

Original Research Article

Socio-demographic correlates and prevalence of obesity among school children in Amritsar district, Punjab, India

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ABSTRACT

Background: Obesity, a key risk factor for the non-communicable diseases has become a serious health concern in developing nations. Present study aims at estimating the burden of overweight, obesity and socio-demographic correlates of obesity among school going children of Amritsar, Punjab, India.

Methods: Estimate sample of 900 subjects were selected in the age group of 6 to 15 yrs. Nine schools (four rural and five urban) were taken at random in Amritsar district. The cross-sectional study was carried out in all the schools. Probability proportionate to size of population technique was used to decide the number of children to be studied from each school, class and then section. Systematic random sampling technique was used to select the children from each section. Pre-designed and pre-tested questionnaire was used to elicit the information on the subjects. Overweight and obesity was assessed by BMI for age. Appropriate statistical techniques were applied for analysis of data.

Results: Above study showed that prevalence of overweight and obesity was 10.22% and 6.88% respectively. Among males 48 (52.2%) and 43 (69.4%) were overweight and obese, while females were 44 (47.8%) and 19 (30.6%) overweight and obese respectively. In socio demographic factors sex, residence, type of family, socioeconomic status was identified as significant risk factors.

Conclusions: The study highlights the high burden of obesity in study population and the need for promoting healthy lifestyle changes focused on combating obesity.

Keywords: Childhood, Overweight, Obesity, Cross sectional study

INTRODUCTION

Obesity can be seen as the first wave of a defined cluster of non-communicable diseases called new world syndrome” creating an enormous socioeconomic and public health burden in poorer countries.¹

In ancient days, weight gain and fat storage were viewed as a sign of health and prosperity. Today, however, as a

standard of living continues to rise, weight gain and obesity are posing a growing threat to health in all countries over the world.²

Non-communicable diseases are the leading cause of death in the world and are responsible for 63% of the 57 million deaths that occurred in 2008. Globally, the leading risk factors for mortality in non-communicable diseases are raised blood pressure (responsible for 13% of

deaths globally), followed by tobacco use (9%), raised blood glucose (6%), physical inactivity (6%), and obesity (5%).³

Obesity, a key risk factor for the chronic and non-communicable diseases, has become a serious public health concern in both developed and developing countries.⁴

Increasing rates of overweight and obesity have reached epidemic proportions in developed countries and are rapidly increasing in many middle-income and less-developed countries.⁵

The proportion of children in the general population who are overweight and obese has doubled over the past two decades in developed and developing countries including India.⁶

The fundamental cause of obesity and overweight is an energy imbalance between calories consumed and calories expended. Globally, there has been an increased intake of energy-dense foods that are high in fat, salt and sugars and a decrease in physical activity due to the increasingly sedentary nature of many forms of work, changing modes of transportation, and increasing urbanization. Changes in dietary and physical activity patterns are often the result of environmental and societal changes associated with development and lack of supportive policies in sectors such as health, agriculture, transport, urban planning, environment, food processing, distribution, marketing and education.⁷

At least 30% of obesity begins in childhood. Obese children will continue as obese adults and fall into risk group of diabetes, hypertension, coronary heart disease and many more obesity related diseases. Complications of adult obesity are made worse if the obesity begins in childhood. Obesity is harder to treat in adults than in children. Effective prevention of adult obesity will require the prevention and management of childhood obesity.⁸

Obesity is associated with social stigma among children. Overweight children are teased at school which reduces their self - confidence. It is observed that their quality of life is improved with loss of weight.⁹

Present study aims at estimating the burden of overweight, obesity and socio-demographic correlates of obesity among school going children of Amritsar, Punjab, India.

METHODS

Study design and setting

This was a cross-sectional study done in 9 schools (5 in urban, 4 in rural areas) selected by simple random sampling.

Sample size and sampling design

The prevalence of obesity in India is approximately 10% as per available literature. The minimum size of the sample required for the study was calculated as per the following formulae:

$$n=4pq/L^2$$

Where, n=sample size, p=positive attribute, q=1-p, L=allowable error.

$$p=10\%=0.1$$

$$q=(1-p)=1-0.1=0.9$$

$$L=20\% \text{ of } p=20\% \text{ of } 0.1 = 0.1 \times 20=0.02$$

$$\text{So, } n=\frac{4 \times (0.1) \times (0.9)}{(0.02)^2} =900$$

The computed sample size by applying the above formula comes out to be 900. Hence 900 subjects were studied.

Sampling technique

The study among the school children was conducted by multistage sampling technique. Students from class 1 to 10 were selected and from each class, 10 students were selected by systematic sampling.

Inclusion criteria

Inclusion criteria were children in age group of 6 to 15 years and children who were co-operative and willing to participate.

Exclusion criteria

Exclusion criteria were children who did not co-operated and children who were suffering from chronic disease.

Study questionnaire

A pre-designed and pre-tested questionnaire was used to interview the study participants to elicit the information on family characteristics like residence, type of school, religion, type of family, education and occupation of parents; and information on individual characteristics like age, sex. Anthropometric measurements were taken and noted. The questionnaire was pre-tested on nine students each from nine schools selected purposively out of 9 schools included in the study. Necessary modifications were made in the questionnaire before the start of study.

Data collection

Consent of school authorities was obtained after explaining the objectives as well as the method of study. Data were collected from January 2014 to December

2014. Body weight was measured (to the nearest 0.5 kg) with the subject standing motionless on the weighing scale with feet 15 cm apart, and weight equally distributed on each leg. Height was measured (to the nearest 0.5 cm) with the subject standing in an erect position against a vertical scale of portable stadiometer and with the head positioned so that the top of the external auditory meatus was in level with the inferior margin of the bony orbit. Body mass index (BMI) was calculated as weight in kilograms / (height in meter). Overweight and obesity was assessed by BMI for age. Student who had BMI for age >85th and <95th percentile of reference population was classified as overweight. Students who had BMI for age >95th percentile of reference population were classified as obese.

Statistical analysis

Data were analyzed using SPSS (SPSS for windows, version 12.0.1.2001. SPSS Inc.). Prevalence of

overweight and obesity is presented as percentage. Odds ratio (OR) and 95 per cent confidence interval (95%CI) was calculated for each categorical risk factor. Multiple logistic regression was performed with overweight and obesity together as dependent variable with dichotomous outcome and with age, sex, residence, religion, type of school, type of family, education level of parents, occupation of parents as the independent variables. P<0.05 was considered as statistically significant.

RESULTS

Depicts that among the 900 study subjects, 92 (10.2%) are overweight and 62 (6.9%) are obese. Most number of normal subjects were in 9 to 11 years age group i.e. 172 (87.3%). Most number of overweight subjects are in the age group of 11 to 13 years i.e. 26 (11.9%). Most number of obese subjects are in age group of 7 to 9 years i.e. 15 (9.4%). There by also showing that more number of subjects are obese in adolescent age group (Table 1).

Table 1: Distribution of study subjects according to age, overweight and obesity.

| Age (in years) | Normal (%) | Overweight (%) | Obese (%) | Total (%) |
|----------------|--------------------|-------------------|------------------|---------------------|
| 5-7 | 80 (86) (10.7) | 5 (5.4) (5.4) | 8 (8.6) (12.9) | 93 (100.0) (10.3) |
| 7-9 | 126 (79.2) (16.9) | 18 (11.3) (19.6) | 15 (9.4) (24.2) | 159 (100.0) (17.7) |
| 9-11 | 172 (87.3) (23.1) | 16 (8.1) (17.4) | 9 (4.6) (14.5) | 197 (100.0) (21.9) |
| 11-13 | 174 (79.5) (23.3) | 26 (11.9) (28.3) | 19 (8.7) (30.6) | 219 (100.0) (24.3) |
| 13-15 | 194 (83.6) (26) | 27 (11.6) (29.3) | 11 (4.7) (17.7) | 232 (100.0) (25.8) |
| Total | 746 (82.9) (100.0) | 92 (10.2) (100.0) | 62 (6.9) (100.0) | 900 (100.0) (100.0) |

Table 2: Risk of overweight or obesity.

| Variable | Total no | Overweight or obesity | Normal | OR (95% CI) | P value |
|------------------------------|------------|-----------------------|------------|---------------|---------|
| | N (%) | N (%) | N (%) | | |
| Overall | 900 (100) | 154 (17.1) | 746 (82.9) | | |
| Sex | | | | | |
| Males | 444 (49.3) | 91 (20.5) | 353 (79.3) | 1.608 | 0.008 |
| Females | 456 (50.7) | 63 (13.8) | 393 (86.2) | (1.131-2.286) | |
| Residence | | | | | |
| Rural | 400 (44.4) | 48 (12.0) | 352 (88.0) | 0.507 | 0.000 |
| Urban | 500 (55.6) | 106 (21.2) | 394 (78.8) | (0.350-0.734) | |
| Type of family | | | | | |
| Joint | 427 (47.4) | 89 (20.8) | 338 (79.2) | 1.653 | 0.005 |
| Nuclear | 473 (52.6) | 65 (13.7) | 408 (86.3) | (1.164-2.347) | |
| Socio economic status | | | | | |
| Upper | 525 (58.3) | 123 (23.4) | 402 (76.6) | 3.395 | 0.000 |
| Lower | 375 (41.7) | 31 (8.3) | 344 (91.7) | | |
| Primary care giver | | | | | |
| Mother | 805 (89.4) | 138 (17.1) | 667 (82.9) | 1.022 | 0.941 |
| Grandmother or other | 95 (10.6) | 16 (16.8) | 79 (83.2) | (0.579-1.802) | |
| Occupation of mother | | | | | |
| Income generating | 194 (21.6) | 28 (14.4) | 166 (85.6) | 0.776 | 0.263 |
| Housewife | 706 (78.4) | 126 (17.8) | 580 (82.2) | (0.498-1.211) | |

On univariate analysis, the risk of overweight/obesity was significantly higher among male children i.e. 91 (20.5%) as compared to females i.e. 63 (13.8%) (OR: 1.608, CI: 1.131-2.286, $p=0.008$), children residing in urban area i.e. 106 (21.2%) as compared to children in residing in rural area i.e. 48 (12.0%) (OR=0.507, CI =0.350-0.734,

$p=0.000$), children belonging to joint family i.e. 89 (20.8%) as compared to children in nuclear family i.e. 65 (13.7%) (OR=1.653, CI=1.164-2.347, $p=0.005$) and children from high socio economic status i.e. 123 (23.4%) as compared to children from low socio economic status i.e. 31 (8.3%) (OR=3.395, CI=2.232-5.164, $p=0.000$) (Table 2).

Table 3: Multivariate logistic regression of socio-demographic factors.

| Parameter | BMI | | Crude OR (CI) | P value | Adj. OR (CI) | P value |
|-----------------------|--------------------|------------|------------------------|---------|------------------------|---------|
| | Overweight/obesity | Normal | | | | |
| Area | Rural (400) | 48 (12.0) | 0.507 (0.350-0.734) | 0.000 | 0.778 (.518-1.169) | 0.226 |
| | Urban (500) | 106 (21.2) | | | | |
| Sex | Males (444) | 91 (20.5) | 1.608 (1.164-2.347) | 0.008 | 1.763 (1.228-2.530) | 0.002 |
| | Females (456) | 63 (13.8) | | | | |
| Socio economic status | Upper (525) | 123 (23.4) | 3.395 (2.232-5.164) | 0.000 | 3.015 (1.899-4.787) | 0.000 |
| | Lower (375) | 31 (8.3) | | | | |
| Type of family | Joint (427) | 89 (20.8) | 1.653 (1.164-2.347) | 0.005 | 1.251 (0.863-1.814) | 0.237 |
| | Nuclear (473) | 65 (13.7) | | | | |

On multivariate analysis sex and socio-economic status had positive effect on obesity. These were related as follows sex (Adj. OR: 1.763, CI: 1.228-2.530, $p=0.002$) and socio economic status (Adj. OR: 3.015, CI: 1.899-4.787, $p=0.000$) were found to be significantly associated with obesity (Table 3).

DISCUSSION

Present study depicts that among the subjects, 92 (10.2%) are overweight and 62 (6.9%) are obese. Most number of normal subjects were in 9 to 11 year's age group i.e. 172 (87.3%). Most number of overweight subjects are in the age group of 11 to 13 years i.e. 26 (11.9%). Most number of obese subjects are in age group of 7 to 9 years i.e. 15 (9.4%) (Table 1).

The result of present study is in consonance with Mysore childhood obesity study it showed that in the ages of 5 to 16 years overweight and obesity is present among the children of all ages.¹⁰

Overweight and obesity was higher in males i.e. 91 (20.5%) as compared to females i.e. 63 (13.8%). The difference was statistically significant. (OR: 1.608, CI: 1.131-2.286, $p=0.008$) (Table 2).

Similar study done in Ujjain also showed males were more likely to be obese as compared to females i.e. 28 (46.7%) and 34 (43.6%). But association was not significant in this study.¹¹

Another study done in Latur city also showed that obesity was grater in males as compared to females but association was significant.¹²

It appears that overweight and obese are less in rural i.e. 48 (12.0%) as compared to the subjects in urban area i.e. 106 (21.2%). This difference was statistically highly significant. (OR=0.507, CI=0.350-0.734, $p=0.000$) (Table 2).

Children living in the urban area of lahore with high socioeconomic status (SES) were significantly at risk for being overweight and obese (both $p<0.001$) as compared to children living in the rural area with lower SES.¹³

Similar results were supported by study done in wardha city, it showed 12 (1.8%) to be overweight/obese out of 671 in rural residence while 99 (5.3%) to be overweight/obese out of 1884 in urban residence (OR: 3.046, CI: 1.662-5.582, $p=0.001$).¹⁴

The findings of current study show's significant association of high overweight and obesity was seen in subjects of joint family as compared to subject of nuclear family i.e. 89 (20.8%) and 65 (13.7%) (OR=1.653, CI=1.164-2.347, $p=0.005$) (Table 2).

Similar results were seen in Lucknow study overweight and obese were higher in joint as compared to nuclear family i.e. 14 (7%) & 6 (2.89%) respectively (OR: 0.40 CI: 0.13-1.13 $p=0.06$).¹⁵

Above result were supported by study done in Wardha it showed overweight and obese 43 (5.2%) in joint family and 68 (3.9%) in nuclear family (OR: 1.334: CI: 0.902 - 1.927 $p=0.149$).¹⁴

In present study it was found overweight and obese subjects were higher in upper socio economic status i.e. 123 (23.4%) as matched to subjects of lower socio economic status i.e. 31 (8.3%). The association is

significant (OR=3.395, CI=2.232-5.164, p=0.000) (Table 2).

A similar study done in Delhi showed that subjects belonging to high income group 2 (5.3%) and 1 (1.5%) were overweight and obese out of 67 while only 1 (0.5%) and 0 (0%) were overweight and obese in low income group out of 212. P value being highly significant (p<0.001).¹⁶

Above results were also supported by a study done in Latur it showed that subjects with higher socio economic status were more obese as compared to low socio economic status i.e. 11(1.55%) and 6 (0.62%) ($\chi^2=39.00$, p<0.000).¹²

It appears that overweight and obesity was more in subjects where mother is primary care giver i.e. 138 (17.1%) as related to grandmother or other i.e. 16 (16.8%). The difference is statically not significant (OR=1.022, CI=0.579-1.802, p=0.941) (Table 2).

In recent study overweight and obesity was lesser in subjects of income generating mothers i.e. 28 (14.4%) as matched to subjects of housewife i.e. 126 (17.8%). The difference is statistically insignificant. (OR=0.776, CI=0.498-1.211, p=0.263) (Table 2).

These results were in consonance with study done in Kerala it showed overweight and obese subjects were more in housewife's mothers i.e. 13 and 7 as compared to income generating mothers 3 and 5.¹⁷

CONCLUSION

To conclude we can say that overweight and obesity are very much prevalent among children of Amritsar. Overweight and obesity is prevalent in both the sexes but according to our study males are more predisposed to obesity as compared to females. As age advances prevalence of overweight and obesity also increases. Various socio-demographic factors like residence, living in joint family, socio economic status, primary care giver and occupation of mother higher prevalence of overweight and obesity. BMI is a very simple and effective method to screen overweight and obesity so that appropriate measures could be taken to prevent the progression of the disease. Awareness about overweight and obesity should be transmitted to the rural as well as urban areas so they could keep them healthy in their life.

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