

“PREVALENCE OF OBESITY AND RELATED FACTORS AMONG THE UNDER GRADUATE MEDICAL STUDENTS OF PESHAWAR DISTRICT”

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ABSTRACT

Objective: To estimate the prevalence of overweight and obesity and to determine eating habits and level of physical activities and its association with obesity of under graduate medical students of Peshawar district.

Materials and Methods: A cross sectional study was conducted among undergraduate medical students of all medical colleges of public and private sector of Peshawar District in 2014. A sample size of 384 was selected by simple random sampling technique. A pre-tested questionnaire was used to assess eating practices, levels of physical activity and sedentary lifestyle of the participants. Height and weight were measured and BMI was calculated. Chi-square test was used to observe association between eating habits, physical activity and sedentary behavior of students and BMI weight categories.

Results: According to WHO Asia-pacific population cut off criteria for BMI, prevalence of overweight and obesity among medical students were 18.6% and 15.7% respectively. Majority of the students have healthy eating habits i.e. 45% participants of the study consumed the recommended serving of bread, 78% ate the recommended serving of fruit a day, 87% students consumed at least 1-2 or more serving of vegetables daily, more than 70 % undergraduate medical students were taking the recommended serving of meat, poultry, fish, nuts and legumes and 70% students consumed the recommended serving of milk and dairy products. Only 40% respondent consumed junk food at least 3 or more times per week, 35.7% consumed fruit juices at least 3 times or more per week and approximately 32.3% students had energy drinks ≥ 3 times a week. 48 % participants undertook moderate exercise and 17% were doing strenuous exercise i.e. 65% were doing some exercises weekly. However out of 65% only 30% respondents were performing the WHO recommended ≥ 600 Met min/wk. Mean sedentary time spent was 10 ± 3.2 hours per day. There was no significant association between BMI weight categories and eating habits and physical activity of students, yet significant association was found between sedentary behavior of students and obesity.

Conclusion: The study indicated that overweight and obesity among the undergraduate medical students was mainly due to their sedentary life style. Consequently health programs are needed to promote healthy lifestyle among medical students.

Key words: Overweight, obesity, physical activity, sedentary lifestyle, body Mass Index (BMI).

INTRODUCTION

Obesity is the most common nutritional disorder and one of the major public health concerns of 21 century. A report of WHO indicates that since 1980 the obesity has more than doubled and in 2014 nearly 1.9 billion adults age 19 and above were overweight¹.

Obesity is defined as the accumulation of excessive fat in the body and it adversely affect the health of an individual¹. It is the fifth principal risk for worldwide deaths and is major risk factor for a number of chronic diseases such as cancer, diabetes, cardiovascular and

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gallbladder diseases. At least 2.8 million adult die each year due to obesity and overweight problem. Obesity usually reduces life expectancy by six to seven years².

Obesity among young adults who are experiencing transition into university life is mainly due to adoption of sedentary life style and making their own food choices, often leading to poor eating habits^{3,4}. Stress of university life, also negatively affect dietary habits⁵.

In Pakistan childhood obesity, especially in urban areas, is mainly due to availability of processed foods, snacks, high intake of large quantity of meat by children and sedentary life style^{6,7}. In Pakistan the overall prevalence of obesity and overweight was around 25% of general population⁸. A study showed that around 44% male and 61% of female medical students of a private medical dental college in Karachi were above normal weight⁹. Another study showed that 41.7% of the students of the Baqai Medical University of Karachi were overweight or obese¹⁰.

Focus on healthy eating habits, physical active

life, weight control and general wellness is of growing importance in Pakistan. Despite this concern an average medical student still gets involved in poor eating habits, sedentary lifestyle, less sleep and experiencing more stress.

Therefore we need to know the prevalence of obesity and related factors i.e. eating habits and life style of the medical students, so the results of the study will provide some important baseline information, which would help in the development of strategies for creating awareness among the medical students regarding negative effects of sedentary life style and unhealthy food choices to address and prevent obesity in medical students. As this may reduce the risks of lifestyle-related disorders later in life.

The present study has been carried to estimate the prevalence of obesity and assess the dietary habits and level of physical activities and its association with obesity of under graduate medical students of Peshawar district.

MATERIAL AND METHODS

A cross sectional study was carried out among the undergraduate medical students of first to final year MBBS/BDS (2014 batch) of all public and private sector medical colleges of Peshawar district from 1 November, 2014 to 30 April, 2015. Total study population was approximately 4510 with a sample size of 384. Study population was selected by simple random sampling technique. The students having chronic diseases or using any kind of medicine for more than 07 days and pregnant female students were excluded from the study. Data collection procedure included use of a pretest structured self administered questionnaire and anthropometric measurements of the respondents. A brief introduction was given, the objectives of the research work were explained and informed consent was obtained from each respondent. Questionnaire included questions about socio-demographic characteristics, eating behavior and physical activity of the respondents. Height and weight of the participant were measured by using standard procedure, and BMI (Mass in (kg) / Height in (m²) of each participant was calculated. Finally data was analyzed in SPSS version 20.0. Chi-square analyses were conducted to determine the relationship of eating habits, physical activities and sedentary life style with obesity. Statistical significance level was kept at $p < 0.05$.

RESULTS

A total of 384 undergraduate medical students were included in the study, out of which 350 (91%) willingly participated in the study. So the response rate was 91%.

Participants of the study were classified on the basis of WHO Asia-pacific population cut off criteria for

BMI, 18.6% were found overweight and 15.7% were obese as presented in table 1.

The mean age of the undergraduate medical students was 21 ± 1 years with the age range between 18-24 years. Out of 350 participants 190 or 54.3% were males and 160 or 45.7% were females. 57% student's family income was between 50,000 to 100,000, 12 % family income was less than 50,000 and 31.1% families' income was more than 100,000.

Eating Habits of the Students

Eating practices of the undergraduate medical students were assessed by food frequency questionnaire (FFQ). It included questions regarding the types and frequency of eating major food groups (grains, fruits and vegetables, meat and legumes, fats and oils, dairy and milk products and sweets and sugary products) that is consumed per day and making healthy food choices. Questions about specific food intake such as junk food and fizzy drink per week were also included. The response of the participants to these questions was evaluated for making comparisons against recommendations of USDA food pyramid¹¹.

The results indicated that there was no statistical significant difference between the BMI weight categories with regards to number of serving of major food group's consumption per day (P-value for different food groups was more than 0.05). Furthermore there was no statistical significant difference between BMI categories and frequency intake of junk food, fruit juices and fizzy drinks consumption per week (Table 2 and 3)

Regarding healthy food choices, there was no statistical significant difference between the BMI categories and making healthy food choices as shown in table 4.

Physical Activities of the Participants

Levels of physical activities questionnaire comprised of two domains such as moderate activities e.g. moderate-intensity sports, fitness or recreational (leisure) activities such as brisk walking, cycling, swim-

Table 1. Prevalence of Overweight & Obesity among Students based on BMI

Weight Categories	Frequency (n)	Percent (%)
Underweight (BMI <18.5)	32	9.1
Normal (BMI between 18.5 - 22.9)	198	56.6
Overweight (BMI between 23 – 24.9)	65	18.6
Obese (BMI ≥ 25.0)	55	15.7
Total	350	100

Table 2 Association between BMI Weight Categories and frequency intake of major Food groups per day.

Breads, Rice and Cereals Recommended Serving 6-11 /day	Under-weight n (%)	Normal n (%)	Over-Weight n (%)	Obese n (%)	Total n (%)	X²	P-value
No Serving/ day	2 (6%)	4(2%)	1(1%)	0(0%)	7(2%)	13.333	0.345
< 6 times/ day	17 (53%)	98(50%)	37(57%)	35(64%)	187(53%)		
> 6Serving/ day	13(41%)	96(48%)	27(42%)	20(36%)	156(45%)		
Total	32 (100%)	198(100%)	65 (100%)	55 (100%)	350(100%)		
Fruits (2-4/day)							
No Serving	5(16%)	20(10%)	11(17%)	6(11%)	42(12%)	12.149	0.434
2-4 Serving	24(75%)	155(78%)	48(74%)	45(82%)	272(78%)		
> 4 Serving/day	3(9%)	23(12%)	6(9%)	4(7%)	36(10%)		
Total	32(100%)	198(100%)	65(100%)	55(100%)	350(100%)		
Vegetables (3-5/d)							
No Serving/day	2(7%)	25(13%)	11(17%)	7(13%)	45(13%)	10.852	0.542
1-2 Serving	22(71%)	121(61%)	37(57%)	32(58%)	212(61%)		
3-6 Serving	6(19%)	50(25%)	5(26%)	15(27%)	88(25%)		
> 6 Serving	2(3%)	2(1%)	0(0%)	1(2%)	5(1%)		
Total	32(100%)	198(100%)	65(100%)	55(100%)	350(100%)		
Meat, Poultry& fish (2-3 time/ day)							
No Serving/day	1(3%)	14(7%)	5(8%)	7(13%)	27(8%)	8.424	0.751
1-4 Serving	27(84%)	158 (80%)	50(77%)	38(69%)	273(78%)		
> 4Serving	4(13%)	26(13%)	10(15%)	10(18%)	50(14%)		
Total	32(100%)	198(100%)	65(100%)	55(100%)	350(100%)		
Nuts & legume 2-3							
No Serving/day	6(19%)	41(21%)	22(34%)	16(29%)	85(24%)	12.755	0.387
1-4 Serving	24(75%)	147(74%)	43(66%)	36(65%)	250(72%)		
> 4Serving	2(6%)	10(5%)	0(0%)	3(6%)	15(4%)		
Total	32(100%)	198(100%)	65(100%)	55(100%)	350(100%)		
Milk and dairy products (2-3/day)							
No Serving/day	5(15%)	26(13%)	9(14%)	9(17%)	49(14%)	3.907	0.985
1-4 Serving	21(66%)	143(72%)	43(66%)	37(67%)	244(70%)		
> 4Serving	6(19%)	29(15%)	13(20%)	9(16%)	57(16%)		
Total	32(100%)	198(100%)	65(100%)	55(100%)	350(100%)		
Types of Milk	Under-weight n (%)	Normal n (%)	Over-Weight n (%)	Obese n (%)	Total n (%)	X²	P-value
None	6(19%)	26(13%)	10(15%)	8(14%)	50(14%)	8.948	0.442
Whole milk	23(72%)	146(74%)	40(62%)	43(78%)	252(72%)		
Reduced Fat	1(3%)	11(6%)	5(8%)	1(2%)	18(5%)		
Skim Milk	2(6%)	15(7%)	10(15%)	3(6%)	30(9%)		
Total	32(100%)	198(100%)	65(100%)	55(100%)	350(100%)		

Fats & Oil							
Vegetable oil	29(90%)	171(86.5%)	50(77%)	42(76%)	291(83.1%)	6.408	0.093
Ghee	3(10%)	27(13.5%)	15(23%)	13(24%)	58(16.6%)		
Total	32(100%)	198(100%)	65(100%)	55(100%)	350(100%)		
Sweets and Sugar							
No Serving/day	6(19%)	38(19%)	12(18%)	10(18%)	66(19%)	5.875	0.922
1-2 Serving	14(44%)	91(46%)	31(48%)	31(56%)	167(48%)		
>3Serving	12(37%)	69(35%)	22(34%)	14(26%)	117(33%)		
Total	32(100%)	198(100%)	65(100%)	55(100%)	350(100%)		

Table 3 Association between BMI and frequency intake of Specific Food

Fruit Juice Serving/ Week	Under-weight n (%)	Normal n (%)	Over Weight n (%)	Obese n (%)	Total n (%)	X ²	P-value
No Serving	6(19%)	21(11%)	8(12%)	8(15%)	43(12%)	9.705	0.642
1-2Serving	14(44%)	107(54%)	34(53%)	27(49%)	182(52%)		
>3 Serving	12(37%)	70(35%)	23(35%)	20(36%)	125(36%)		
Total	32(100%)	198(100%)	65(100%)	55(100%)	350(100%)		
Fizzy Drinks							
No Serving	4(13%)	44(22%)	14(21%)	13(24%)	75(22%)	14.812	0.252
1-2Serving	13(41%)	94(48%)	31(48%)	24(43%)	162(46%)		
>3 Serving	15(47%)	60(30%)	20(31%)	18(33%)	113(32%)		
Total	32(100%)	198(100%)	65(100%)	55(100%)	350(100%)		
Junk Food							
No Serving	1(3%)	15(8%)	9(14%)	5(9%)	30(9%)	16.374	0.175
1-2Serving	17(53%)	103(52%)	32(49%)	28(51%)	180(51%)		
>3 Serving	14(44%)	80(40%)	24(37%)	22(40%)	140(40%)		
Total	32(100%)	198(100%)	65(100%)	55(100%)	350(100%)		

Table 4 Association between BMI and Reduced Fat & Salt Intake.

Reduced Fat Intake	Under-weightn (%)	Normal n (%)	Over-weightn (%)	Obese n(%)	Total n(%)	X ²	P-value
Never	6(19%)	23(12%)	7(11%)	8(15%)	44(13%)	15.373	0.222
Rarely	9(28%)	56(28%)	18(28)	18(33%)	101(29%)		
Sometime	17(53%)	83(42%)	32(49%)	26(47%)	158(45%)		
Regularly	0(0%)	30(15%)	5(8%)	3(5%)	38(11%)		
Always	0(0%)	6(3%)	3(4%)	0(0%)	9(2%)		
Total	32(100%)	198(100%)	65(100%)	55(100%)	350(100%)		
Reduced Salt Intake							
Never	12(38%)	58(29%)	25(39%)	19(35%)	114(32%)	12.159	0.433
Rarely	8(25%)	69(35%)	22(34%)	16(29%)	115(32%)		
Sometime	10(31%)	41(21%)	9(14%)	13(24%)	73(21%)		
Regularly	2(6%)	14(7%)	7(11%)	5(9%)	28(8%)		
Always	0(0%)	16(8%)	2(3%)	2(4%)	20(6%)		
Total	32(100%)	198(100%)	65(100%)	55(100%)	350(100%)		

Table 5 Association between BMI and Moderate Exercise

Moderate Exercise	Under-weight n (%)	Normal n (%)	Over Weight n (%)	Obese n (%)	Total n (%)	X ²	P-value
No	16(50%)	102(52%)	36(55%)	27(49%)	181(52%)	0.543	0.909
Yes	16(50%)	96(48%)	29(45%)	28(51%)	169(48%)		
Total	32(100%)	198(100%)	65(100%)	55(100%)	350(100%)		
<600Met Min/Wk	8(50%)	60(63%)	15(52%)	16(57%)	99(59%)	1.750	0.626
>600Met Min/Wk	8(50%)	36(37%)	14(48%)	12(43%)	70(41%)		
Total	16(100%)	96(100%)	29(100%)	28(100%)	169(100%)		
Strenuous Exercise							
No	29(91%)	168(84%)	54(83%)	41(79%)	292(83%)	3.996	0.262
Yes	3(9%)	33(16%)	11(17%)	11(21%)	58(17%)		
Total	32(100%)	201(100%)	65(100%)	52(100%)	350(100%)		
<600Met Min/Wk	0(0%)	17(51%)	4 (36%)	3(27%)	24(41%)	3.292	0.349
>600Met Min/Wk	3(100%)	16 (49%)	7(64%)	8(73%)	34(59%)		
Total	3(100%)	33(100%)	11(100%)	11(100%)	58(100%)		

Table 6 Association between BMI and Sedentary Behavior of the Students.

No of Hrs/day	Underweight n %	Normal n %	Overweight n %	Obese n %	Total n %	X ²	P value
4-7	7 22%	51 26%	14 21%	8 15%	80 22%	47.868	0.046*
8-11	17 53%	73 37%	27 42%	18 32%	135 39%		
12-15	8 25%	74 37%	24 37%	29 53%	135 39%		
Total	32 100%	198 100%	65 100%	55 100%	350 100%		

ming, dancing and volleyball, and vigorous physical activities such as vigorous-intensity sports, fitness or recreational (leisure) activities like running, football, jogging, hockey and soccer etc. Each domain was assigned MET value such as moderate-intensity sports, fitness or recreational activities were assigned a MET value equivalent to 4.0. Vigorous-intensity sports, fitness or recreational activities were assigned an average MET value equivalent to 8.0. Participants were asked to report the total number of hours and minutes per day and numbers of days per week, over the past four weeks they have spent on different physical activities. Total number of minutes per week was calculated and these were changed into MET minutes per week. Based on their MET minutes per week, the respondents were evaluated for making comparisons against WHO recommendations on physical activity, which is equal to 600 MET minutes/week¹². Furthermore there was no significant difference between different levels of physical activity and BMI weight categories of the students (Table 5).

Sedentary Behavior of the Participants

Lastly the participants were asked about their sedentary lifestyle like watching T.V, playing computer or video games, reading, sitting with friends, and traveling in car, bus, train, etc. 22% students spent between 4-7 hours in sedentary activities while 39% spent between 8-11 hours a day and 39% students spent between 12-15 hours on such activities. Mean sedentary time spent was 10 ± 3.2 hours per day. There was a statistically significant association between sedentary lifestyle and BMI weight categories of the undergraduate medical students (Table 6)

DISCUSSION

In the study population, 18.6% were found overweight and 15.7% were obese. Results findings are in accordance with the findings of previous studies carried out among the medical students in Pakistan and other countries, such as Rehman Medical College Peshawar¹³, Dow and Sindh Medical College¹⁴, and Indian

studies^{15,16,17}.

Present study findings are comparatively lower than the findings of prior studies conducted in private medical colleges of Karachi, which reported that almost 44% male and 61% female medical students were overweight or obese⁹. Similarly 41.7% medical students of Baqai Medical University were overweight¹⁰. The reasons of low figures in our study might be due to difference in eating habits and level of physical activities of the medical students.

Regarding the eating habits of students it was found that 98% of the participants were consuming \geq 1-2 serving of fruits daily, while 87% students consumed at least 1-2 or more serving of vegetables daily. Similar results were reported by M. Ashraf Chudery et al¹⁸ and Lebanese American University¹⁹. In contrast, Chytra R Rao et al reported that 14% medical students were taking fruits and vegetables at least 5 times a day²⁰. Another Indian study reported that 68% medical students ate fruits \geq two days per week and 81% students ate vegetables for $>$ 5 times a week²¹.

In our study more than 70 % students were taking the recommended serving of meat, poultry, fish, nuts and legumes and almost 70% students consumed the recommended serving of milk and dairy products. Contrarily, an Indian study reported that 20% undergraduate medical students consumed meat at least one time a week, 56% ate chicken at least one time/ week and 62% ate egg at least 3 times/week²¹.

Present study found, that only 40% respondent consumed junk food \geq 3 times per week, 35.7% consumed fruit juices at least 3 or more times / week and 32.3% students had fizzy drinks \geq 3 times a week. Similar findings were reported among Indian medical students¹⁵.

The findings in our study were comparatively lower than the finding of previous studies from different countries, which found greater proportion of Pakistani medical students i.e. 96% eating junk food and 72% taking fizzy drinks daily¹⁰. Chytra R Rao et al reported that 84% students of Kasturba Medical College (India) were taking snacks 2 times/day, 89% had fizzy drinks regularly, 98% had fast food regularly and 99.6% consumed bakery items regularly²⁰.

The study found no significant difference between BMI categories and frequency of major food group's consumption of the students. These finding were consistent with the results of previous studies, such as a study carried out among medical students in Malaysia²² and India^{16,21}. Contrasting findings have been reported by Nisar N et al¹⁰ and Mahmood S et al¹⁴. Difference in the results might be due to different methods used for measurements of food habits of the participants and analysis procedure used in previous studies, or it might be due to information bias.

In the study population, it was noticed that 48% respondents were undertaking moderate exercises and about 17% of the students were doing strenuous exercises. Similar results were reported by Nisar N et al¹⁰ and Kokila Silvaraj and P. Sivaprakasam¹⁵.

Etiology of obesity is multifactorial. The role of physical activity/ exercise is controversial. Our study found no significant difference between different levels of physical activity and BMI categories of the students. These findings are similar to the findings of previous studies such as a Pakistani study²³ and Indian study²⁰. Conversely, our findings are not consistent with the finding of studies carried out in Lahore Medical College,¹⁸ and Fatima Jinnah Dental College, Karachi⁹.

The reasons for difference in the results might be due to adopting different sampling techniques, methods of measurements for physical activities and statistical data analysis used.

One of the key results of our study was the predominant sedentary life style among our study population. Approximately 23% of the study population spent between 4-7 hours/day in sedentary behavior, 39% students spent almost 8-11 hours per day while 39% students spent between 12-15 hours a day in sedentary behavior. Similarly 57% medical students of India spent almost 15-30 hours/week in sedentary behavior, 22% students spent 31-45 hours/week and 21% had spent more than 45 hours per week¹⁵. Unlikely only 37% medical students of Madras Medical College of India had sedentary life style for more than four hours/day²¹. Furthermore, significant association was found between sedentary lifestyle and BMI weight categories. This might be one of the reasons for high prevalence of overweight and obesity in our study population. Similar results were reported from Lahore medical college¹⁸, Fatima Jinnah Dental College, Karachi⁹, and Tamil Nadu, India²¹.

Limitations of the Study

- Being a cross sectional study, couldn't establish a cause & effect relationship.
- Self administrated questionnaire might have introduced some error in understanding of the question and recall bias.
- Due to limited resources, in the present study only BMI was used to determine the prevalence of obesity. BMI could not distinguish clearly between weight associated with fat and weight associated with lean tissue.

Strengths of the present study were the use of representative sample of public and private medical students in Peshawar district and a validated and comprehensive pretested structured questionnaire was used for assessing the eating habits of the undergraduate medical students.

CONCLUSION

One of the most important finding of our study was the dominance of sedentary life style among the undergraduate medical students and it was found to be the major risk factor promoting obesity in the medical students. Awareness programs are needed to promote healthy life style to prevent obesity and obesity related diseases.

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