Association of Body Mass Index with Lifestyle Behaviours among Students of Punjab University

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Abstract

Objective: To determine association of body mass index with life style behaviours among students of Punjab University. Methodology: This was a cross sectional study, done among Punjab University students. Study was started after approval of Institutional Review Board of the Department of Public health and after taking informed consent. Data was collected on a self structured questionnaire. Body Mass Index (BMI) was calculated after measurements of weight and height. BMI was taken normal in the range of 18.5-24.9 kg/m², under-weight below 18.5kg/m² and overweight 25-29.9kg/m². Then analysis was done using appropriate statistical tests. Results: Most of the respondent (80%) had age group 17-25 years. Majority respondents sleep late night, 93.5% were nonsmoker, 55% had good sleep 6 to 8 hours daily, 50% respondents walk 10 to 20 minutes daily, 90% did not have outdoor games activity, jogging and swimming habit. Majority (60%) respondents had normal BMI, 25% had high and 15% below normal. Demographic variable when associated with BMI age, gender, weight, height, and income were found statistically significant. Similarly, physical activities when associated with BMI then daily sleeping hours, timing of sleeping, daily walk, outdoors games, jogging and use of bike were statistically significant. Conclusion: Lifestyle of University students of young age shows that there is need to create awareness about healthy physical activities and improving their lifestyle behaviours so as to maintain a normal BMI. Descriptive statistics shows that majority of the university students do not have health lifestyle and around 25% had high BMI in spite of young age. There is need of the hour to create awareness about healthy physical activities and improving their lifestyle behaviours so as to maintain a normal BMI.

Keywords: Body Mass Index (BMI), Height, Lifestyle Behaviours, Weight

1. Introduction

Obesity is a medical condition in which extra fat gets deposited in the body to such an extent that it can exert a negative impact on health. Obesity is measured by Body Mass Index (BMI) which has been defined by World Health Organization (WHO) and is achieved by dividing weight of a person by the square of his height. A person is considered as obese when his BMI is over 30 kg/m². The range of 25–30 kg/m² is considered as overweight while

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range of 18.5-24.9 kg/m² as normal^[1]. BMI is associated with the amount of fat present in the body especially in the youth and middle aged people who have more number of obese people. However, for a body, both the quantity and the location of fat deposition in the body are equally important. When extra fat is deposited in different viscera, it is labeled as central obesity which is strongly associated with heart and blood vessel atherosclerosis. It is more dangerous for the body than the fat which is below the skin like in waist and hips^[2].

The cause of developing obesity is multi-factorial including pattern and type of food consumed, levels of daily physical activity, individual susceptibility and social and environmental variables which are determined by biological and genetic factors^[3]. Almost one third of the population of the World is either Obese or Overweight. The global obesity epidemic continues to rise and about two billion people in the world are either overweight or obese^[1]. Obesity was estimated to be the fifth leading cause of mortality at the global level^[4]. The overall prevalence of obesity almost increased three times between the years 1975 and 2016^[1]. This high prevalence of obesity is now a major health issue of the world^[5]. Inactive lifestyle has been found to be causative factor of obesity but exact mechanism is not yet clearly understood. But an association was found between physically inactive life style and obesity^[6-9].

A study found that boys with increased weight tend to be more inactive. But level of physically active life is not easy to measure and is a complex and multi-dimensional procedure^[7,10]. Other factors which also have specific link with obesity development include levels of sedentary life style, and hours of watching television^[7,11]. Physical activity has many health benefits that it provides valid and genuine reasons to convince students to opt and continue an active healthy lifestyle. Regular exercise has lots of benefits on human body especially in students which include development of good muscles mass, prevention and management of hypertension and bone loss, stability in fatty acid metabolism and decreased risk of ischemic heart disease, good self awareness, good control of anxiety and depression, energy levels and good quality of sleep. Actively taking part in physical activities gradually starts decreasing from high schools and then continues up to university levels as students fail to cope with the pressure of studies, they stop doing active physical activity like exercise or sports activities^[12]. Higher secondary schools have been identified as sites where interventions can be done to promote physical activity among students by Healthy People 2010^[13].

For student's exercise becomes difficult when other responsibilities start contributed by poor accountability and added on by lack of energy due to mental exhaustion. They also noted that students feel more encouraged and enthusiastic when they do physical activities with their social circle. As college and university students have their time schedule constrained because of burden of studies yet they can manage their leisure time. It was found that students spend two and half hours a day in front of television and video games and 162 minutes a day in front of computer. Many of the students have accepted the truth that physical activity level was greatly reduced during their transition from school to college level and they are not happy with this downfall. Despite this situation, most of them don't try to increase their hours for exercise and physical activity and even they don't have their regular schedule of exercise^[14]. Prevalence of obesity is increasing around the globe with time^[1,15]. Because of this, complications of obesity related issues are also increasing with time^[16]. The purpose of this study was to determine the range of Body Mass Index, physical activity, lifestyle behaviors and their associations with BMI among university students.

2. Materials and Methods

This descriptive cross-sectional study was conducted in the University of the Punjab Lahore Pakistan with sample size of 200 students of different departments. It was started from 1st April 2016 and concluded on 30th September 2017. Students of both genders were included having. Physically handicapped and non-cooperative students were not made part of the study. After the informed consent sociodemographics data (name, age, sex, contact number, address and monthly income of parents) was recorded on a specified Proforma. Monthly income was grouped as <Rs. 10000, Rs.10000-30000, Rs.30000-60000 and >Rs. 65000. Students' height and weight were recorded. Weight was measured with a standard bath room weighing machine, taken without shoes and having minimum clothes on the body, rounding off to nearest 0.5kg after correcting zero error. Height was measured in the standing position by using stadiometer without footwear measuring to the nearest 0.1cm and then converted to meters. BMI was calculated using Quetelet's Index. Underweight, Overweight and obesity were classified

using the WHO classification. After data collection it was analyzed using SPSS 21. Percentage and frequency was calculated. A chi square test was also applied between the socio-demographic variables and the Body Mass Index. Cross tabulation between different dietary habits and Body Mass Index was also performed. P-value<0.05 was taken as significant. Then different independent variables were cross tabulated with the dependent variable (BMI).

3. Results

Table 1 is demonstrating the distribution of frequencies and percentages of demographic characteristics of participants of the study. Half of them were boys and half were girls. There were 5 weight categories. The most common category was 60% in range of 40-60 KG of weight, then 20% having range 71-80 KG and 10% having range of 61-70 KG. Results of height show that 35% of people have height in range of 1.61-1.7m, two groups make 25% each in the range of 1.51-1.6 m and

1.71-1.8 m. Regarding BMI, 60% of individuals fell in the Normal BMI group while 25% were obese. 15% were below normal BMI. Most individuals (40%) fall in the income group of 30,000-60,000 per month while 35% in the range of >60,000 per month and 25% have <30,000 rupees per month income.

Table 2, is the frequency table of lifestyle and physical activities among university students. First variable is smoking in the table showing that major population i.e., 93.5% individuals in study never smoked while 6.5% are smokers. It also shows that 55% individuals in study sleep 6-8 hours a day while 30% sleep 8-10 hours per day and 15% sleep <6 hours a day. Table also shows that 60% individuals in study sleep after 12MN and before 2AM while second group comprising 35% are those who sleep between 10-12 PM daily, and 5% sleep before 10PM daily.

It also shows frequency of use of bike by the university students. It shows that 60% of people use bike for small daily life activities while other 40% prefer to walk for daily

Demographic Features	Groups	Frequencies	Percentages
A ===	17-25	160	80
Age	26-30	40	20
Condon	Boys	100	Percentages 80 20 50 60 10 20 10 25 35 25 10 10 5 25 10 15 60
Gender	Girls	100	50
	40-60	120	60
Weight (KG)	61-70	20	10
	71-80	40	20
	81-100	20	10
	1.41-1.5m	10	5 25
Height	1.51-1.6m	50	25
	1.61-1.7m	70	35
	1.71-1.8m	50	25
	1.81-1.9m	20	Percentages 80 20 50 50 60 10 20 10 25 35 25 10 15 60 25 25 40 35
	<less normal<="" td="" than=""><td>30</td><td>15</td></less>	30	15
BMI	Normal	120	60
	Overweight	50	120 60 50 25
Income <pre> <300</pre>	<30000	50	25
	30000- 60000	80	40
	>60000	70	35

Table 1.Frequency table of socio-demographic
features (n=200)

Table 2.Frequencies of lifestyle and physical activity
factors (n=200)

Variable	Scale	Frequency	Percent
Smalring	Yes	13	6.5
Smoking	No	187	93.5
	<6 hours	30	15.0
Sleep Hours	6-8 hours	110	55.0
	8-10 hours	60	Percent 6.5 93.5 15.0 55.0 30.0 5.0 30.0 5.0 30.0 5.0 30.0 5.0 35.0 60.0 40.0 60.0 15.0 50.0 25.0 10.0 90.0 10.0 90.0 10.0 90.0 10.0
	before 10PM	10	5.0
Bed Time	10PM-12MN	70	35.0
	12-2AM	120	Percent 6.5 93.5 15.0 55.0 30.0 55.0 30.0 55.0 30.0 55.0 30.0 50 35.0 60.0 40.0 60.0 15.0 50.0 25.0 10.0 90.0 10.0 90.0 10.0 90.0 10.0 90.0 10.0 90.0 80.0
Liss of Dilas	Yes	80	40.0
Use of bike	No	120	60.0
	<10 minutes	30	40.0 60.0 15.0 50.0 25.0
Daily Walk	10-20 min	100	50.0
	20-30 min	50	25.0
	>30 min	20	10.0
Outdoor	Yes	20	10.0
Games	No	180	90.0
I. anima	Yes	20	10.0
Jogging	No	180	90.0
Service and a	Yes	20	10.0
Swimming	No	180	90.0
Climbing	Yes	160	80.0
stairs	No	40	20.0

activities. Fifty parent students (50%) walk daily for 10-20 minutes, and 25% walk 20-30 minutes daily. Third group comprises of 15% who walk <10 minutes. The last group comprises of 10% individuals who walk >30 minutes daily.

Table 2, also shows Frequency Table of outdoor games shows that 90% of individuals are not participating in outdoor games and only 10% of participating individuals are in habit of outdoor games. Table also shows Frequency Table of jogging showing that 90% of individuals are not participating in jogging and only 10% of participating individuals are in habit of regular jogging. Table also shows Frequency Table of swimming showing that 90% of individuals are not participating in swimming and only 10% of participating individuals are in habit of regular swimming. Table also shows Frequency Table of climbing stairs showing that 80% of individuals are in the habit of regular climbing stairs and 20% of not regularly climbing stairs.

Table 3 shows association of BMI with different demographic variables. First association is age with BMI showing out of 120 normal BMI participants, 110 were 17-25 years old. Those, having age >26 years, 75% were having abnormal BMI. Association of gender with BMI shows that 70% of girls had normal BMI while 50% boys had normal BMI. The second important finding is 50% boys were overweight while 30% of girls were underweight. Association between BMI and weight shows that 75% out of normal BMI had weight in 40-60 KG group and only 25% in 61-80 KG group. Among abnormal BMI individuals 37.5% had weight in 40-60 KG group while other 37.5% 60-80 KG and 25% had 81-110 KG groups. Table also shows association between height and BMI. It depicts that among normal BMI individuals, 66.7% had height in ranges of 1.51-1.7 m, 25% in range of 1.71-1.9 m and only 8.3% were in range of <1.5m. Among abnormal BMI individuals 50% were in each height ranges of 1.51-1.7 m and 1.71-1.9 m. Results of association between BMI and income shows that out of normal BMI individuals, 50% belong to the income group of 30,000-60,000 while 33.33% belong to the income group of >60,000 and other 16.7% belong to income group of 10,000-30,000. Out of abnormal BMI individuals 25% belong to the income group of 30,000-60,000 while 37.5% belong to the income group of >60,000 and 37.5% belong to income group of 10,000-30,000.

Table 4 shows association of BMI with different physical activity variables. It depicts that among normal BMI individuals 50% were having adequate sleep daily with 6-8 hours, 25% were sleeping 8-10 hours and 25% were sleep deprived with sleep of only <6 hours. Among abnormal weight individuals 62.5% were sleeping adequately with 6-8 hours daily and 37.5% were sleeping 8-10 hours daily. Table also shows association between BMI and daily time of going to bed. It depicts that out of normal BMI individuals 75% were sleeping after 12 MN, 16.7% were sleeping between 10PM-12MN and only 8.3% were sleeping before 10PM. Out of abnormal BMI individuals 62.5% individual were sleeping 10PM-12MN daily and 37.5% were sleeping after

Table 3.Association of BMI with demographic
factors (n=200)

		BMI			
Variable	Scale/ Group	Below Average and Above Average BMI (<18.5 and >25)	Normal BMI (18.5- 24.9)	Total	P value
	17-25	50	110	160	
Age	26-30	30	10	40	0.000
	Total	80	120	200	
	Male	50	50	100	0.004
Gender	Female	30	70	100	
	Total	80	120	200	
	40-60kg	30	90	120	0.000
	61-80kg	30	30	60	
Weight	81- 110kg	20	0	20	
	Total	80	120	200	
Height	1.4-1.5m	0	10	10	0.000
	1.51- 1.70m	40	80	120	
	1.71- 1.9m	40	30	70	
	Total	80	120	200	
	10000- 30000	30	20	50	0.000
Income	30000- 60000	20	60	80	
	>60000	30	40	70	

	BMI				
Variable	Scale/ Group	Below average and above average BMI (<18.5 and >25)	Normal BMI (18.5- 24.9)	Total	P value
Daily Sleep hours	<6 hours	0	30	30	0.000
	6-8 hours	50	60	110	
	8-10 hours	30	30	60	
	Total	80	120	200	
Bed Time	Before 10PM	0	10	10	0.000
	10PM- 12MN	50	20	70	
	After 12MN	30	90	120	
	Total	80	120	200	
	Yes	40	40	80	0.018
Use Bike	No	40	80	120	
	Total	80	120	200	
	<10 minutes	20	10	30	0.000
	10-20	21	80	101	
Daily	20-30	29	20	49	
Walk	>30 minutes	10	10	20	
	Total	80	120	200	
Outdoor Games	Yes	14	0	14	0.000
	No	66	120	186	
	Total	80	120	200	
Jogging	Yes	14	0	14	0.000
	No	66	120	186	
	Total	80	120	200	
Climbing	Yes	70	90	160	0.03
	No	10	30	40	
	Total	80	120	200	

12MN. Table also shows association between BMI and use of bike for daily small works. It depicts that out of normal BMI individuals 66.6% were not using bike for routine small works and 33.3% were using bikes. Out of overweight individuals 50% individual were using bikes for small works and 50% were not using daily. Table also shows association between BMI and minutes of daily walk. It depicts that out of normal BMI individuals 66.7% were doing walk daily 10-20 minutes, 16.7% were walking daily 20-30 minutes, 8.3% were walking >30 minutes and 8.3% were walking <10 minutes. Out of abnormal BMI individuals 26.25% individual were walking <10 minutes, 25% 10-20 minutes, 36.25% were walking 20-30 minutes and 12.5% were walking >30 minutes. Table also shows association between BMI and playing outdoor games. It depicts that out of normal BMI individuals all were not playing outdoor games. Among overweight individuals of 82.5% individual were not playing outdoor games while 17.5% were playing outdoor games. Table also shows association between BMI and doing jogging. It depicts that out of 120 normal BMI individuals all were not doing jogging. Among the overweight individuals 82.5% individual were not doing jogging while 17.5% were doing jogging. Table also shows association between BMI and climbing stairs. It depicts that among normal BMI individuals 75% were climbing stairs daily while 25% were not climbing. Among the abnormal BMI individuals 87.5% were climbing stairs daily and 12.5% were not climbing stairs daily.

4. Discussion

Our results show that students with young age group are more active and have normal BMI than the more grown one. The ones with good income also have normal BMI, while those with less income have more chance of having abnormal BMI. United States Surgeon General published a report on health benefits of physical activity which provides strong and valid reasons to keep and maintain a physically active life. despite these proven facts, 2000 National College Health Assessment results show that 57% males and 61% females of college students don't do regular high output exercise which is essential that is at-least 3 out of 7 days^[17]. However, in current study 90% respondents do not do exercise and only 15% respondents walk less than 10 minutes, 50% 10-20 minutes, 25% for 30 minutes and only 10% for more than 30 minutes. This attitude is depicted due to biking which is almost 40% within the university.

Report of Healthy People 2010 found that higher secondary schools are the places where maximum interventions can be done by promoting physical activity among students. Report also found that college students in America are not doing required hours of physical activity recommended for a week. Because of this fall in hours of physical activity, there is decline in physical fitness among students moving from high schools to college level^[13]. During last 50 years, obesity rate has become double in the United States, having 34% obese adults till year 2005. This increase in obesity rate is considered because of regularly increasing amount of in energy intake which leads to consistently weight gain each year, approximately 0.2-0.8kg/year^[18]. The knowledge and classification of body mass index is important for college student and they should be aware that this can affect their physical health status. Our study shows that most of the students with high BMI are using motor vehicles like Bikes for small daily works which can be done by walking on foot. This results in less energy burn and BMI. (Table 4).

Reported^[19] that only 40% were obese with abnormal BMI, 45% with normal BMI and remaining 15% were below normal BMI in reproductive age group women. However, in current study 60% respondents had normal BMI while only 25% were obese and having abnormally high BMI. However, in both studies 15% respondents had BMI below than normal. In their study most of the women had unhealthy lifestyle almost 60% had habit of daily walk less than 30 minutes however in our study 90% respondents have habit of daily walk for less than 30 minutes, furthermore we categorized daily exercise into four groups. In this study most individuals (40%) fall in the income group of 30,000-60,000 per month while 35% in the range of >60,000 per month and 25% have <30,000 rupees per month income while Sharma's result showed that 60% respondents belonged to high income group (20000-80000).

Reported^[20] that physical activity and BMI were only weakly and inversely correlated (rs, -0.10) however in current study age, gender, weight, height, income sleeping hours, timing of sleeping, daily walk, outdoors games, jogging and use of bike were statistically significant factor when associated with BMI. Reported^[21] that sleeping hours statistically significant associated with BMI. Their study showed that mean daily sleeping time was 7.06 ± 1.03 h (women vs men: 7.14 ± 1.08 h vs 6.98 ± 0.96 h, P<0.001) while in the current study 55% individuals sleep 6-8 hours a day while 30% sleep 8-10 hours per day and 15% sleep <6 hours a day however in current study majority respondents (60%) sleep late night after 2 midnights. Found^[22] that overweight (BMI \geq 25–29kg/m²) and obese (BMI \geq 30-39kg/m²) patients slept less than those with normal BMI (17–24kg/m²). Other authors have also been reported an inverse relationship between daily sleeping hours and risk of obesity^[23,24].

Reported^[25] that physical activity is affected by BMI. However, we explored certain aspects of physical activity and BMI among university students. We found certain factors statistically significant factors such as age, gender, weight, height, income, sleeping hours, timings of sleeping, daily walk, outdoors games, jogging and use of bike.

5. Conclusion

The high occurrence of underweight and overweight with low physical activity levels among our study participants is an issue of serious concern. These observations show that university students despite adequate knowledge are not motivated enough to modify their lifestyle behaviour. The students should be encouraged to adopt healthy moderate to vigorous physical activity and various outdoor sports activities. There is a need to undertake a larger study involving all the university and college students, both undergraduate and postgraduate students to identify prevalence of overweight population and necessary actions should be planned. Considering that lifestyle risk factors play an important role in the causation of overweight and obesity, this is need of time locally, nationally and internationally, representative prevalence studies of lifestyle risk factors should be conducted among different population groups.

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