Adolescent Obesity and Overweight Prevalence amongst Urban Population of Pakistan

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Authors' contributions

This work was carried out in collaboration among all authors. Authors ZK, MYB and TM designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors ZK, MM and MZ managed the analysis of the study. Authors MS, SM and HS managed the literature searches. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

Background: Adolescent obesity is a worldwide threatening health challenge. Current study was designed to assess the obesity and overweight occurrence in adolescent age groups of 12-18 years pertaining to high and low income groups of the city of Quetta Pakistan.

Methods and Results: A total of 2000 school children were investigated and classified into 1088 High Income Category (HIC) and 912 Low Income Category (LIC). Obesity and overweight were reviewed by using Body Mass Index (BMI) and Triceps Skin Fold Thickness (TSFT) specifying age and sex values for adolescents. By using BMI as the core value, occurrence of obesity and overweight remained as 1.3% to 0.5% in LIC respectively. And in HIC the obesity and overweight percentile remained 3.3% and 1.5% respectively (p<0001). While using TSFT criteria, the obesity and overweight occurrence in LIC was 0.4% and 0.4% and in HIC the obesity and overweight assessments were 1.4% and 0.7% respectively (p<0001). Current study presented that obesity and overweight occurrence found higher in HIC compared to LIC adolescent age groups. This

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emphasizing the possibilities based on modified pattern of dietary habits and physical activities with mount in income height.

Conclusions: Socioeconomic condition matters in pattern of obesity and overweight amongst adolescent.

1. INTRODUCTION

Child and adolescent obesity has appeared as a grave health apprehension of community in 21st century. Global adolescent obesity has markedly increased in developed and developing countries as warned by World Health Organization (WHO) [1]. Obesity and overweight is a multidimensional state of pathology [2]. World Health Organization warned that in developed and developing countries, obesity and overweight is one of the highest health risks and must combat. This ratio of obesity among youngsters aging 5-17 years of age is increasing rapidly in developing countries due to changes in life style and eating habits [3]. Evidences reveal that one in five girls and one in three boys of young age are overweight or obese [4]. Overweight or obesity mounts the risk of causing type II diabetes mellitus, sleep disturbances, hypertension and related diseases with depressive quality of life [5]. Most of these adolescents will continue this obesity in their adult life [6]. This nature of overweight and obesity can strict social mobilization and activities leading to ill health and poverty. Worse outcomes in low socioeconomic societies exist with inequalities due to obese behavior [7]. Fundamental reasons of obesity in adolescents can be linked to energy associated behaviors, inactive physical performance, sleep and eating behavior which supplements to an energy disparity [8]. Many developing countries are facing progressive increase in obesity and overweight amongst adolescent [9]. In Southeast Asia country like Pakistan identified to have elevated predominance for undernutrition, a marked number of obese and overweight adolescents now found abreast to under nourished [10]. Very limited research has been accomplished on overweight and obesity amongst adolescents in Pakistani urban population. Current study is conducted in the city of Quetta Pakistan.

2. MATERIALS AND METHODS

This cross sectional study was conducted in city of Quetta and its catchment area. Schools were assessed for children and adolescent obesity and overweight both in private and public sectors. Socioeconomic categories were made for both higher and lower income groups. Low income group schools categorized for Quetta Government schools and private sector schools included in high income group schools.

2.1 Sample Size

The sample size of 1000 for each group was taken with a total of 2000 for both groups included in the study. 95% confidence level and10% relative accuracy envisaged. 1000 children of low income category and 1000 children of high income category included.

2.2 Data Collection Pattern

A questionnaire was made based on socioeconomic grounds, dietary intake, physical activities and anthropometric measurements. Each child was assessed for height, weight and triceps thickness measurement. For height and weight standard BMI was measured. Weight was recorded by electronic weight scale. Height was recorded with an anthropometric board. Triceps fold was measured by using circumference tape. Three readings were noted for all and finally an average was made to be calculated. Physical activity was noted for both socioeconomic groups. A common physical sport or activity list was provided to each child and their performance was noted. These activities included as jogging, walking, playing outdoor, physical exercise and swimming. Metabolic value of each activity was known [11]. Child was asked for hours of play during free time, energy expenditure and later calculation of activity.

2.3 Obesity Assessment

International Obesity Task Force (IOTF) reference classification was used for overweight and obesity inference. The BMI standards in current study were established into free access software introduced by Dr. Tim Cole – LMS Growth software. When envisaging overweight (OW) it is defined as BMI value 85th to 95th percentile for age and sex. While calculating obesity (OB) the BMI is estimated for age and sex is above 95th percentile [12]. The assessment of triceps skin fold was valued with

thickness [13]. Prior study protocol was given to school administration. For estimation of *p* value Pearson correlation analysis was carried out in both socioeconomic categories to estimate obesity and overweight.

3. RESULTS

A total number of 2,000 school children of age group between 09-18 years were studied including 1088 HIC and 912 LIC students. Regarding students dietary habits 17% of LIC had never eaten meat or its products. On consumption of any energy food, only 06% of LIC children had taken any drink while 45% of HIC children had taken any energy drink. On occurrence of obesity and overweight, the age wise calculation of BMI is described in Table 1. This table shows that occurrence of obesity and overweight was 1.3% and 0.5% respectively in Low Income Category children. The High Income Category children had the prevalence of 3.3% and 1.5% respectively ($p<0.001$).

This study manifested that according to the physical activities of HIC children, compared with 45% LIC, was involved in various kinds of sports like football, cricket, jogging or walk. The physical activities and BMI based explanations in this study manifested a negative correlation in the students of LIC (r=−0.021; $p<0.001$) and HIC (r=−0.051; $p<0.001$).

4. DISCUSSION

The current study is a well planned study to find out and assess in detail adolescent obesity and overweight spectrum of children by calculating BMI and TFT in low and high socioeconomic groups. This study, previously conducted in Karachi Pakistan, is for the first time in a lower developed province (Balochistan) of Pakistan. Previous result patterns were found different compare to current one as obesity and overweight were more prominently seen in Karachi. Similar type of result patterns were noted in India too [14]. In another study done in Bangladesh revealed that undernutrition prevalence is very high at the age of 5 years of about 64% [15]. In a study done in Indian Punjab accounted that obesity and overweight occurrence in school adolescent were 14.2 % and 11.1% respectively [16]. The current study shows a high occurrence of obesity and overweight in male adolescents as compared to female school children in both HIC and LIC. This kind of results are well documented in India which manifested that obesity and overweight occurrence is high amongst male as compared to female adolescent (12.4% vs 9.9% obesity, 15.7% vs 12.9% overweight) [16].

While analyzing the connection between the physical activity and BMI amongst adolescent it is noted that when physical activity augmented the BMI get decreased with obesity and overweight reduction [17].

The higher obesity and overweight in HIC in all age groups emphasizes a role of modified physical activities and dietary pattern with enhanced income heights.

Table 1. Division of studying children categorized on socioeconomic grounds for overweight and obesity according to Body Mass Index Criteria IOTF classification

Age (yrs) and Socio-Economic groups	Females			Males			Total			*p* value
	OB	OW	n	OB	OW	n	OB	OW	n	
9-12 yrs										*p<0.001**
LIC	00	01(1.0)	99	01(0.8)	01(0.8)	121	01(0.4)	02(0.9)	220	
HIC	04(3.8)	02(1.9)	104	10(7.1)	03(2.1)	140	14(5.7)	12(4.9)	244	
12-15 yrs										*p<0.001**
LIC	02(1.4)	00	142	02(1.2)	02((1.2)	165	04(1.3)	02(0.6)	307	
HIC	07(2.5)	01(0.3)	277	04(2.7)	01(0.6)	143	11(2.6)	02(0.4)	420	
15-18 yrs										*p<0.001**
LIC	03(1.8)	00	162	04(1.7)	01(0.4)	223	07(1.8)	01(0.2)	385	
HIC	04(2.0)	02(1.0)	192	07(3.0)	01(0.4)	232	11(2.5)	03(0.7)	424	
Total										*p<0.001**
LIC	05(1.2)	01(0.2)	403	07(1.3)	04(0.7)	509	12(1.3)	05(0.5)	912	
HIC	15(2.6)	05(0.8)	573	21(4.0)	05(0.9)	515	36(3.3)	17(1.5)	1088	

*Percentage in parenthesis and * Significance level of confidence at 95%*

Table 2. Division of studying children categorized on socioeconomic grounds for overweight and obesity according to Triceps skin fold thickness Criteria IOTF classification

Age (yrs) and Socio-Economic groups	Females			Males			Total			p value
	OB	OW	n	OB	OW	n	OB	OW	n	
9-12 yrs										p<0.001*
LIC	01(1.0)	00	99	00	01(0.8)	121	01(0.4)	01(0.4)	220	
HIC	02(1.9)	01(0.9)	104	04	02(1.4)	140	06(2.5)	03(1.2)	244	
12-15 yrs										p<0.001*
LIC	00	00	142	01(0.6)	00	165	01(0.3)	00	307	
HIC	02(0.7)	01(0.3)	277	02(1.4)	01(0.7)	143	04(0.9)	02(0.4)	420	
15-18 yrs										p<0.001*
LIC	00	01(0.6)	162	02(0.9)	02(0.9)	223	02(0.5)	03(0.7)	385	
HIC	01(0.5)	01(0.5)	192	05(2.1)	02(0.8)	232	06(1.4)	03(0.7)	424	
Total										p<0.001*
LIC	01(0.2)	01(0.2)	403	03(0.6)	03(0.6)	509	04(0.4)	04(0.4)	912	
HIC	05((0.8)	03(0.5)	573	11(0.9)	05(0.9)	515	16(1.4)	08(0.7)	1088	

Percentage in parenthesis and * Significance level of confidence at 95 %

5. CONCLUSION

This study draws attention to the challenges faced by school children of Pakistan. Alarming expressive increase seen in the number of obese and overweight children even with a steadily high burden of undernutrition. Center of attention is deterrence of overweight and obesity in children must comprise planning for promotion of sports and physical activities. In addition, dietary chart or lessons to the students must be introduced to avoid food induced obesity.

CONSENT

Study consent was taken from all schools administrative authority and parents.

ETHICAL APPROVAL

It is not applicable.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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