Original Research Article

STUDY OF MID-ARM CIRCUMFERENCE IN INDIAN SCHOOL CHILDREN

Kharat Vidya S *[1], Puranik Medha [2].

*[1] Assistant Professor, Department of Anatomy, Bharati Vidyapeeth (Deemed to be University) Medical College, Pune.

[2] Professor, Department of Anatomy, Bharati Vidyapeeth (Deemed to be University) Medical College, Pune.

ABSTRACT

The objective of our study was to obtain the Anthropometric measurements of body mid- arm circumference, in School going adolescents,9-12 years, boys and girls, contrasting socioeconomic groups and was investigated by cross sectional survey. The cross-sectional study was conducted on School going adolescents (total no-511), Pune, India. We observed that the measurements of mid- arm circumference of Higher income group (HIG) were almost greater than Lower income group (LIG) values in all the age groups. The analysis would be effective to interpret the pattern of growth in adolescents, 9-12 years, which could be altered by social upbringing and economic status in a community.

KEY WORDS: Anthropometry, School Children, Growth pattern, Socio-economic groups.

Address for Correspondence: Dr. Kharat Vidya S, Assistant Professor, Department of Anatomy, Bharati Vidyapeeth (Deemed to be University) Medical College, Dhankawadi, Pune 411043, India. Mobile Number: 09423018816 **E-Mail:** kharatvidya2@gmail.com

INTRODUCTION

India being a developing country shows a great diversity in its Socio-economic status .Dietary variation would have an impact on growth pattern. Humans have rapid growth phase immediately after birth, followed by a latent period and again rapid adolescent growth spurt [1]. Adolescence [2] is a period of growth at an accelerated pace.' Growth and Development' is influenced by various factors like nutrition, genetics of an individual, social upbringing and economic standing in a society. Adolescent and childhood growth stages are both significant phases of growth development. Physical meta-morphosis in this phase results in discrepancy or in inequality amongst both boys and girls.

This results in a necessity to evaluate the pattern of growth in both genders. Assessing child's growth with Anthropometric measurements is comparatively economical than other health evaluation methods [3].

The survey of nutritional status is of an immense significance for the recognizing the social prosperity of a community [4].

The aim of our study was to obtain the Anthropometric measurements of body mid- arm circumference, in School going adolescents, 9-12 years, boys and girls, contrasting socioeconomic groups and was investigated by cross sectional survey. We observed that the measurements of mid- arm circumference of Higher income group (HIG) were almost greater than

Lower income group (LIG) values in all the age groups.

MATERIALS AND METHODS

The cross-sectional study was conducted on School going adolescents (Table no 1), Pune, India. The adolescent students belonged to both girls and boys and both Upper income group/ Higher income group (HIG) and lower socio-economic status /Lower income group (LIG) [5].

The measurement was taken at mid- point of the tip of the acromion process to the olecranon process. At this point, the mid-arm circumference was measured with the tape slung to the skin but not compressing the soft tissues. Both right and left sides were measured and the average was taken [2].

RESULTS AND DISCUSSION

As seen in Table no 2 and Graph no 1, the maximum growth in mid-arm circumference was seen at 10 – 11 years in males and females of HIG. There was a steady growth in Mid -arm circumference in males and females of lower socio-economic group from 9 –12 years. Mean measurements of mid-arm circumference of LIG were lower than those of HIG in the corresponding age groups. In HIG group, in both sexes, there was a growth spurt observed in the age group of 10 – 11 years Boys (20.63 cm) and Girls (21.06 cm) these values were seen to decrease in 11 – 12 age group in both genders of HIG Boys (19.80 cm) and Girls (20.86 cm). These could be due to the fact that the analysis was on cross-sectional. But in the same cross-sectional study, the LIG group shows the steady growth in mid-arm circumference from 9 – 12 years.

A child's growth is definitely acknowledged as an important indicator of health of the community in developing countries. In community based surveys, mid upper arm circumference (MUAC) was seen as a good assessor of undernutrition in children [4]and also good at predicting mortality [6].

The underprivileged school children are lagging behind their counterparts as they face severe deficits in levels of nutrition and are also face immense environmental and social strains. These facts were seen in our study. Nutritional Anthropometry is one of the most important tools in assessing the nutritional status of a community or a nation, which is of great value in guiding public programs.

It is a well acknowledged fact that changes in dimensions of the body are mainly accounted by changes in nutritional food intake and life style .In the Upper income group children in the urban area, it has been seen that lots of efforts are taken in terms of exercises and food regulation for maintenance of specific desired body dimensions. The values for the above measurements were compared in both genders of HIG and LIG in three age groups.

Our data showed a variation because the comparative data comes from heterogeneous parts. However, the overall temporal changes were clearly observable from these tables. A few discrepancies were observed in measurements. This was because the selection of the school children was based on only one criterion that is economic status. The fluctuations that we observed here in different age groups could be due to sampling error.

Our study was statistically analyzed by using 'Z' test for significance and was presented in the following tables (Tables no 3 and table no 4)

Z-test used for comparison of the two contrasting socioeconomic groups showed the p –value was <0.05, indicating that there was relevant contrast between the two groups. Similarly 'Z' test used for comparison between males and females also showed that the p-value was <0.05, indicating that there was important and relevant contrast between the Males and Females.

Table 1: Distribution of School going students.

Age (years)	MALE		FEMALES	
	HIG	LIG	HIG	LIG
09-10	42	42	42	42
10-11	42	42	42	42
11-12	42	42	42	49
Total	126	126	126	133

(Total no. 511   Males: 252   Females: 259)

Table 2: Measurements of mid-arm circumference.

Mid-arm circumference (cm)		9-10yrs		10-11yrs		11-12yrs	
		Males	Females	Males	Females	Males	Females
LIG	Mean	17.02	15.71	17.25	17.91	17.74	19.06
	S.D	1.05	0.92	2.02	1.76	1.55	2.49
HIG	Mean	18.8	18.01	20.63	21.06	19.8	20.86
	S.D.	2.36	1.69	2.17	2.31	2.05	1.63

Table 3: 'Z' test analysis for comparison between low and high socio-economic group.

Comparison Between LOW and HIGH socio-economic group			Mid-arm circumference
9-10 years	Males	Z value	3.88
		p-value	0
		Significance	HS
	Females	Z value	6.18
		p-value	0
		Significance	HS
10-11 years	Males	Z value	6.25
		p-value	0
		Significance	HS
	Females	Z value	5.69
		p-value	0
		Significance	HS
11-12 years	Males	Z value	4.08
		p-value	0
		Significance	HS
	Females	Z value	3.63
		p-value	0.0001
		Significance	HS

(HS: Highly Significant S: Significant NS: Not significant)

Table 4: 'Z' test analysis for comparison between Males and females.

Comparison Between Males and females			Mid-arm circumference
9-10 years	LIG	Z value	1.88
		p-value	0.04
		Significance	S
	HIG	Z value	3.18
		p-value	0
		Significance	HS
10-11 years	LIG	Z value	0.85
		p-value	0.25
		Significance	NS
	HIG	Z value	1.69
		p-value	0.044
		Significance	S
11-12 years	LIG	Z value	2.08
		p-value	0.003
		Significance	HS
	HIG	Z value	3.63
		p-value	0.0001
		Significance	HS

(HS: Highly Significant S: Significant NS: Not significant)

Graph 1: Distribution of mid-arm circumference.

Distribution of Mid-arm Circumference(cm) in Males & females According to Age and Socio-Economic Status
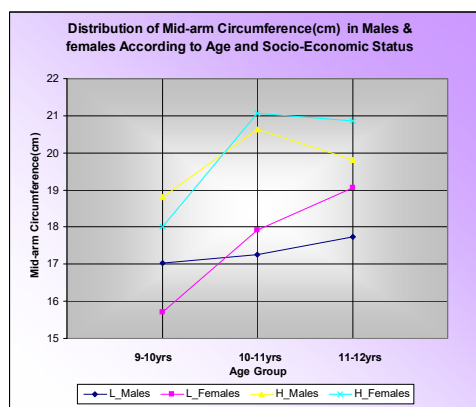
L– Lower Socio-economic group H – Higher Socio-economic group

CONCLUSION

Our analysis inferred that different age groups showed variations in rate of growth in LIG and HIG. Both genders in the above age and socio-economic groups showed a relevant contrast. In HIG, growth spurt in mid-arm circumference, was earlier at 10-11 years in both males and females, which showed decrease thereafter in the above values in 11-12 years groups. While steady increase in the growth was observed in the mid-arm circumference in Males and Females of LIG. Thus, the of growth in mid-arm circumference is similar in HIG and LIG. In our study we had observed that HIG values are always greater than LIG values in all the age groups.

The analysis would be effective to interpret the pattern of growth in adolescents, 9-12 years, which could be altered by social upbringing and economic status in a community.

Conflicts of Interests: None

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