

## **Physical Growth Status of Affluent Arora children of Amritsar** **Navdeep Kaur<sup>1</sup>, Manjula Uppal<sup>2</sup> and Sharda Sidhu<sup>3</sup>**

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### **ABSTRACT**

*In the present cross-sectional study an attempt has been made to investigate the growth pattern of affluent Arora pre-school children of Amritsar (Punjab). Two anthropometric measurements (weight and height) were taken on 1879 children (949- boys and 930- girls) ranging in age from 2-5 years. The children from six crèches, fifteen play-pen or kindergarten and three public schools of Amritsar formed the study group. From weight and height, body mass index was calculated using standard formula. It has been observed from the present study that there is increase in the mean values of weight and height with advancements of age and the increment in these variables was uniform throughout all the age groups. The boys were heavier and taller than girls in all the age groups and in the pooled sample. It is also evident from this study that the mean value of BMI decreased from age group 2+ to 5+ among both boys and girls, respectively. Arora boys and girls are heavier and taller than the other Punjabi and Indian children.*

**Key words:** *Weight, height, Arora, pre-school children, Amritsar.*

### **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 (Sidhu *et al.*, 2005). Child growth is the universal means to assess adequate nutrition, health and development of individual children which constitute nutritionally the most vulnerable segment of

the population (Bisai and Manna, 2010, Mandal and Bose, 2010). Growth is defined as a regular process of quantitative increase in size or mass of different tissues and organs of the body from conception to adulthood. Children grow from birth to maturity and keep on increasing with age. The basic technique for describing the growth at the level of the individual is anthropometry. Anthropometric measurements provide valuable information about the rate and pattern of physical growth. At present, a paucity of information exists on the growth pattern of pre-school children of Punjab which may be in part due to difficulty of sampling and studying this age group. Therefore in the present study an attempt has been made to evaluate the growth pattern of affluent Arora pre-schoolchildren of Amritsar (Punjab)

## **MATERIALS AND METHODS**

For the present cross-sectional study, data were collected from 1879 (boys- 949 and girls- 930) affluent Arora children ranging in age from 2 to 5 years. The children from six crèches, fifteen play-pens or kindergartens and three public schools of Amritsar city formed the study group. Approval for this study was obtained from the Guru Nanak Dev University Ethics Committee in compliance with the guidelines issued by Indian Council of Medical Research (ICMR). The study was appropriately designed to realize the objectives. A written voluntary consent was obtained from the parents through the crèche, play-pen or kindergarten and public school authorities (who arranged parent-teacher meeting) after explaining the objectives as well as methodology of the study. Weight and height measurements were taken from each subjects using standard protocol of Weiner and Lourie (1981). From weight and height, body mass index (BMI) was calculated by standard formula. The Statistical Package for the Social Sciences (SPSS) version 16.0, PC windows was used for data analysis.

## **RESULTS**

A regular measurement of weight is an important variable in growth monitoring and helps in early detection of health and nutritional problems in growing children. Table 1 presents the basic statistical constants of body weight of Arora children of Amritsar (Punjab). Changes in weight with age give a gross idea of body growth in children. In the present study the mean values of

weight showed an increase with age amongst boys and girls. The mean weight of boys and girls in age group 2+ was 13.0 kg and 12.4 kg, respectively. In age group 5+ it became 19.5 kg and

Table 1 Mean, Standard Deviation (SD), Gain/year and 't'-value with significance level of Weight and Height of affluent Arora children according to age and sex

| Age group (years)                         | Boys               |       |     |             | Girls              |       |     |             | 't' value | P     |
|---|--------------------|-------|-----|-------------|--------------------|-------|-----|-------------|-----------|-------|
|   | Number of subjects | Mean  | SD  | Annual Gain | Number of subjects | Mean  | SD  | Annual Gain |           |       |
| <b>Weight (kg)</b>                        |                    |       |     |             |                    |       |     |             |           |       |
| 2+  | 204                | 13.0  | 2.4 | -           | 198                | 12.4  | 2.0 | -           | 2.7*      | 0.007 |
| 3+  | 220                | 15.1  | 1.9 | 2.1         | 253                | 14.6  | 2.1 | 2.2         | 2.7*      | 0.007 |
| 4+  | 254                | 17.3  | 2.5 | 2.2         | 240                | 16.8  | 2.5 | 2.2         | 2.2*      | 0.028 |
| 5+  | 271                | 19.5  | 2.3 | 2.2         | 239                | 19.1  | 2.8 | 2.3         | 1.8       | 0.070 |
| 2+-5+                                     | 949                | 16.5  | 2.3 | 6.5         | 930                | 15.8  | 2.4 | 6.7         | 6.4*      | 0.000 |
| <b>Height (cm)</b>                        |                    |       |     |             |                    |       |     |             |           |       |
| 2+  | 204                | 91.0  | 8.3 | -           | 198                | 90.3  | 6.4 | -           | 0.9       | 0.360 |
| 3+  | 220                | 98.6  | 5.5 | 7.6         | 253                | 97.4  | 5.4 | 7.1         | 2.4*      | 0.017 |
| 4+  | 254                | 106.4 | 6.0 | 7.8         | 240                | 104.6 | 5.6 | 7.2         | 3.4*      | 0.000 |
| 5+  | 271                | 114.5 | 6.3 | 8.1         | 239                | 112.7 | 7.1 | 8.1         | 3.0*      | 0.003 |
| 2+-5+                                     | 949                | 103.6 | 6.5 | 23.5        | 930                | 101.7 | 6.1 | 22.4        | 6.5*      | 0.000 |
| <b>Body Mass Index (kg/m<sup>2</sup>)</b> |                    |       |     |             |                    |       |     |             |           |       |
| 2+  | 204                | 15.7  | 1.6 | -           | 198                | 15.2  | 1.5 | -           | 3.2*      | 0.001 |
| 3+  | 220                | 15.5  | 1.5 | -0.2        | 253                | 15.4  | 1.6 | 0.2         | 0.7       | 0.480 |
| 4+  | 254                | 15.3  | 1.5 | -0.2        | 240                | 15.3  | 1.9 | -0.1        | 0         | -     |
| 5+  | 271                | 14.9  | 1.5 | -0.4        | 239                | 15.0  | 1.6 | -0.3        | 0.7       | 0.480 |
| 2+-5+                                     | 949                | 15.4  | 1.5 | -0.8        | 930                | 15.2  | 1.7 | -0.2        | 2.7*      | 0.007 |

\* Significant sex differences

19.1 kg amongst both boys and girls, respectively. This showed that over a period of 4 years, a total gain of 6.5 kg among boys and 6.7 kg among girls has been observed. The mean weight of boys and girls of pooled data (age group 2+ to 5+) was found to be 16.5 kg and 15.8 kg, respectively. The maximum annual increase (2.2 kg) in weight was observed from age group 3+ to 4+ and 4+ to 5+ in case of boys whereas in girls, the maximum annual gain (2.3 kg) was observed between age group 4+ and 5+. The boys were found to be heavier than girls in all age

groups and in the pooled sample. The difference in body weight between both the boys and girls was statistically significant ( $p < 0.05$ ) in all the age groups and in the pooled sample except age group 5+.

Height is the second largest composite of the body. Table 1 also indicates that mean values of height increased in both the sexes as the age advances. Boys and girls of age group 2+ had mean height of 91.0 cm and 90.3 cm, respectively, while in age group 5+, the height showed an increase to the mean values of 114.5 cm and 112.7 cm, respectively. Thus, in the period of four years (i.e. age group 2+ to 5+) an increase of 23.5 cm and 22.4 cm in height was observed in boys and girls, respectively. The mean height of studied boys and girls (age group 2+ to 5+) was 103.6 cm and 101.7 cm respectively thereby boys were 1.90 cm taller than girls. In both the boys and girls, the maximum annual gain in height (8.1 cm) was observed between age group 4+ and 5+. The differences in height of boys and girls was found statistically significant ( $p < 0.05$ ) in all the age groups and in the pooled sample except age group 2+.

Body mass index (BMI) is the best combination of weight and height to assess the adiposity among children and adults. The mean, SD and gain per year in BMI of sampled children have been presented in Table 1. Boys of age group 2+ had a mean value of body mass index, 15.7 kg/m<sup>2</sup> which decreased to 14.9 kg/m<sup>2</sup> up to age group 5+. On the other hand, in girls the mean value increased from 15.2 kg/m<sup>2</sup> in age group 2+ to 15.4 kg/m<sup>2</sup> in age group 3+, and then decreased to 15.0 kg/m<sup>2</sup> up to age group 5+. The mean value of BMI in the pooled sample (age group 2+ to 5+) was 15.4 kg/m<sup>2</sup> and 15.2 kg/m<sup>2</sup> among boys and girls, respectively, indicating thereby a bit higher increase in boys than girls. It has also been observed from this table that differences in BMI between boys and girls were statistically insignificant in all the age groups except in the age group of 2+ and in the pooled sample ( $p < 0.05$ ).

## **DISCUSSION**

In children, weight and height are the two basic measures that are commonly used to assess the growth status. The measurement of weight is the most important reliable criterion for the assessment of health and nutritional status of children and is considered to be the chief trait to change during childhood. It is evident from the Table 1 that there was a continuous increase in mean values of weight with advancement of age among the studied children. The increment of

weight among both boys and girls was almost uniform (2.2 kg/year) throughout the age period which proves that early childhood is a period of relative growth stability. Ghai *et al.* (2009) reported that, a normal child gains about 2 kg every year between the age of three to seven years and 3 kg per year after that till the pubertal growth spurt begins. Thus it is evident from the results of the present study that Arora boys and girls gained more weight than the reported values of Ghai *et al.* (2009). Boys were heavier than girls in all age groups as well as in the pooled sample and the difference in body weight among both sexes were statistically significant in the pooled sample and in all the age groups except in age group 5+. A total gain in weight during 2+ to 5+ years of age was found to be 6.5 kg and 6.7 kg in boys and girls, respectively.

Table 2 Comparison of mean value of Weight (kg) of affluent Arora children with various national and international studies

| Age group (years) | WHO (de Onis <i>et al.</i> , 2006) | Well-to-do Indians (1991) | Affluent Indian children (Khadilkar <i>et al.</i> , 2010) | Affluent Indian children (Agarwal and Agarwal, 1994) | Punjabi children (ICMR, 1977) | Ludhiana children (Singh and Grover, 2003) | Scheduled caste community of Punjab (Uppal, 2002) |               | Present study |
|-------------------|------------------------------------|---------------------------|---|--|-------------------------------|--|---|---------------|---------------|
|                   |                                    |                           |   |  |                               |  | Sikh Harijan                                      | Hindu Harijan |               |
| <b>Boys</b>       |                                    |                           |   |  |                               |  |   |               |               |
| 2+                | 13.28                              | 12.51                     | 11.15   | 11.90  | 10.30                         | 12.80                                      | 9.26  | 9.11          | 13.00         |
| 3+                | 15.25                              | 14.78                     | 13.40   | 13.80  | 12.50                         | 12.90                                      | 10.88   | 10.41         | 15.10         |
| 4+                | 17.25                              | 16.12                     | 15.65   | 15.40  | 14.00                         | 15.30                                      | 12.44   | 12.92         | 17.30         |
| 5+                | 18.30                              | 19.33                     | 17.40   | 17.10  | 15.40                         | 18.90                                      | 14.02   | 14.57         | 19.50         |
| <b>Girls</b>      |                                    |                           |   |  |                               |  |   |               |               |
| 2+                | 12.70                              | 11.67                     | 11.05   | 11.60  | 9.60                          | 11.90                                      | 8.53  | 8.29          | 12.40         |
| 3+                | 14.87                              | 13.79                     | 13.00   | 13.50  | 11.40                         | 11.60                                      | 9.89  | 9.92          | 14.60         |
| 4+                | 17.06                              | 15.85                     | 15.00   | 15.10  | 12.80                         | 15.20                                      | 12.23   | 11.87         | 16.80         |
| 5+                | 18.20                              | 18.67                     | 16.50   | 16.80  | 15.10                         | 15.90                                      | 13.92   | 13.35         | 19.10         |

In order to study population differences in growth pattern, mean weight of the sampled children have been compared with World Health Organization (WHO) standards (de Onis *et al.*, 2006), Well-to-do-Indian children (1991), Affluent Indian children (Khadilkar *et al.*, 2010), Affluent Indian children (Agarwal and Agarwal, 1994), Punjabi children (Indian Council of Medical Research, ICMR, 1977), Ludhiana children (Singh and Grover, 2003) and Scheduled caste children of Punjab (Uppal, 2002). An inspection of gain per year revealed (Table 2) that weight gain was more for studied boys (6.5 kg) and girls (6.7 kg) during the period of four years compared to Punjabi boys (5.1 kg) and girls (5.5 kg) reported by ICMR (1977). Similarly, a higher gain in the weight measurements was observed in the studied boys and girls compared to Sikh Harijan (boys: 4.8 kg and girls: 5.4 kg) and Hindu Harijan (boys: 5.5 kg and girls: 5.1 kg) of Punjab (Uppal, 2002), Affluent Indian boys (5.2 kg) and girls (5.2 kg) (Agarwal and Agarwal, 1994) as well as compared to the given standards (boys: 5.0 kg and girls: 5.5 kg) of WHO (de Onis *et al.*, 2006). The net gain in weight among boys of the present study had a comparable value with boys of Ludhiana (6.1 kg) (Singh and Grover, 2003) and Affluent India (6.2 kg) (Khadilkar *et al.*, 2010), whereas, net weight gain was less among girls of Ludhiana (4.0 kg) and Affluent India (5.4 kg) than the girls of the present study. A net gain in weight among studied Arora boys and girls was marginally lower than Well-to-do-Indian children (1991) (boys: 6.8 kg; girls: 7.0 kg).

Height is another widely used practical tool for assessing the nutritional status of an individual. Forbes (1987) also in a study opined that, height is a useful indicator of nutritional status, under-nutrition delays height growth, while over-nutrition accelerates it. It is evident from the present study that there was a continuous increase in mean values of height from age group 2+ to 5+ amongst boys as well as girls (Table 1). The increment in height measurements was almost uniform (7.65 cm/year) throughout all the age groups among both the sexes. This proves that 2-5 years of age is in general, period of relative growth stability, where velocity of height tends to be regular with little variation. Ghai *et al.* (2009) reported that the child gains about 6 cm in height every year until the age of 12. This shows that boys and girls of Amritsar gained more height than the reported values of Ghai *et al.* (2009). Boys were taller than girls in all the age groups and the magnitude of differences between two sexes for stature was found to be statistically significant in the pooled sample and in all the age groups except in age group 2+. The net gain in height during the period of four years (i.e. from age group 2+ to 5+) was 23.5 cm and 22.4 cm among boys and girls, respectively.

The increase in height over a period of four years in the present study (Table 3) was observed to be 23.5 cm in boys and 22.4 cm in girls which was higher than the children (boys: 20.1 cm and girls: 22.1 cm) studied by ICMR (1977). Likewise a higher gain of height was achieved by studied boys and girls compared to Sikh Harijan (boys; 19.9 cm and girls; 21.4 cm) and Hindu Harijan (boys; 21.9 cm and girls; 22.2 cm) of Punjab (Uppal, 2002), Affluent Indian children (Agarwal and Agarwal, 1994), given (boys: 18.5 cm and girls: 19.2 cm) WHO standards (de

**Table 3 Comparison of mean value of Height (cm) of affluent Arora children with various national and international studies**

| Age group (years) | WHO (de Onis <i>et al.</i> , 2006) | Well-to-do Indians (1991) | Affluent Indian children (Khadilkar <i>et al.</i> , 2010) | Affluent Indian children (Agarwal and Agarwal, 1994) | Punjabi children (ICMR, 1977) | Ludhiana children (Singh and Grover, 2003) | Scheduled caste community of Punjab (Uppal, 2002) |               | Present study |
|-------------------|------------------------------------|---------------------------|---|--|-------------------------------|--|---|---------------|---------------|
|                   |                                    |                           |   |  |                               |  | Sikh Harijan                                      | Hindu Harijan |               |
| <b>Boys</b>       |                                    |                           |   |  |                               |  |   |               |               |
| 2+                | 91.45                              | 90.01                     | 86.75   | 86.00  | 82.40                         | 88.70                                      | 79.91   | 79.17         | 91.00         |
| 3+                | 99.49                              | 98.36                     | 94.60   | 94.40  | 90.10                         | 99.40                                      | 87.08   | 86.84         | 98.60         |
| 4+                | 106.38                             | 104.70                    | 102.30  | 100.80   | 96.70                         | 104.30                                     | 91.68   | 94.34         | 106.40        |
| 5+                | 110.0                              | 113.51                    | 107.90  | 106.20   | 102.50                        | 109.10                                     | 99.77   | 101.13        | 114.50        |
| <b>Girls</b>      |                                    |                           |   |  |                               |  |   |               |               |
| 2+                | 90.18                              | 87.93                     | 87.00   | 85.00  | 80.50                         | 86.90                                      | 76.95   | 75.30         | 90.30         |
| 3+                | 98.65                              | 96.21                     | 95.70   | 93.30  | 87.40                         | 92.60                                      | 84.68   | 85.54         | 97.40         |
| 4+                | 105.85                             | 104.19                    | 100.90  | 99.80  | 93.20                         | 102.50                                     | 93.63   | 90.41         | 104.60        |
| 5+                | 109.40                             | 112.24                    | 106.00  | 106.00   | 102.60                        | 107.40                                     | 98.31   | 97.54         | 112.70        |

Onis *et al.*, 2006), Ludhiana boys (20.4 cm) and girls (20.5 cm) (Singh and Grover, 2003), and children of Affluent India (boys: 21.1 cm and girls: 19.0 cm) (Khadilkar *et al.*, 2010). The total gain in height was same in boys of the present study and Well-to-do-India (23.5 cm), while

among Amritsar girls' net gain in height was less than the girls of Well-to-do-India (1991) (24.3 cm).

It is evident from the results of the present study that weight and height measurements of Arora children of Amritsar increased with age. Similar pattern of increase for both the sexes has been reported by Das and Bose (2009) in children of West Bengal. Present results showed that the maximum annual increase in weight and height measurements was between the age group of 4+ and 5+ among both boys and girls. Similar results have been reported for Well-to-do-Indian (1991) and Centers for Disease Control and Prevention (CDC, 2000) standards.

A comparative picture of body weight (Table 2) and height (Table 3) of other studies reveal that Amritsar Arora boys and girls were heavier and taller than the various reported populations. It could be concluded from these results that since Arora boys and girls belong to a high socioeconomic status thus they had a better growth pattern. It is apparent from the literature that genetic, dietary and environmental constraints are the major determinants for the differences in growth performance between the children of developing and developed countries (Bhasin *et al.*, 1990; Dugdale *et al.*, 1994; Loka *et al.*, 1994; Droomers *et al.*, 1995; Quinn *et al.*, 1995; Mei *et al.*, 1998; Sharma, 2010).

In recent years the BMI has become a medical standard to be used for overweight and obesity measurement. The cut-off points of BMI for defining overweight and obesity in the adults are age and gender independent (WHO, 1995). However during the last decade many countries used the BMI for measuring fatness in children (Rolland-Cachera *et al.*, 1982; Guillaume, 1999). Various studies examined the validity of BMI to estimate its correlation with body fat accumulation in children (Mei *et al.*, 2002; Field *et al.*, 2003; Eto *et al.*, 2004). Despite the certain limitations of the BMI (Freedman *et al.*, 2004; Freedman *et al.*, 2005), WHO recommends it as a fatness measure in children for public health screening. Reilly (2006) also reported that a high BMI for age in pediatrics has acceptable diagnostic accuracy for a high fat content and denotes increased risk of morbidity. It is evident from the Table 1 that mean values of BMI decreased with age among both boys and girls. The sex difference in BMI was statistically insignificant in all age groups except in age group 2+ and in the pooled sample.

Table 4 reveals that mean values of BMI measured in the present study was higher than the children of other states of India (Biswas *et al.*, 2009; Das and Bose, 2011). A comparison of



the mean values of BMI between the children of the present study and WHO standards (de Oniset *et al.*, 2006), Affluent Indian children (Khadilkar *et al.*, 2010) and children of Lithuania (Jakimaviciene and Tutkuvieni, 2007), Germany (Schwandt *et al.*, 2008) and Nigeria (Okoroigwe and Okeke, 2009) clearly demonstrated that studied children were having comparable values in different age groups with little fluctuation in few of the age groups. According to WHO standards (de Onis *et al.*, 2006), the mean value of BMI was 15.81 kg/m<sup>2</sup>

**Table 4 Comparison of mean value of Body Mass Index (kg/m<sup>2</sup>) of affluent Arora children with various national and international studies**

| Age group (years) | WHO (de Onis <i>et al.</i> , 2006) | Affluent Indian children (Khadilkar <i>et al.</i> , 2010) | Indian children (Biswas <i>et al.</i> , 2009) | Indian children (Das and Bose, 2011) | Lithuanian children (Jakimaviciene and Tutkuvieni, 2007) | German children (Schwandt <i>et al.</i> , 2008) | Nigerian children (Okoroigwe <i>et al.</i> , 2009) | Present study |
|-------------------|------------------------------------|---|---|--------------------------------------|--|---|--|---------------|
| <b>Boys</b>       |                                    |   |   |                                      |  |   |  |               |
| 2+                | 15.81                              | 14.75   | -   | 14.70                                | -  | -   | 18.06  | 15.50         |
| 3+                | 15.45                              | 14.85   | 15.03   | 14.50                                | 16.40  | 15.44   | 14.36  | 15.80         |
| 4+                | 15.25                              | 14.95   | 14.49   | 14.30                                | 16.00  | 15.50   | 16.05  | 15.70         |
| 5+                | 15.20                              | 15.00   | 14.25   | 13.80                                | 15.80  | 15.22   | 15.54  | 15.10         |
| <b>Girls</b>      |                                    |   |   |                                      |  |   |  |               |
| 2+                | 15.55                              | 14.40   | -   | 13.60                                | -  | -   | 15.73  | 14.90         |
| 3+                | 15.32                              | 14.55   | 14.62   | 14.10                                | 16.20  | 14.84   | 15.91  | 15.40         |
| 4+                | 15.29                              | 14.65   | 14.27   | 14.20                                | 15.80  | 15.16   | 15.36  | 15.30         |
| 5+                | 15.30                              | 14.70   | 13.91   | 13.20                                | 15.60  | 15.60   | 15.07  | 15.10         |

and 15.55 kg/m<sup>2</sup> in age group of 2+ which decreased to 15.20 kg/m<sup>2</sup> and 15.30 kg/m<sup>2</sup> in age group of 5+ among both boys and girls respectively. Khadilkar *et al.* (2010) studied the affluent Indian children and reported that the mean value of BMI was 14.75 kg/m<sup>2</sup> in the age group of 2+ and 15.00 kg/m<sup>2</sup> in the age group of 5+ among boys and 14.40 kg/m<sup>2</sup> in the age

group of 2+ and 14.70 kg/m<sup>2</sup> in the age group of 5+ among girls, respectively. Biswas *et al.* (2009) studied Indian children and observed that the mean value of BMI was 15.03 kg/m<sup>2</sup> in the age group of 3+ which decreased to 14.25 kg/m<sup>2</sup> in the age group of 5+ among boys. Similarly among girls the mean value of BMI was 14.62 kg/m<sup>2</sup> in age group 3+ which decreased to 13.91 kg/m<sup>2</sup> in the age group of 5+. Das and Bose (2011) also studied Indian children and found that mean value of BMI among boys and girls was 14.7 kg/m<sup>2</sup> and 13.6 kg/m<sup>2</sup> in the age group of 2+ which decreased to 13.8 kg/m<sup>2</sup> and 13.2 kg/m<sup>2</sup> in the age group of 5+, respectively. Jakimaviciene and Tutkuvienė (2007) studied the children of Lithuania and reported that mean BMI value decreased from 16.4 kg/m<sup>2</sup> and 16.2 kg/m<sup>2</sup> in age group 3+ to 15.8 kg/m<sup>2</sup> and 15.6 kg/m<sup>2</sup> in the age group of 5+ among both boys and girls. Schwandt *et al.* (2008) studied German children and observed that mean value of BMI was 15.44 kg/m<sup>2</sup> in age group 3+ decreased to 15.22 kg/m<sup>2</sup> in age group 5+ among boys, while in case of girls, the mean value of BMI increased from age group 3+ (14.84 kg/m<sup>2</sup>) to 5+ (15.60 kg/m<sup>2</sup>). Okoroigwe and Okeke (2009) studied the children of Nigeria and also reported that mean value of BMI decreased from age group 2+ (Boys: 18.06 kg/m<sup>2</sup>; Girls: 15.73 kg/m<sup>2</sup>) to 5+(Boys: 15.54 kg/m<sup>2</sup>; Girls: 15.07 kg/m<sup>2</sup>) among both sexes. The comparative account of different populations indicated that mean values decreased with advancing age as do the mean values of the BMI of the present study. Rolland-Cachera *et al.* (1991) observed that the distribution of BMI varies considerably with age and it had a rapid increase during the first year of life while declined after 9 to 12 months of age and settled at an average level at 5-6 years before beginning a gradual increase through adolescence and most of the adulthood. Thus it is apparent from the present sample that the children belonging to affluent families were close to international standards with regard to anthropometric measurements.

## CONCLUSION

The growth status of Arora affluent pre-school children was assessed using two anthropometric measurements. It was observed that boys were heavier and taller than girls in all age groups and in the pooled data. The increment in weight and height was uniform throughout all the age groups. The present results also revealed that boys and girls were heavier and taller than the other Punjabi and Indian children. The mean values of BMI decreased from age group 2+ to 5+

among both boys and girls. The mean value of BMI was higher among children of the present study than the other populations of India.

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