has been seen that there is strong influence of socioeconomic and parental care as the cause of malnutrition which indirectly are controlled by the various factors like political stability of region, state and country, climatic condition, geographic location, literacy, social stigmas, and finally last but not the least, the social and political desire, will and wish to implement and execute the various developmental programs.⁶

The families with good financial condition typically have access to wide range of resources to promote and support child's growth and development. They have easy accessibility to information regarding child's health as

well as social, emotional and cognitive development.⁷ The home environment and parent character/occupation reflects the poor parenting behavior. Persistent shouting, yelling, slapping adversely affects the growth and development of a child compared to love making and warmth through cuddling and hugging which is possible when the parent are at ease due to financial stability.⁸

The present study was carried out to study the comparison between the height of children from the upper and lower socioeconomic status.

Aims and objectives

- To study height as a parameter of growth in school children.
- To determine various factors affecting growth of the child in this group.
- To find association of socioeconomic status and height of child.
- To study normal growth pattern in both sexes in this age group on basis of height.

METHODS

Description of the body measurement room

The body measurement room is prepared in each school. The room is equipped with unique features designed to facilitate accurate and efficient measurement. The equipment, namely the stadiometer, is arranged.

Basic information of the students like name, sex and age is entered in the proforma. The decision of the of the socioeconomic status is made by interviewing and showing the three type of ration card i.e. yellow card is for the below poverty line hence those are entered in the poor socioeconomic class or lower socioeconomic group and those students who identify the orange card is entered in the above poverty line i.e. upper socioeconomic group. The students who are having the white card are entered in the upper socioeconomic class or group. The permission to carry out the study was taken from the ethical committee.

Equipment

Stadiometer

A well calibrated stadiometer was installed in the well illuminated class room. The student was well informed in advance about what examiners were going to do before they do it.

RESULTS

This study was carried out in rural area of Wardha district, Maharashtra, India. For this purpose, school going children of age 6 to 14 years were examined from 5

different schools. Total 1520 student were enrolled in this study.

Table 1: Distribution of the students according to their schools and their percentage.

School name	Total number of student	Percentage (%)
Nehru Vidyalaya, Salood	381	25.07
Prathmik Kendra, Salood	96	6.32
Prathamik kanyashala, Salood	259	17.04
Janta School, Padegaon	590	38.82
Prathmik School, Padegaon	194	12.76
Total	1520	100

The mean height in cm of 6 years male students from LSEG (108.72 ± 6.21) was found lesser than that of USEG (114.66 ± 2.58). By using Z-test, statistically significant difference was found in the height of two socioeconomic classes ($Z=2.764$, $P=0.015$).

The mean height in cm of 6 years female students from LSEG (108.73 ± 4.55) was found lesser than that of USEG (112.43 ± 4.72). By using Z-test, statistically significant difference was found in the height of two socioeconomic classes ($Z=2.718$, $P=0.012$).

Table 2: Gender wise distribution of the students and their percentage.

Gender	Total number of student	Percentage (%)
Male	826	54.3
Female	694	45.6
Total	1520	100

The mean height in cm of 7 years male students from LSEG (113.43 ± 4.72) was found lesser than that of USEG (113.80 ± 3.08). By using Z-test, statistically insignificant difference was found in the height of two socioeconomic classes ($Z=1.913$, $P=0.064$).

The mean height in cm of 7 years female students from LSEG (116.33 ± 2.11) was found greater than that of USEG (115.80 ± 7.89). By using Z-test, statistically insignificant difference was found in the height of two socioeconomic classes ($Z=1.397$, $P=0.169$).

Table 3: Socioeconomic status wise distribution of the students and their percentage.

Socioeconomic status	Total number of student	Percentage (%)
Upper	802	52.7
Lower	718	47.2
Total	1520	100

The mean height in cm of 8 years male students from LSEG (119.68 ± 4.16) was found lesser than that of USEG

(121.53±6.64). By using Z-test, statistically insignificant difference was found in the height of two socioeconomic classes (Z=1.879, P=0.063).

Table 4: Distribution of the male and female students according to their socioeconomic status.

Total number of students	Male	Female
Upper socioeconomic status	423 (52.7%)	379 (47.3%)
Lower socioeconomic status	403 (54.2%)	314 (42.4%)

The mean height in cm of 8 years female students from LSEG (117.22±4.79) is found lesser than that of USEG (123±4.28). By using Z-test, statistically significant difference was found in the height of two socioeconomic classes (Z=6.775, P=0.000).

The mean height in cm of 9 years male students from LSEG (123.53±4.12) is found lesser than that of USEG (123.55±5.94). By using Z-test, statistically insignificant difference was found in the height of two socioeconomic classes (Z=0.021, P=0.983).

Table 5: Analysis of height of male and female students.

Weight	Gender	SES	N	Mean	Std. Deviation	Z-value	p-value
6 years	Male	LSEG	11	108.72	6.21	2.764	0.015 S, p<0.05
		USEG	6	114.66	2.58		
	Female	LSEG	15	108.73	2.81	2.718	0.012 S, p<0.05
		USEG	16	112.40	4.55		
7 years	Male	LSEG	66	113.43	4.72	1.913	0.064 NS, p>0.05
		USEG	34	113.80	3.08		
	Female	LSEG	45	116.33	2.11	1.397	0.169 NS, p>0.05
		USEG	20	115.80	7.89		
8 years	Male	LSEG	58	119.68	4.16	1.879	0.063 NS, p>0.05
		USEG	65	121.53	6.64		
	Female	LSEG	61	117.22	4.79	6.775	0.000 S, p<0.05
		USEG	41	123.37	4.28		
9 years	Male	LSEG	66	123.53	4.12	0.021	0.983 NS, p>0.05
		USEG	49	123.55	5.94		
	Female	LSEG	53	143.38	1.58	0.863	0.392 NS, p>0.05
		USEG	9	142.55	4.72		
10 years	Male	LSEG	73	129.17	6.39	1.162	0.247 NS, p>0.05
		USEG	76	130.28	5.27		
	Female	LSEG	55	130.18	5.32	0.410	0.684 NS, p>0.05
		USEG	29	129.62	6.28		
11 years	Male	LSEG	52	132.92	8.77	0.469	0.640 NS, p>0.05
		USEG	41	133.70	7.34		
	Female	LSEG	83	131.41	6.85	3.622	0.000 S, p<0.05
		USEG	98	135.20	7.21		
12 years	Male	LSEG	38	141.63	7.17	4.076	0.000 S, p<0.05
		USEG	83	146.44	4.68		
	Female	LSEG	34	139.64	8.50	3.302	0.002 S, p<0.05
		USEG	46	145.27	5.96		
13 years	Male	LSEG	45	147.47	8.21	2.905	0.003 S, p>0.05
		USEG	34	149.01	6.86		
	Female	LSEG	18	147.58	2.95	0.225	0.823 NS, p>0.05
		USEG	36	147.84	5.67		
14 years	Male	LSEG	14	149.21	7.37	1.494	0.157 NS, p>0.05
		USEG	15	152.23	1.73		
	Female	LSEG	15	146.76	4.66	1.584	0.123 NS, p>0.05
		USEG	20	149.37	5.02		

The mean height in cm of 9 years female students from LSEG (143.38 ± 1.58) was found lesser than that of USEG (142.55 ± 4.72). By using Z-test, statistically insignificant difference was found in the height of two socioeconomic classes ($Z=0.863$, $P=0.392$).

The mean height in cm of 10 years male students from LSEG (129.17 ± 6.39) was found lesser than that of USEG (130.28 ± 5.27). By using Z-test, statistically insignificant difference was found in the height of two socioeconomic classes ($Z=1.162$, $P=0.247$).

The mean height in cm of 10 years female students from LSEG (130.18 ± 5.32) was found lesser than that of USEG (129.62 ± 6.28). By using Z-test, statistically insignificant difference was found in the height of two socioeconomic classes ($Z=0.410$, $P=0.684$).

The mean height in cm of 11 years male students from LSEG (132.92 ± 8.77) is found lesser than that of USEG (133.70 ± 7.34). By using Z-test, statistically insignificant difference was found in the height of two socioeconomic classes ($Z=0.469$, $P=0.640$).

The mean height in cm of 11 years female students from LSEG (131.41 ± 6.85) was found lesser than that of USEG (135.20 ± 7.21). By using Z-test, statistically significant difference was found in the height of two socioeconomic classes ($Z=3.622$, $P=0.000$).

The mean height in cm of 12 years male students from LSEG (141.63 ± 7.17) was found lesser than that of USEG (146 ± 4.68). By using Z-test, statistically significant difference is found in the height of two socioeconomic classes ($Z=4.076$, $P=0.001$).

The mean height in cm of 12 years female students from LSEG (139.64 ± 8.50) was found lesser than that of USEG (145.27 ± 5.96). By using Z-test, statistically significant difference was found in the height of two socioeconomic classes ($Z=3.302$, $P=0.002$).

The mean height in cm of 13 years male students from LSEG (147.47 ± 8.21) was found lesser than that of USEG (149.01 ± 6.86). By using Z-test, statistically significant difference was found in the height of two socioeconomic classes ($Z=0.905$, $P=0.003$).

The mean height in cm of 13 years female students from LSEG (147.58 ± 2.95) was found lesser than that of USEG (147.84 ± 5.67). By using Z-test, statistically significant difference was found in the height of two socioeconomic classes ($Z=0.225$, $P=0.823$).

The mean height in cm of 14 years male students from LSEG (149.21 ± 3.37) is found lesser than that of USEG (152.23 ± 1.73). By using Z-test, statistically insignificant difference was found in the height of two socioeconomic classes ($Z=1.494$, $P=0.157$).

The mean height in cm of 14 years female students from LSEG (146.76 ± 4.66) was found lesser than that of USEG (149.37 ± 5.02). By using Z-test, statistically insignificant difference was found in the height of two socioeconomic classes ($Z=1.584$, $P=0.123$).

There was a gradual rise in the height from 6 to 10 years in both the sex. But the rate of rise is steeper after 11 years to 14 years. The rise was more in males than the female of same age. Also the gain was more in LSEG than the USEG for both sex.

From the Table 6 it has been analyzed that the socioeconomic factor has played a significant role on the height of male children from the age group of 6,7,10, and 14 years while from 6,8,11 and 12 years female children.

DISCUSSION

The World Health Organization (1996) convened an Expert Committee to re-evaluate the use of anthropometry at different ages for assessing health, nutrition and social wellbeing.⁹

Bruce Cogill stated that anthropometry is used to describe the nutritional situation in a population and this can be useful for problem analysis and for evaluation.¹⁰ Changes in body dimensions reflect the overall health and welfare of individuals and populations. Anthropometry is used to assess and predict performance, health and survival of individuals and reflect the economic and social well-being of populations. Anthropometry is a widely used, inexpensive and non-invasive measure of the general nutritional status of an individual or a population group.¹¹

Advantage of anthropometrical measurement

- It is non- invasive
- It is relatively easy to carry out with a modest amount of training
- It is possible to become skilled at acquiring reliable measures
- Most techniques utilize inexpensive equipment that are generally portable
- Growth characteristics related to anthropometry;

Socioeconomic status

Socioeconomic status (SES) is often measured as a combination of education, income and occupation. It is commonly conceptualized as the social standing or class of an individual or group. When viewed through a social class lens, privilege, power and control are emphasized. Furthermore, an examination of SES as a gradient or continuous variable reveals inequities in access to and distribution of resources.¹² SES is relevant to all realms of behavioral and social science, including research, practice, education and advocacy. Andalakshmi S et al noticed that many Indian children suffer from poverty;

more than 50% of India's total population lives below the poverty line, and more than 40% of this population are children.¹³

The present study was carried out with the aim to study the growth parameter of the school going children, their comparison between the two socioeconomic status and the growth pattern

Height

The study of height of the male students showed the remarkable difference from the age group of 6 and 13 years, while those of female students from 6,8,11 and 12 years.

Galton et al pointed out that children in a factory in England were smaller by about 3cm than their counterparts who did not work in a factory although originated from worker families.¹⁴ The difference increased with age in both sex.

Malegaonkar S et al in their study observed that the height of private school children when compared with municipal school children, all values of municipal school children are less than that of private school children from 6-14 years of age which was found extremely statistically significant.¹⁵ Silva LM found that the children of higher socioeconomic status were taller than those of lower socioeconomic status.¹⁶

Lee C had done same research in Southern Chinese children from 6 to 14 years of age and noticed that the values are constantly less for height both in boys and girls among school children in lower socioeconomic groups and these values are statistically significant.¹⁷

Chevassus S, stated that on a population-wide basis, high levels of stunting are associated with poor socio-economic conditions and increased risk of frequent and early exposure to adverse conditions such as illness and/or inappropriate feeding practices.¹⁸

Fotso JC et al demonstrated that child growth is by four different dimensions of poverty at the household level namely, expenditures poverty, assets poverty, food poverty, and subjective poverty.¹⁹ The descriptive results show a grim picture, with the prevalence of overall stunting reaching nearly 60%. There was a strong association between food poverty and stunting among children aged 6-11 years ($p<0.01$), while assets poverty and subjective poverty have stronger relationships ($p<0.01$) with undernutrition at older age.

Bowditch et al studied comparative effects of city and country life on the growth process.²⁰ He demonstrated that the boys of the labouring classes in England were shorter than those of the non-labouring classes throughout all ages.

Rietz illustrated the socio-economic differences in Berlin school children.²¹ Height curves of children from the upper classes run at least 4-5cm above those for the lower classes. He determined this phenomenon hysteroptasy, i.e. children of rich families grow faster, are taller and mature earlier than children in poor families. Ten years later Faundler P described the phenomenon proteroptasy, i.e. urban children are taller, grow faster, and mature earlier than their rural counterparts.²²

Hence at the end of the study we found that in view of height as a parameter, statistically significant difference is found in the age group of 6, 7, 12 and 13 years and 6, 8, 11 and 12 years in male and female respectively between two socioeconomic groups.

Studies had proven that the nutritional status had a significant influence on level of intelligence. Hence, there is need for supplementary programme to improve the nutritional status of children which indirectly improves level of intelligence and there is a need for modification of school curriculum to uplift nutritional status of children which in turn have positive impact on level of intelligence.

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Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

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