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PREVALENCE OF OBESITY AND OVERWEIGHT AMONG PUBLIC SCHOOL-GOING CHILDREN AGED 12 – 15 YEARS IN PESHAWAR, PAKISTAN: A CROSS-SECTIONAL DESCRIPTIVE STUDY

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Abstract

Background: *Childhood overweight and obesity have emerged as critical public health issues globally. According to the World Health Organization (WHO), the worldwide prevalence of overweight has more than doubled since 1980, and projections indicate that over 50% of the global population may be overweight or obese by 2035 if preventive measures are not intensified. Pakistan faces a growing double burden of communicable and non-communicable diseases, and childhood obesity is a rising concern.*

Methods: *A cross-sectional study was conducted from September 2022 to January 2023 among 251 public school children aged 12–15 years in Peshawar, Pakistan. Anthropometric measurements (height, weight) were collected using standardized procedures, and Body Mass Index (BMI) categories were assigned using Asian-Pacific and WHO cut-off values. A structured questionnaire that captured demographic information and relevant lifestyle factors was employed.*

Results: *Among 251 participants, 61% were male and 39% female. The majority (36.7%) were enrolled in Grade 7. Using BMI cut-offs, 72.5% were normal weight, while 15.1% were overweight and 11.6% obese. Only 0.8% were underweight. Most mothers (66.1%) were illiterate, and 95.6% were housewives. Fathers had higher education levels, with 39.4% holding a bachelor's degree or above.*

Conclusion: *Childhood overweight and obesity are becoming increasingly prevalent in Peshawar. School-based health promotion, cultural changes in the schools, and empowering mothers through education may play a crucial role in*

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improving children's health behaviors. Regular annual physical screening is recommended to prevent progression into adulthood obesity.

Highlights:

- Pakistan faces a growing burden of non-communicable diseases, including childhood obesity.
- Schools provide an important platform for early screening and promotion of healthy behaviors.
- Identifying overweight and obesity in school-aged children is essential to reducing future health burdens.

INTRODUCTION

Obesity and overweight are among the major public health issues of the 21st century and the most common nutritional problems. It is an "abnormal or excessive fat accumulation that may impair health". It can be calculated using parameters such as waist-to-hip ratio (WHR), waist circumference, and Body Mass Index (BMI) [2].

The world is facing a double burden of overweight and obesity, including developed and developing countries. It was once considered a problem limited to high-income countries, but now it is surging in low and middle-income countries, specifically in urban settings, facing problems in terms of physical inactivity and nutritional changes[8]. The high burden of overweight and obesity will disturb the health system and non-communicable diseases in the future, and will result in a huge loss of US$ 7 trillion in the coming 15 years[5]. Precautionary measures may play a great role in reducing the burden[6]. The positive association of BMI with non-infectious chronic diseases like pediatric hypertension, coronary heart disease, rheumatology problems, and other respiratory diseases[11]. Furthermore, it can also lead to gall bladder diseases, cancer, diabetes, and other cardiovascular diseases, reducing life expectancy up to seven years, and accounting for major global deaths[2].

The consequences of a fatty environment shaped by the socioeconomic and nutritional evolutions on adult overweight and obesity are well known and have similar consequences for children. The uncontrolled marketing and easy access to unhealthy foods and beverages without any restrictions are among the main causes of overweight and obesity[7].

Being a low-income country, Pakistan is facing the "double burden of diseases," which is considered the main risk factor for many non-infectious diseases[10], and is among those countries that have a high prevalence rate of overweight and obesity among boys and girls of about 15% to 20%[10].

Peshawar is an urban region and the capital of Khyber Pakhtunkhwa, and one of the economically, culturally, and socially fast-growing areas. The majority of its residents belong to different ethnicities and backgrounds.

A limited study was found about the prevalence of obesity and overweight among school-going children in Peshawar. The researcher intended to conduct a study to find out the distribution of overweight and obesity, and its potential associated factors.

Study Aim: This study investigates the prevalence of overweight and obesity among public school-going children in Peshawar, Pakistan.

Methodology

A cross-sectional study was carried out by using a convenience sampling technique among public school-going children aged 12 – 15 years from September 2022 to January 2023. The sample size (233) was calculated by using Open-Epi software. However, this number was raised to two hundred and fifty-one (251) by keeping the possibility of drop-out.

Inclusion Criteria: All school-going healthy children who had not participated in any planned exercise program for at least 6 months before the study, and not taking any kind of medicine in the last seven days.

Exclusion criteria: The students having chronic diseases or using any kind of medicine for more than 07 days, those having known health issues, and pregnant female students were excluded from the study.

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Collection of Data: A convenient sampling technique was used to collect data by using a standardized questionnaire. Two female graduate volunteers were trained and explained the procedure for taking data from girls' schools, following the cultural and moral values.

Ethical consideration: The purpose and procedures of the screening were fully explained to the concerned teacher and the participants after obtaining written and verbal permission from the heads of the schools, as approved by the ethics review board of the Institute of Management Sciences, Peshawar.

Measurement of weight: Participants' weight was measured by using a digital weight scale and recorded in kilograms (Kg). The scale was kept on a hard surface, and the shoes and heavy clothes of the study subjects were removed before weighing. It was confirmed that the scale was calibrated at zero. The subject was permitted to stand on the digital weight scale and recorded to the nearest value of 0.1 kg.

Measurement of Height: Data regarding the height of the studied subjects were taken on a standing measuring board. The measuring board was kept fixed against a concrete wall. The participant was permitted to stand with the board in such a position that their eyes made a parallel position by keeping their feet fixed and flat. The adjustable headboard was kept firmly on the subject's head, and recorded in the questionnaire to the nearest value of 0.1 cm.

Classification of Body Mass Index (BMI): According to the National Heart, Lung, and Blood Institute (NHLBI), Body Mass Index is calculated as weight in kg divided by the square of height in meters (kg/m^2). BMI is classified into four sets according to the Asian-Pacific cutoff points: underweight (<18.5 kg/m^2), normal weight (18.5–22.9 kg/m^2), overweight (23–24.9 kg/m^2), and obese (> 25 kg/m^2). For comparison, BMI was also categorized into four groups according to the conventional WHO classification: underweight (>18.5 kg/m2), normal weight (18.5–24.9 kg/m2), overweight (25–29.9 kg/m2), and obese (>30 kg/m^2) (26).

Study Tool: A Standardized questionnaire already used in the Pakistani context was used to collect data, which includes demographic data and behaviors toward food and drink consumption, and details about their activities.

Statistical analysis: The data were entered into Statistical Package for Social Sciences (SPSS) software (version 21.0). Descriptive analysis was presented in the form of frequencies and percentages.

Results

Based on cut-off values of Body Mass Index (BMI), children were categorized into underweight, normal, overweight, and obese individuals (Table 1). A total of 251 adolescents were assessed, and the frequency and percentage of all the variables were calculated. Among them (61%) were males, and 98 (39%) were females, with the maximum age group of 14-15 years, which were 86 (34.3%), and with a minimum age range of 12-13 years, which were 24 (9.6%). The majority, 92 (36.7%) of the participants were found in grade 7^{th}, while the minimum was 39 (15.5%) was found in grade 9^{th}. The majority (72.5%) of the participants were found in the normal range; however, overweight and obesity were identified as 15.1% and 11.6%, respectively, as shown in Table 2.

Table 1. Participants' Gender and Class of Study

Sex	Frequency	Percent
Male	153	61.0
Female	98	39.0

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Class of study

6th	80	31.9
7th	92	36.7
8th	40	15.9
9th	39	15.5

Table 2. Prevalence of Overweight and Obesity among Students Based on BMI

BMI Categories		
Underweight	2	0.8 %
Normal	182	72.5%
Overweight	38	15.1%
Obese	29	11.6%
Total	251	100.0%

Distribution of Age

Table 3 shows the maximum age of 15 years, which comprises 34.3%, and a minimum age of 12 years, which comprises 9.6%.

Table 3

Age (Years)	Frequency	Percent
12	24	9.6%
13	65	25.9%
14	76	30.3%
15	86	34.3%
Total	251	100.0

Mother's Educational Status and Occupation

Maternal education was classified into six groups to assess their literacy level. The first group shows illiteracy, in which the total number of children's mothers was 166, and their percentage was 66.1%. The second group shows literacy and was accompanied by those children's mothers who were literate in up to five classes, in which the frequency and percentage were 29 and 11.6%, which is five times less than the illiterate group. The middle group represents those levels of education whose literacy rate was up to eight classes, in which the frequency and percentage of literate mothers were six and 3.2 %, respectively. The child's mothers were matriculated was 20 in number, and their percentage was 8.0 %. Similarly, the frequency and percentage of maternal education in higher secondary school levels were 22 and 8.8%, respectively. The frequency and percentage of maternal education in bachelor's and those who had above bachelor's level of education were found 5% and 2.4%, respectively.

Table 4. Mother Education and Occupation.

Mother education	Frequency	Percent
Illiterate	166	66.1
Primary	29	11.6
Middle	8	3.2
SSC	20	8.0
HSSC	22	8.8
Bachelor & above	6	2.4

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Total	251	100.0

Mother Occupation

	Frequency	Percent
Housewife	240	95.6
On-job	11	4.4

Father's Education Status and Occupation Status.

Table 5 displays the results on the father's education status of all participants. Paternal education was classified into six groups to evaluate their education level. The first group shows illiteracy, in which the total number of children's fathers was 30, and their percentage was 12%. The second group shows literacy and is accompanied by those children's fathers who were literate to five classes, in which the frequency and percentage were 34 and 13.5% approximately, similar to illustrate group. The middle group represents those levels of education whose literacy rate was up to eight grade, in which the frequency and percentage of literate fathers were 15 and 6 %, respectively. The child's father, who was matriculated, was 33 in number, and their percentage was 13 %. Similarly, the frequency and percentage of fathers' education at the higher secondary level were 40 and 15.9%, respectively. Paternal occupation status, which is mainly divided into two groups: jobless and employed. A total number of children's unemployed fathers was 17, and their percentage was 6.8%, while those who were accounted as employees either in public or private sectors were reported 93.2%, and their frequency was 234 out of 251, as shown in Table 5.

Table 5. Father's Education and Occupational Status

Father education	Frequency	Percent
Illetrate	30	12.0
Primary	34	13.5
Middle	15	6.0
SSC	33	13.1
HSSC	40	15.9
Bacherlor & above	99	39.4
Total	251	100.0

Father occupation	Frequency	Percent
Jobless	17	6.8
On-job	234	93.2
Total	251	100.0

Discussion

Overweight and obesity are no longer limited to developed countries. The trends of overweight incidences in school children tend to increase over time) [16]. Previous studies in Pakistan showed that the prevalence of overweight and obesity combined among children aged 8 - 15 years were 8%and 18.6%, respectively[9],[2].

Results of the present study (n=251) are encouraging, which has shown that the maximum candidates, 182 (72.5%), fall in group 2, followed by Group-3, BMI >25kg/(m)2, which were an

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account in the overweight group. Whereas (8%) individuals belonged to Group-1, BMI<18kg/(m)2 came under the category of underweight and children belonged to group-4, BMI 23-24.9 kg/(m)2 were identified by 29 (11.6%) which came in the category of obesity which is in line with the WHO, cut-off values of Southeast Pacific guidelines.

Mean weight (kg), height (cm), and BMI of children were reported as 59.6, 161.8, and 22.7, respectively. The majority of 153 (61%) studied participants were male. Paternal education in bachelor's and those who had above bachelor's level of education was calculated 99 (39.4%). A maximum of 166 (66.1%) mothers were identified as illiterate, as shown in previous research, due to different cultural reasons. This **significant prevalence of overweight (15.1%) and obesity (11.6%)** indicates a growing risk for future chronic diseases.

Maternal illiteracy was notably high (66.1%), consistent with literature suggesting a strong association between low maternal education and childhood obesity due to limited health literacy, reduced awareness of nutrition, and suboptimal dietary practices.

Conclusion

The overall prevalence of obesity and overweight was 11.55% and 15.14%, respectively. This can increase as age develops, adding to the existing overweight and obesity prevalence in the country. Annual physical examination can play a critical role in identifying and preventing obesity and overweight among children. Moreover, female education shall encourage addressing these problems.

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