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Prevalence of Obesity Among Female Children of Amritsar in Punjab with Convenient Indicators

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INTRODUCTION

In the present time, the most important medical and public health hazard is obesity. Obesity indicates excess adipose tissue frequently resulting in a significant impairment of health (Burton et al., 1985; Lean, 2000). In the case of children there has been little agreement over either the criterion measure or the cutoff point for classification of obesity. The WHO (1997) recommends the use of appropriate weight-for-height in children based on the NCHS growth standard.

Obesity is now widely prevalent in several developing countries and is affecting both children and adults. However, in India the problem of obesity has been scantily explored even in the affluent population groups (Asthana et al., 1998). The risk of overweight in adulthood is greater with high degrees of overweight in childhood which has also been linked to subsequent morbidity and mortality in adulthood (Dipietro et al., 1994; Guo et al., 1994; Nieto et al., 1992). Therefore, accurate screening of obesity in children and adolescents is particularly important to generate the prevalence of obesity rate and treatment programms. The present study has an attempt to assess the prevalence of obesity among the female children of Amritsar district in Punjab.

MATERIALS AND METHODS

The data on 500 Punjabi female children aged 6-11 years who were attending high fee paying public schools preferred by the well of sections of Amritsar district in Punjab. A two-stage stratified probability sampling frame was implemented. The exact data of birth was collected for each subject with great care either from the concerned school registers or from the birth records.

Measurements: The data were collected during summer in the year 2000. Height was measured to the nearest millimeter on a portable stadiometer and weight measured to the nearest 0.1 kg on a calibrated beam balance scale with minimum clothes adjustment. Triceps skinfolds were measured to the nearest 0.2 mm using skinfold caliper following the general procedure as given by Weiner and Lourie (1981).

Three common adiposity indicators like relative weight, body mass index (BMI) and relative BMI were calculated from the measures of height and weight. Triceps skinfold also used as a fourth adiposity indicator. The National Centre for Health Statistics percentiles (Hamill et al., 1979) were used for the calculations of relative weight and relative BMI. Relative weight was calculated for height and age with reference to gender at the 50^{th} percentile as: (Subject Weight/ Expected weight) x 100.

BMI was calculated as weight (kg) divided by height (m^2). Relative BMI was obtained as: (Actual BMI/ BMI_{50} x 100) where BMI_{50} is BMI at the 50^{th} percentile of height and weight for the same age and gender (Must et al., 1991; Poskitt, 1987).

Obesity Classification: The four adiposity indicators (relative weight, BMI, relative BMI and triceps skinfold) has commonly considered for obesity classification. Subjects with a BMI ≥ 95th percentile for age and sex were considered as obese (Must et al., 1991). A value of ≥ 120% represented obesity for both relative weight and relative BMI (Bray, 1987 ; Poskitt, 1987). A triceps skinfold value ≥ 90th percentile for age and sex was defined as obese (Dietz, 1983).

Analyses: The diagnostic utilities of all four adiposity indicators with new accepted obesity cutoff points were examined. These included sensitivity (Proportion of truly obese subjects detected by the indicators), specificity (proportion of truly nonobese subjects), overall accuracy (proportion of correct classifications in the sample), positive predictive value and negative predictive value.

RESULTS

A description of the age, distribution of the

Table 1: Means and Standard deviations for available measurements of overall size by age.

Age (years)	*N*	*Height (cm)*	*SD*	*Weight (kg)*	*SD*	*BMI (kg/m²)*	*SD*	*Relative weight (%)*	*SD*	*Relative BMI(%)*	*SD*	*Triceps skinfold (mm)*	*SD*	*Upper arm Circum-ference (cm)*	*SD*
6	72	108.84	5.42	17.28	2.22	14.59	1.31	85.86	11.67	97.74	8.78	8.83	2.60	14.50	1.94
7	67	125.50	5.60	23.90	3.36	15.22	1.68	103.67	14.57	99.32	11.71	9.67	3.17	17.33	2.09
8	76	129.02	8.28	27.88	6.24	16.87	3.06	108.49	24.67	106.86	19.23	13.97	4.64	19.07	2.98
9	92	131.53	9.07	30.91	7.23	17.84	3.46	103.75	24.32	107.65	24.51	14.30	4.69	19.31	2.61
10	90	142.16	8.79	38.16	7.44	17.83	3.45	112.13	22.82	109.41	20.18	14.79	4.44	20.57	3.20
11	103	147.47	7.27	40.06	9.61	18.34	3.30	104.44	23.36	103.79	18.49	15.14	5.17	20.71	3.24

sample and the summary of all measurements taken is given in table 1. The proportion of the female children within the age group 6 to 11 years classified as obese by the indicators varied from 5% (triceps skinfold) to 21.6% (relative weight) (Table 2).

Table 2: Frequencies and percentage of sample classified as obese by the obesity indicators

Indicator	*N*	*Percentage*
Body Mass Index (BMI)	49	9.80
Relative BMI	84	16.80
Relative weight	108	21.60
Triceps skinfold	25	5.00

Comparison of the four convenient indicators for obesity classification showed a significant variability (Table 3). However, the negative predictive value (NPV, the probability of a subject who has been measured as nonobese is truly nonobese) for all indicators are much higher than positive predictive value (PPV, the probability that a subject who has been measured as obese is truly obese). In general, all the indicators were more sensitive when used with females (Marshall et al., 1991). The most sensitive indicator in the present study among female children was relative weight followed by relative BMI, BMI and triceps (sensitivity : 61.36%, 59.57%, 42.36% and 31.64% respectively). Both relative weight and relative BMI had relatively high positive predictive value (0.352 and 0.282 respectively) and therefore, these two indicators were useful in identifying obesity in female children.

DISCUSSION

The results suggested that the obesity prevalence rates among punjabi female children vary between 5% to 23%. It was also evident from the results that the relative weight and relative BMI were the most sensitive and reliable indicator for obesity classification among females, which also strengthened the previous findings (Al-Nuaim et al., 1996; Bray, 1987; Dietz, 1983; Gallangher et al., 1996; Himes and Dietz, 1994; Mashall et al., 1990, 1991 and Obarzanek, 1993).

It is interesting to note that among the criterion measures used in the present study, triceps skinfold was the most sensitive indicator for identifying true obesity in females due to high specificity (88.63%, proportion of truly non-obese subjects detected) and high accuracy (89.2%, proportion correct classification in sample). Therefore, triceps skinfold is useful for identifying female candidate for treatment programme and health planning. Whereas, screening of health fitness perspective, relative weight and relative

Table 3: Diagnostic utilities of four obesity indicators with new cutoff points.

Indicator	*New Cutoff*	*Obesity*		*Sensitivity (%)*	*Specificity (%)*	*Accuracy (%)*	*PPV*	*NPV*
		N	*%*					
Relative Weight	≥ 120%	108	21.60	61.36	82.65	86.4	0.352	0.648
Relative BMI	≥ 125%	84	16.80	59.57	86.30	88.6	0.282	0.718
BMI	≥ 95th percentile	49	9.80	42.36	85.81	87.2	0.226	0.774
Triceps Skinfold	≥ 90th percentile	25	5.0	31.64	88.63	89.2	0.158	0.842

BMI appeared to be better indicators with high sensitivity (61.36% and 59.57% respectively, probability that a female identified as obese will be obese). The obesity cutoff point for females in this study would vary between 18.48% and 32.23% (9-10 years old). It appears that the use of single cutoff point cannot be justified in female. It is suggested that the obesity cutoff point should vary with the different age ranges in female. Therefore, pubertal status should be accounted for classification of obesity cutoff points in females.

KEY WORDS Obesty. BMI. Punjabi Children.

ABSTRACT In the present study, an attempt has been made to report the prevalence of obesity among the female children of Amritsar district in Punjab. Data on height, weight and triceps skinfold measurements were collected from 500 school going female children, ranging in age from 6-11 years. Body mass index, relative body mass index, relative weight and triceps skinfold were compared as indicators of obesity.

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