

FREQUENCY AND RISK FACTORS OF OVERWEIGHT AND OBESE SCHOOL GOING ADOLESCENTS OF DISTRICT PESHAWAR, KHYBER PAKHTUNKHWA, PAKISTAN

Sidra Irfan, Adeela Mustafa, Romana Ayub

Department of Community Medicine, Khyber Medical College, Peshawar

ABSTRACT

Objective: To assess the frequency and risk factors of overweight and obese school-going adolescents of district Peshawar and to determine the association of these risk factors with obesity in school-going adolescents.

Material and methods: This was a cross-sectional descriptive study, conducted in public and private schools of district Peshawar from 1st October 2020 till 30th March 2021. A pre-validated questionnaire was used to assess the dietary habits of students. The schools were stratified into three categories according to the fee structure i.e., low SES (socioeconomic status (fee < 1000 PKR), middle SES (fee = 1000-2500 PKR), high (SES) (fee > 2500 PKR). A sample of 300 was calculated using who sample size calculator. Stratified random technique was used to select two schools from each category. From each school, a sample of 50 students were taken. Six students were selected from each class using simple random method (balloting). Data were analyzed using SPSS 23. Chi-square test was used to determine the association between obesity and socioeconomic status and between obesity and dietary habits. Kendal-tau was used to determine the statistical correlation between obesity and socioeconomic status and between obesity and dietary habits.

Results The overall frequency of overweight and obesity was found to be 14.7 % and 8% respectively. After applying chi-square test, it was found that obesity had a significant association with the socioeconomic condition and dietary habits of adolescents. Kendal-tau was applied to develop correlation. It was found that obesity has positive correlation with socioeconomic condition +0.312. However, obesity had a negative correlation with dietary habits -0.092.

Conclusion Obesity in adolescents is rising significantly in district Peshawar where every 4th or 5th adolescent is either overweight or obese. The major risk factors were socioeconomic status and dietary habits, which were statistically found to be associated with obesity.

Keywords: BMI, school going adolescents, obesity, overweight.

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INTRODUCTION

Obesity is the fifth major cause of death, to be associated with approximately 3.4 million deaths in 2019¹. Childhood obesity has now reached the level of an epidemic in developed countries². The burden of overweight and obese people has found to have increased significantly from 857 million to 2.1 billion in the last 3 decades. According to statistics worldwide, 37% of men and 38% of women are overweight and obese. However, 10% of the adolescents are estimated to be overweight and obese^{3,4,5}

Within the United States, nearly one-third of adoles-

cents are either overweight or obese with the prevalence of 17%⁶. In the U.S, obesity rates in youth (2-19 years) are increasing tremendously. In developed countries, the prevalence of obesity in adolescents has increased from 17% to 24% in boys and from 16% to 23% in girls over 4 decades. However, in developing countries, the increase is 8% to 13% in boys and 8% to 13% in girls^{7,8,9}. In Africa, the prevalence of childhood obesity has increased from 8.5% to 12.7% from 2010 to 2022, which shows an alarming increase by 49%^{10,11,12}.

In Asian countries, there is a large variation within and between countries 3.5% in rural Bangladesh^{13,14} to over 65% in the Maldives^{15,16}, 30% in Iran and Saudi Arabia¹⁷ and approximately 12.5% for Chinese¹⁸. In Asia, Obesity is found to be the highest among Thailand and lowest in India¹⁹. Pakistan is a country which is in the transition state and must deal with the double burden of coexistent over nutrition and undernutrition simultaneously. National Health Survey, Pakistan, 2017-18²⁰ found that among adolescents aged 5-17, 17% were overweight and 8.1% were obese.

Correspondence

Dr. Adeela Mustafa,

Assistant Professor

Department of Community Medicine, Khyber Medical College, Peshawar - Pakistan

Email: adeelaamir17@gmail.com

Cell: +92-345-2909019

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According to the Bureau of Statistics Planning and Development Department Government of Khyber Pakhtunkhwa ²¹ there is total of 1181 government primary schools, 171 government middle schools and 155 government high schools in Peshawar. According to the Elementary and Secondary Education Department Government of Khyber Pakhtunkhwa ²² there are total of 247 private primary schools, 388 private middle schools and 344 private high schools in Peshawar.

Because of the increasing prevalence of obesity in adolescents, it is an important issue to examine and monitor the risk factors in among adolescents who are vulnerable. The objective of this study is to determine the frequency of overweight and obese school-going adolescents and its associated risk factors in areas of district Peshawar Pakistan. As no information regarding the burden and contributing factors of overweight and obesity among school-going adolescents in district Peshawar is available, this study will provide fresh data and will identify the magnitude of the factors involved, which will help for planning interventional strategies focusing on primordial and primary prevention. Along with weight management measures on the individual level, societal interventions on the community level are also necessary.

MATERIAL AND METHODS

A total of 300 students were involved in the study and was completed in 6 months period from 1st October 2020 till 30th March 2021. Apparently healthy adolescents both male and female, aged 10- 18 years attending private and government primary, secondary and high schools in the district Peshawar Khyber Pakhtunkhwa are included in our study. Any child with known medical conditions such as asthma, tuberculosis, chronic bronchitis, diabetes was excluded from study, because medications like insulin put them at risk of weight gain. Using WHO formula for prevalence studies for calculation of sample size using 95 % confidence interval and 5% margin of error.

Based on an overweight/obesity prevalence of 24.5% among school adolescents in Lahore sample size of 288 was estimated which was rounded off to 300. ³

The listed schools in district Peshawar were stratified into three categories according to the monthly fee structure of the schools (figure-1). Those with a fee of 2500 PKR or above were categorized as high SES, those with a fee between 1000-2500 PKR in middle SES and those with a fee < 1000 PKR were put into low SES. Approval was sought from the school administration for data collection. The sample of 300 students was divided among three categories. Sample of 100 students was taken from 2 schools from each category which were selected using convenient sampling technique. From each school a sample of 50 students was taken. Six students were taken from each class i.e., grade 2-10. A Simple random sampling tech-

nique (balloting) was used to select male and female students from each age group. There was a bowl with papers coded as "yes" or "no". Students were asked to pick from the bowl and were then selected accordingly. The Weight and height of selected students were measured using digital weight machine and stadiometer respectively. Students were asked to remove shoes, jackets, watches or any excessive material. "BMI was calculated as Weight in kilograms over height in meters squared ($BMI = \text{weight} / \text{height}^2$)" ⁽²⁾. According to the Center for Disease Control and Prevention (CDC), "adolescents who measure BMI-for-age at or above the 95th percentile as obese and with 85th and 95th percentile as overweight". ²³ A pre-validated questionnaire was given to students to assess students' dietary habits. Answers are evaluated by assigning a score ranging from 0 to 3 with the maximum score assigned to the healthiest one and the minimum score to the least once. The total score of this section is 33. It is divided into three ranges, where the lowest one (15-21) referred to "inadequate eating habits", the medium one (22-27) referred to "partially satisfactory eating habits" and the highest score range from (28-33). ²⁷ The Frequency of obesity is measured and its association with SES and dietary habits of students is determined by using chi-square test through SPSS-23. Kendall's Tau was used to determine statistical correlation between obesity and socioeconomic status and between obesity and dietary habits.

Ethical approval was sought from Institutional Review Ethical Board, Khyber Medical College Peshawar and from the administration of selected schools for data collection. Parents of students were contacted through consent forms.

RESULTS

The age group range was between 10-18 years for both girls and boys with a mean of (13.80 years+ 2.48 S.D). The overall frequency of overweight and obesity was found to be 12.3% and 6.0% respectively.

Socioeconomic status was related to adolescents' risks of being overweight and obese. Highest frequency was found in adolescents of high socioeconomic status i.e., 35%, followed by middle SES 18% and 15% in low socioeconomic adolescents. After applying chi-square test, it was found that with overweight and obesity has a strong statistical association with socioeconomic status, with $p=0.0001$. By applying chi-square test, overweight and obese were found to have a significant relationship with dietary habits with $p=0.002$. Kendal-tau was applied to develop correlation. It was found that overweight and obesity has a positive correlation with socioeconomic condition +0.312. However, a negative correlation with dietary habits -0.092. .

Table 1: Descriptive statistics

Variables	Sub classes	Under weight	Normal	Overweight	Obese	Total
	10	1	24	3	5	33
	11	0	27	4	2	33
	12	9	21	7	3	40
	13	6	26	5	0	37
	14	4	24	5	2	35
	15	6	27	4	0	37
	16	5	19	5	3	32
	17	1	21	2	1	25
	18	4	20	2	2	28
	Total	36	209	37	18	300
Gender	Male	22	106	17	13	158
	Female	14	103	20	5	142
	Total	36	209	37	18	300

Table 2: Distribution of responses to different questions in the survey

	Options	Under weight	Normal	Overweight	Obese	Total
Do you eat breakfast?	Often	8	63	13	7	91
	Always	28	146	24	11	209
	Total	36	209	37	18	300
Which beverage do you drink at Breakfast?	Tea	21	72	10	8	111
	Fruit juice	1	32	4	2	39
	Milk	14	105	23	8	150
	Total	36	209	37	18	300
Do you eat cereal (roti) in breakfast?	No	11	47	16	8	82
	Yes	25	162	21	10	218
	Total	36	209	37	18	300
Do you eat morning snacks?	Always	19	81	14	11	125
	Often	17	128	23	7	175
	Total	36	209	37	18	300
Do you eat afternoon snacks?	Always	24	114	25	8	171
	Often	12	95	12	10	129
	Total	36	209	37	18	300
Do you consume snacks with	Cereals	26	131	17	6	180
	Fruits/fruit juice	8	53	12	5	78
	Milk/yogurt	2	25	8	7	42
	Total	36	209	37	18	300
Do you consume two portions of Fruit/day?	Often	16	120	20	14	170
	Always	20	89	17	4	130
	Total	36	209	37	18	300
Do you consume two portions of Vegetables/day?	Often	23	91	19	13	146
	Always	13	118	18	5	154
	Total	36	209	37	18	300
Do you consume dessert at each meal?	Always	12	65	11	9	97
	Often	24	144	26	9	203
	Total	36	209	37	18	300

Do you consume soft drink at each meal?	Always	5	40	14	7	66
	Often	31	169	23	11	234
	Total	36	209	37	18	300
Do you consume five meals/day?	Always	10	75	14	9	108
	Often	26	134	23	9	192
	Total	36	209	37	18	300
Your habitual diet is	Unchanging	9	114	25	8	171
	Varied	27	95	12	10	129
	Total	36	209	37	18	300
Which beverages do you consume Out of meals?	Soft drinks	6	56	15	6	83
	Fruits/fruit juice	3	23	5	0	31
	Water	27	130	17	12	186
	Total	36	209	37	18	300
Do you consume a glass of milk or Yogurt/day?	Often	20	107	24	14	165
	Always	16	102	13	4	135
	Total	36	209	37	18	300
Do you consume a liter of water/day?	Often	13	107	24	14	165
	Always	23	102	13	4	135
	Total	36	209	37	18	300

Table 3: The relationship of nutritional status with socioeconomic status

		Health status				Total	P=0.0001	Correlation +0.301
		Underweight	Normal	Overweight	Obese			
		n (%)	n (%)	n (%)	n (%)			
Fee Of School	(<1000) low socioeconomic status	24(66.7%)	65(31.1%)	8(21.6%)	3(16.7%)	100(33.3%)		
	1000_2500(middle socioeconomic status)	10(27.8%)	77(38.6%)	9(24.3%)	4(22.2%)	100(33.3%)		
	>2500 (high socio-economic status)	2(5.6%)	67(32.0%)	20(54.1%)	11(61.1%)	100(33.3%)		
Total		36(100%)	209(100%)	37(100%)	18(100%)	300(100%)		

Table 4: The relationship of nutritional status with dietary habits

		Health status				Total	P=0.004	Correlation +0.301
		Underweight	Normal	Overweight	Obese			
		N (%)	N (%)	N (%)	N (%)			
Food status	Inadequate food habits	7(19.4%)	18(8.6%)	8(21.6%)	4(22.2%)	37(12.3%)		
	Partial satisfactory food habits	20(55.6%)	97(26.4%)	21(56.8%)	12(66.7%)	150(50.1%)		
	Satisfactory food habits	9(25.1%)	94(45.1%)	8(21.6%)	2(11.1%)	113(37.7%)		
Total		36(100%)	209(100%)	37(100%)	18(100%)	300(100%)		

DISCUSSION:

The overall frequency of overweight and obese School-going adolescents was found to be 12.3 % and 6.0% respectively. A Higher prevalence was found in girls with 23% girls being overweight and obese and boys were 22%. It was also determined by Ahmed J et al ²⁴, a study

was done in Hyderabad Pakistan, thirteen percent (95% CI) adolescents were overweight and 7.5% (95% CI) were obese.

Although, obesity was seen in all categories of socioeconomic status adolescents, it was found to be more prevalent in high socioeconomic adolescents as

compared to middle and low socioeconomic adolescents which were also ascertained by Mushtaq et al²⁵ that adolescents of high socioeconomic status living in the urban area were significantly at risk of obesity (both $P < 0.001$) as compared to adolescents of low SES living in the urban area. Our study results are also consistent with Anekwe CV et al²⁸ who studied the effects of socioeconomic status with obesity and found it significant. Our study results are also in line with Gnani R²⁹ studied obesity in Prepubertal adolescents and found significant association with socioeconomic status.

Dietary habits were also associated with obesity. Our results were also consistent with Abdullah et al²⁶ who found a negative correlation between obesity and dietary habits. Ludwig et al²⁷ conducted a study of 548 participants to find the relationship of obesity with eating food types and found increasing obesity with high calorie consumption. Our study results are consistent with Brownell KD³⁰. Our study results are also in line with Leung CW et al⁽³¹⁾ who studied associations of food and its Dietary Quality with Obesity in Adolescents and found it to be significantly associated.

Obese people were found to have inadequate dietary habits due to the easy lifestyle, high calorie consumption and sedentary behavior of urban adolescents.

The limitations of my study were that due to financial constraints we couldn't take sample from all the districts of KPK.

CONCLUSION

Obesity in adolescents is rising significantly in district Peshawar where every 4th or 5th adolescent is either overweight or obese. The major risk factors were socioeconomic status and dietary habits, which were statistically found to be strongly associated with obesity.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under

Irfan S: Concept and design of study

Mustafa A: Concept and design of study

Ayub R: Manuscript writing

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.