Original Article

Prevalence of Overweight and Obesity among Primary School Children's in Rural Areas of Pakistan

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ABSTRACT

Background: Childhood obesity is a growing global epidemic affecting both children and adults. According to the World Health Organization, 43 million children under five are overweight worldwide, a concern that extends into adulthood with almost 1.5 billion affected individuals.

Objective: The aim of this study was to assess the prevalence of overweight, obesity, and underweight among primary school children in district Swat, Pakistan.

Methods: This cross-sectional descriptive study was conducted from August 2023 to February 2024, encompassing 707 primary school students selected through multi-cluster sampling. Measurements adhering to CDC guidelines were recorded. Data analysis was performed using SPSS 22, employing descriptive and inferential statistics, including chi-square tests for associations and independent t-tests and ANOVA for group differences.

Results: The cohort comprised predominantly male students (88%, 622 students), with the most common age being 11 years (31.8%, 225 students). Overall, 71.9% (508 students) were categorized as healthy, 15.3% (108 students) as overweight, 8.8% (62 students) as underweight, and 4.1% (29 students) as obese. Significant differences were observed across gender (p=0.003), age (p<0.001), and class (p<0.001), but not school type.

Conclusion: The study highlights a significant prevalence of overweight and obesity among primary school students in rural Pakistan, emphasizing the urgent need for tailored obesity prevention strategies and interventions in these areas.

Keywords: Children, Obesity, Overweight, Prevalence, School children.

INTRODUCTION

Obesity, characterized by excessive fat accumulation in adipose tissues, has emerged as a significant public health concern, particularly among children (1, 2). The World Health Organization has identified obesity as one of the gravely underestimated public health crises of our time, noting a concurrent rise in the prevalence of overweight and obesity among children and adolescents with the increase in adult obesity (3). While developed countries have experienced epidemic levels of pediatric obesity, developing nations are also witnessing a surge in this condition (4). Hormonal differences innately predispose females to higher obesity rates than males (5). Moreover, childhood obesity is increasingly recognized as a critical factor contributing to the onset of chronic illnesses such as type 2 diabetes and coronary heart disease in later life, with the past four decades marking a significant rise in obesity rates, especially in affluent countries (6).

Childhood obesity heightens the risk of developing severe, chronic diet-related diseases in adulthood, including stroke, hypertension, cardiovascular diseases, type II diabetes, and certain cancers (7). Poor dietary practices such as the consumption of sugary beverages and fast food, meal skipping, low intake of fruits and vegetables, and frequent dining out are primary contributors to this trend. Simultaneously, an increase in sedentary lifestyles, characterized by excessive time spent indoors watching television, playing video

games, and using computers, has further exacerbated the issue (8, 9). Over the last two decades, the number of overweight children and adolescents has doubled globally in both developed and developing countries, with the prevalence of overweight and obesity among school-aged children continuing to rise daily (10, 11).

In Pakistan, childhood overweight and obesity are emerging public health challenges, with prevalence rates ranging from 15 to 20% among children (12). Although the current health policy focus in Pakistan largely addresses under-nutrition, there is an evident nutrition transition in urban areas leading to over-nutrition, suggesting a dual burden of malnutrition (13). The objective of this study is to investigate the prevalence of overweight, obesity, and underweight among primary school children in rural districts of Pakistan, highlighting the shifting patterns of nutrition and its implications on public health policies. This exploration aims to provide a foundation for formulating targeted interventions to address these growing concerns effectively.

METHODS

The study was conducted between August and December 2023 using an analytical cross-sectional design in both private and public primary schools located in SWAT, KPK. To achieve a statistically significant sample, the size was determined to be 707 using an online sample size calculator, based on a 95% confidence level, a 5% margin of error, and an assumed prevalence rate of 80%. Cluster sampling was employed as the sampling strategy, ensuring the inclusion of all students in selected settings, except for those whose parents did not consent to participate or were absent at the time of the study.

Three days prior to the start of the study, parents were informed and asked for voluntary participation through a permission letter. A week before data collection commenced, the primary investigator, accompanied by two trained nurses, visited the schools to obtain permission from the school administrations and to communicate the findings to parents, as well as to discuss the study's objectives with the faculty and administration to secure their cooperation in the data collection process.

The physical measurements of height and weight were crucial for assessing the nutritional status of the participants. These were conducted using standardized analogue physician health scales (14), which were calibrated to zero before each measurement session. Measurements were taken in the morning or early afternoon, with children dressed in light summer school uniforms and barefoot to ensure accuracy. Height was recorded in centimeters and weight in kilograms, with the scales accommodating weights up to 160 kg.

Data analysis was performed using SPSS version 22. Body Mass Index (BMI) was calculated from the weight and height measurements to assess nutritional status. Categories of nutritional status were defined according to the BMI percentile ranges established by the Centers for Disease Control and Prevention: underweight (BMI < 5th percentile), normal weight (5th percentile ≤ BMI < 85th percentile), overweight (85th percentile ≤ BMI < 95th percentile), and obesity (95th percentile ≤ BMI) (15). Descriptive statistics were employed to compute mean and standard deviation for continuous variables and frequency and percentages for categorical variables. Differences in nutritional status across demographic groups were analyzed using an independent t-test and ANOVA, while the chi-square test was utilized to explore associations between demographic data and nutritional status.

Ethical approval for the study was granted by the ethical review board, and the study was conducted in accordance with the Declaration of Helsinki, ensuring that informed consent was obtained from the parents of all participants. To maintain confidentiality, all collected data was coded, and access was restricted to the principal investigator.

RESULTS

The study encompassed a total of 707 primary school children, with males comprising 88% (622 children) of the population. Among these students, the most common age was 11 years, representing 31.8% (225 children), and the majority attended government schools, accounting for 80.2% (567 children). The largest grade representation was the 4th grade, making up 41.5% (295 children). A significant proportion of the children came from families where the mother had no formal education (77.9%, 551 children), and 40.3% (285 children) had fathers with no education. Most families had between 6 to 10 members, encompassing 64.4% (455 families).

Regarding the nutritional status of the children, the data revealed that the majority were within a healthy weight range, comprising 71.9% (508 children). Overweight and obese students accounted for 15.3% (108 children) and 4.1% (29 children), respectively, while 8.8% (62 children) were underweight. This distribution highlights a predominant trend towards a healthy weight among the study participants, though notable proportions were affected by weight issues either above or below the ideal range.

The study further examined differences in nutritional status across various demographic groups. Males displayed a higher mean nutritional score (2.18 ± 0.62) compared to females (1.88 ± 0.47). Among age groups, 8-year-olds had the highest mean score (3.33 ± 1.03), whereas 7-year-olds had the lowest (1.50 ± 0.70). The analysis also revealed variations across educational settings, with

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children in government schools exhibiting a slightly higher nutritional mean score (2.04 ± 0.59) compared to those in private schools. Additionally, children in the 6th grade showed higher mean scores (2.42 ± 0.75) relative to 4th graders (1.99 ± 0.53).

Statistical analysis indicated significant differences in nutritional status based on gender (p=0.003), age (p<0.001), and class level (p<0.001). However, no significant differences were observed in relation to the type of school attended (p=0.081).

The associations between demographic data and nutritional assessments were also evaluated. The results confirmed that gender, age, and class level were significantly associated with the nutritional status of the students, underscoring the impact of these factors on health outcomes. However, the type of school did not show a significant association with nutritional status, suggesting that other demographic factors may play more pivotal roles in influencing the nutritional health of children in this study.

Table 1: Demographic data of the participants

	Frequency 707	%
Gender		
Male	622	88.0
Female	85	12.0
Age (Years)		
7	2	0.3
8	6	0.8
9	34	4.8
10	88	12.4
11	225	31.8
12	206	29.1
13	105	14.9
14	41	5.8
Mean (SD) age	11.50	1.26
School status		
Government	567	80.2
Private	140	19.8
Class		
2nd	49	6.9
3rd	94	13.3
4th	295	41.7
5th	255	36.1
6th	14	2.0
Mother Education		
No education	551	77.9
Primary	70	9.9
Middle	86	12.2
Father Education		
No education	285	40.3
Primary	85	12.0
Middle	68	9.6
Matric	218	30.8
Intermediate	42	5.9
Bachelor	9	1.3
Family size		
1 to 5 member	66	9.3
6 to 10 members	455	64.4
11 and above members	186	26.3

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Table 2: Nutritional status of the participants

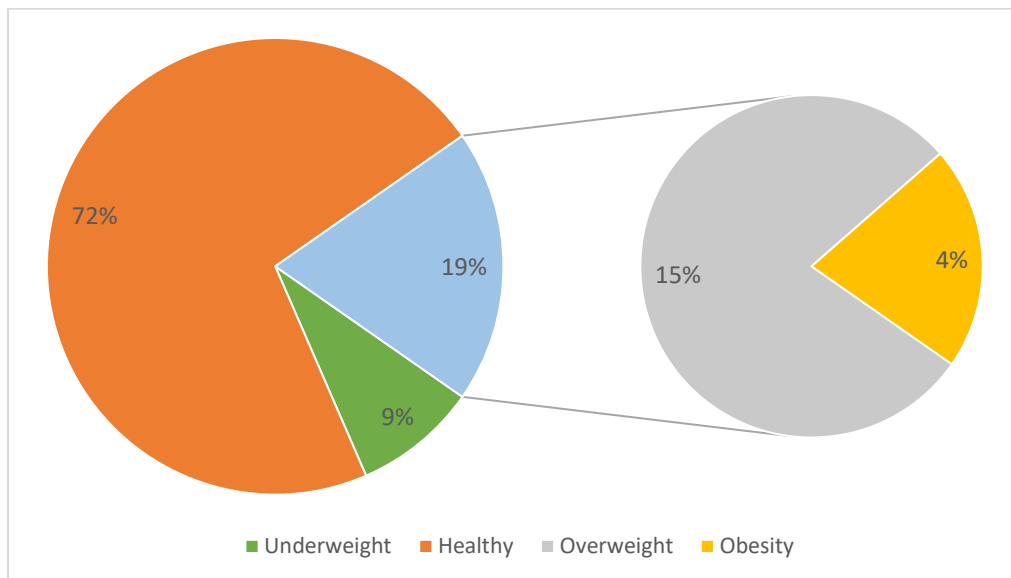| Underweight	Healthy	Overweight	Obesity
62 (8.8%)	508 (71.9%)	108 (15.3%)	29 (4.1%)

Figure 1 Nutritional Assessment of the participants

Table 3: Difference within the groups regarding nutritional status of the participants

Gender	Mean	SD	F-value	P-value
Male	2.1833	0.62825	8.919	0.003
Female	1.8824	0.47338		
Age (Years)				
7 years	1.5000	0.70711	14.321	0.000
8 years	3.3333	1.0328		
9 years	1.9118	0.45177		
10 years	2.1477	0.55791		
11 years	2.2489	0.52637		
12 years	1.9854	0.57998		
13 years	1.9810	0.41558		
14 years	2.8780	0.97967		
School types				
Government	2.1728	0.62212	2.251	0.081
Private	2.0429	0.59822		
Class				
2nd class	2.3878	0.90867	7.115	0.000
3rd class	2.0106	0.37373		
4th class	1.9966	0.53132		
5th class	2.3098	0.65366		
6th class	2.4286	0.75593		

Table 4: Association of nutritional status with demographic data of the participants

	Underweight	Healthy	Overweight	Obese	Sig
Gender					
Male	48	440	106	28	0.000
Female	14	68	2	1	

	Underweight	Healthy	Overweight	Obese	Sig
Age (Years)					
7 years	1	1	0	0	0.000
8 years	0	2	0	4	
9 years	5	27	2	0	
10 years	8	59	21	0	
11 years	10	149	66	0	
12 years	29	158	12	7	
13 years	9	90	5	1	
14 years	0	22	2	17	
School status					
Government	45	403	95	24	0.081
Private	17	105	13	5	
Class					
2nd class	9	17	18	5	0.000
3rd class	6	81	7	0	
4th class	41	215	38	1	
5th class	6	185	43	21	
6th class	0	10	2	2	

DISCUSSION

The study conducted in an urban district of Pakistan aimed to assess the nutritional status of primary school children and revealed a notable majority of male participants at 88.0% (622), while females accounted for only 12% (85). This gender disparity likely reflects the structural divisions within educational institutions where gender-segregated sections may pose challenges to comprehensive data collection. Notably, the prevalence of 11-year-olds was the highest at 31.8% (225), suggesting a demographic concentration that might influence the generalizability of the findings.

The demographic profile of the participants indicated that the majority were from government schools (80.2%, 527), reflecting the broader accessibility of public education in comparison to private institutions. The educational status of the parents, predominantly non-educated, highlights a socio-economic dimension that potentially influences both dietary choices and lifestyle, contributing to the nutritional statuses observed.

The majority of children were categorized as healthy (71.9%, 508), which is an encouraging indicator of adequate nutrition among a significant portion of the sample. However, the findings also pointed to concerns with 15.3% (108) being overweight and a smaller proportion categorized as obese (4.1%, 29). These figures align with global trends where urbanization and changes in lifestyle and dietary habits contribute to increased rates of overweight and obesity among children. Comparatively, studies conducted in different regions of Pakistan and neighboring India present variable results, with some reporting higher percentages of overweight and obesity, highlighting regional disparities in dietary patterns and physical activity levels (16-18, 20-21).

The study's strengths include a robust sample size and the comprehensive use of standardized instruments for data collection. However, the study's limitations must also be acknowledged. The skewed gender ratio may limit the applicability of the findings across the entire pediatric population. Additionally, the self-reporting of dietary habits and physical activity by parents or guardians could introduce bias, possibly underestimating or overestimating the prevalence of nutritional issues.

Comparative analysis with studies from other regions within Pakistan and South Asia reveals both common patterns and distinct discrepancies, attributed to cultural, economic, and systemic differences in health education and school environments. For instance, the prevalence of obesity and overweight is markedly higher in some urbanized settings compared to the current study, possibly reflecting varied socio-economic backgrounds and access to recreational facilities (18, 22).

The global context also underscores the shifting paradigms in pediatric health, necessitating continuous monitoring and targeted interventions to address the rising trend of obesity and its associated health risks. This study contributes to the broader understanding of child health and highlights the need for policies that promote balanced nutrition and physical activity, especially in school settings where early habits are formed. Such initiatives could significantly mitigate the long-term risk of chronic diseases associated with obesity.

CONCLUSION

The study underscores a concerning increase in overweight and obesity among primary school students in Pakistan, particularly highlighting significant associations between nutritional status and factors such as gender, age, and educational class. These findings emphasize the urgent necessity for a national childhood obesity prevention strategy tailored to the unique needs of rural populations. Implementing locally specific interventions that engage community members meaningfully can play a pivotal role in curbing this escalating health issue. Such strategies should not only focus on enhancing dietary and physical activity behaviors but also on educating communities about the long-term consequences of obesity, thereby fostering a more proactive approach to child health management.

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