



SMU SIKKIM
MANIPAL
UNIVERSITY

Established under Govt. of Sikkim, Act 9 of 1985, recognized under 2(f) of the UGC Act, 1956

SMU Medical Journal

ISSN : 2349 – 1604 (Volume – 4, No. 1, January 2017) Research Article

Indexed in SIS (USA), ASI (Germany), IZOR & i-Scholar (India), SJIF (Morocco) and Cosmos Foundation (Germany) databases. Impact Factor: 3.835 (SJIF)

Paediatric Anthropometry: A Longitudinal Study of 0 - 3 Years of Male and Female Children

N Kaur^{1*}, Z Singh² and G Kaur³

¹N. Kaur, Department of Anatomy, Adesh Institute of Medical Sciences and Research, Bathinda, India

²Z. Singh, Department of Anatomy, Deshmesh Institute of Dental Sciences & Research, Faridkot, India

³G Kaur, Department of Paediatrics, Guru Gobind Singh Medical College & Hospital, Faridkot, India

*Corresponding Author

Manuscript received : 25.10.2016

Manuscript accepted: 17.11.2016

ABSTRACT

Growth is a continuous process commencing at conception and progressing at a varying pace till its completion about 2 decades later, with closure of epiphysis. The process of 'Growth' is accompanied with increase in body size and or mass at varying rates. It is multi factorial and complex, still remarkably predictable. Boys and girls grow differently and each child has his or her distinct growth pattern.

To study growth pattern of male and female infants, a longitudinal study, a total 320 Jat

Sikh and Bania infants (Male 160; Female 160), aged birth-36 months were taken. Body weight and length of all children measured at birth and where after, at quarterly age intervals with time tolerance to ± 5 days by the same investigator up to 24 months of life & then half yearly till 36 months. Comparing the data of males & females it was observed that males of both groups were taller than their females counterparts. Inter group comparison showed that the difference for weight between Jat sikh & Bania male were highly significant ($p < 0.001$) from birth to 18th month whereas no significant difference were found in females of both groups. Jat sikh males & females had comparatively higher value of height than Bania males & females. The children of the present study are heavier when compared to their counterparts in other states of India.

Key words: Height, Weight, Growth, Children, Male, Female.

Introduction

Growth is a fundamental and common property of life. Growth patterns may vary from one group to another. The growth and development processes of an individual are the resultant products of both genetics and environment factors [1]. Growth is a continuous process commencing at conception and progressing at a varying pace till its completion about 2 decades later, with closure of epiphysis. The process of 'Growth' is accompanied with increase in body size and or mass at varying rates. It is multi factorial and complex, still remarkably predictable. Boys and girls grow differently and each child has his or her distinct growth pattern [2].

Stature is an important variable of assessing body size. Estimation of stature has significant bearing on assessment of growth, nutritional status, calculating body surface area and predicting pulmonary function[3]. Paediatrician, especially biologists, lay stress on growth processes, the normal pattern in an individual child to assess whether the subject is following the normal path, progressing through the formative years to normal adolescence and adulthood or is the child deviating into abnormal facets of growth and development. Weight and height are good indicator of a nation's progress in socio- economic terms [4-8].

By measuring the various parameters of growth such as weight, crown heel length, crown

rump length, head circumference and chest circumference, one can compare the growth and development of a child in relation to other children of same age group pertaining to sequential measurements, which will indicate the normal or abnormal growth of each child [9].

In the present investigation an attempt has been made to study the physical growth and compare the growth performance of Jat Sikh and Bania children up to the age of 3 years residing in Bathinda and Barnala district (Punjab). The study was carried out in between 2011 to 2015.

Material and methods

The present study is longitudinal based on 320 children from endogamous groups of Jat-Sikhs (160) and Banias (160) ranging in the age from 0 to 3 years. This study is approved by ethical committee. The measurements of weight and height were taken at birth and ages 3 months, 6 months, 9 months, 1 year, 1 year 3 months, 1 year 6 months, 1 year 9 months, 2 year, 2 year 6 months and 3 year (± 5 days). The data have been collected mainly from Bathinda and Barnala. The measurements taken on these subjects are: weight (kg) and height (cm). The data collected have been subjected to various statistical tests i.e., mean, S.D., S.E.M., 't' test. The result obtained have been presented in Tables.

Results

Table 1&2 presents the age changes in weight and height of Jat Sikh and Bania children from birth to 3 years. There is continuous trend of increase in weight and height from birth to 3 years in both male and female children. Mean value of birth weight is observed at birth in Jat sikh males (3.13 ± 0.47 kg), Jat sikh females (3.18 ± 0.43 kg) and bania male (3.10 ± 0.39 kg) & Bania females (3.14 ± 0.40 kg) respectively, whereas at the age of three years in Jat sikh males (14.02 ± 1.15 kg) and Jat sikh females (11.66 ± 1.19 kg), Bania males (14.24 ± 1.03 kg) & females (11.22 ± 1.06 kg) respectively.

The average height at birth in Jat Sikh male is 46.81 ± 2.75 cm and Bania male is 44.99 ± 3.09 cm. In female the average height at birth 46.77 ± 2.65 cm and 45.66 ± 2.77 cm which increases to 98.12 ± 4.58 cm and 96.01 ± 4.64 cm in Jat Sikh and Bania respectively.

Table 1 & 2 depicts the mean, standard deviation and intra group comparison (t – value) of gross body measurements i.e. height & weight among Jat sikh and bania (both male & female) respectively. Comparing the data of males & females it was observed that males of both groups were taller than their females counterparts. Inter group comparison (Table 1) showed that the difference for weight between Jat sikh & Bania were highly significant ($p < 0.001$) from birth to 18th month whereas no significant difference were found in females of both groups.

Table 1: Gross Body Measurements of Jat Sikh and Bania Males.

Age Group	N	Height (cm)		t-value	Weight (kg)		t-value
		Jat Sikh	Bania		Jat Sikh	Baniya	
		Mean $\pm$ SD	Mean $\pm$ SD		Mean $\pm$ SD	Mean $\pm$ SD	
At Birth	80	46.81 $\pm$ 2.75	44.99 $\pm$ 3.09	-3.933	3.13 $\pm$ 0.47	3.10 $\pm$ 0.39	-0.415
3 rd Month	80	56.07 $\pm$ 4.23	54.36 $\pm$ 3.72	-2.717	5.19 $\pm$ 0.70	4.84 $\pm$ 0.60	-3.422
6 th Month	80	62.63 $\pm$ 4.55	60.91 $\pm$ 4.04	-2.535	6.51 $\pm$ 0.72	6.13 $\pm$ 0.58	-3.658
9 th Month	80	67.55 $\pm$ 4.28	66.34 $\pm$ 4.06	-1.838	7.55 $\pm$ 0.80	7.10 $\pm$ 0.70	-3.817
12 th Month	80	71.91 $\pm$ 4.06	70.95 $\pm$ 4.03	-1.494	8.50 $\pm$ 0.89	7.98 $\pm$ 0.77	-3.984
15 th Month	80	76.24 $\pm$ 4.15	75.44 $\pm$ 4.60	-1.154	9.38 $\pm$ 0.91	8.86 $\pm$ 0.85	-3.772
18 th Month	80	80.71 $\pm$ 4.55	79.74 $\pm$ 4.79	-1.318	10.23 $\pm$ 1.03	9.67 $\pm$ 0.91	-3.672
21 st Month	80	85.11 $\pm$ 4.66	84.05 $\pm$ 5.20	-1.360	11.00 $\pm$ 1.07	10.52 $\pm$ 0.97	-2.921
24 th Month	80	89.45 $\pm$ 4.52	88.55 $\pm$ 5.46	-1.134	11.74 $\pm$ 1.10	11.35 $\pm$ 1.04	-2.319
30 th Month	80	95.18 $\pm$ 4.28	94.70 $\pm$ 5.07	-0.640	12.77 $\pm$ 1.09	12.72 $\pm$ 1.01	-0.276
36 th Month	80	98.97 $\pm$ 3.81	97.23 $\pm$ 4.88	-0.514	14.02 $\pm$ 1.15	14.24 $\pm$ 1.03	1.306

Discussion

The body weight gives an important indication about the health status of a child. In the present study, the weight has increased continuously from birth to 3 years. The total gain in weight during this period is 10.89 kg and 11.14 kg in Jat Sikh and Bania males and 10.79kg and 10.81 kg in Jat Sikh and Bania females respectively. The children of the present study are heavier as compared to the studies reported by various authors Kaur H et al (2003); Prabhjot & Sidhu S (2003); Agarwal

DK & Agarwal KN (1994) on Indian children [10-12].

Height is another composite of the body. Height increases with the advancement of age. Jat sikh males & females had comparatively higher value of height than Bania males & females. The maximum increase in stature has been taken place from age group birth to 3 years both in males and females. The height values of present study were higher than those reported by Kaur H et al (2003); Prabhjot & Sidhu S (2003); Bhargava SK et al (1980); Agarwal DK & Agarwal KN (1994) on Indian children [10-12].

Table 2: Gross Body Measurements of Jat Sikh and Bania Females.

Age Group	N	Height (cm)		t-value	Weight (kg)		t-value
		Jat Sikh	Bania		Jat Sikh	Baniya	
		Mean $\pm$ SD	Mean $\pm$ SD		Mean $\pm$ SD	Mean $\pm$ SD	
At Birth	80	46.77 $\pm$ 2.65	45.66 $\pm$ 2.77	-2.573	3.18 $\pm$ 0.43	3.14 $\pm$ 0.40	-0.718
3 rd Month	80	55.77 $\pm$ 3.75	55.11 $\pm$ 3.81	-1.094	5.00 $\pm$ 0.63	5.06 $\pm$ 0.72	0.593
6 th Month	80	62.32 $\pm$ 3.61	61.49 $\pm$ 3.85	-1.409	6.31 $\pm$ 0.67	6.28 $\pm$ 0.73	-0.326
9 th Month	80	67.29 $\pm$ 3.77	66.82 $\pm$ 3.67	-0.797	7.33 $\pm$ 0.76	7.23 $\pm$ 0.92	-0.763
12 th Month	80	71.96 $\pm$ 3.75	71.59 $\pm$ 3.60	-0.645	8.25 $\pm$ 0.89	8.08 $\pm$ 1.00	-1.069
15 th Month	80	75.96 $\pm$ 3.83	75.79 $\pm$ 3.87	-0.287	9.09 $\pm$ 0.99	8.96 $\pm$ 1.00	-0.857
18 th Month	80	79.79 $\pm$ 4.05	79.69 $\pm$ 4.13	-0.145	10.00 $\pm$ 1.04	9.69 $\pm$ 1.00	-1.942
21 st Month	80	84.03 $\pm$ 4.22	83.75 $\pm$ 4.36	-0.405	10.88 $\pm$ 1.16	10.43 $\pm$ 1.01	-2.562
24 th Month	80	88.36 $\pm$ 4.59	87.81 $\pm$ 4.49	-0.774	11.66 $\pm$ 1.19	11.22 $\pm$ 1.06	-2.493
30 th Month	80	94.34 $\pm$ 4.56	93.84 $\pm$ 4.80	-0.675	12.75 $\pm$ 1.10	12.45 $\pm$ 1.07	-1.698
36 th Month	80	98.12 $\pm$ 4.58	96.01 $\pm$ 4.64	-0.377	13.97 $\pm$ 1.07	13.95 $\pm$ 0.98	-0.176

Infants and children upto the age of 5 years constitute as much as 15% of our total population. It is reasonable to assume that the weight and height of Punjabi children is well within the defined limits which may be termed as healthy. When weight and height of present study was compared with ICMR [13], they are found to be taller and heavier than their counterparts. This may be because the combined Indian sample is a pool of many ethnic and socio- economic

groups.

Conclusion

Jat sikh males & females had comparatively higher value of height than Baina males & females. The general growth pattern of growth was seen characterized by a period of rapid initial increase followed by a period of slower increment during the second half of infancy

References

- [1] Tanner, JM (1962) Growth at adolescence, Blackwell Scientific Publication, Oxford.
- [2] Agarwal KN, Bansal A. and Agarwal DK (2015) Growth pattern in Indian children. Statistics and Applications. 13(1&2),11-23.
- [3] Gauld RF, Rakhrir SM (2004) The nutritional status of disabled children: a cross-sectional survey. Eur J Clin Nutr 53,915-19.
- [4] Tanner JM (1978) Foetus into man: Physical growth from conception to maturity. Cambridge. Harvard University press.
- [5] Eveleth PB and Tanner JM (1990) Worldwide variation in Human Growth. 2nd ed. Cambridge University Press, Cambridge.
- [6] Hauspie RC, Wachholder A, Sand EA, Susanne C (1992) Body length, body weight and head circumference in Belgian boys and girls aged 1-36 months. Sex difference and effect of socio-economic status. Acta Med. Auxol., 24, 149-58.
- [7] Tanner JM (1994) Growth in height as a mirror of the standard of living. In: Stature, living Standards and Economic Development. Essays in Anthropometric History. J. Komlos Ed., The Univ. of Chicago Press, Chicago, 1-6.
- [8] Ulijaszek SJ (2000) Anthropometric measure: In: Design concepts in Nutritional Epidemiology. B.M.Margetts, K.M.Nelson Eds. Oxford University Press, Oxford:, 289-311.
- [9] Kumar A et al (1990) Weight and height norms of 5-10 years old children of upper socio-economic status. Indian Pediatrics, 27, 835-844.
- [10] Kaur H, Bhatngar DP and Singal P (2003) Physical growth of Punjabi children in age from 3 months to 3 years. In: Understanding people of India, Anthropological insight. Edited by Kalla AK and Bhattacharya DK. University of Delhi,113-121.
- [11] Prabhjot and Sidhu S (2003) Assessment of growth pattern of Punjabi infants. In:

Understanding people of India, Anthropological insight. Edited by Kalla AK and Bhattacharya DK. University of Delhi, 125-131.

[12] Agarwal, DK and Agarwal, KN (1994) Physical growth in Indian affluent children (Birth – 6 years). Indian pediatrics, 31, 377-413.

[13] Indian Council of Medical Research (1972)). Growth and physical development of Indian infants and children. ICMR Technical Report Series No. 18. New Delhi: ICMR.

Authors Column



Mrs Navjot Kaur Bhullar did MSc in Human Anatomy from Government Medical College & Hospital, Sector- 32, Chandigarh, India. She passed MSc with Gold Medal from Punjab University, Chandigarh. She has attended several conferences and published research papers in National and International journals. She is now working as Assistant Professor in Adesh Institute of Medical Sciences and Research from 2007 and enrolled herself in Baba Farid University of Health Sciences for PhD degree under the Faculty of Medical Sciences.