Growth Pattern among Kolam Children and Adolescents aged 0 to 18 years: 10 Anthropometric Measurements

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ABSTRACT

A cross-sectional study was undertaken among Kolam tribal population by using systematic household survey method. The sample consists of 1840 subjects belonging to both sexes (boys-1024; girls-816) who are considered for 10 anthropometric measurements to evaluate the growth patterns of both sexes from 0+ to 18+ years age group. Data on body weight, stature, sitting height vertex, bi-acromial breadth, hip breadth, chest, waist, upper arm, calf circumferences were considered using standard techniques. Patterns of change have been observed in the physical traits which indicates progressive accelerating trend with advancement in age. The mean values of body weight; in stature; in sitting height vertex; in bi-acromial breadth are statistically significant. The p-value for hip breadth (p= 0.183) and hip circumference (p= 0.234) among girls is not statistically significant from Kolam boys.

KEYWORDS: Body Measurements; Anthropometry; Growth; Kolam; Tribe

INTRODUCTION

Growth and development are indicators of health and nutritional status of a population. Growth is a product of the continuous and complex interaction of heredity and environment (Tanner, 1978). Growth pattern is controlled by a maturation clock (Tanner, 1963). One particular time of this clock is puberty where an acceleration of growth is observed. In malnourished populations, anthropometry is used as an efficient tool for diagnosis which was validated by experimental study on animals and of controlled supplementary food intake(Jelliffe, 1966). The influence of socio-economic factors on growth is very much evident (Johnston et al., 1978. Malina et al., 1995), low income prevalence among lower social groups than in higher groups (Sussane, 1984; Malina et al., 1995). Malnutrition delays growth and the children who are subjected to acute starvation recover by virtue of their recuperative power.

The study of physical growth comprises of a comprehensive understanding of both health and nutritional status. Anthropometric measurements such as height, weight, breadths, and circumferences are valuable indicators to assess nutritional status of a community. Malnutrition leads to deficiencies mostly observed among children in the world's less developed areas (WHO, 1995). Earlier studies on rural population have indicated that with the advancement of age, there is an increase in the physical traits (Singh, 1980; ICMR, 1989; Bharati et al., 1991; Sharma, 1991; Nath et al., 1991; Busi et al., 2003; Busi et al., 2004; Rao et al., 2005;

Rao et al., 2006; Rao et al., 2009) is observed. Keeping this in view followed by dearth of anthropometricstudies of Kolam tribe, a cross-sectional survey of growth pattern was undertakento evaluate standard reference values for the study population.

MATERIAL AND METHODS

Kolam is a primitive tribe concentrated predominantly in the tribal areasand lives in exclusive settlement in the interior forests and hilly tracts of Adilabad district of Telangana state, India.A cross-sectional study was undertaken amongKolam tribal population by using systematic household survey method. The sample consists of 1840 subjects belonging to both sexes (boys-1024; girls-816) who are considered for 10 anthropometric measurements. The size of the sample is maintained to a minimum limit of 30 in order to make the sample statistically significant. The variation in the sample size between each group is due to the availability of the tribal children in the course of data collection. The present study is intended to focus upon the differential growth trends, health and nutritional statusamong children aged 0 to 18 years.

The data was collected from 168 households inhabiting 32 villages and also from 51 schools in the study area. Villages selected from the mandals (blocks) in the scheduled area by taking in to consideration the numerical preponderance of the tribal population in the tribal sub-plan area. The data was collected both from villages and schools periodically throughout the year and informed consent was obtained from all individual participants. The data was collected by using the expertise ofwell-trained2 personnel in recording the

anthropometric measurements.Standard instruments such asanthropometer, rod compass, tape etc. manufactured by Galaxy Informatics, New Delhi were used to assess the following measurements, such as body weight, stature, sitting height vertex, bi-acromial breadth, hip breadth, chest, waist, upper arm, and calf circumference using standard techniques (Weiner and Lowrie, 1969). The ages of the subjects were recorded by taking the assistance of school teachers, and as per school admission registers at schools and from anganwadi workers in the study villages.

All the subjects between the ages of 0.0 to 0.9 years were considered under 0+ age group, 1.0 to 1.9 years in 1+ age group and so on up to 18+ years following (Tanner, 1962) and(Eveleth and Tanner, 1976). The entire data was entered in MS-Excel and statistical analysis was done using the software SPSS (version 16.0).Student t-test was performed to find the significant differences in the measurements between both the sexes.

RESULTS AND DISCUSSION

The anthropometric measurements showing mean and standard deviationvalues for age group are presented in Table 1 and 2. It is observed that the mean values of all the physical traits increase as the age advances with a few fluctuating discrepancies mostly due to cross-sectional nature of the study. The mean body weight of Kolam infant at 0+ age group is 5.62 kgs. among boys and 5.17 kgs. among girls. Between 0+ to 18+ years, both boys and girls showed a marked difference of 4.25 kgs. and 6.11 kgs.from lowest to highest values. A peak velocity has occurred between 12+ and 13+ years among Kolam

boys (+4.62 kgs. per year), which is later by one year, between 14+ and 15+ years in Kolam girls (+6.22kgs. per year). It indicates the growth of the total body mass manifested.

The mean stature of infants at 0+ age group among Kolam boys is observed as 64.05 cms. while it is62.05 cms.amongKolam girls. The difference between the lowest and highest annual incrementsin stature of boys is higher than the condition in girls. The highest mean annual gain have occurred between 12+ and 13+ years among Kolam boys (+9.24 cms. per year) and(+5.08 cms.per year)between14+ and 15+ years among girls. When both sexes were compared, it is observed as occurring later by one year among Kolam girls.

The mean sitting height vertex of infants at 0+ age group among boys is 38.99 cms. andit is observed as 39.07 cms. among girls. The difference in minimum and maximum annual increment of sitting height vertex of girls is greater than that among boys. The highest mean annual gain has occurred between 12+ and 13+ years (+3.09 cms per year) among boys and between 14+ and 15+ years (+2.76 cms.per year) among girls.

The mean Bi-acromial breadth of infants at 0+ age group among boys is observed as 16.78 cms. andit is noted as 16.95 cms. among girls. The difference in minimum and maximum annual increment of bi-acromial breadth of girls is greater than that among boys. The highest mean annual gain among boys has occurred between 14+ and 15+ years (+2.45 cms.per year) between 14+ and 15+ years (+1.42 cms.per year) among girls.

The mean hip breadth of infants among boys at 0+ age group is observed as 13.65 cms. and 12.82 cms. among girls. The difference in minimum and maximum annual increment of hip breadth of girls is lesser than that in boys. The highest mean annual gain among boys has occurred between 12+ and 13+ years (+1.69 cms. per year) and between 14+ and 15+ years (+1.38 cms. per year)among girls.

The mean chest circumference of infants at 0+ age group among boys is observed as 42.15 cms. whileamong girls, it is observed as 41.52 cms . The difference inthe annualincrementin chest circumference of girls is greater than among boys. The highest mean annual gain among boys has occurred between 14+ and 15+ years (+3.85 cms.per year) however among girls, it is observed in between 12+ and 13+ years (+6.40 cms. per year).

The mean waist circumference of infants at 0+ age group among boys is observed as 40.56 cms. and 40.45 cms. amongKolam girls. The difference in minimum and maximum annual increment of waist circumference of boys is greater than in girls. However, the highest mean annual gain among boys has occurred between 15+ and 16+ years (+2.17 cms per year) and it is observed in between 14+ and 15+ years (+3.22 cms per year) among Kolam girls.

The mean hip circumference among boys at 0+ age group is observed as 41.08 cms while among girls it is observed as 41.67cms. The difference in minimum and maximum annual increment of hip circumference of girls is greater than among boys. The highest mean annual gain among boys has occurred between 12+ and 13+ years (+3.86 cms. per year) while it is observed in between 14+ and 15+ years (+4.43 cms. per year) among girls.

The mean mid-upper arm circumference among boys at 0+ age group is observed as 13.56 cms. and 13.15 cms. among girls. The difference in minimum and maximum annual increase of mid-upper arm circumference of boys is greater than in girls. The highest mean annual gain among boys has occurred between 12+ and 13+ years (+1.74 cms. per year) while among girls, it is observed in between 14+ and 15+ years (+1.63 cms. per year).

The mean calf circumference among boys at 0+ age group is observed as 15.55 cms. and 15.25 cms. among girls. The difference in minimum and maximum annual increase in calf circumference is greater among boys than in girls. The highest mean annual gain among boys has occurred between 13+ and 14 + years (+2.05 cms.per year) while it is observed in between 11+ and 12+ years (+1.72 cms .per year) among girls.

The juvenile spurt of body weight (+2.90 kgs.) in boys was attained during 5+ and 6+ years and the same occurred earlier among girls (+2.53 kgs.) during 1+ and 2+ years. The juvenile spurt of stature (+11.3 cms.) in boys and girls (+12.00 cms) was accomplished early at 1+ and 2+ years. The juvenile spurt of sitting height vertex in boys (+4.26 cms.) has been attained between 3+ and 4+ years which occurred later when compared to the juvenile spurt of sitting height among Kolam girls (+4.90 cms.)during 1+ and 2+ years. Further, the juvenile spurt of bi-acromial breadth in boys (+1.62 cms.) and girls (+1.77 cms.) is attained between 1+ and 2+ years and hence, it is evident that the juvenile spurt in bi-acromial breadth occurred earlier among both sexes. The juvenile spurt of hip breadth among boys (+1.71cms.) and among girls (+2.44 cms.) is observed to

have occurred between 1+ and 2+ years. The juvenile spurt of chest circumference among boys (+3.65 cms.) is attained between 1+ and 2+ years while among girls (+2.46 cms.) it is during 2+ and 3+ years. The juvenile spurt of waist circumference among boys (+2.68 cms.)andgirls (+2.86 cms.) has occurred during the course of 0+ and 1+ year(s) indicates the occurrence of spurt at an earlier age. The juvenile spurt of mid-upper arm circumference among boys (+0.83 cms.) is attainedduring 2+ and 3+ years while among girls (+0.78 cms.) it is attained between 3+ and 4+ years. So, it is clear that the juvenile spurt of mid-upper arm circumference of boys is attained earlier than girls. The juvenile spurt of calf circumference among boys (+1.09 cms.) is attained between 1+ and 2+ years while for girls (+1.72 cms.) during 0+ to 1+ yearclearly indicate its early occurrence among girls than boys.

The result of t-test comparison between somatometric measurements of boys versus girls is presented in Table 3. It is observed that the mean values of Kolam boys and girls for body weight during 14+, 16+ and 17+ years; for stature from 14+ to 18+ years; for sitting height vertex from 15+ to 17+ years; for bi-acromial breadth from 15+ to 18+ years are observed to be statistically significant.

Tests of the 171 a priori hypotheses were conducted using Bonferroni adjusted alpha levels of 0.00029 per test (.05/ 171). Results indicated that the average number of errors were significantly lower among girls in mid upper arm circumference (M= 16.95, SD=3.49), than boys (M= 17.50, SD= 4.57), F (1, 1839)=7.87, p= 0.005.The pairwise comparisons for hip breadth is not statistically significant and lower among girls (M= 20.49, SD= 5.40) than boys (M=

20.81, SD= 5.01), F (1, 1839)=1.77, p= 0.183. The errors in calf circumference is significantly lower among girls (M= 22.78, SD= 4.83), than boys (MD= 23.93, SD= 5.05), F (1, 1839)= 24.61, p= 0.000 than those were in body weight among girls (M= 22.82, SD= 12.15) than were those among boys (M=25.44, SD=12.44), F (1, 1839)= 20.46, p= 0.000 than those in biacromial breadth which is significantly lower among girls (M= 26.72, SD= 5.73) than boys (M= 27.92, SD= 5.61), F (1, 1839)= 20.50, p= 0.000followed in waist circumference which is significantly lower among girls (M= 54.76, SD= 8.67), than boys (M= 57.05, SD= 8.76), F (1, 1839)= 31.51, p= 0.000 than in chest circumference is significantly lower among girls (M= 60.11, SD= 12.61) than boys (M= 62.12, SD= 11.04), F (1, 1839)=13.28, p=0.000. The pairwise comparisons for hip circumference is not statistically significant and are lower among girls (M= 62.45, SD= 13.69), than boys (M= 63.18, SD= 12.69), F (1, 1839)= 1.419, p= 0.234. Sitting vertex is significantly lower among girls (M= 60.57, SD= 11.54) than boys (M= 63.71, 11.42), F (1, 1839)=33.96, p= 0.000 than in stature among girls which is significantly lower among girls (M= 119.72, SD= 27.02) than among boys (M= 125.78, SD= 26.22), F (1, 1839) = 23.58, p= 0.000. The pairwise comparison for all the anthropometric measurements is highly significant among girls than boys and does not show equal means in all treatments.

CONCLUSION

It is apparent from the above discussion that the growth pattern of Kolam populationamong both the sexes is slightly lighter in weight and shorter in height when compared with the results of earlier studies among other populations (Singh, 1980; Bharati et al., 1991; Sharma, 1991; Rao et al., 1997) of India and also lighter and shorter than the height of boys and girls of West Bengal (Hauspie, 1980). Further, it is found that Kolam boys and Kolam girls are heavier in weight and lengthier in height when compared with the results of Savara tribal population (Rao et al., 2009)of Andhra Pradesh.Kolam boys arefound to be heavier in weight and slightly lengthier in height; and Kolam girls are found to be lighter in weight and possess similar height when compared with the results of Gadaba tribal population of Andhra Pradesh (Rao et al., 2006).However, the Bonferroni correction shows that Kolam girls are not statistically significant in hip breadth and hip circumference than Kolamboys.Growth and maturation are influenced by several factors depending on the geographical location and availability of the food required to meet the nutrient supplement to maintain average growth rates. Linear growth though remains constant in childhood but varies after onset of growth spurt resulting in constitutional growth delay.

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