



Prevalence of Overweight, Obesity and Blood Pressure Levels in Adolescent School Children

KEYWORDS

Obesity, Overweight, Socio economic factor

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ABSTRACT Adolescent obesity is becoming a common health problem with increasing prevalence in both developed and developing countries. In the light of this information an attempt has been made in the present study to assess overweight, obesity and blood pressure levels in adolescent school children of rural and urban areas in and around Tirupati, Chittoor District, in Andhra Pradesh. A total of 1032 adolescent school children comprising 611 urban (F=218; M=393) and 421 rural (F=223; M=198). Information on anthropometric measurements, blood pressure levels and demographic profiles were collected from all the participants. Both male and females from urban area shown that the adolescent school children were taller and heavier by possessing significant higher levels of body mass index than to their rural counterparts. Though some fluctuations are observed in waist circumference, hip circumference, triceps SFT, sub scapular SFT, abdominal SFT between rural and urban populations, but none were statistically different. In contrary, urban males and females do possess lower levels of both systolic and diastolic blood pressure than to rural population. In conclusion it is inferred that urban adolescents are characterized by higher levels of overweight and obesity, which warrants attention to correct this menace.

INTRODUCTION

Adolescent obesity is becoming a common health problem with increasing prevalence in both developed and developing countries. Overweight is associated with the onset of major chronic diseases leading to complications and also psychosocial problems in children and adults. The greater concern is that the risks of overweight during childhood will persist into adolescence and adulthood.

Overweight and obesity during childhood is a matter of growing concern in India also. The transition in nutrition and life style by the popularity of fast foods, sedentary life style, and lack of exercise, increased television watching and computer use are the common trends adopted by children today. Prospective studies carried out elsewhere on different population groups have clearly shown that these may be the some of the causes in gaining overweight and obesity in adolescents.

In 1998, World Health Organization recognized obesity as a major health problem¹. According to WHO², the prevalence of obesity is 4.8% in developing countries, 17.1% in transitional countries and 20.4% in developed countries. The causes for the precipitation of overweight and obesity are multifactor including genetic, biological, social, and environmental determinants either collectively or independently affecting weight gain by acting through the mediators of energy metabolism and physical activity³. The rising prevalence of obesity among genetically stable population groups indicates that the social and environmental determinants might have much more significant in understanding the overweight and obesity epidemic⁴. Recent workshop on 'Education for childhood obesity prevention: a life-course approach', coordinated by the Pan-American Health Organization and the Pan-American Health and Education Foundation, held on 14 June 2012 in Aruba, as part of the II Pan-American Conference on Childhood Obesity suggested life course frame work and education as a social determinant of health to address the childhood obesity⁵. Towards this end Indian Council of Medical Research in its taskforce project cautioned to document information on obesity prevalence and its risk factors across the country in view of divorce cultures⁶. In the light of this information the current study was undertaken to assess the prevalence of overweight and obesity and its association

with social and environmental determinants from adolescent school children of Tirupati, Andhra Pradesh, India.

Method

The present investigation is a cross sectional one, to collect and document the information on anthropometric indicators and social & environmental factors for a population of adolescent school children from Tirupati Town of Andhra Pradesh. The study was under taken between June-2011 to April 2012. The study design was approved by the Departmental Ethics Committee of Sri Venkateswara University, Tirupati. Tirupati is one of the largest city in Rayalaseema regions of Andhra Pradesh State, India.

Study Population and Design

Study population consists of school children of both genders between the ages of 12-16 years. A total of 1032 urban and rural adolescent school children in the age group of 12-16 years in Tirupati town and adjacent rural villages. The study used multistage random sampling technique to get representative estimates of the population. The Town consists of 36 Municipal wards. 8 wards were picked, and 2 schools from each ward were randomly selected and children were sampled with probability proportionate to size. In the current study the sample used for the analysis was comprising 611 urban (218 F+ 393 M) and 421 rural (223F+198M) were studied.

Data Collection

A structured schedule was designed with prior validation through pilot study. The questionnaire consisted information on the demographics, education, occupation, socio-economic conditions of the parents. Further children's sleep patterns, physical activity, video watching and eating habits were procured. Information on anthropometry like height, weight, waist circumference, hip circumference and skin fold thickness at biceps, sub scapular and abdomen was obtained as per the standard procedures⁶. Weight was measured in light clothing with no shoes nearest to 10 g. Height was measured when student is shoeless and measurement was taken to the nearest 1 mm. Waist circumference was measured to the nearest 0.1 cm horizontally at the narrowest point between lower end of the rib cage and iliac crest. Hip circumference was measured to the nearest 0.1 cm at the greatest

horizontal circumference below the iliac crest at the level of greater trochanter. The triceps skinfold is measured on the back of the right arm over the triceps muscle, midway between the elbow and the acromion process of the scapula. The sub scapular skinfold is measured at the inferior angle of the right scapula. The abdominal skinfold is measured at a site 3 centimeters to the side of the midpoint of the umbilicus and 1 centimeter below it. All the measurements were taken twice on the subject with a gap of 5 min and the average is taken for the analysis. Body mass index (BMI) was calculated as weight in kg/height in meter square (kgm^{-2}). Overweight and obesity is considered as the 85th and 95th percentiles respectively as specified by WHO⁷, for sex and age specific BMI. Waist hip ratio was obtained as waist circumference/hip circumference. The three skin fold measurements were summed to calculate sum of the skin fold thickness.

Statistical analyses

The data were coded and statistical analysis was carried out through SPSS version 16.0. Alpha levels were set at 0.05 as statistical significant. Continuous variables were provided with descriptive statistics and discontinuous variables with percentages. Chi square test was used to see the differences in the prevalence rates between groups. Students' 't' test was applied to see the difference between genders. One way analysis of variance was used to see the difference in descriptives across the age groups. The effect of socioeconomic and life style measures on the prevalence of overweight and obesity were analyzed by using odds ratios through multinomial logistic regression model after adjusting for age and sex. The variables that have shown significant variation in the prevalence of overweight and obesity are entered in the model.

Results

Descriptive statistics for anthropometric measurements in different age groups for adolescent boys and girls are presented in table 1. Anthropometric measurements like height, weight, body mass index, circumferences of waist and hip, waist hip ratio, skin fold thickness at triceps, sub scapular, abdomen and sum of the skin fold thickness have shown an increasing trend ($p < 0.05$) from 12 yrs to 16 in both boys and girls except waist hip ratio in girls. Gender comparisons in different age groups indicate that girls are dominating boys in accumulating skin fold thickness at different sites. Though girls possess higher hip circumference than boys, the resulting waist hip ratio is significantly higher in boys than girls

($p < 0.05$) except in 16 yrs age group. Girls have shown higher body mass index than boys in 13 and 14 years age groups ($p < 0.05$).

A total of 1032 adolescent school children comprising 611 urban (218 F+ 393 M) and 421 rural (223F+198M) were studied. Both male and females from urban area shown that the adolescent school children were taller and heavier by possessing significant higher levels of body mass index than to their rural counterparts. Though some fluctuations are observed in waist, hip circumference, triceps, sub scapular, abdominal SFT's between rural and urban populations, but none were statistically different. Urban males and females do possess lower levels of both systolic and diastolic blood pressure than rural population.

variable	Urban		Rural	
	Male	Female	Male	Female
Height	149.87± 9.44	148.02± 7.34	146.66± 9.69	146.31± 7.65
Weight	39.70± 9.05	39.80± 8.81	33.31± 7.82	35.42± 8.02
BMI	17.5434± 2.967	18.0805± 3.325	15.3030± 2.141	16.4298± 2.917
WC	58.52± 7.129	56.21± 7.112	54.01± 6.119	54.53± 6.435
HC	72.10± 7.0415	74.13± 8.074	69.37± 6.931	72.89± 7.578
Triceps	4.20± 1.98	5.47± 2.552	6.52± 3.044	7.91± 3.126
Sub scapular	5.04± 2.297	6.34± 2.649	6.09± 2.658	7.91± 3.326
Abdominal	6.59± 3.173	7.47± 2.825	6.14± 3.460	7.92± 3.351
Systolic	111.88± 12.075	108.90± 12.896	107.45± 11.831	110.72± 11.528
Diastolic	63.97± 9.758	63.06± 10.726	67.88± 43.892	66.42± 10.549
Pulse rate	86.96± 47.218	88.34± 12.848	83.28± 11.977	89.27± 13.759

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