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Growth Pattern of Children of Two Social Groups: A One-Year Longitudinal Study

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INTRODUCTION

Physical growth assessment best demonstrates the health and nutritional status of children. Populations having low dietary intakes experienced a pattern of growth characterised by slow growth rate (Eveleth and Tanner, 1976; Rao and Satyanarayana, 1976). However, slow growth is also an indicator of poor environmental conditions affecting past, present and future health (Mascie-Taylor, 1991). Again, a well marked seasonal effect on growth velocity has been observed in the industrialised countries of the temperate areas. Growth in height and weight are on average are fastest in spring and autumn respectively. The average velocity of height from March to May is about twice that from September to October in most of the older western European data (Tanner, 1999). Panter-Brick (1997) has shown that growth velocity among children is affected by seasonal changes and to previous growth status. Cole (1993) is of the opinion that in addition to seasonal changes, food availability, parasitic load, infection, etc. affects growth rates of children.

Health and nutritional problems during childhood are the result of a wide range of factors like insufficient food intake (Rao, 1978) and/or several repeated infections, particularly affecting the low income group (Steinhoff et al., 1986; Dixit, 1992; Asthana, 1995). Bisharat and Zagha (1986) studied slum children of Jordan and found that 28% and 46% of 3-year-old male and female children respectively were below 90% of their reference weight for age. Giugliani et al. (1987) studied the children over one year in a squatter settlement in Brazil and found that the social determinants were stronger antecedents of malnutrition than the biological determinants. Bogin and Mac Vean (1981) showed that the stunting was more prevalent among children of low than high socioeconomic stratum. Easwaran et al. (1972) showed that the boys and girls in the "better fed" groups were heavier and taller than those in "poorly fed ones". In India, Rao and Karkhanis (1993) found stunting as major problem of children belonging to the low socioeconomic group. Kakarni and Nadakarni (1986) found that the growth potential of slum children was low and that was due to environmental, cultural, economic and nutritional factors acting in combination. Nutrition Foundation of India (NFI) (1988) studied the growth velocity of the infants living in slum area of Calcutta, Madras and Mumbai and found that the average growth performance of infants of Calcutta was the worst.

Very few longitudinal growth studies on children have been conducted on squatter children in India and elsewhere. In the present study, an attempt has been made to (a) observe the pattern of growth of children of two social groups of age 3, 4 and 5 years through a period of one year, (b) the effect of social group and sex difference on growth pattern.

MATERIALS AND METHODS

The present study has been conducted in a squatter settlement located on the embankment of a canal in Calcutta Metropolitan area. The two social groups selected for the study are Hindu and Muslim, who reside here in adjacent clusters. Both the two groups are Bengali-speaking and migrated from South 24 Parganas district. The stretch selected for the study comprises Calcutta Municipal Corporation wards no. 28 and 36 (canal west) and 29 canal (east).

The environment in which these people live is extremely unhygienic. The impoverished condition of these people is manifested in their dwelling types, dwelling materials, overcrowding of houses, etc. Majority of the people is non-literate and work as labourer. Both the populations have high fertility and infant mortality rates. The children of both the social groups have a high morbidity in terms of intestinal parasitic infestation, prevalence of anaemia, vitamin deficiency diseases, reported morbidity, etc. (Ray et al., 1997a,b; Ray et al., 1998a,b).

The anthropometric measurements were made following standard techniques (Weiner and Laurie, 1981). Anthropometric data were collected on children of both the social groups between 3 and 5 years of age, at an interval of 2

months, for a period of 1 year (6 time points). The data have been collected from December 1995 to November 1996. The six time points were-

1st – end of December to beginning of January
2nd - end of February to beginning of March
3rd - end of April to beginning of May
4th - end of June to beginning of July
5th - end of August to beginning of September
6th - end of October to beginning of November

Occurrence of morbidity of several kinds about the children was collected from the mothers before the measurements were made at each time point.

The measurements were made on a total number of 142 children (Hindu 87, Muslim 55) of both sexes and both social groups, wearing light apparel [male 3 years, 23 (Hindu 12, Muslim 11); female 3 years, 19 (Hindu 13, Muslim 6); male 4 years, 18 (Hindu 11, Muslim 7); female 4 years, 22 (Hindu 11, Muslim 11); male 5 years , 26 (Hindu 15, Muslim 11), female 5 years, 34 (Hindu 25, Muslim 9)].

The following measurements were made – height (cm), weight (kg), head circumference (cm.), chest circumference (cm), mid upper am circumference (Muac) (cm), triceps skinfold thickness (mm.). The log transformed values of triceps skinfold thickness are presented throughout the description.

In the field, efforts were made to determine the age of a child accurately. In some cases where possible, birth certificates were checked. In others, the age of a child was estimated from the reporting of the mother, by reference to some important local, social or historical events contemporaneous with the birth, and cross checked from a number of elderly individuals, so as to reduce the chance of error of reporting (Weiner and Lourie, 1981). Moreover, the chance of error in reporting of age in case of young children (≤ 5 years of age) is comparatively less than in case of older ones, because of the relatively lesser chance of operation of the "recall lapse" factor.

In the present study the author made all the measurements himself. Attempt was made to remove intra-observer error by undertaking rigorous practice. Before starting the field work, repeated measurements were made by the author on a particular group of students of a kindergarten school aged 3, 4 and 5 years, for a period of two months, using the same instrument which was later used in the field. The measurements were recorded everyday on separate sheet of papers. The successive measurements on each subject were compared regularly. The practice-run continued until the difference between the successive measurements (same measurement, same subject) became very small or, as in most cases, zero.

The following are the abbreviations used in the tables:

(a) Ht1, Ht2, Ht3, Ht4, Ht5 and Ht6 - Heights at time points 1 to 6.
(b) Wt1, Wt2, Wt3, Wt4, Wt5 and Wt6 - Weights at time points 1 to 6.
(c) Hc1, Hc2, Hc3, Hc4, Hc5 and Hc6 - Head circumferences at time points 1 to 6.
(d) Cc1, Cc2, Cc3, Cc4, Cc5, and Cc6 - Chest circumferences at time points 1 to 6.
(e) Muac1, Muac2, Muac3, Muac4, Muac5 and Muac6 - Mid upper arm circum-ferences at time points 1 to 6.
(d) Ts1, Ts2, Ts3, Ts4, Ts5 and Ts6 - Triceps skinfold thicknesses at time points 1 to 6.

RESULTS

3-Year-Male: The mean height increases between pairs of successive time points in both the groups. It is found that the net increases in height, after 1 year, in the Hindu and Muslim are similar though the mean height is greater in the Muslim than the Hindu at all the time points (Table 1).

At the initial time point, the mean weight is greater in the Muslim than the Hindu. But, there is an increase in weight between pairs of successive time points in the Hindu but not in the Muslim. However, the net increases in weight, after 1 year, are similar in the Hindu and Muslim.

The increase in mean head circumference is uniform between the pairs of successive time points in both the groups. Net increases in head circumference, after 1 year, are similar in the Hindu and Muslim. The mean head circumference is greater in Hindu than in the Muslim at all the time points.

The increase in mean chest circumference is uniform between the pairs of successive time points in both the groups. Net increases in chest circumference, after 1 year, are similar in the Hindu and Muslim. The mean chest circumference is greater in the Muslim than in the Hindu at all the time points.

The mean Muac does not show any uniform pattern of increase or decrease in both the groups. There is a net increase in mid upper arm circumference, after 1 year, in both the groups.

Table 1: Anthropometric measurements: 3-year-old children

Measurements	*Male*				*Female*			
at different	*Hindu (n= 12)*		*Muslim (n= 11)*		*Hindu (n= 13)*		*Muslim (n= 6)*	
time points	*Mean (cm)*	*S.D.*	*Mean (cm)*	*S.D.*	*Mean (cm)*	*S.D.*	*Mean (cm)*	*S.D.*
Ht1	86.40	3.22	88.87	4.78	84.68	4.50	83.55	6.90
Ht2	87.00	3.39	90.41	4.21	85.46	4.02	85.07	6.21
Ht3	88.90	3.57	91.54	4.61	86.64	4.12	86.22	6.28
Ht4	90.10	4.03	92.23	4.53	87.88	4.61	86.97	6.59
Ht5	90.99	4.09	93.39	4.60	88.97	4.40	87.88	6.61
Ht6	91.74	3.60	94.58	4.44	89.74	4.40	89.32	6.92
Wt1	11.66	1..17	12.50	1.88	10.88	0.96	10.58	1.62
Wt2	11.75	1.30	12.31	1.72	10.92	1.09	11.00	1.48
Wt3	11.83	1.26	12.27	1.43	11.15	0.94	10.91	1.39
Wt4	12.08	1.50	12.09	1.57	11.38	1.02	11.00	1.41
Wt5	12.41	1.47	12.59	1.49	11.80	0.92	11.16	1.43
Wt6	12.54	1.48	12.86	1.41	11.80	1.05	11.41	1.32
Hc1	47.10	1.17	46.90	0.63	45.51	1.22	44.81	0.93
Hc2	47.28	1.11	46.98	0.54	45.70	1.17	44.93	0.96
Hc3	47.40	1.07	47.38	1.01	45.90	1.17	45.16	0.99
Hc4	47.55	1.11	47.49	1.00	46.08	1.19	45.28	1.00
Hc5	47.65	1.16	47.68	1.01	46.23	1.14	45.38	1.07
Hc6	47.86	1.19	47.81	1.02	46.36	1.13	45.38	1.07
Cc1	47.98	1.59	49.46	2.62	47.08	1.25	47.68	2.72
Cc2	48.51	1.94	49.70	2.57	47.45	1.34	47.90	2.89
Cc3	48.70	1.91	49.81	2.55	47.66	1.38	48.02	2.79
Cc4	48.89	2.00	50.01	2.53	48.08	1.46	48.12	2.64
Cc5	49.17	2.00	50.06	2.51	48.35	1.51	48.23	2.75
Cc6	49.53	1.97	50.37	2.40	48.70	1.46	48.62	2.84
Muac1	13.42	1.03	13.63	1.26	13.36	0.65	13.70	0.95
Muac2	13.67	1.22	13.63	1.24	13.52	0.59	13.90	0.88
Muac3	13.66	1.23	13.67	1.23	13.56	0.66	13.98	0.94
Muac4	13.53	1.31	13.67	1.21	13.50	0.81	13.90	1.09
Muac5	13.71	1.15	13.72	1.11	13.67	0.82	13.91	1.10
Muac6	13.79	0.97	13.67	1.17	13.53	0.85	13.90	1.01
Ts1	0.9224	0.0715	0.9112	0.0653	0.9427	0.0661	0.9527	0.0404
Ts2	0.9289	0.0708	0.9233	0.0664	0.9437	0.0595	0.9671	0.0542
Ts3	0.9120	0.0771	0.9343	0.0637	0.9464	0.0614	0.9729	0.0576
Ts4	0.8819	0.0835	0.9254	0.0648	0.9408	0.0741	0.9573	0.0595
Ts5	0.8937	0.0782	0.9250	0.0609	0.9539	0.0654	0.9619	0.0609
Ts6	0.8895	0.0870	0.8974	0.0797	0.9319	0.0826	0.9501	0.0792

The mean triceps skinfold thickness shows a net decrease, after 1 year, in both the groups. There is no definite pattern of increase or decrease of triceps skinfold thickness in both the groups, except at the 4th time point where there is a decrease in both the groups.

3-Year-Female: There is an increase in height, between pairs of successive time points, in both the groups. Net increases in height, after 1 year, are similar in both the groups. The mean height is greater in the Hindu than in the Muslim at all the time points (Table 1).

Net increases in mean weight, after 1 year, are similar in both the groups. An increase in weight is found between pairs of successive time points, in the Hindu. However, in the Muslim there is a decrease in mean weight, at the 3rd time point.

The head circumference increases between pairs of successive time points, in both the groups. Net increases in head circumference, after 1 year, are similar in the Hindu and Muslim. The head circumference in the Hindu is greater than in the Muslim at all the time points.

The mean chest circumference increases between pairs of successive time points in the

Table 2: Anthropometric measurements: 4-year-old children

Measurements	*Male*				*Female*			
at different	*Hindu (n= 11)*		*Muslim (n= 7)*		*Hindu (n= 1)*		*Muslim (n= 11)*	
time points	*Mean (cm)*	*S.D.*	*Mean (cm)*	*S.D.*	*Mean (cm)*	*S.D.*	*Mean (cm)*	*S.D.*
Ht1	86.40	3.22	88.87	4.78	84.68	4.50	83.55	6.90
Ht1	97.15	3.75	94.26	4.49	92.31	4.91	91.79	8.03
Ht2	97.72	3.78	96.04	4.23	93.14	5.00	93.29	8.07
Ht3	99.52	3.55	96.50	4.39	94.55	4.56	94.14	7.76
Ht4	100.68	3.38	97.54	4.67	95.94	4.60	95.07	7.71
Ht5	101.73	3.40	98.67	4.40	96.62	4.60	96.13	7.67
Ht6	102.38	3.43	99.21	4.25	97.56	4.83	97.09	7.56
Wt1	14.36	1.56	13.92	1.56	12.59	0.86	12.68	1.95
Wt2	14.31	1.41	13.42	1.53	12.72	0.90	12.59	1.80
Wt3	14.36	1.18	13.78	1.52	12.86	0.77	12.77	1.83
Wt4	14.45	1.12	14.00	1.52	13.04	0.78	12.72	2.11
Wt5	15.00	1.20	14.14	1.52	13.45	0.85	12.90	2.02
Wt6	15.22	1.03	14.57	1.42	13.31	0.84	13.00	1.91
Hc1	47.95	1.19	47.21	0.89	46.43	1.16	46.09	0.84
Hc2	48.10	1.16	47.40	1.07	46.55	1.19	46.26	0.85
Hc3	48.26	1.17	47.68	1.05	46.70	1.16	46.44	0.84
Hc4	48.36	1.16	47.74	1.10	46.83	1.15	46.53	0.78
Hc5	48.37	1.18	47.90	1.15	46.99	1.11	46.69	0.81
Hc6	48.66	1.22	48.00	1.04	47.11	1.16	48.80	0.78
Cc1	49.34	6.82	51.60	1.55	49.47	1.56	49.49	2.48
Cc2	51.44	1.90	51.70	1.13	49.69	1.51	49.55	2.54
Cc3	51.60	1.91	51.85	1.31	49.92	1.47	49.53	2.50
Cc4	51.89	1.82	52.15	1.51	50.10	1.45	49.70	2.52
Cc5	52.25	2.07	52.42	1.46	50.60	1.43	49.79	2.56
Cc6	52.64	1.98	52.70	1.71	50.77	1.49	49.99	2.49
Muac1	13.79	0.93	13.94	0.55	13.88	0.98	13.91	0.58
Muac2	13.97	0.82	14.05	0.46	14.06	1.05	13.91	0.59
Muac3	14.05	0.76	14.18	0.46	14.16	0.98	13.97	0.58
Muac4	13.92	0.74	14.11	0.62	14.20	0.90	13.92	0.74
Muac5	13.87	0.59	14.15	0.58	14.30	0.76	13.93	0.75
Muac6	13.87	0.62	14.31	0.70	13.96	0.99	13.90	0.86
Ts1	0.8337	0.0926	0.8856	0.1005	0.9164	0.0927	0.9256	0.1049
Ts2	0.8483	0.0920	0.8896	0.0874	0.9225	0.0898	0.9346	0.0895
Ts3	0.8501	0.0944	0.9002	0.0973	0.9240	0.0871	0.9427	0.0953
Ts4	0.8209	0.0797	0.8907	0.0979	0.9197	0.0946	0.9233	0.0965
Ts5	0.8332	0.0683	0.8934	0.0914	0.9274	0.0875	0.9285	0.0926
Ts6	0.8200	0.0785	0.8741	0.0725	0.8986	0.1027	0.9175	0.0967

Hindu and Muslim. Net increases in the chest circumferences, after 1 year, is greater in the Muslim than in the Hindu. At all time points, the mean chest circumferences are greater in the Muslim than in the Hindu.

There is a decrease in Muac, at the 4th time point in both the groups. However, there is a net increase in Muac, after 1 year, in both the groups which is similar. The Muslim show a greater value for Muac than the Hindu at all the time points.

The mean triceps skinfold thickness decreases at the 4th time point in both the groups. The net increase in triceps skinfold thickness, after 1 year, is greater in the Hindu than in the Muslim. The Muslim show greater metric values than the Hindu at all the time points.

4-Year-Male: The mean height increases between pairs of successive time points, in both the groups. Net increases in mean height, after 1 year, are similar in both the groups. The mean height of the Hindu is greater than the Muslim at all the time points (Table 2).

The mean weight decreases in both the groups at the 2nd time point. Thereafter the mean weight

Table 3: Anthropometric measurements: 5-year-old children

Measurements	*Male*				*Female*			
at different	*Hindu (n= 15)*		*Muslim (n= 11)*		*Hindu (n= 25)*		*Muslim (n= 9)*	
time points	*Mean (cm)*	*S.D.*	*Mean (cm)*	*S.D.*	*Mean (cm)*	*S.D.*	*Mean (cm)*	*S.D.*
Ht1	101.15	5.81	100.08	7.44	100.60	4.21	101.48	8.68
Ht2	102.34	5.15	101.21	7.41	101.03	4.22	102.79	8.48
Ht3	104.07	4.88	101.80	7.62	102.41	4.23	103.58	8.26
Ht4	105.17	4.92	102.48	7.63	103.48	4.30	104.26	8.37
Ht5	106.11	4.62	103.22	7.70	104.33	4.38	105.42	8.09
Ht6	106.58	4.67	104.30	7.55	104.95	4.45	106.61	8.00
Wt1	15.40	1.39	14.09	1.96	14.50	1.64	14.94	1.92
Wt2	15.60	1.50	14.00	2.21	14.58	1.75	14.83	1.87
Wt3	15.80	1.50	14.40	2.17	14.76	1.65	14.83	1.76
Wt4	15.63	1.54	14.27	2.19	14.82	1.67	15.00	1.76
Wt5	16.20	1.48	14.45	2.13	15.28	1.84	15.22	1.95
Wt6	16.13	1.49	14.81	2.23	15.44	1.85	15.61	1.94
Hc1	48.56	1.55	46.92	1.10	46.93	1.23	47.88	0.86
Hc2	48.76	1.52	47.03	1.12	47.05	1.25	48.02	0.81
Hc3	48.91	1.53	47.32	1.16	47.18	1.27	48.24	0.87
Hc4	49.04	1.51	47.39	1.14	47.30	1.28	48.35	0.88
Hc5	49.10	1.46	47.52	1.19	47.38	1.29	48.46	0.90
Hc6	49.25	1.44	47.68	1.20	47.48	1.26	48.57	0.82
Cc1	52.25	1.51	51.79	2.90	50.61	2.60	51.77	1.97
Cc2	52.52	1.61	51.71	2.95	51.02	2.72	51.73	1.92
Cc3	52.86	1.80	51.89	2.96	51.25	2.71	51.55	2.01
Cc4	53.03	1.83	52.25	2.61	51.52	2.62	51.67	2.09
Cc5	53.23	1.85	52.40	2.61	51.80	2.85	52.16	2.04
Cc6	53.40	1.86	52.81	2.51	52.23	2.89	52.54	2.06
Muac1	14.05	0.78	13.46	0.99	13.75	0.96	14.22	0.67
Muac2	14.19	0.76	13.53	0.98	13.94	0.98	14.27	0.71
Muac3	14.30	0.77	13.58	0.97	14.06	1.06	14.14	0.68
Muac4	14.28	0.76	13.53	0.96	13.97	1.06	14.07	0.47
Muac5	14.38	0.76	13.57	1.00	14.06	1.08	14.16	0.54
Muac6	14.42	0.75	13.58	0.98	14.18	1.13	14.14	0.59
Ts1	0.8422	0.0762	0.8344	0.0902	0.8433	0.0693	0.8924	0.0892
Ts2	0.8541	0.0732	0.8338	0.0935	0.8670	0.0670	0.8927	0.0809
Ts3	0.8573	0.0781	0.8438	0.0892	0.8712	0.0671	0.8853	0.0726
Ts4	0.8261	0.0726	0.8296	0.0792	0.8498	0.0738	0.8770	0.0703
Ts5	0.8414	0.0763	0.8268	0.0824	0.8542	0.0727	0.8773	0.0758
Ts6	0.8303	0.0828	0.8128	0.0878	0.8665	0.0734	0.8638	0.0719

increases between rest of the pairs of successive time points in both the groups. Net increases in weight, after 1 year, are similar in both the groups. The mean weights of the Hindu are greater than the Muslim at all the time points.

The mean head circumference increases between pairs of successive time points, in both the groups. Net increases in mean head circumference, after 1 year, are similar in both the groups. The mean head circumference of the Hindu is greater than the Muslim at all the time points.

The mean chest circumference increases between pairs of successive time points, in both the groups. Net increases in mean chest circumference, after 1 year, are greater in the Hindu than in the Muslim. The mean chest circumference of the Hindu is lesser than the Muslim at all the time points.

The mid upper arm circumference does not show any definite pattern. However, there is a slight decrease at the 4th time point in both the groups. Net increases in the mid upper arm circumference are greater in the Muslim than in the Hindu. The mean mid upper arm circumference of the Muslim is greater than the Hindu

at all the time points.

The mean triceps skinfold thickness decreases at the 4th and 6th time points in both the groups. There is a net decrease in triceps skinfold thickness, after 1 year, in both the groups.

4-Year—Female: The mean height increases between pairs of successive time points, in both the groups. Net increases in mean height, after 1 year, are similar in both the groups. The mean height of the Hindu is greater than the Muslim at all the time points (Table 2).

The mean weight increases between pairs of successive time points in both the groups, except for a decrease at the 6th and 4th time points of the Hindu and Muslim respectively. Net increases in weight, after 1 year is greater in the Hindu than in the Muslim. The mean weights of the Hindu are greater than the Muslim at all the time points.

The mean head circumference increases between pairs of successive time points, in both the groups. Net increases in mean head circumference, after 1 year, are similar in both the groups. The mean head circumference of the Hindu is greater than the Muslim at all the time points.

The mean chest circumference increases between pairs of successive time points, in both the groups. Net increases in chest circumference, after 1 year, are greater in the Muslim than in the Hindu. The mean chest circumference is greater in the Hindu than in the Muslim from 2nd time point onwards.

The mean mid upper arm circumference in the Hindu increases successively till the 5th time point. However, in the Muslim no definite pattern is observed. Net increase in mid upper arm circumference is greater in the Hindu than in the Muslim.

There is a net decrease in the mean triceps skinfold thickness in both the groups and it is greater in the Hindu than in the Muslim. The decrease in triceps skinfold thickness took place at the 4th and 6th time points in both the groups. The mean triceps skinfold thickness is greater in the Muslim than in the Hindu at all the time points.

5-Year-Male: There is an increase in mean height between pairs of successive time points, in both the groups. Net increases in height, after 1 year, are greater in the Hindu than the Muslim. The mean height is greater in the Hindu than in the Muslim at all the time points (Table 3).

The net increases in the mean weight after 1 year are similar in both the groups. There is a decrease in the mean weight at the 4th and 6th time points in the Hindu and at the 4th time point in the Muslim. The mean weight of the Hindu is greater than that of the Muslim at all the time points.

The mean head circumference also increases between pairs of successive time points, in both the groups. Net increases in mean head circumference, after 1 year, are similar in the Hindu and Muslim. The mean head circumference is greater in the Hindu than in the Muslim at all the time points.

There is an increase in mean chest circumference at all the time points in both the groups. Net increases in the chest circumference, after 1 year, is less in the Muslim than in the Hindu. The mean chest circumference is greater in the Hindu than in the Muslim at all the time points.

There is an increase in mean mid upper arm circumference between pairs of successive time points, in both the groups except at the 4th time point. Net increases in mid upper arm circumference, after 1 year, are greater in the Hindu than in the Muslim. The mean mid upper arm circumference is greater in the Hindu than in the Muslim at all the time points.

The mean triceps skinfold thickness decreases at the 4th and 6th time points in both the groups. Net decreases in the mean triceps skinfold thickness, are greater in the Muslim than in the Hindu. The mean triceps skinfold thickness is greater in the Hindu than in the Muslim, at all the time points.

5-Year-Female: There is an increase in mean height between pairs of successive time points, in both the groups. Net increase in mean height, after 1 year, is greater in the Muslim than in the Hindu. The mean height of the Muslim is greater than that of the Hindu, at all the time points (Table 3).

The mean weight increases between pairs of successive time points, in both the groups. Net increase in mean weight, after1 year, is greater in the Hindu than in the Muslim at all the time points.

The mean head circumference increases between pairs of successive time points, in both the groups. Net increases in mean head circumference, after 1 year, is greater in the Muslim than in the Hindu. The mean head circumference is greater in the Muslim than in the Hindu at all the time points.

The mean chest circumference increases between pairs of successive time points, in both the groups. Net increases in mean chest circum-

ference after 1 year, is greater in the Hindu than in the Muslim, at all the time points. The Hindu shows greater values than the Hindu at all the time points.

There is a decrease in mean mid upper arm circumference, at the 4th time point in the Hindu, and at the 3rd, 4th and 6th time points in the Muslim. The mean mid upper arm circumference is greater in the Muslim than in the Hindu at all the time points. However, the net increases in mean mid upper arm circumference are greater in the Hindu than in the Muslim.

There is a decrease in the triceps skinfold thickness at the 4th time point in both the groups. In the Muslim, the decrease in triceps skinfold thickness occurs also at the 6th time point. Net increase mean triceps skinfold thickness, after 1 year, is greater in the Hindu than in the Muslim. The mean triceps skinfold thickness is greater in the Hindu than in the Muslim till the 5th time point.

One way ANOVA

One way analysis of variance (ANOVA) was performed after correcting all the variables for age, using Statistical Package for Social Sciences (SPSS). These were done to find out the effect of group difference, sex difference (within each social group) at each time point. Only the signi-

Table 4: Comparison between Hindu and Muslim male children

Measurements at different time points		*Sum of squares*	*df*	*Mean square*	*F*	*p*
Hc1	Between groups	13.087	1	13.07	9.378*	0.003
	Within groups	90.714	65	1.396		
	Total	103.801	66			
Hc2	Between groups	15.071	1	15.071	11.034*	0.001
	Within groups	88.782	65	1.366		
	Total	103.854	66			
Hc3	Between groups	9.790	1	9.790	6.545*	0.013
	Within groups	97.225	65	1.496		
	Total	107.016	66			
Hc4	Between groups	11.163	1	11.163	7.394*	0.008
	Within groups	98.137	65	1.510		
	Total	109.300	66			
Hc5	Between groups	8.625	1	8.625	5.639*	0.021
	Within groups	99.423	65	1.530		
	Total	108.048	66			
Hc6	Between groups	10.418	1	10.418	6.891*	0.011
	Within groups	98.274	65	1.512		
	Total	108.693	66			
Wt5	Between groups	11.484	1	11.484	4.594*	0.036
	Within groups	162.478	65	2.500		
	Total	173.962	66			

* Significant at 5%

Table 5: Comparison between Muslim male and female children

Measurements at different time points		*Sum of squares*	*df*	*Mean square*	*F*	*p*
Hc1	Between groups	4.393	1	4.393	4.817*	0.033
	Within groups	48.335	53	0.912		
	Total	52.728	54			
Hc2	Between groups	5.035	1	5.035	5.302*	0.025
	Within groups	50.330	53	0.950		
	Total	55.336	54			

* Significant at 5%

ficant results are presented in the tables 4 and 5. The results show that in Hindu and Muslim male children, only the differences in head circumferences at all the time points and weight at the 5th time point are statistically significant ($p<0.05$) (Table 4). In comparison between Hindu and Muslim female children, none of the difference, in respect of any of the measurements at any time point is statistically significant ($p>0.05$). In comparison between Hindu male and female children none of the differences in respect to any of the measurements at any time point is statistically significant ($p>0.05$). In comparison between Muslim male and female children, except for head circumferences (Table 5) at 1st and 2nd time points none of the differences in respect of any of the measurements at any time point is statistically significant ($p>0.05$). In comparison between male and female children (Hindu and Muslim pooled), the differences in measurements at all the time points are statistically non significant ($p>0.05$).

DISCUSSION

Anthropometric measurements made on 3-year-old male children show that the Muslim has higher metric values than the Hindu at all the time points, in all the measurements, except head circumference and mid upper arm circumference. A similar pattern is observed in the Hindu-Muslim comparison of 5-year-old female children. However, in the Hindu-Muslim comparison of 5-year-old male children and 4-year-old female children (except triceps skinfold thickness) the Hindu has higher metric values than the Muslim, almost at all the time points.

No clear pattern has been observed in the Hindu-Muslim comparison of 3-year-old female and 4-year-old male children.

Thus no specific pattern has been found in most of the anthropometric measurements made on children in both the groups, and both sexes of all the three age groups, in general. However, there is a decrease in triceps skinfold thickness at the 4th time point, in both the groups, and both sexes in all the three age groups. Moreover, a decrease in mid upper arm circumference and triceps skinfold thickness at the 4th time point has been found in both the groups and sexes in all the three age groups except, 3-year-old and 4-year-old male children.

Net increase in height, weight, head circumference, chest circumference, after one year are similar in both the groups in case of 3-year-old male and female children (except for the chest circumference in case of female children), 4-year-old male children (except for the chest circumference), 4-year-old female children (except for weight and chest circumference) and 5 –year-old male children (except for height and chest circumference). In case of 5-year-old female children, similarity in net increase, after one year, does not exist in any of the measurements

From the one way ANOVA analyses it appears that the social group difference does not affect the anthropometric traits studied in either male or female children, except in case of head circumference in males. Sex difference does not seem to affect any of the measurements at any time point in Hindu, Muslim and the pooled (Hindu and Muslim) groups.

In the present study, an attempt has been made to observe the pattern of growth of children at two months interval for a period one year. It has been found that in general, there is a gradual increase in all the linear measurements through successive time points. However, in case of triceps skinfold thickness, there is a decrease at the 4th time point (i.e. measurement taken during the month of June-July), in general. Data on reported morbidity for a period of two months, prior to the month of June, shows that the frequency is the highest when compared with rest of the year. It is possible, although it is not readily known how probable, that the dip in triceps skinfold thickness at the 4th time point is related to the high prevalence of morbidity shortly before that time point.

Thus both the analysis, the descriptive statistics and the one way ANOVA lead to the same conclusion that the inter- group, inter-subgroup and sex differences do not seem to occur in any measurement at any time point, with a few exceptions.

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KEYWORDS Squatter Children. Hindu and Muslim. Growth Pattern

ABSTRACT The present article is on a short-term longitudinal growth study, conducted for a period of one year, on squatter children of two social groups (Hindu and Muslim), belonging to age groups 3, 4 and 5 years. Here attempts have been made to observe the similarities and differences in growth pattern of children of each age group belonging to two social groups and to see the effect of social group and sex difference on growth pattern. The results show that except some measurements, there exists no clear growth pattern in both the groups. Again, social group and sex difference do not seem have any effect on the growth pattern.

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