Original Article

Influence of Parental Obesity on School Children

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ABSTRACT

Objective. To find out the association between parental obesity and Childhood obesity.

Methods. Children in middle schools were screened for obesity. For each obese child two controls were studied.

Results. Parental history of obesity was present for 32.7% of obese children. Children with parental history of obesity showed 25.2 times more chances of developing obesity than controls. 33.8% of the obese girls and 31.6% of the obese boys had history of parental obesity. If the father was obese, boys had 6.5 times more chance and girls had 40.1 times more chance of developing obesity. Mother's obesity had an influence on 23.7 % of the boys and only 16 % of the girls.

Conclusion. The childhood obesity has been influenced by genetic factors in the present study and it also shows that maternal obesity mainly passes to boys and paternal obesity to girls. **[Indian J Pediatr 2010; 77 (3) : 255-258]**
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Key words: *Childhood obesity; Parental obesity; Odds ratio*

Childhood obesity is a matter of concern to the whole world, nowadays. The problem of childhood obesity is quite high in rich and affluent countries. Recent studies have shown that this problem started percolating even to the underdeveloped and developing countries, including India. According to some studies 50-80% of obese children will continue as obese adults.[1] Obesity predisposes to diabetes, hypertension, cardiovascular diseases, cancer and many more life shortening problems are well recognized. Obesity is often expressed in terms of body mass index (BMI) which is based on height and weight. In adults a BMI of 30 or more is widely accepted as denoting obesity.[2] In children BMI changes substantially with age, rising steeply with infancy, falling during preschool years, and then rising in during adolescence and early adulthood. For this reason, child BMI needs to be assessed using age related reference curves.

Obesity tends to run in families. Genetics plays a major role. A common explanation is the family members share common attitude towards food, eating habits and exercise.[3] Modern environment may have unmasked previously silent obesogenic genes thrifty genotypes[4]. In some cases genes are directly responsible for obesity in disorders such as Prader willi syndrome, Lauren moon Biedl Bardet syndrome.[5] Risk of childhood obesity increases in direct relation with parental obesity. The risk of obesity is low in children with neither parent being obese and greater when one parent is obese and greatest when both parents are obese. The strongest predictor of childhood overweight as well as later adult obesity is parental obesity.[6]

An estimate says that heredity contributes about 5 - 25% of the risk of obesity. The risk of childhood obesity where one parent is obese is comparable regardless of the sex of the parent or the child[7]. The pattern of basal metabolic rate (BMR) an important determinant of fat accumulation may be genetically linked to parental obesity.

MATERIAL AND METHODS

A Case Control study was conducted in the Middle schools of Davangere taluk after obtaining the permission from education department. Schools were selected from the school list provided by education department by using simple random sampling till the desired sample size was met. Considering the

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[DOI-10.1007/s12098-010-0015-3]

[Received September 20, 2009; Accepted November 24, 2009]

prevalence of childhood obesity as 6 percent (5 percent significance level with 10 percent permissible error), sample size was derived and it was approximately 400 students. 400 obese children (cases) were chosen by screening the school children. The height (in mts) and weight (in Kgs) of each child were measured by adopting standard procedure. BMI was calculated using BMI charts based on NCHS (National Center for Health Statistics) standards[8]. For the purpose of the study "a child was considered obese if the BMI was more than 95th percentile cutoff point which is specific to the age and sex which works out to following cutoff levels".

Age and Gender Specific BMI Cutoff Point Adopted[8]

Age in yr	BMI CUTOFF POINT	
	Boys	Girls
10	22	23
11	23	24
12	24	25

For each obese child (case) identified 2 non obese children of same age, sex, class and section having immediate proceeding and succeeding register number of the case were selected as controls. A profile of age, sex, class, section and Roll No of all students was recorded. The information gathered was transformed into pretested proforma specially designed for this purpose.

To assess the parental obesity, parents of both cases and control were involved in the study. After identifying cases and selecting controls, parents of both cases and controls were invited to schools through school authorities on a specified date in each school. To asses the obesity of parents, height and weight of the parents were measured and BMI was calculated. Parents with BMI > 30 were considered as obese. The data thus obtained was analyzed by using SPSS (Statistical Package for Social Services version 13 USA).

RESULTS

A total of 231 obese girls and 190 obese boys were selected as cases by screening the middle school students. Two age and sex matched controls of same class and section were chosen as controls. However, more than half of the obese girls were of 12 yr and about 77% of the obese boys were of 11 and 12 yr (Table 1).

Table 1. Age And Sex Distribution of Subject Under Study

Age in years	Girls		Boys	
	Cases	Controls	Cases	Controls
10	50 (21.6)	100 (21.6)	43 (22.6)	86 (22.6)
11	59 (25.5)	118 (25.5)	76 (40)	152 (40)
12	122 (52.9)	244 (52.9)	71 (37.4)	142 (37.4)
Total	231 (100)	462 (100)	190 (100)	380 (100)

Parental history of obesity was present for 32.8 % (138) of obese children and only 1.9 % (16) of non-obese children. Parental history of obesity was absent in 98.1 % (826) of non obese children in contrast 67.2 % (283) of obese children. Influence of parental obesity on childhood obesity observed here is statistically significant (P<0.001). Children with parental history of obesity showed 25.2 times more chances of developing obesity than in children with no background of parental obesity (Table 2).

Table 2. Association Between Parental Obesity and Children's Obesity

Parental Obesity	CASES(obese)		CONTROLS (non obese)		Odds Ratio
	No	%	No	%	
Present	138	32.8	16	1.9	25.2
Absent	283	67.2	826	98.1	
Total	421	100.0	842	100.0	

X^2 = 249.9, df = 1, P< 0.001

33.8% of the obese girls (cases) had history of parental obesity compared to 1.1% of the non obese girls (controls) and 31.6% of the obese boys (cases) had history of parental obesity than non obese boys (controls). The association between parental obesity and childhood obesity was highly significant in both sexes (P<0.001). Obese girls had 46.6 times more chances of developing obesity than non obese girls. Boys with history of parental obesity showed 15.5 times higher risk of developing obesity than non obese boys (Table 3).

By analyzing the association of paternal (father) and maternal obesity on the children (boys and girls) we

Table 3. Association Between Parental Obesity and Childhood Obesity According to Sex

Parental obesity	Girls					Boys				
	Case		Control		OR	Case		Control		OR
	No	%	No	%		No	%	No	%	
Present	78	33.8	5	1.1	46.6	60	31.6	11	2.9	15.5
Absent	153	66.2	457	98.9		130	68.4	369	97.1	
Total	231	100	462	100		190	100	380	100	

X^2= 156.0, df = 1, P <0.001 X^2=95.5 df=1 P <0.001

Table 4. Association Between Paternal (Father) Obesity and Children Obesity

Father obesity	Girls					Boys				
	Case		Control		OR	Case		Control		OR
	No	%	No	%		No	%	No	%	6.5
Present	48	20.8	3	0.6	40.1	26	13.7	09	2.4	
Absent	183	79.2	459	99.4		164	86.3	371	97.6	
Total	231	100	462	100		190	100	380	100	

X^2= 91.5, df = 1, P <0.001 X^2=28.1 df=1 P <0.001

Table 5. Association Between Maternal (Mother) Obesity and Children Obesity

Mother obesity	Girls					Boys				
	Case		Control		OR	Case		Control		OR
	No	%	No	%		No	%	No	%	
Present	37	16.0	04	0.9	21.8	45	23.7	04	0.5	29.2
Absent	194	84.0	458	99.1		145	76.3	376	99.5	
Total	231	100	462	100		190	100	380	100	

X^2=63.5 df=1 P<0.001 X^2=77.9 df=1 P<0.001

found that 20.8 %(48) of obese girls and 13.7 %(26) of obese boys had obesity background of father. This difference in the influence was statistically significant (P<0.001). Obese boys had 6.5 times more chances of developing obesity while obese girls had 40.1 times more chances of developing obesity if the father is obese (Table 4).

When the impact of maternal (mother) obesity on children was analyzed, it was found that mother's obesity had an influence on 23.7 %(45) of the boys and only 16 %(37) of the girls. This indicates that maternal obesity has more influence on boys than girls. This difference in the influence was statistically significant (P<0.001) (Table 5).

DISCUSSION

Children with parental (Family) history of obesity have shown 25.2 times higher chances of developing obesity than children who do not have parental history of obesity. A cohort study by Whitaker *et al*[9] (1997) has shown that parental obesity is also a strong predictor for childhood obesity. The children of obese parents are at increased risk of childhood obesity either due to their parent's obesity or their own likelihood of getting obesity especially of children under 10 yr. The present study has shown that, if the mother is obese, sons shown a risk of developing obesity 29.2 times, more than that of daughters. If the father is obese, daughters shown a risk of developing obesity 40.1 times, more than that of sons. Parental (family) obesity had a definite influence on obesity of children. The present study shows obesity of mother passes mainly to boys and obesity of father to girls. Recently a study of 7-9 yr old children in Punjab showed positive relationship between BMI of boys with BMI of both father and mother whereas BMI of girls is associated with BMI of father only.[10]

CONCLUSION

It is evident from this study that maternal obesity mainly passes to boys and paternal obesity to girls. To summarize, childhood obesity has been influenced by genetic factors in the present study.

The observed risk of obesity in children associated with parental factors might involve parent-child linkage of environmental factors. Not only parental obesity but also increase in parental BMIs was likely to be associated with development of obesity in children. It may be possible that improvement of parental environmental factors reduces the risk of obesity even in children, and it is worth emphasizing the importance of health education for parents.

Contributions: SK- Acquisition of data, analysis and interpretation of data, Edition of manuscript; MR- Revision of the manuscript for important intellectual content; NG- Drafting of the manuscript.

Conflict of Interest: None.

Role of Funding Source: None.

REFERENCES

1. Styne DM. childhood obesity and adolescent obesity. *PCNA* 2001; 48: 823-847.
2. WHO – TRS 894. *Obesity. Preventing and managing the global epidemic*. Geneva : WHO 2000.

3. Merritt RJ. Obesity. *Curr Probl Padiatr* 1982; 12: 1-58.
4. Bangaiorno Ros. Childhood obesity prevention. *Research Across Australia* May 2002;
5. Goran Micheal. Metabolic precursors and effects of obesity in children : A decade of progress 1990-1999. *Am J Cli Nutr* 2001; 73: 158-171.
6. Joseph A Skeleton, Colin D. Rudolph : Overweight and Obesity. *Nelson's Textbook of Pediatrics*. 18th ed, Elsievier Publications; 2007; 233.
7. W.H. Dietz. Childhood obesity: Susceptibility, cause and management. *J Pediatrics* 1983; 103: 676-686.
8. Growth Charts, [serial online] Available from: URL: *http://www.cdc.gov/growth charts.htm Accessed November 15, 2006*.
9. Whitaker RC, Wright JA, Pepe MS, Seidel KD, Dietz WH. Predicting obesity in young adulthood from childhood and parental obesity. *NEJM* 1997; 337: 869-873.
10. Sangha Jasvinder Kaur. Anthropometric profile and adiposity in the obese Punjabi children and his parents *J Hum Ecol* 2006; 19: 159-162.