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**CROSS-SECTIONAL STUDY OF DETERMINANTS OF BODY MASS INDEX IN A  
MEDICAL INSTITUTE OF LAHORE PAKISTAN**

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**ABSTRACT**

**Background & Objective:**

Today's generation is facing a major health problem that is obesity. It is becoming an epidemic leading to diabetes, hypertension and Ischemic heart diseases. Medical students due to over stress and peer pressure of studies are not able to be involved in physical activities and so they develop inappropriate snacking habits. This makes them vulnerable to this epidemic disease. Human ability to consume energy stores declines after 40 years and they gain weight with the exact amount of food they take before 40 years. According to survey African, Asian, Latin American and Middle Eastern countries are facing obesity. Today's medical students are tomorrow's doctors so they should be a role model for the community.

**Methodology:**

This was a formal questionnaire based cross-sectional study to observe the factors influencing medical students' BMI. This study was conducted at Rahbar Medical and Dental College (RMDC) Lahore Pakistan. The survey was conducted after ethical clearance by the college's ethical clearance committee. The respondents were students from 1<sup>st</sup> year to 5<sup>th</sup> year MBBS studying in RMDC.

**Results:**

The data was obtained from 137 medical students of Rahbar Medical College; among the total respondents 85 (62%) were female and 52 (38%) were male students. Among 137 students 88 (63%) of these respondents were within normal BMI range (18.5-24.9), 39 (20%) were found overweight and obese while 14 (12%) found underweight. Out of the total respondents 59 (43%) students were performing 2-3 times exercise per week, 16 (12.4%) were doing exercise 4-5 times per week, 25 (18.2%) were doing exercise daily, 5 (4%) had other physical activity, while 32 (23%) had no physical activity throughout the week. It was also observed that physical activities during regular week was 33(25%) and during examination was 100 (73%). It was observed 32(23%) of the respondents consume 4 or more drinks per week while 42(31%) did not consumed a single drink per day. Out of the total respondents 38 (28%) had less than 6 hours sleep while 98 (72%) had more than 6 hours sleep.

**Conclusions**

This study concludes that, most of the students had normal BMI. The group with the normal BMI had the highest physical activity. The sleep pattern observed normal BMI group was getting sleep for mostly between 6-8 hours/day. The consumption of carbonated drinks was not high in the group of normal BMI.

**Keywords: BMI, Medical Students, Exercise, Sleep, Carbonated drinks, Examination**

**INTRODUCTION**

Today's generation is getting more obese and slower, obesity has become a major problem and presence of excess fat in the body may lead to many health problems [1]. World Health Organization has three ways of measuring obesity that is Basal Mass Index, waist circumference and waist to hip ratio [2].

Obesity is mostly due to sedentary lifestyle and has become so common in the recent years that it is now labeled as an "escalating epidemic" causing major health issues such as hypertension, diabetes, ischemic heart diseases in both developed and developing countries [3].

Medical education requires extensive efforts and continuous studying hours that lead to social isolation. The other effects of medical education include variations in expectations and reality, fear of failure, passing of test or promotion examinations and peers pressure that all lead to psychological stress [4, 5]. This increase in stress and various other life style factors such as increased intake of fast food, inappropriate snacking habits, meal skipping, reduced intake of home cooked meals, lack of physical activities, imbalance between the energy intake and energy requirements and economic status of the student is contributing to

accumulation of energy stores within the body [6-8]. Human ability to consume energy stores declines as the person ages especially after 40 years thus explaining weight gain in people above 40 years of age while consuming exact same amount of food that is taken by people with age less than 40 years [9, 10]. Some researchers are of the opinion that weight gain in medical students may be due to inappropriate intake of food and lack of comprehensive knowledge about junk food effects on the human body [11-13].

Several studies carried out in many countries indicate that that obesity rates have increased in the urban population due to high calorie food intake and sedentary life style. A study was conducted to observe the levels of obesity in different countries of the world. Among the African countries Nigeria has the least percentage of obesity that is 10% while South Africa ranking second with 10.8%–24% and Egypt has the highest percentage 25.3%–59.4%. Among the Asian countries, China is having the lowest rate of obese population that is 2.9%–14.3% while Thailand 31%, Malaysia 20%–30.1%, Bangladesh 20.8%, Pakistan: 13%–52.6% and India: 11%–37.5% populations are considered obese. Latin American countries, Colombia and Mexico are having 12.4%–16.7% and 31.6% obese population respectively. The Middle Eastern countries,

Saudis: 47.9%, Omanis: 28.2%, Kuwaitis: 42%, Iran's 12.4%, and Turkish: 10%–47.4% people are obese [14].

Today's medical students are tomorrow's doctors, they are the role models and community expect from them to be most knowledgeable and health conscious. The aim of this research is to identify various factors leading to weight gain medical students. During the literature review it was observed that there is very scarce literature available with respect to Pakistan on this subject. Very little research has been done about this topic in Lahore previously.

**Aim:**

The aim is to study factors affecting BMI of medical students.

**Objectives:**

- To check the effect of physical activity, use of carbonated drinks and sleep with their relationship with BMI.

**METHODS****Study design;**

This was a formal questionnaire based cross-sectional study. There were close ended questions, a total of 17 questions.

**Study location;**

This study was conducted at Rahbar Medical and Dental College, Lahore, Pakistan.

**Study population;**

The questionnaire was distributed by the members of Batch E to students of first

year, second year, third year, fourth year and fifth year after taking verbal consent from them.

**Study duration:**

The duration of the study was three months from the April 2018 to the June 2018.

Inclusion and exclusion criteria:

**● Inclusion criteria**

- All the students from 1<sup>st</sup> year - 5<sup>th</sup> year MBBS in RMDC were offered to participate in this research.

**● Exclusion criteria**

Any student who was not present on the questionnaire filling day and the students who are not enrolled in RMDC were excluded from this research.

**Development of questionnaire:**

The Questionnaire was developed with the guidance of the supervising staff. Previous studies were held in reference as well as the aims and objectives to make the desired questions. It was developed using Microsoft Office 2010.

**Data Collection methodology:**

A total of 400 questionnaires were distributed among the students and out of which 137 responded. The students were informed about the research and were given instruction to return the completely filled questionnaire. The data was collected using convenience sampling.

**Statistical analysis:**

The data was entered into IBM SPSS version 23 and the tables and graphs representing the statistics were formed. The data was presented in the form of frequency and numbers.

**Ethical considerations:**

The study was completely anonymous, the identity and the confidential information of the participants was not disclosed. Verbal consent was taken from the participants prior to the filling of the forms and anyone who refused to participate was not forced in any way. Any person who took part in the research was not provided with an incentive. As it is an educational research no review by the ethical board was needed.

**RESULTS**

The data was obtained from 137 medical students of Rahbar Medical College; Among the total respondents 85 (62%) were female and 52 (38%) were male students. Among 137 students 84 (62%) of these respondents were within normal BMI range (18.5-24.9).

**Figure 1**, shows the class wise frequencies of the respondents. Among the students 32 (23%) students are from 1<sup>st</sup> year, 30 (22%) from 2<sup>nd</sup> year, 24(18%) from 3<sup>rd</sup> year, 32 (23%) students are from 4<sup>th</sup> year and 19 (14%) students belong to final year MBBS.

**Figure 2**, interprets that 16 (12%) of students had BMI less than 18.5, 87 (63%) of students had BMI in the range of 18.5-

24.9, 27 (20%) observed with BMI of range 25.0-29.9, 10 (07%) students had BMI greater than 30. To conclude 10 (07%) students found to be obese while 87 (63%) had normal BMI.

**Figure 3**, shows out of the total respondents, 59 (43%) students were performing 2-3 times exercise per week, 16 (12%) were doing exercise 4-5 times per week, 25 (18%) were doing exercise daily, 5 (04%) had other physical activity, while 32 (23%) had no physical activity throughout the week.

**Figure 4**, shows the relation between the percentages of students with consumption of carbonated drink in a week. 16 (12.4%) students consume one drink in a week while 25 (18.2%) students consumes carbonated drinks twice a week, 22 (15.3%) students consumption is 3 times a week, 33 (23.4%) students consume 4

times in a week and 41 (31%) students are non-consumers.

**Table 1**, shows that 19 (23%) students with the normal BMI (18.5-24.9) performed exercise daily while 2 (7%) students with the BMI (25.0 -29.9) performed exercise daily.

**Table 2**, shows that only 15 (18%) of students with normal BMI consumed 4 drinks in a week whereas 5 (50%) of students with BMI above 30 consumed 4 or more carbonated drinks in a week. Carbonated drink consumption is directly related to rise in BMI.

**Table 3**, indicates the influence of sleep on the BMI of the students, 2 (20%) students with BMI 30 and above reported having 5 hours of sleep whereas only 2 (2%) of students with normal BMI (18.5-24.5) slept for 5 hours. The maximum percentage of students with BMI within the normal range slept for 6-8 hours.

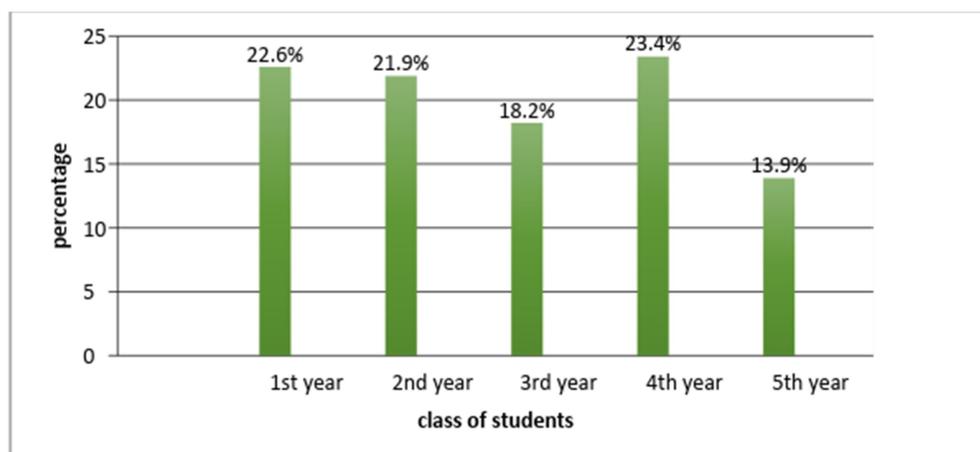


Figure 1: Class wise survey respondents

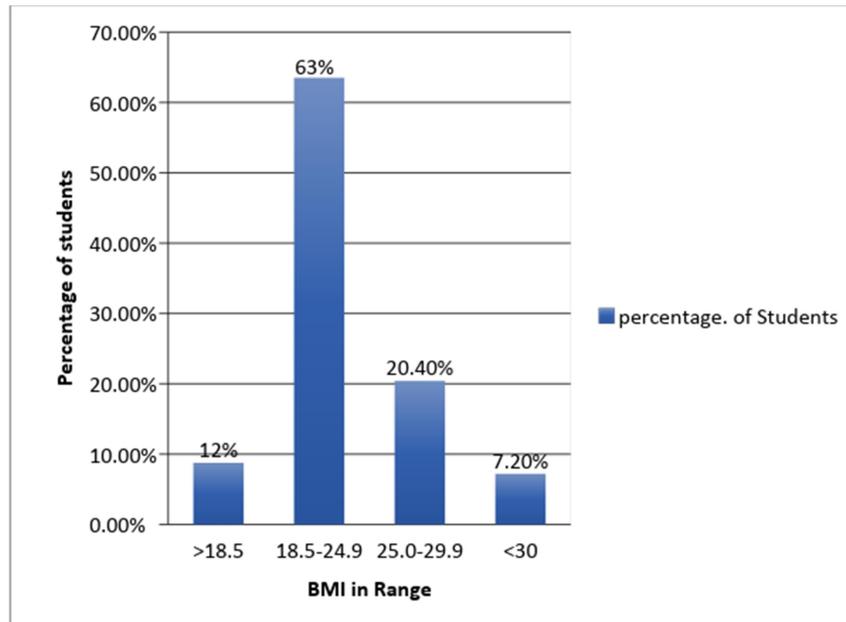


Figure 2: BMI of the total respondents

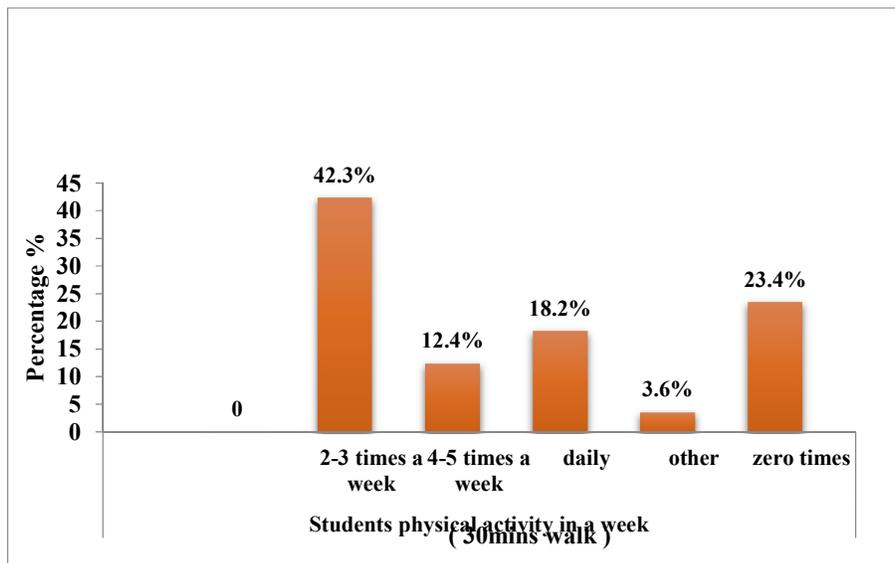


Figure 3: Percentage of Physical Activity performed by the students in a week

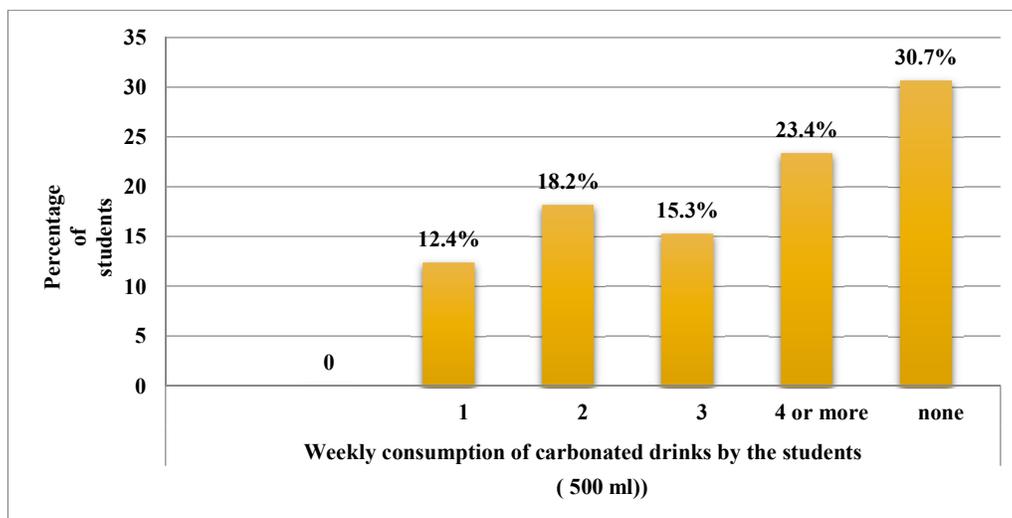


Figure 4: Consumption of carbonated drinks by the students in a week

Table 1: Comparison of BMI and physical activities by respondents during regular weeks

		Students physical activity in a week (walking for 30 minutes)									
		2-3 times a week		4-5 times a week		daily		Other		zero times	
		n	%	n	%	n	%	n	%	n	%
BMI of students in range	>18.5. n 14	7	51%	2	14%	2	14%	1	7%	2	14%
	18.5-24.9 n 84	35	42%	12	14%	19	23%	1	1%	17	20%
	25.0-29.9 n 29	14	48%	3	10%	2	7%	2	7%	8	28%
	30 and above n	2	20%	0	0%	2	20%	1	10%	5	50%

Table 2: Comparison of the weekly consumption of carbonated drinks to the BMI of the total students

Comparison of the weekly consumption of carbonated drinks to the BMI of the total students ( 500 ml)											
BMI of the students in range		Weekly consumption of carbonated drinks by the students									
		1		2		3		4 or more		none	
		n	%	n	%	n	%	n	%	n	%
Less than 18.5 n 14		02	14%	04	30%	02	14%	03	21%	03	21%
18.5-24.9 n 84		11	13%	16	19%	16	19%	15	18%	26	31%
25.0-29.9 n 29		03	10%	04	14%	03	10%	09	31%	10	35%
30 and above n 10		01	10%	01	10%	00	00%	05	50%	03	30%

Table 3: Comparison of the BMI of the respondents to the number of sleeping hours of the students

BMI of the students in range		Sleeping hours of students							
		6 hours		6-8 hours		>8 hours		5 hours	
		n	%	n	%	n	%	n	%
>									
<18.5 (Underweight) n 14		2	14%	08	58%	03	21%	01	7%
18.5-24.9 n 84 (Normal)		22	26%	43	51%	17	21%	02	2%
25.0-29.9 n 29 (Overweight)		07	24%	14	48%	08	28%	00	00%
30 and above (Obese) n 10		03	30%	03	30%	02	20%	02	20%

## DISCUSSION

Obesity, overweight and underweight have appeared to be major problems during the last few decades. The harmful effects and health hazards due to obesity have made it an important topic of worldwide research projects. MBBS students are at higher risk of these issues due to the mode of their study, lifestyle and the eating habits [1, 2]. BMI is one of the most important and major criteria to categorize the population in underweight, overweight, obese and normal categories. WHO defines overweight as BMI equal or more than 25kg/m<sup>2</sup> and WHO has also defined being obese as the following BMI > or = to 30kg/m<sup>2</sup>.

Our study was conducted in Rahbar Medical and Dental college, Lahore, Pakistan, in which total 137 students participated in which 85 (62%) are the females and 52 (38%) are the males. Among 137 students who participated in the study, only 86 (63%) were in normal BMI range that is 18.5-24.9. 14 (10%) students were underweight, 28 (21%) of the students were overweight and 10 (07%) were obese. The results were similar to a study conducted in India<sup>4</sup>. Such prevalence of obesity and overweight is also reported by Boo et (Malaysia) and the research has also been conducted [5, 6].

A previous study reported a low prevalence of overweight and obesity among the

medical students of Trivandrum and Kolkata [7, 8]. An increase in the prevalence of obesity and overweight among the medical students can be due to their sedentary lifestyle and little or no physical activity among the students, the routine of a medical students' life is somewhat responsible for an unhealthy and sedentary lifestyle. Our study showed a significant decline in the students physical activity especially during the exams during a regular week 14(36%) reported daily physical activity and during exams only 5 (4%) reported any physical activity majority of the students did not report any form of physical exercise during the exams period which can also lead to weight gain. The comparison between BMI and regular physical activity showed that 69 (51%) of students with BMI below 18.5 had any form of physical activity 2-3 times a week, 19 (14%) 4-5 times a week and 19 (14%) daily, 58 (42%) of students with normal BMI reported 2-3 times and 19 (14%) 4-5 times a week out of the students with BMI 30 and above 27 (20%) reported physical activity 2-3 times a week and 0% reported activity 4-5 times a week. The importance of moving one's body and actually doing something can be seen by these numbers along with the outcome of a sedentary lifestyle.

This behaviour is remarkably reduced during the exams as MBBS is a very tough

field. The hectic routine of the students does not let them participate in regular physical activities. According to a study conducted in Karachi Pakistan, the major barriers to adopt a healthy lifestyle are the lack of time and stress<sup>9</sup>. According to the same study the students are sleep deficient so they cannot bring a healthy lifestyle into practice<sup>10</sup>. Our study shows that out of obese students, only 41 (30%) had normal 6-8 hours of sleep, 65 (48%) overweight students, 69 (51%) of students with normal BMI had normal hours of sleep that is 6-8 hours and among the students with BMI below normal 79 (58%) got 6-8 hours of sleep. This result states that students that get proper sleep tend to feel more refreshed and are much more active and so that not to gain as much weight. Although those students that are sleep deprived tend to gain weight much easier. According to Silliman et al, lack of time and improper hours of sleep are the most important factors that affect the eating habits of medical students these unhealthy food intake has been a major cause of concern [11, 15].

Carbonated drinks high in calorie and sugar content, are one of the important causes of obesity<sup>15</sup>. Our research showed that as the number of carbonated drinks increased the BMI has also increased. We also see that only 24 (18%) participants with BMI within the normal range reported consuming 4 or more carbonated drinks

and 42 (31%) were non-consumers contrary to this 68 (50%) of the participants with BMI 30 and above reported consumption of 4 or more drinks. High calorie carbonated drinks can cause severe health related issues such as diabetes, kidney disorders, obesity etc. Measures should be taken to educate the students on the harmful effects of an unhealthy diet and an unhealthy lifestyle. As most of the medical students are already aware of many problems, caused by obesity but they are not able to get enough time to bring a healthy lifestyle into practice, so they should be helped with the time management to bring about a balance in their routine.

### LIMITATIONS

The limitations are the following:

- Small sample size that prevented generalization.
- Due to limited resources we were not able to perform an extended survey into various other medical colleges.
- Reduce selection bias by randomization.

### CONCLUSION

This study concluded that the prevalence of low risk obesity appears to be higher in our population. The research conducted the BMI was highest in the normal BMI range (18.5-24.9), this is due to the increased rate of physical activity in this and reduced intake of carbonated drinks. Students with

BMI greater than 30 were found to have reduced exercise patterns, increased intake of carbonated drinks. The sleep patterns observed in this group are seen to be reduced in this group.

We also had to face certain issues regarding data collection these are; limited availability of resources to conduct the study in wide spread manner, we could only conduct the research in one medical college due to limited financial support. Most of the students were not present on the specified day. Most of the students did not complete their forms accurately and some chose more than two options. With more allocated resources we could have conducted this research on a larger number medical student and medical colleges. This leads to a more widespread, generalized and effective research regarding the BMI in medical students.

### RECOMMENDATIONS

- This study should be repeated on a larger sample size so that it can be generalized.
- Medicals students especially those with normal BMI should limit their consumption of carbonated drinks to avoid sugar related health problems.
- Regular exercise especially during exams can have a positive influence on a student's health.

- Inappropriate sleeping habits should be corrected to improve the general well-being of a person.

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### CONFLICT OF INTEREST

Authors declare no conflict of interest.

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