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# FREQUENCY AND RELATED FACTORS CAUSING OBESITY IN SCHOOL GOING CHILDREN OF PESHAWAR: A CROSS SECTIONAL STUDY

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## ABSTRACT

**Background:** Obesity is a global health concern, particularly among school-going children. This study aimed to assess the prevalence of obesity and overweight in school-going children in Peshawar, Pakistan. **Methods:** A cross-sectional study was conducted in public and private schools in Peshawar. A total of four schools, including one boys' and one girls' school from rural and urban areas each, were conveniently selected. Participants aged 14 to 17 years from classes' eighth to tenth were included. Data on height and weight were collected to calculate body mass index (BMI). A standard self-formed questionnaire was used for data collection. The study duration was six months, and data analysis was performed using SPSS version 25. **Results:** Among the 114 participants, 50% were males and 50% were females. The age range was 14 to 17 years, with a mean of 15.33 years. The baseline characteristics revealed varying distributions of BMI categories across gender, age, and grade groups. No significant association was found between BMI categories and gender or residence. However, a significant association was observed between BMI categories and family income status. Moreover, there was a significant association between BMI categories and the frequency of consuming fast food from takeaway and fizzy drinks. **Conclusion:** The study revealed significant associations of obesity (df=5%, N=114, &C,I=95%; $p<0.05$) with the following variables; physical activity, income status, dietary habits, mobile usage, modes of transportation to school, consumption of fizzy drinks with obesity. Most of the student

reported to consume food from school canteen. The obesity of students appeared to be the same in Urban/Rural residences and both genders. The parents' education status found not associated with obesity of the students (*df 5% N=114 & C.I=95%; p>0.05*).

## Introduction

Obesity and overweight are founded to be a syndrome characterized by multiple diseases that affect the physiology of our body in a negative way (1) . According to the definition of World Health Organization (WHO), obesity in children with age 5-19 years, 'being at or above the 95th percentile of body mass index for age and sex, and Overweight as being between the 85th and 95th percentiles of body mass index for age and sex'. It is considered a global epidemic affecting those populations who live in urban areas due to their lifestyles and food habits (2). It was necessary to describe overweight and obesity according to standard criteria which were developed by Metropolitan Life Insurance Company (MLIC-1983). The company made a table of weight according to height which is now standard for the definition of underweight, normal overweight and obesity (3). Obesity and overweight are also related to race, the presence is more common in women in Africa, Caribbean and Pakistani while less in Bangladeshi and Chinese men. Obesity can cause various complications like type 2 diabetes mellitus, systemic hypertension, cholelithiasis and gastro-esophageal reflux disease, and psychological and psychiatric disorders (4). Hippocrates for the first time described that obesity can cause childlessness and early death. They hypothesized that human body contains blood, mucus, yellow bile, and black bile in a balanced proportion and any disturbances (deficiency or excess) in the proportion of these fluids would consider being a disease. Later on, this hypothesis was proven that extra fluid is the reason for different ailments like diabetic mellitus, hypertension, and cardiovascular disorders

(3,5). The major factors which are associated with obesity are genetic, environmental, biological and psychosocial influences (6,7). Due to the development in the field of technology, video games, online games, increasing the duration of watching screens etc. can decrease the physical activities. Also much of works are done by machines which also reduces the physical involvement of our body lead us to become overweight and obese (1,6). Also, the increased weight of newborn at birth, period of feeding of newborns by mothers with their own milk, family instability, anthropological condition, different means of transportation are the other factors which are associated in the development of obesity (8,9). In the present century, globally the most prevalent nutritional disorders are the overweight and obesity especially in children population in developed and developing countries and progressively increased day by day (1,6). The Frequency of obesity is more in population having good economic status than lower one (10).

## Materials and methods

This was a cross-sectional study, conducted in public and private schools of Peshawar from August 2021 to January 2022. 114 students were selected through convenient sampling technique as a sample from four schools, one boys and one girl's school from rural area and one boys and one girl's school from urban area. The only inclusion criteria for sampled students was age between 14 to 17 years. While leaving those students having age equal to or below 13 and above 17 and also excluded those having obesity due to non-nutritional causes (for examples due to drugs

or diseases), and not actual residence of Peshawar.

**Data collection procedure**
The data was collected through a self-formed questionnaire having twenty-nine questions divided into four sections. First section was about sociodemographic information like student age, gender, place of residence, parents' education and their occupation. Second section included anthropometric questions like weight of student, height, BMI while section 3rd included questions about diet and food consumptions and its pattern. 4th section had questions regarding physical activity including sleep pattern. Cronbach alpha was 0.722 related to the research topic of the questionnaire. The questionnaires were filled by the teachers after demonstrating them how to fill the questionnaires, while interviewing the students. The height board and weight machine were provided to each school for measuring the weight and height of each student for calculation of their BMI.
Every part of the ethical issues associated to the research study was comprehensively reviewed with the principal of each school and each feature of the research study have been appraised to guarantee the

confidentiality and privacy of the study participants. Verbal consent have been taken from the study participants and the agreeing participants were asked for certain questions in questionnaire.

**Data analysis procedures**
Statistical software IBM SPSS version 25 was used for the data analysis. Descriptive statistics (mean, and frequencies) was applied to analyze categorical variables of the study subjects. Data were represented graphically (bar graph). The association between categorical variables was determined by chi square and a *p* value of less than 0.05 was considered as significant.

**Results**

**A.    Demographic variables**
In this study, the number of male and female students were equal (n=57), on the basis of BMI, number of male and female students with their weight category was summarized in figure 1. The age range was between 14-17 years with mean age of 15.33 years$\pm$ 0.92 S.D. Students from urban and rural were equal in proportion (n=57).   Equal proportion of students were taken from grade 8th, 9th and 10th as 38 each. Table 1 showed BMI categories in the different variables.

**Table 1:** BMI across different variables.

| Variables | | BMI Status | | | | Total |
|---|---|---|---|---|---|---|
| | | Underweight | Normal | Overweight | Obese | |
| **Gender** | Male | 4 | 44 | 5 | 4 | 57 |
| | Female | 5 | 37 | 9 | 6 | 57 |
| | **Total** | **9** | **81** | **14** | **10** | **114** |
| **Age (years)** | 14 | 1 | 19 | 2 | 5 | 27 |
| | 15 | 2 | 22 | 5 | 2 | 31 |
| | 16 | 5 | 3 | 6 | 2 | 47 |
| | 17 | 1 | 6 | 1 | 1 | 9 |
| | **Total** | **9** | **81** | **14** | **10** | **114** |
| **Residence** | Rural | 4 | 46 | 4 | 3 | 57 |
| | Urban | 5 | 35 | 10 | 7 | 57 |
| | **Total** | **9** | **81** | **14** | **10** | **114** |
| **Grades** | 8th | 1 | 27 | 4 | 6 | 38 |
| | 9th | 4 | 27 | 5 | 2 | 38 |

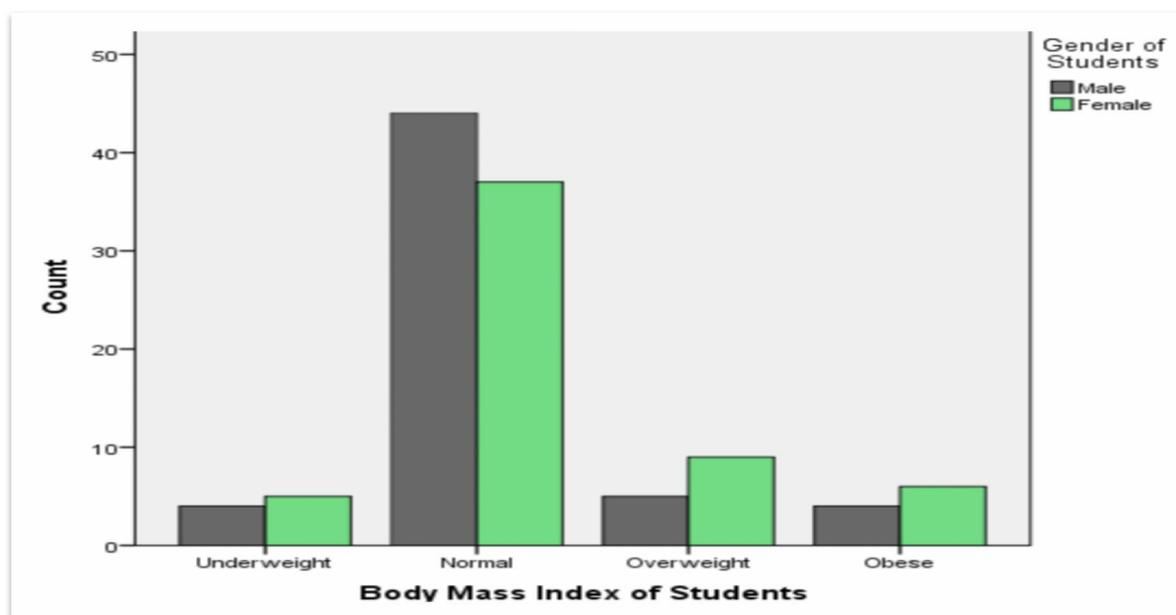| | | | | | |
|---|---|---|---|---|---|
| 10th | 4 | 27 | 5 | 2 | 38 |
| **Total** | **9** | **81** | **14** | **10** | **114** |



Figure 1: Bar chart showed weight categories on the basis of BMI in male and female respondents.

## B. Association of BMI categories with different variables

Using chi-square test, we found significant association of BMI categories with family income ($p=0.001$), favorite food ($p=0.002$) and physical activities (e.g. cricket, football, athletic) by students ($p=0.042$). Table 2 summarized the frequency of students in different BMI categories and also according to family income of students, favorite food of students, and physical activities by students.

We also found insignificant relationships of BMI categories with parents' education of students ($p=0.137$), and residence of students ($p=0.123$). They were shown in table 3 along with $p$ value.

**Table 2**: Significant association of BMI with family income, food choice and physical activities were shown along with frequency of students in different categories.

| Associated Variables | | BMI Status | | | | Total | p Value |
|---|---|---|---|---|---|---|---|
| | | Underweight | Normal | Overweight | Obese | | |
| **Family Income Status\*** | Low | 7 | 50 | 5 | 2 | 64 | 0.001 |
| | Middle | 2 | 27 | 6 | 2 | 37 | |
| | High | 0 | 4 | 3 | 6 | 13 | |
| | **Total** | **9** | **81** | **14** | **10** | **114** | |
| **Favorite Food Choices** | Fast food | 0 | 3 | 3 | 5 | 11 | 0.002 |
| | Vegetables | 0 | 8 | 0 | 1 | 9 | |
| | Fruits | 3 | 16 | 1 | 0 | 20 | |
| | Dairy products | 0 | 0 | 1 | 0 | 1 | |
| | Biryani | 3 | 29 | 7 | 2 | 41 | |
| | Meat | 1 | 13 | 1 | 1 | 16 | |

| | | Underweight | Normal | Overweight | Obese | Total | p Value |
|---|---|---|---|---|---|---|---|
| | Fish | 2 | 12 | 1 | 1 | 16 | |
| | **Total** | **9** | **81** | **14** | **10** | **114** | |
| **Sports or Physical Activities** | Cricket | 5 | 51 | 5 | 1 | 62 | 0.042 |
| | Football | 1 | 5 | 2 | 1 | 9 | |
| | Athletics | 2 | 17 | 4 | 3 | 26 | |
| | None | 1 | 8 | 3 | 5 | 17 | |
| | **Total** | **9** | **81** | **14** | **10** | **114** | |

**Note (*):** The income status of the families is classified according to The Khyber Pakhtunkhwa Minimum Wages Ordinance, 2022 which was promulgated by the Khyber Pakhtunkhwa government on May 19, 2022. The ordinance sets the minimum wage for unskilled workers in the province at Rs. 25,000 per month. According to this criterion we have estimated three groups; low with income of 25,000/month, middle 50,000 to 100,000/month and high income 100,000 to 150,000/month.

**Table 3**: Statistical insignificant results were shown between BMI and parents' education and residence of students.

| Associated variables | | BMI Status | | | | Total | p Value |
|---|---|---|---|---|---|---|---|
| | | Underweight | Normal | Overweight | Obese | | |
| **Parents' Education** | Both educated | 1 | 3 | 2 | 3 | 9 | 0.137 |
| | Both uneducated | 4 | 42 | 6 | 4 | 56 | |
| | Only father educated | 4 | 36 | 6 | 3 | 49 | |
| | **Total** | **9** | **81** | **14** | **10** | **114** | |
| **Residence** | Rural | 4 | 46 | 4 | 3 | 57 | 0.123 |
| | Urban | 5 | 35 | 10 | 7 | 57 | |
| | **Total** | **9** | **81** | **14** | **10** | **114** | |

## Discussion

Regarding the distribution of BMI categories, our study found that 7% of males were underweight, 77% had a normal weight, 9% were overweight, and 7% were obese. Among females, 9% were underweight, 65% had a normal weight, 16% were overweight, and 11% were obese. These findings are consistent with a study conducted in Karachi, Pakistan, by Qaisrani et al. (11), which reported similar prevalence rates of underweight, normal weight, overweight, and obesity among adolescents. Additionally, a study conducted in Saudi Arabia by Al-Hazzaa et al. (12) also reported comparable prevalence rates of these BMI categories among Saudi adolescents. In Afghanistan, a study conducted by Taraki et al. (13) reported a higher prevalence of underweight among Afghan adolescents compared to our study. They found that 24% of males and 18% of females were underweight. Examining favorite foods, our study found that the most popular favorite food among students was biryani (41), followed by vegetables (9) and fruits (20). These findings are consistent with a study conducted in Karachi, Pakistan, by Azeem et al. (14), which reported that biryani was a favorite food among adolescents. The results of this study suggest that there is a significant association between sports participation and BMI in Pakistani students. The most popular sport among students was cricket, followed by football and athletics.

However, the distribution of sports participation varied across BMI categories. Among normal weight students, cricket was the most popular sport, whereas underweight students had a preference for athletics. For the overweight category, cricket and football were the top choices. Among the obese students, a mixture of sports participation was reported. This finding is consistent with other research papers in Pakistan. For example, a study by Khan et al. (15) found that sports participation was associated with lower BMI in Pakistani adolescents. The authors of this study suggested that sports participation may lead to increased physical activity and decreased sedentary behavior, which could contribute to weight loss. Regarding the income status of students' families, the results of this study suggest that there is a significant association between BMI categories and family income status in Pakistani students. The low-income group had the highest proportion of underweight students, while the high-income group had the highest proportion of obese students. The middle-income group had a more balanced distribution of BMI categories. These findings are consistent with a study by Khan et al. (15) found that low-income Pakistani children were more likely to be underweight or obese than high-income children. The authors of this study suggested that this may be due to a number of factors, including access to healthy food, access to healthcare, and environmental factors. In the present study, overweight and obese were 7.0% and 5.2%, respectively, in rural students while 17.5% and 12.2% in urban students, but we found no significant association between BMI and residence of students. Inconsistent A.C. Kafyulilo et al. (1) found significant relation between BMI and residence. The percentages were 4.0% and 0% for overweight and obese in rural students while 14.0% and 9.0% in urban students respectively. This was supported by another study conducted by Mushtaq et al. (16) that overweight and obesity were more prevalent in children living in the urban area (35.5% and 18%) which then reduced to children living in the urban area with lower socioeconomic status (22% and 10%) and rural children (3% and 0.6%). In our study, we found 2 and 3 students in overweight and obesity categories respectively with both educated parents while 6 and 4 students in overweight and obesity categories respectively with both parents were illiterate. We found no statistical significance between parents' literacy and BMI of students as lowest literacy level of our study was grade 10th as this level much of people had no such ideas and knowledge about complications of high BMI. Inconsistent to H. Jeong et al. study (7), they found significant result between parents' literacy and BMI of students.

**Limitations**

It is crucial to consider the limitations of the current study, such as the sample size, the specific context of the surveyed participants. The parents attitude and knowledge should be evaluated besides categorizing them as educated and un educated. Secondly, it was cross sectional study and a non-probability sampling technique was used so, caution should be made in generalizing the results on entire Peshawar.

**Conclusion**

This study provided valuable information on various variables related to obesity in school going children; dietary habits, physical activity, income status of parents. The obesity of students appeared to be the same in urban/rural residences and both genders. The parents' education status found not associated with obesity of the students. It may be due to the inclusion of matric level parents and categorized as educated. I would suggest that government should introduce school health policies in all government and private schools, which should include check and balance on availability of unhealthy food items in canteen (fast food, fizzy drinks etc.) and to promote

healthy diet habits from school level, physical activity to be mandatory in schools. Because childhood obesity can progress to adulthood obesity which may further cause cardiovascular and other complications.

## References

1.      Kafyulilo AC. Prevalence and Implications of Overweight and Obesity in Children's Health and Learning Behavior: The Case of Kinondoni and Njombe Districts in Tanzania. Online Submiss. 2008;1–107.

2.      Sah V, Giri A, Acharya R. Prevalence of overweight, obesity and its associated risk factors among school children aged 6-16 years of Biratnagar. J Nobel Med Coll. 2016;5:22.

3.      Komaroff M. For Researchers on Obesity: Historical Review of Extra Body Weight Definitions. J Obes. 2016;2016:2460285.

4.      The National Clinical Guidelines Centre (NCGC) | Patient experience in adult NHS services | Quality standards. NICE; 2012 [cited 2023 Oct 30]. Available from: https://www.nice.org.uk/guidance/qs15/docu ments/merger-creates-largest-guideline-centre-in-uk

5.      El-Hazmi MAF, Warsy AS. A comparative study of prevalence of overweight and obesity in children in different provinces of Saudi Arabia. J Trop Pediatr. 2002 Jun;48(3):172–7.

6.      Hala AAT, Marawan M. Socio-behavioral Determinants of Overweight and Obesity in Egyptian Primary School Children. J Child Adolesc Behav. 2015;03(05):1–6.

7.      Gautam S, Jeong HS. Childhood Obesity and Its Associated Factors among School Children in Udupi, Karnataka, India. J Lifestyle Med. 2019 Jan;9(1):27–35.

8.      Pirinçci E, Durmuş B, Gündoğdu C, Açik Y. Prevalence and risk factors of overweight and obesity among urban school children in Elazig city, Eastern Turkey, 2007. Ann Hum Biol. 2010;37(1):44–56.

9.      Overweight Children and Adolescents | NEJM [Internet]. [cited 2023 Oct 30]. Available from: https://www.nejm.org/doi/full/10.1056/NEJM cp043052

10.     Warraich HJ, Javed F, Faraz-ul-Haq M, Khawaja FB, Saleem S. Prevalence of Obesity in School-Going Children of Karachi. PLoS ONE. 2009 Mar 24;4(3):e4816.

11. Qaisrani, A., Ulhaq, N., Saeed, N., Zia, A., Chaudhary, S. (2020). Prevalence of underweight, overweight, and obesity in Pakistani adolescents. Pakistan Journal of Medical Sciences, 36(3), 393-397.

12. Al-Hazzaa, H. M., Abahussain, N. A., Al-Sobayel, H. I., Qahwaji, D. M., Musaiger, A. O., & Al-Qahtani, A. R. (2020). Prevalence of overweight, obesity, and abdominal obesity among Saudi Arabian adolescents: Gender and regional variations. Journal of Health, Population, and Nutrition, 39(1), 6

13. Taraki, M. H., Ghobadi, H., Karimy, M., Jafarzadeh, F., & Khani Jeihooni, A. (2020). Prevalence and factors associated with underweight among Afghan adolescents: A cross-sectional study. BMC Public Health, 20(1), 1265.

14. Azeem, M., Ahmed, M. H., & Nisar, N. (2020). Perception of healthy eating and favorite food items among Pakistani adolescents. Cureus, 12(5), e8187.

15. Khan, M. A., Khan, S. U., & Ali, S. (2017). Mobile phone use and its association with body mass index among adolescents in Pakistan: A cross-sectional study. Journal of the Pakistan Medical Association, 67(4), 437-441.

16. M. U. Mushtaq, S. Gull, H. M. Abdullah, U. Shahid, M. A. Shad, and J. Akram, "Prevalence and socioeconomic correlates of overweight and obesity among Pakistani primary school children," BMC Public Health, vol. 11, no. September, 2011, doi: 10.1186/1471-2458-11-724.