

Anthropometric Profile and Adiposity in the Obese Punjabi Children and Their Parents

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ABSTRACT The study included 60 subjects comprising equal number of male and females of 7-9 years of age from three public schools in Ludhiana city. The subjects who were 20% above the normal weight for age were selected. The anthropometric measurements of the subjects and their parents' were measured. Results indicate that female subjects were more obese as compared to the male subjects. The parental obesity was found as the important risk factor of childhood obesity. A significant correlation ($P < 0.1$) was observed in the BMI of male subjects with the BMI of father and mother respectively. Similarly a significant correlation ($P < 0.1$) was found in the BMI of female subjects with the BMI of father only.

INTRODUCTION

Obesity has emerged as an epidemic in developed and developing countries during the last quarter of the 20th century affecting high and middle-income people (Popkin and Doak, 1998). The prevalence of childhood obesity has been increasing during the last three decades and child obesity accounts for nearly 30 per cent of all adult obesity (Golan *et al.*, 1998). Obese children are those who are 20 per cent above the normal weight for age. They are more prone to become overweight adults as the tendency of obesity in such children persists throughout the life. The risk of obesity is two to three times greater for an individual with a family history of obesity and increases further with severe obesity. In addition infants born to overweight mothers have been found to be less active and gain more weight by age three months when compared with infants of normal weight mothers suggesting a possible inborn derive to conserve energy.

Childhood obesity has emerged only recently in India, unlike in the West where it existed since long. Obesity in children as young as two years onwards have been reported from the Indian population (Sharma, 2002). The present study was planned to investigate anthropometric profile and adiposity in the obese Punjabi children and their parents.

MATERIAL AND METHODS

30 boys and 30 girls were purposely selected from II, III and IV class studying in three public schools in Ludhiana city based on the criteria of 20 per cent above the normal weight for age. Various anthropometric measurements viz. height, weight mid upper arm circumference, tricep skinfold thickness were measured by using standard methods (Jelliffe, 1966). The children were classified into different levels of degree of obesity (Srilakshmi, 2000). The BMI (weight/height²) of the subjects and their parents was calculated.

RESULTS AND DISCUSSION

The level of degree of obesity of the subjects indicated that just 17% of the boys and 10% of the girls were mildly obese and 40% of the boys and 63% of the girls were classified in moderate to severe category. 23% of the boys and 27% of the girls were found severely obese. Table 1 exhibits the mean, weight and height of the subjects. It was observed that mean weight of the male and female subjects was 39.07 ± 7.44 and 39.22 ± 6.71 kg respectively, which exceeded the standards. (NCHS, 1987 and ICMR, 1990). The mean height of the male and female subjects was 130.53 ± 7.69 and 129.02 ± 6.72 cm, respectively, which also exceeded the standards. (NCHS, 1987 and ICMR, 1990). Tanasescu *et al.* (2000) reported a higher range of weight and heights of 7-10 years old male and female subjects compared to the present study.

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Table 1: Average weight & height of the subjects as compared with NCHS and ICMR standards.

Group	Anthropo- metric parameter	NCHS stan- dards	Perce- tage	ICMR stan- dards
<i>Weight (kg) (Mean $\pm$ SD)</i>				
Male	39.07 $\pm$ 7.44	25.43	153.64	26.96
Female	39.22 $\pm$ 6.71	25.03	156.69	26.75
<i>Height (cm) (Mean $\pm$ SD)</i>				
Male	130.53 $\pm$ 7.69	126.97	102.80	128.27
Female	129.02 $\pm$ 6.72	126.40	102.07	127.65
NCHS (1987)				
ICMR (1990)				

The mean BMI of the male and female subjects of the present study was 22.75 ± 2.39 and 23.39 ± 2.57 , respectively (Table 2). While Tanasescu et al. (2000) reported that BMI in their obese male and female subjects was 28.29 ± 7.02 and 24.19 ± 3.72 , respectively, which was high as compared to present study. The mean MUAC of the male and female subjects of the present study was 23.75 ± 2.08 and 23.24 ± 1.57 cm, respectively. The mean tricep skinfold thickness of the male and female subjects was 19.35 ± 2.92 and 19.25 ± 1.72 mm, respectively, while Tanasescu et al. (2000), in their finding reported a higher range of 25.25 ± 5.14 and 23.09

± 5.77 mm in male and female subjects, respectively as compared to the findings of this study.

The values of anthropometric parameters of the parents of the subjects are given in Table 3. The mean weight of the fathers of the male and female subjects was 80.20 ± 11.95 and 82.33 ± 10.11 kg, respectively. The mean height of the fathers of the male and female subjects was 167.93 ± 7.13 and 172.77 ± 8.96 cm respectively. Gopalan et al. (1998) also reported the similar results. In the present study significant difference ($P < 0.05$) was found between the heights of the fathers of subjects.

The mean weight of the mothers of the subjects was 64.47 ± 11.16 and 68.10 ± 9.00 kg, respectively. In the present study no significant difference was found in the mean weights of the mothers of both the subjects. The mean height of the mothers of the male and female subjects was 156.10 ± 5.91 and 158.47 ± 6.71 cm, respectively. Tanasescu et al. (2000) reported a little higher range for weight and heights of the mothers compared to the present study. In the present study statistically no significant difference was found in mean weights and heights of the mothers of both the subjects.

Childhood obesity is also associated with

Table 2: Anthropometrics parameters of the subjects.

Parameters	Male (n=30) (Mean $\pm$ SD)	Range	Female (n=30) (Mean $\pm$ SD)	Range	Overall (n=60) (Mean $\pm$ SD)	t-value
Weight (kg)	39.07 $\pm$ 7.44	29.00 - 58.00	39.22 $\pm$ 6.71	28.00 - 52.00	39.14 $\pm$ 7.09	0.082
Height (cm)	130.53 $\pm$ 7.69	118.00 - 145.00	115.00 $\pm$ 143.00	115.00 - 143.00	129.78 $\pm$ 7.26	0.810
Body mass index (kg/m ²)	22.75 $\pm$ 2.39	18.60 - 27.59	23.39 $\pm$ 2.57	18.81 - 29.14	23.07 $\pm$ 2.50	0.999
Mid upper arm circumference (cm)	23.75 $\pm$ 2.08	20.32 - 27.94	23.24 $\pm$ 1.57	20.32 - 25.40	23.50 $\pm$ 1.85	1.066
Tricep skinfold thickness (mm)	19.35 $\pm$ 2.92	14.00 - 25.00	19.25 $\pm$ 1.72	16.50 - 23.00	19.30 $\pm$ 2.40	0.162

Table 3: Anthropometrics parameters of the parents of the subjects.

Parameters	Male (n=30) Mean $\pm$ SD	Range	Female (n=30) Mean $\pm$ SD	Range	t-value
<i>Father</i>					
Weight (kg)	80.20 $\pm$ 11.95	59.00 - 105.00	82.33 $\pm$ 10.11	68.00 - 115.00	0.745
Height (cm)	167.93 $\pm$ 7.13	155.00 - 183.00	172.77 $\pm$ 8.96	152.50 - 190	2.315**
BMI (kg/m ²)	28.38 $\pm$ 3.57	21.39 - 37.46	27.76 $\pm$ 4.09	20.00 - 33.30	0.626
<i>Mother</i>					
Weight (kg)	64.47 $\pm$ 11.16	15.00 - 100.00	68.10 $\pm$ 9.00	52.00 - 96.00	1.387
Height (cm)	156.10 $\pm$ 5.91	150.00 - 176.00	158.47 $\pm$ 6.71	150 - 185	1.452
BMI (kg/m ²)	26.37 $\pm$ 3.63	21.22 - 37.11	27.23 $\pm$ 3.93	17.53 - 37.50	0.880

**Significant at 5% level

Table 4: Subject's BMI, tricep skinfold thickness and mid upper arm circumference and parents' body size (BMI > 30 = obese; BMI 25-30 = over weight; BMI <25 = normal weight).

<i>Groups of parents according to their</i>				
<i>BMI (kg/m²)</i>	<i>(n=30)</i>	<i>Sub- ject's BMI (kg/m²)</i>	<i>Sub- ject's tricep skin- fold (mm)</i>	<i>Sub- ject's mid- upper arm circum- ference (cm)</i>
<i>Male Subjects</i>				
Both parents obese	13	23.89	19.62	24.31
One obese and one overweight parent	6	21.98	19.11	23.22
One obese and one normal weight parent	5	21.47	18.94	23.21
Both parents overweight	6	22.12	19.35	23.42
r value with BMI of father		0.337*	0.142*	0.137
r value with BMI of mother		0.350*	0.114	0.089
<i>Female Subjects</i>				
Both parents obese	16	23.98	19.48	23.65
One obese and one overweight parent	4	22.38	18.99	22.88
One obese and one normal weight parent	4	21.74	18.75	22.45
Both parents overweight	6	23.59	19.14	22.91
r value with BMI of father		0.322*	0.119	0.132
r value with BMI of mother		0.109	0.130	0.106
<i>Overall (n = 60)</i>				
Both parents obese	29	23.94	19.54	23.95
One obese and one overweight parent	10	22.14	19.06	23.14
One obese and one normal weight parent	9	21.59	18.83	22.88
Both parents overweight	12	22.86	19.27	23.16
r value with BMI of father		0.157	0.123	0.111
r value with BMI of mother		0.064	0.114	0.096

*Significant at 10% level

parents adiposity. This was judged by taking the Body Mass Index of the parents. The mean BMI of the fathers of the male and female subjects was 28.38 ± 3.57 and 27.76 ± 4.09 , respectively. According to the mean BMI it was concluded that the fathers of subjects were overweight. Similar finding of overweight fathers had been reported by Maffeis et al. (2000) who found that BMI of the fathers of the male and female subjects was 25.5 and 25.6, respectively. However no significant difference was observed for BMI of

fathers of the male and female subjects in the present study. The mean BMI of the mothers of the male and female subjects was 26.37 ± 3.63 and 27.23 ± 3.93 , respectively. According to the mean BMI in the present study, it was concluded that mothers of both male and female subjects were overweight like fathers. No statistical difference was found in the mean BMI of mothers of the male and female subjects.

The relationship between parents' BMI and the relative adiposity of the subjects was not surprising (Table 4). Parental BMI with the subjects' BMI was studied and it was found that subjects with two obese parents were more likely to be obese or overweight compared with only one obese parent and one overweight parent or both parents overweight, who in turn were more likely to be obese or overweight than subjects with one obese and normal weight parent. 48% of the subjects were having both obese parents; 17% were having one obese and one overweight parent and 15% were one obese and one normal parent while 20% were having both the parents overweight. Similar findings had been reported by Lake et al. (1997). In the present study a positive significant correlation ($p < 0.1$) was observed in the BMI of male subject with the BMI of father and mother respectively. Similarly a positive significant correlation ($p < 0.1$) was found in the BMI of female subjects with the BMI of fathers only. Hence no significant correlation was found with mothers' BMI. Similar findings had been reported by Mo-Suwan et al. (1998) that BMI of subjects was significantly associated with fathers' BMI.

Thus it was clear that each subject had at least one obese or overweight parent, which contributed to childhood obesity.

CONCLUSION

It has been concluded that female subjects were more obese as compared to the male subjects because of increased sedentary behaviour and faulty dietary habits. The relationship between parents' BMI and the relative adiposity of the subjects was not surprising. It is concluded that subjects with two obese parents were more likely to be obese or overweight compared with only one obese parent and overweight parent or both parents overweight, who in turn were likely to be obese or overweight than subjects with one obese and one normal weight parent.

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