

Growth Pattern of Affluent School Children of Amritsar

Prabhjot, Navdeep Kaur, Gauri Marwaha and Sharda Sidhu

Department of Human Genetics, Guru Nanak Dev University, Amritsar 143 005, Punjab, India

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ABSTRACT The present study is an attempt to investigate the growth pattern of affluent school children of Amritsar (Punjab). Cross-sectional data based on six anthropometric measurements (weight, height, upper arm circumference, triceps skin fold, subscapular skinfold, supra iliac skinfold) was collected from 500 girls and 582 boys aged 6 to 15 years attending convent and public schools. It has been observed from the present study that there is increase in all dimensions of the body with advancement of age except skinfolds only among boys. The study reveals that the highest peak velocity among girls (11+ and 12+ age) is attained earlier by one year than among boys (12+ and 13+ age). Amritsar girls and boys are equal or heavier than Well to do Indian children and NCHS standards. Therefore the findings of this study can be used as reference material for Punjabi children.

INTRODUCTION

Children are a critical resource whose growth and well being will determine to a large extent the course of a country's social and economic future. Therefore appraisal of the progress of a country in the field of health can be made from time to time with the help of growth studies. According to de Onis (2003) growth assessment is the single measurement that best defines the health and nutritional status of children, just as it provides an indirect measurement of the quality of life of an entire population. The future of human societies relies on children being able to achieve their optimal physical growth and development (Jaswal et al., 2001). In general, children living under better socio-economic conditions have consistently exceeded in growth and maturation than their counterparts living under worse conditions. Actually the genetic endowment can better manifest themselves under better environmental circumstances (Eiben, 1998, 2001; Kaul and Nyamongo, 1990; Huss-Ashmore and Johnstan, 1985,). There is dearth of published data on growth pattern of Indian children but there is paucity of growth data on affluent children of Amritsar district of Punjab. Therefore in the present study an attempt has been made to study the growth pattern of affluent girls and boys of Amritsar district of Punjab.

MATERIAL AND METHODS

For the present cross-sectional study the data from 1082 (500 girls and 582 boys) subjects were collected from various public schools and convent schools of Amritsar district of Punjab during the years 2000-2002. The age of children varies from 6 to 14 years. The sampled children belonged to well-off families of professionals, high officials and businessmen residing in Amritsar city of Punjab. Six anthropometric measurements (height, weight, upper arm circumference, triceps skin fold, subscapular skinfold and suprailiac skinfold) were taken on each subject using standard techniques of Weiner and Lourie (1981). All the bilaterally represented measurements were taken on the left side of the subject. Date of birth of each subject was recorded from the school records and their decimal ages were calculated from date of birth and date of examination using decimal age calendar (Eveleth and Tanner, 1976).

The whole data was arranged in ten age groups. All the subjects between age 6.00 to 6.99 years were included in age group 6+, 7.00 to 7.99 were in age group 7+ and so on up to 15 years.

RESULTS AND DISCUSSION

The mean values and standard deviation for six anthropometric measurements have been shown in table 1. It is apparent from this table that the mean values of all the anthropometric measurements are progressively accelerating with advancement of age except skinfolds only among boys.

Address Correspondence to: Dr. (Mrs.) Sharda Sidhu, Reader, Department of Human Genetics, Guru Nanak Dev University, Amritsar 143 005, Punjab, India
Phone: O) 0183-2258802-09 Ext. 3280
(R) 0183-2257639 *Fax:* 0183-2258819, 2258820
E-mail: shardasidhu@hotmail.com

Table 1: Mean and Standard deviation for weight, height, upperarm circumference, triceps skinfold, subscapular skinfold and suprailiac skinfold among Amritsar children of Punjab.

Age group (years)	No. of Sub-jects	Weight (kg)		Height (cm)		Upper arm circum-ference (cm)		Triceps S.F. (mm)		Subscap S.F. (mm)		Suprailiac S.F. (mm)	
		Mean	S. D	Mean	S. D.	Mean	S. D.	Mean	S. D.	Mean	S. D.	Mean	S.D.
Girls													
6+	54	21.80	4.1	118.7	3.7	16.5	1.68	8.4	1.2	5.6	1.0	5.2	1.0
7+	49	24.95	2.6	122.8	4.5	16.9	1.57	9.0	1.1	5.9	0.9	5.6	1.5
8+	57	26.02	3.5	128.1	3.9	17.2	2.00	9.6	2.0	6.3	0.8	5.9	1.1
9+	59	30.20	2.9	133.6	3.2	17.8	1.90	10.2	1.6	6.8	1.1	6.7	1.0
10+	48	33.96	4.5	139.0	4.0	18.2	1.67	10.9	1.5	7.2	1.2	6.9	1.2
11+	46	37.58	3.6	145.9	5.1	18.9	1.25	11.3	1.0	7.8	1.5	7.5	1.4
12+	56	43.27	4.0	150.6	4.2	20.1	1.30	12.0	1.4	8.4	1.0	8.4	1.3
13+	44	45.02	2.9	153.7	3.6	20.9	1.95	13.0	1.2	9.3	0.9	8.9	1.2
14+	47	47.10	3.6	156.2	4.1	21.8	2.10	13.5	0.9	9.6	1.2	9.4	1.0
15+	40	48.82	3.5	157.1	3.8	22.2	2.00	14.0	1.0	9.7	1.3	9.6	1.2
Boys													
6+	63	22.6	2.2	120.0	3.1	17.0	1.27	8.2	1.85	5.4	0.90	5.0	1.0
7+	64	25.2	4.1	124.8	3.5	17.4	2.50	8.9	0.99	5.6	0.70	5.2	1.20
8+	60	27.8	3.5	130.0	2.9	17.8	1.68	9.5	1.20	6.2	1.00	5.7	1.41
9+	65	31.4	4.2	134.8	4.0	18.3	1.00	10.0	1.40	6.7	1.10	6.3	1.22
10+	50	35.2	3.5	141.0	4.5	18.6	2.10	10.6	1.12	7.2	1.00	6.7	1.88
11+	58	39.6	2.6	147.4	4.7	19.0	2.32	11.0	1.95	7.9	1.20	7.2	1.40
12+	61	44.8	2.9	152.9	3.9	19.2	2.40	12.0	1.00	8.2	1.30	8.0	1.10
13+	60	50.6	2.1	159.9	3.6	20.6	1.95	12.9	2.00	9.0	1.10	8.4	0.9
14+	59	55.0	2.7	163.8	2.6	21.5	1.78	12.7	1.00	9.2	1.00	9.1	0.8
15+	42	60.2	3.0	166.4	2.8	22.1	1.75	12.2	1.20	8.6	1.11	8.5	1.0

The mean weight for girls and boys at age group 6+ is 21.80kg and 22.60kg, respectively and at age 15+ girls have a mean weight of 48.8kg, which is 11.3kg less than the weight of boys at the same age. The total gain of weight from age 6+ to 15+ is 27.02kg among girls and 37.6kg among boys. Similarly a general trend of increase in height for both girls and boys is observed, boys being slightly taller than girls at all groups. The total gain in height from 6+ to 15+ years is 38.4cm and 46.4cm for girls and boys, respectively. The mean upper arm circumference at age group 6+ is 16.5cm in girls and 17.0cm in boys. Among girls the upper arm circumference show a rapid increase from age group 11+ to 15+ but among boys rapid increase is observed after age group 12+. The most striking difference between skinfold thicknesses is that the girls have higher mean values than boys at all age groups. Among boys all the skin folds increased steadily till the age group of 13+ and thereafter gradually decreases. This decrease in the fat folds does not really represent lesser fat accumulation, but results from the enlargement of the underlying muscular tissue (Pathmanathan and Prakash, 1994). The growth spurt for all the anthropometric measurements is noticed between age group 11+ to 12+ among

girls and 12+ to 13+ among boys. The t-test comparison between six anthropometric measurements of affluent girls versus boys according to age, show significant differences in some age groups (Table 2).

To study the population differences in growth pattern, the mean weight and height of affluent Amritsar children have been compared with well to do Indian children (Vijayraghavan et al., 1971) and NCHS (1977) standards (Table 3). The results of the present study demonstrate that the children in this affluent population were close to the well-to-do children and NCHS reference population.

Comparison of mean weight and height of the present sample with NCHS percentiles standards shows that the mean values of weight and height of Amritsar girls fluctuates between 20th and 50th percentile but among boys it fluctuates between 50th and 60th percentile. General pattern of growth in skin folds of Amritsar children is similar to that of the NCHS standards and their mean values lie between the 25th and 50th percentile. Thus it is apparent from the present sample that the anthropometric status of the affluent Amritsar children is very close to that of the NCHS reference population. Therefore this population

Table 2: t-test comparison of six measurements among affluent Amritsar girls and boys according to age

Age group (in years)	Weight	Height	Upperarm circumference	Triceps skinfold	Subs- scapular skinfold	Suprailiac skinfold
6+	1.3	3.20*	2.1*	1.05	1.13	0.136
7+	0.46	2.60*	1.20	0.50	1.90	1.58
8+	2.45*	3.15*	1.76	0.33	0.59	0.858
9+	2.80*	1.80	1.85	0.74	0.50	3.0*
10+	1.52	2.32*	1.04	1.12	0.22	0.645
11+	3.36*	1.54	0.26	2.21*	0.37	1.08
12+	2.38*	3.06*	1.50	-	0.93	1.42
13+	11.3*	8.60*	0.77	0.29	1.48	2.43*
14+	13.9*	11.60*	0.80	4.20*	1.87	1.72
15+	15.8*	12.60*	0.19	7.30*	4.1*	4.50*

* significant at 5% level.

Table 3: Comparison of weight and height of Amritsar children with well-to-do Indian children and NCHS standards.

Age group (in years)	Present study	Well-to do Indian children	NCHS Dt.	Present Sample	Well to do Indian children	NCHS Dt.
<i>Girls</i>						
6+	-21.80	21.56	19.50	118.70	117.73	114.60
7+	24.95	24.45	21.8	122.80	122.65	120.60
8+	26.02	25.97	24.80	128.10	127.2	126.40
9+	30.20	29.82	28.50	133.60	133.08	132.20
10+	33.96	33.58	32.50	139.00	138.90	138.30
11+	37.58	37.17	33.70	145.90	145.00	142.00
12+	43.27	42.97	44.00	150.60	150.98	148.00
13+	45.02	44.54	48.00	153.70	153.44	155.00
14+	47.10	46.70	51.40	156.20	155.04	159.00
15+	48.82	48.75	53.00	157.10	155.98	161.00
<i>Boys</i>						
6+	22.60	22.14	20.70	120.00	118.90	116.10
7+	25.20	24.46	22.90	124.80	123.32	121.70
8+	27.20	26.42	25.30	130.00	127.86	127.00
9+	31.40	30.00	28.10	134.80	133.63	132.20
10+	35.20	32.29	31.40	141.00	138.45	137.50
11+	39.60	35.26	32.20	147.40	143.35	140.00
12+	44.80	38.78	37.00	152.90	148.91	147.00
13+	50.60	42.88	40.90	159.90	154.95	153.00
14+	55.60	48.26	47.00	163.80	161.70	160.00
15+	60.20	52.15	52.60	166.40	165.33	166.00

should be included in the World Health Organization Multicentre Growth Reference Study (MGRS) for the construction of a new reference for the World's children.

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