

Trends of Overweight and Obesity in Affluent School Girls of Punjab between 1996 and 2003

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Abstract

To assess the prevalence of overweight and obesity in school girls between 6-15 years of age among the affluent families of Punjab, two studies are compared using body mass index (BMI) as a parameter. The first study done in the year 1996-1997 (Group-I) was compared with the second study in 2003-2004 (Group-II). Group-I had 677 girls and group-II had 727 girls. Overweight and obesity were assessed using age- and sex-specific body mass index cut-off points. Results showed a 10.49% and 13.48% prevalence of overweight and 4.87% and 6.33% prevalence of obesity in girls of group-I and group-II, respectively. This shows that the overall prevalence of overweight and obesity has increased by 2.99% and 1.45%, respectively, in seven-year period. However, the difference in the prevalence of overweight and obesity in the two surveys was statistically non-significant.

Key Words: Body Mass Index, Overweight, Obesity, Punjabi Males

Introduction

Representative data for examining the prevalence of obesity and secular trends in childhood obesity have been collected over the past three decades in many industrialized countries. *Bundred et al. (2001)* studied children of U.K. and observed the prevalence of overweight as 14.7% in 1989 and 23.6% in 1998 while that of obesity increased from 5.4% to 9.2% during this period. Between 1975 and 1995, the prevalence of overweight rose from 10.0% to 16.3% in German boys and from 11.7% to 20.7% in German girls (*Kromeyer-Hauschild et al., 1999*). Among US children and adolescents, the prevalence of overweight, including obesity, has increased from 15.4% in 1971-1974 to 25.6% in 1988-1994 (*Ogden et al., 2002*). In Canada, in 1981, only 11% of boys and 13% of girls were overweight and obese according to IOTF reference while by 1996 these figures reached 33% and 27% for boys and girls, respectively (*Tremblay et al., 2002*).

Data from Brazil and Chile are good examples to show that the rate of increase of obesity among some developing countries is similar or even faster than that in the USA. In Brazil, the prevalence of overweight, including obesity, tripled between 1970's and the late 1990's, increasing from 4.1% to 13.9% among children and adolescents aged 6-18 years (*Wang et al., 2002*). In Japan, between 1974 and 1995, the prevalence of overweight, including obesity, doubled, rising from 5.5% to 10.8% (*Kotani et al., 1997*). Among urban children in China within six-year period between 1991 and 1997, the prevalence of overweight and obesity increased from 7.7% to 12.4% (*Wang et al., 2002*). In Thailand (*Mo-Suwan et al., 1993*), the obesity prevalence increased from 12.2% to 15.6% in two-year period. Only limited data are available on change in prevalence of overweight and obesity with time from Indian subcontinent. *Subramanyam et al. (2003)* reported no significant change in the prevalence rate of obesity in 17-year span among Chennai

girls of India. *Saha et al.* (2004) studied Bengalee boys and observed that the prevalence of overweight remained unchanged and obesity has emerged (1.6%) in the later survey (1999-2001) whereas in the baseline survey (1982-1983) it did not occur. There is an urgent need to know the burden of this problem in Punjab, because Punjab is an economically advanced and physically robust state of the country. The children from affluent families in Punjab have a greater risk of overweight and obesity, as their affluence is the result of the fast rate of socio-economic development in the last 50 years. During this period, the fast-developing economy of Punjab with an agricultural base transformed the whole of India from a food-deficient to grain-surplus nation (*Gill, 2004*). Simultaneously, the Punjabi society witnessed a White revolution in addition to the Green one. This resulted in higher *per capita* availability of milk and milk-products. Due to the improved economic conditions and availability of nutritious food-products, the living conditions and nutritional status of the Punjabi population experienced a tremendous upward transformation (*PSCST, 2005*). In this prevailing transitional situation of the state, it appears that there exists an ample opportunity to pursue subsequent studies on assessment of overweight and obesity among Punjabi children in relation to secular factors. Therefore, in the present study, an attempt has been made to study the change in percentage prevalence of obesity among affluent school girls of Punjab in the last seven years.

Materials and Methods

The data sets come from two cross-sectional surveys carried out during the year 1996-1997 (baseline survey) and the other during 2003-2004 (latest survey). All

participants of the two surveys were Punjabi and sampled from Public Schools catering to the affluent population of Amritsar and Kapurthala cities of the Punjab. In the baseline survey, data have been collected from 677 girls and in the latest survey data have been collected from 727 girls ranging in age from 6-15 years. All girls were apparently healthy and were free from any treatment. The exact date of birth was collected from each subject with great care either from the concerned school registers or from the birth records. Height and weight measurements were taken on each subject using standard protocol (*Weiner and Lourie, 1969*). Overweight was denoted by body mass index (BMI). International criteria for BMI (*Cole et al., 2000*) were used to classify children as overweight and obese in both the surveys. The data were arranged into 10 age groups, each of one-year duration starting from 6.00 to 6.99 years up to 15.00 to 15.99 years. Informed written consent was obtained from the children's parents and individual school principals. The first study done during the year 1996-1997 constituted the group-I while that conducted during the year 2003-2004 was designated as group-II.

Results

There were 677 girls in group-I (1996-1997) and 727 girls in group-II (2003-2004) between the age 6 and 15 years (Table 1). In girls of group-I, the percentage prevalence of overweight and obesity was 10.49% and 4.87% whereas in girls of group-II was 13.48% and 6.33%, respectively. In girls of group-I, overweight prevalence varied between 4.89% and 13.23% whereas in girls of group-II the prevalence range has been from 6.00% to 17.77%. On the other hand, obesity in girls of group-I ranged between 3.23% to 6.12%

and in girls of group-II, the range of obesity has been from 4.00% to 9.37%.

Table 1. Number and percentage prevalence of overweight and obesity in girls of group-I (1996-1997) and group-II (2003-2004)

Age groups (years)	Total number of subjects		%age prevalence of overweight		Change in prevalence	%age prevalence of obesity		Change in prevalence
	Group		Group			Group		
	I	II	I	II		I	II	
6	80	95	8.75 (7)	11.57 (11)	2.82	5.00 (4)	7.36 (7)	2.36
7	60	80	10.00 (6)	12.50 (10)	2.50	5.00 (3)	6.25 (5)	1.25
8	75	88	10.66 (8)	13.63 (12)	2.97	4.70 (4)	5.68 (6)	0.98
9	70	75	11.43 (8)	14.66 (11)	3.23	4.34 (4)	5.33 (4)	0.99
10	84	82	11.90 (10)	15.85 (13)	3.95	4.00 (3)	4.87 (4)	0.87
11	71	90	12.68 (9)	17.77 (18)	5.09	5.63 (4)	6.66 (6)	1.03
12	68	64	13.23 (9)	15.62 (10)	2.39	5.88 (4)	9.37 (6)	3.49
13	41	57	12.25 (6)	14.03 (8)	1.78	6.12 (3)	7.01 (4)	0.89
14	58	46	8.62 (5)	8.69 (4)	0.07	3.45 (2)	4.34 (2)	0.89
15	62	50	4.84 (3)	6.00 (3)	1.16	3.23 (2)	4.00 (2)	0.77
Total	677	727	10.49 (71)	13.48 (98)	2.99	4.87 (33)	6.33 (46)	1.46

Age-specific changes in the percentage prevalence of overweight and obesity were also apparent from Table 1. This table shows that there was an increase in the prevalence of overweight with age in both the groups i.e. up to 12 years in girls of group-I and up to 11 years in girls of group-II. Afterwards there was a trend of decrease in the percentage prevalence of overweight in both the groups. However, the prevalence of obesity decreases with age i.e. up to 10 years in both the groups. Then again there was an increase in the percentage prevalence of obesity up to 13 years in girls of group-I and up to 12 years

in girls of group-II. However, after that there was again a trend of decrease up to 15 years.

Discussion

In girls aged 6-15 years, in Punjab, a state in rapid epidemiological transition, the prevalence of overweight and obesity has increased by 2.99% and 1.45%, respectively, in seven-years period. The overall prevalence of overweight and obesity was higher among girls of group-II than the girls of group-I. It appears that overall improvement in the standard of living of the Punjabi people for the last one

decade may be held as one of the primary factors responsible for the positive trends of obesity in school girls of Punjab. But the difference in the prevalence of overweight/obesity between the two groups was statistically non-significant in total sample and among all age groups, or in other words the present results do not show a significant change in the percentage prevalence of overweight and obesity in a 7-year time span. This was perhaps due to smallness of the sample size or due to short time span between the two surveys.

The changes in the percentage prevalence with time have been reported from various countries. In most countries where trends data were available, childhood obesity has increased with time (*Lobstein et al., 2004*). In some countries, this has been very rapid while, in other countries, it has occurred at a much slower pace. For example, among Australian children and adolescents aged 2-18 years, the prevalence of overweight and obesity nearly doubled in 10 years (1985-1995) from 12% to over 20% (*Magarey et al., 2001*). In China, among urban boys, the prevalence of overweight indicates an increase from 9% to 10% between 1991 and 1993 (*Moreno et al., 2001*). In Japan, between 1974 and 1995, the prevalence of overweight, including obesity, doubled rising from 5.5% to 10.8%. But in some countries, like China (*Wang et al., 2002*), Czech Republic (*Bláha and Vignerova, 2002*) and Hongkong (*Chu et al., 2001*), the prevalence has increased in the 1990's, although the increase was not as dramatic as in the developed countries.

References

Bláha, P. and Vignerova, J. 2002. Investigation of the growth of Czech children and adolescents. Prague: National Institute of Public Health.

Subramanyam et al. (2003) and *Saha et al. (2004)* studied Indian girls (Chennai) and boys (Bengalee), respectively, and also observed no significant change in the percentage prevalence of overweight in a 17-year time span.

The study also shows a steady increase in the prevalence of overweight with age. The range of age-specific prevalence of overweight/obesity has increased in the later survey in comparison to the baseline survey. Maximum change in percentage prevalence of overweight and obesity was observed at age 11 and 12 years, respectively. This increase at age group 11 and 12 might be associated with the increase in adipose tissue and body fat during the pubertal growth spurt.

Conclusions

This is perhaps the first study on school girls of affluent families of Punjab that reports the change in prevalence of overweight and obesity with time. This study has revealed that the overall prevalence of overweight and obesity has increased by 2.99% and 1.45%, respectively, in seven-year time span. However, this difference in the prevalence of this problem in two surveys was not statistically significant. This study also shows a steady increase in the prevalence of overweight with age. Maximum change in the percentage prevalence of overweight and obesity was observed at age 11 and 12 years that might be associated with the pubertal growth spurt.

Bundred, P., Kitchiner, D. and Buchan, I. 2001. Prevalence of overweight and obese children between 1989 and 1998; population based series of cross-sectional studies. *British Medical Journal*, **10**: 326-328.

Chu, N.F. 2001. Prevalence and trends of obesity among school children in Taiwan — The Taipei children

- heart study. *International Journal of Obesity Related Metabolic Disorders*, **25**: 170-176.
- Cole, J.J., Bellizzi, M.C., Flegal, K.M. and Dietz, W.H. 2000. Establishing a standard definition for child overweight and obesity worldwide. International survey. *British Medical Journal*, **320**: 1240-1243.
- Gill, S.S. 2004. Socio-economic transition and Scheduled Castes in Punjab. In: *Dalits in Regional Context*. Ed: Puri, H.L. Jaipur: Rawat Publications, pp. 225-257.
- Kotani, K., Nishida, M., Yamashita, S., Funahashi, T., Fujioka, S., Tokunaga, K., Ishikawa, K., Tarui, S. and Matsuzawa, Y. 1997. Two decades of annual medical examination in Japanese obese children: Do obese children grow into obese adults. *International Journal of Obesity-Related Metabolic Disorders*, **19**: 423-430.
- Kromeyer-Hauschild, K., Zellner, K., Jaeger, U. and Hoyer, H. 1999. Prevalence of overweight and obesity among school children in Jena (Germany). *International Journal of Obesity*, **23**: 1143-1150.
- Lobstein, T., Baur, L. and Uauy, R. 2004. Obesity in children and young people: a crisis in public health. Report to the WHO. London: IASO International Obesity Task Force.
- Magarey, A., Daniels, L. and Boulton, T. 2001. Prevalence of overweight and obesity in Australian children and adolescents: reassessment of 1985 and 1995 data against new standard international definitions. *Medical Journal of Australia*, **174**: 561-564.
- Moreno, L.A., Fleta, I., Sarria, A., Rodriguez, G. and Bueno, M. 2001. Secular increase in body fat percentage in male children of Zaragoza, Spain, 1980-1985. *Preventive Medicine*, **33**: 357-363.
- Mo-Suwan, L., Tongkumchum, P. and Puetpaiboon, A. 1998. Determinants of overweight tracking from childhood to adolescence: a 5-year follow-up study based on the Boyd orr cohort. *American Journal of Clinical Nutrition*, **67**: 1111-1118.
- Ogden, C.L., Flegal, K.M., Carroll, M.D. and Johnson, C.L. 2002. Prevalence and trends in overweight among US children and adolescents, 1999-2000. *Journal of American Medical Association*, **56**: 200-204.
- PSCST (Punjab State Council of Science and Technology) 2005. State of environment, Punjab. Report of the Punjab State Council for Science and Technology, Chandigarh.
- Saha, R., Sinha, M. and Dasgupta, R. 2004. Nutritional status and level of subcutaneous fatness among the Bengalee boys 7-16 years: secular trends over two decades. In: *Proceedings of the National Seminar on Recent Advances in Human Biology*. Ed: Daschadhuri, A.B. Kolkata, Calcutta University Press, pp. 27-45.
- Subramanyam, V., Jayashree, R. and Raff, M. 2003. Prevalence of overweight in affluent adolescent girls in Chennai in 1981 and 1998. *Indian Pediatrics*, **40**: 332-338.
- Tremblay, M.S., Katzmarzyk, P.T. and Williams, J.D. 2002. Temporal trends in overweight and obesity in Canada, 1981-1996. *International Journal of Obesity*, **26**: 538-543.
- Wang, Y., Monteiro, C. and Popkin, B.M. 2002. Trend of obesity in older children and adolescents in the United States, Brazil, China and Russia. *American Journal of Clinical Nutrition*, **75**: 971-977.
- Weiner, J.S. and Lourie, J.A. (1969). *Human Biology: A Guide to Field Methods*. Oxford: Blackwell Scientific Publications.