

Factors Related to Obesity among Female Students of a Medical College in Bangladesh

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Abstract

Introduction: The prevalence of obesity is increasing at an alarming rate in many parts of the world. About 2.5 billion people are overweight and one third of them are obese worldwide. Obesity has now become a public health issue affecting both developed and developing countries simultaneously. It is a multifactorial condition caused by a combination of behavioral, social, environmental and genetic factors. Females are particularly vulnerable to developing serious chronic health conditions associated with obesity. The aim of the study was to identify overweight and obese female medical students during their undergraduate years and address the issue of obesity. Identifying and addressing the risk factors at an early stage may help to reduce various morbidities and long-term complications among female medical students.

Methods: A cross sectional descriptive study was conducted among 253 female medical students of Green Life Medical College from October 2022 to December 2022. Non probability purposive sampling was done and data were collected through face-to-face interview by using semi-structured questionnaire.

Results: Among 253 female medical students, half of them (54.9%) were found to be in normal BMI range. However, 28.9% and 13% were found overweight and obese respectively. Majority (88.5%) had their sleeping time less than 7 hours and maximum students (83%) had mentioned the usual bed time is after 12 am. More than one third female medical students (39.9%) did not exercises regularly. One third (36.8%) did exercise only for just 30 minutes among those who did exercise and only 21.1% did >30 minutes and about half (47.4%) preferred walking as their mode of exercise. Majority (88.9%) of them did not follow a diet chart. Family history of obesity was present in only 10.28% respondents. About one fourth female students (19.8%) had irregular menstrual cycles. Two third (78.66%) of female medical students in this study were found to be desk bounded for more than 3 hours in a day. This study revealed that obesity is significantly associated with menstrual irregularities ($P=0.024$, $Or=0.490$, 5% $CI=0.262-0.917$) and desk bound ($P=0.039$, $Or=1.961$, 5% $CI=1.026-3.747$). This study found no significant association between obesity with family income, physical activity, sleeping habit and food habit.

Conclusion: Obesity is a new challenge for developing countries and urges immediate attention and prevention. The prevalence of obesity and overweight increased among the young girls at a higher rate. Health promotion can be done by health education and lifestyle modification in terms of healthy sleep habit, desk bound habit and regular physical exercise.

Keywords: Obesity, BMI, Physical exercise, Menstrual irregularities, Deskbound

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Introduction:

The prevalence of obesity is increasing at an alarming rate in many parts of the world. Adult obesity has more than doubled since 1990 and now 1 in 8 people were living with obesity globally.¹ According to World Health Organization (WHO), in 2022, 2.5 billion adults (18 years and older) were overweight and 890 million were obese.¹ Worldwide, at least 2.8 million people die each year as a result of being overweight or obese and an estimated 35.8 million (2.3%) of global **Disability-Adjusted Life Years (DALYs)** are caused by overweight or obesity.²

The problem of overweight or obesity is no more restricted only to the developed world.³ It is a new challenge for developing countries and urges immediate attention and prevention. The prevalence of obesity and overweight increased among the young girls aged 18 to 23 at a higher rate.⁴

Based on the existing prevalence and the epidemiological evidence linking obesity with a range of physical and psychosocial health conditions, it is reasonable to describe obesity as a public health crisis that severely impairs the health and quality of life of the people.³

Overweight is a condition of excessive fat deposits. Obesity is a chronic complex disease defined by excessive fat deposits that can impair health.¹ Obesity may be measured and categorized in various ways, which include body mass index (BMI), waistsize, waist-to-hip ratio (WHR), and percent body fat. The most commonly used measure of obesity is BMI, which is a supporting marker for a person's body fat composition, based on a person's weight in kilograms and height in meters.⁵ According to WHO, BMI of 18.5 to 24.9 is normal weight. Overweight is defined as a BMI of 25 to 29.9, and BMI of 30 or greater is considered obese. Moreover, morbid obesity is a BMI above 40.⁶

Overweight and obesity result from an imbalance of energy intake (diet) and energy expenditure (physical activity). It is a multifactorial disease resulting from a combination of individual factors, psycho-social factors and genetic variants.¹ Individual factors include lack of physical activity, dietary habit, sedentary lifestyle, hormonal imbalances and use of medication. Family history strongly influences the development of obesity. Stress increased cortisol levels which may redistribute fat into the stomach area and increase food cravings which is very common now-a-days amongst young females. Certain medications such as antidepressants, steroids, antipsychotics and diabetic medications may lead to weight gain.⁷

Obesity increases the risk of several health conditions including diabetes mellitus, hypertension, dyslipidemia, ischemic heart disease and obesity related cancers.⁸ Women with a BMI greater than 45 kg/m² have a sevenfold higher risk of developing gallstones. Additionally, overweight and obesity are associated with menstrual irregularities, infertility, miscarriage and adverse pregnancy outcomes.⁸

Females are at a higher risk of being affected with serious chronic medical conditions deriving from obesity.⁸ At the

same time, the lack of an effective health system response to identify excess weight gain and fat deposition in their early stages is aggravating the progression to obesity. It is alarming as medical students are the role models for the general population to follow in terms of a healthy weight and diet. But very few studies have actually been conducted regarding the determinants related to obesity amongst female medical students. The college years are a formative period when many young females can be aware about their life choices and direct their lifestyle accordingly which will later on have great impacts in their life. So medical colleges can use this opportunity to reach students during their undergraduate years and addressing the risk factors earlier may lead to reduce different morbidities and lifelong complications. The conclusions deriving from this study will help the female medical students to mitigate these health risks by being informed and well prepared for high-risk situations.

Methods:

The study was carried out in Green Life Medical College from October to December, 2022 among 253 female students of Green Life Medical College (Phase I, Phase II, Phase III & Phase IV). Non probability purposive sampling was done. Data were collected using semi structured questionnaire by face-to-face interview. Ethical consideration was followed strictly. Participant anonymity and confidentiality were maintained. Participation was entirely voluntary and informed consent was provided to all participant. Objectives and goals were explained at the beginning of the questionnaire to all participating students and they enrolled after they get consent to participate in the study. After completion of data collection, those were checked and edited for consistency. Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 23.

Results:

Table I demonstrate that age of the students (n=253) ranges from 18 to 25 years. Near half of them were within the age group of 22-23 years. Majority were Muslim (85.8%) and unmarried (95.7%). About half of the students (54.9%) had their family income above 60,000 taka. Two third of them (86.6%) belong from nuclear family. Regarding father's occupation, 41.5% were businessman followed by government service holder (28.9%), non-government service and other professions were 21.3% & 8.3% repetitively. Majority (67.2%) student's mother were homemaker followed by government service holder.

Table I
Socio-economic condition of the participants

Variable	Frequency	Percentage (%)
Age distribution		
18-19	21	8.3
20-21	80	31.6
22-23	115	45.5
24-25	37	14.6
Monthly family income (in taka)		
>60000	139	54.9
<60000	114	45.1
Father's Occupation		
Businessman	105	41.5%
Government service	73	28.9%
Non-government service	54	21.3%
Other professions	21	8.3%
Mother's Occupation		
Homemaker	170	67.2%
Government service	49	19.4%
Non-government service	19	7.5%
Businesswomen	04	1.6%
Other professions	11	4.3

Table II outlines that about half of the respondents (54.9%) were within the normal BMI range. Considerable number of female (28.9%) were overweight and very few (3.2%) of them were underweight.

Table II
Distribution of BMI among participants according to WHO classification

BMI	Frequency	Percentage (%)
<18.5 (Underweight)	8	3.2
18.5-24.9 (Normal)	139	54.9
25-29.9 (Overweight)	73	28.9
≥30 (Obese)	33	13.0
Total	253	100.0

In figure 1, the study population was further divided into two groups which are Non-obese (BMI <30) and Obese (BMI ≥ 30), to assess the association of obesity and all studied variables, including food habits and regular physical activity. Non-obese group includes underweight,

normal and overweight according to the range of BMI. The frequency of Non-obese and Obese that is 147 (58.1%) and 106 (41.9%) respectively.

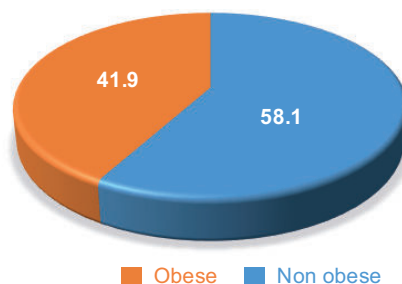


Figure 1: *Scenario of Obesity of the participants*

Figure 2 presents that most of them (80.2%) had regular menstrual cycles and about one fifth (19.8%) had irregular menstrual cycles. Only 17% (43) students had systemic disease and 83% (210) had not. Near half of them (56.9%) had diagnosed psychological health issues like anxiety, depression, revealed by asking question.

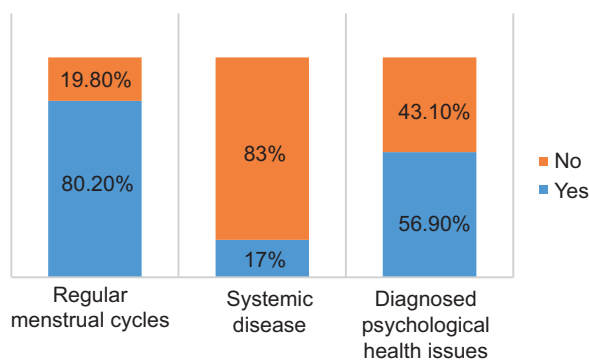


Figure 2: *Medical History of the participants*

Table III illustrates that about two third (78.7%) of the students were desk bounded for more than 3 hours in a day while 21.3% were less than 3 hours in a day. Two third (60.8%) of them did regular exercises but 39.9% did not. Among 152 who did regular exercises, half of them (50.7%) did exercise 3-4 days in a week while 29.6% did on a daily basis. The duration of exercise was less than 30 minutes (42.1%), while 36.8% did for just 30 minutes and only 21.1% did for more than 30 minutes. Majority (88.5%) had their sleeping time less than 7 hours and maximum students (83%) had mentioned the usual bed time is after 12 am.

Table III*History of regular physical activity of the participants*

Variable	Frequency	Percentage (%)
Desk bounded duration per day		
<3 hours	54	21.3
≥3 hours	199	78.7
Practice of exercise (n=253)		
Yes	152	60.1
No	101	39.9
Practice of exercise in a week (n=152)		
Daily	45	29.6
3-4 days	77	50.7
>4 days	30	19.7
Duration of exercise at a time (n=152)		
<30 minutes	64	42.1
30 minutes	56	36.8
>30 minutes	32	21.1
Sleep cycle		
< 7 hours	224	88.5
≥7 hours	29	11.5
Usual bed time		
Before 12 am	43	17.0
After 12 am	210	83.0

Table IV shows food habit of the respondents. Among them only 11.1% respondents follow a diet chart. Maximum (71.5%) took meal 3-4 times per day and only 3.6% took 5-6 times per day. Majority (63.7%) consumed food 2 hours before bed time.

Table IV*Food habit of the participants*

Food habit	Frequency	Percentage (%)
Following a diet chart		
Yes	28	11.1
No	225	88.9
Number of meals taken		
1-2	63	24.9
3-4	181	71.5
5-6	9	3.6
Consuming food 2 hours before bed		
Yes	161	63.7
No	92	36.3

Majority consumed sweet, fruits, soft drink and fast food several times in a week that is 26.5%, 42.3%, 35.6% and 29.6% respectively. (Table V)

Table V*Duration of food consumption by the participants*

Item of food consumed	Everyday	Once a week	Several time a week	Once a month	Several times in a month	Never
Sweet	21(8.3)	65(25.7)	67(26.5)	40(15.8)	48(19)	12(4.7)
Fruit	73(28.9)	34(13.4)	107(42.3)	14(5.5)	20(7.9)	5(2.0)
Fast food	28(11.1)	73(28.9)	75(29.6)	32(12.6)	40(15.8)	5(2.0)
Soft drink	33(13.0)	50(19.8)	90(35.6)	25((9.9)	31(12.3)	24(9.5)

Table VI highlights that there are significant association between obesity with menstrual cycle ($P=0.024$, $OR=0.490$, (5% $CI=0.262-0.917$) and desk bound ($P=0.039$, $OR=1.961$, (5% $CI=1.026-3.747$) but there was no significant association with others variable like menstrual cycle, regular physical exercise, diet chart, systemic disease, sleep hour etc.

Table VI
Relationship between BMI with other variables

Profile of the respondents	Pearson Chi Square (df)	p-value	OR	95% CI
Family income (e" 60,000 tk & > 60,000 tk)	7.598 (1)	0.006	2.051	1.227 – 3.430
Menstrual Cycle	5.091 (1)	0.024	0.490	0.262-0.917
Regular Physical exercise	0.744 (1)	0.388	1.253	0.75-2.093
Diet Chart	0.088 (1)	0.766	0.885	0.397-1.977
Systemic Disease	0.453 (1)	0.501	1.254	0.648-2.424
Sleep hour	0.004 (1)	0.952	0.976	0.445 – 2.141
Usual time to sleep	1.047 (1)	0.306	1.427	0.720 – 2.829
Consume food 2 hours before bed time	0.168 (1)	0.682	1.115	0.662-1.876
Desk Bound	4.244 (1)	0.039	1.961	1.026-3.747
Eat sweet	6.293 (5)	0.279		
Eat Fruits	2.013 (5)	0.847		
Fast Food	2.973 (5)	0.704		
Soft Drink	5.871 (5)	0.319		

Discussion:

This study revealed that obese and overweight female students were remain between the age group of 18 to 25. A study done in Chennai, India where 49.7% of the undergraduate female medical students aged 17-24 years were found to be overweight and obese which is coincide with our study.⁹

In this study revealed that half of the female medical students (54.9%) were found to be in normal BMI range which is 18.5-24.9. However, 28.9% respondents were overweight followed by 13% were obese. A study conducted among female medical students of South India showed that the percentage of overweight and obese were 18.6% and 5% respectively.¹⁰ An analytical study based on Bangladesh Demographic Health Survey 2014 found that around 23% of women of reproductive age in Bangladesh were obese and overweight.¹¹ But the result does not coincide with other study done in Saudi Arabia and other state of India. In Saudi Arabia the obesity rate is low among medical and dentistry students that is 11.2%.¹² Similarly in Sri Siddhartha Medical College, *Karnataka*, India shows that 14.5% and 1.5% of the students were overweight and obese respectively.¹³ Also in Pune, India the prevalence of female obese students was 16.6%.¹⁴ But in a study of Shyam Shah Medical College, *Madhya Pradesh*, India revealed the high rate of overweight that is 32% and 12% were obese.¹⁵ Lower prevalence of obesity

among female medical students in those area stem from several interconnecting factors like medical education, awareness and lifestyle.

Alterations of daily sleeping hours, nap hours and sleeping late affects the health of the students badly.¹⁶ Adults should sleep 7 or more hours per night on a regular basis to promote optimal health. Sleeping less than 7 hours per night on a regular basis is associated with adverse health outcomes, including weight gain and obesity.¹⁷ In this study maximum students (88.5%) had their sleeping time less than 7 hours and majority (83%) had mentioned the usual bed time is after 12 am. Remarkably we did not found any significant association between obesity and sleeping habit. But a study conducted in Boston revealed that there is an inverse linear relationship between sleep duration and prevalence of obesity. A reduction of 1 hour sleep increased obesity prevalence by 4.1% (95% CI, 1.6-6.6; $P = .002$) and abdominal obesity prevalence by 3.6% (95% CI, 1.1-6.1; $P = .007$).¹⁸ Another study found varying pattern of sleep among students in working days and non-working days and oversleeping at weekends were found to be directly associated with obesity.^{19,20} Sleep deprivation is associated with growth hormone deficiency and elevated cortisol levels, both of which have been linked to obesity. Insufficient sleep can also impair the metabolism of food.²¹

Physical activity is another factor of great importance. This study revealed that, more than one third female medical

students did not exercise regularly. One third (36.8%) did exercise only for just 30 minutes among those who did exercise and only 21.1% did >30 minutes. Similarly, in Delhi, India 30% female were involved in physical activity for a minimum period of 30 minutes a day.²² Our female students (47.4%) preferred walking as their type of exercise followed by other types such as jogging, yoga, skipping, cardio, zumba. But a study conducted in Lahore, Pakistan reveals that only 28.7% of medical students were involved in walking/jogging and 80.7% were not involved in any sports.²³ In this study no significant association was observed between obesity and physical activity. But in other studies, conducted in Bangladesh and Ethiopia indicate the lack of physical activity contributes to obesity.¹¹ The reason behind this may be about half of the female medical students in this study were within normal BMI range and more than half did physical exercise.

The associate findings we got from our study that family history of obesity was present in only 10.28% respondents. Some studies revealed that there is a strong genetic component to the likelihood of having obesity.^{6,12,15,24}

In this study it was found that about one fourth female students (19.8%) had irregular menstrual cycles. This study revealed that obesity is significantly associated with menstrual irregularities ($P=0.024$, $OR=0.490$, (5% $CI=0.262-0.917$). Similarly, other studies showed that adolescent girls with obesity were significantly more likely to experience menstrual irregularities.^{25,26}

It is recommended that individuals who sit for more than four hours per day are considered to have a sedentary lifestyle, which can increase their risk of developing various health problem. When a person remains inactive, the body burns fewer calories throughout the day. If calorie intake is not adjusted accordingly, this may result in weight gain.¹ Two third (78.66%) of female medical students in this study were found to be desk bounded for more than 3 hours in a day. This study found significant association between obesity and desk bound ($P=0.039$, $OR=1.961$, (5% $CI=1.026-3.747$). But a study revealed that sitting time was not associated with obesity. Prior obesity was prospectively associated with time spent watching TV per week but no other types of sitting.²⁷

This study found no significant association between obesity and food habit. But a study in Uttar Pradesh, India revealed that increased consumption of soft drinks, sweets and fast foods are seen to be significantly related to high BMI.²⁸ In a similar study in China, significant relation was found between the consumption of soft drink and fast food and overweight and obesity in adolescents.²⁹ This

could be explained by nearly half of our female students (42.3%) were consuming fruits several times a week and only less percentage (35.6% and 29.6%) were found to have consumed soft drinks and fast foods several times a week respectively.

Conclusion:

Obesity has now become a public health issue affecting both developed and developing countries simultaneously. It is a complex health issue resulting from a combination of causes and individual factors such as behavioral, social, environmental and genetical. Therefore, the purpose of this study was to identify obesity among female medical students during their undergraduate years and address the issue early so that they may lead healthier lives. Health promotion can be achieved through health education and lifestyle modification, including maintaining healthy sleep habits, reducing desk-bound behavior by breaking up sedentary hours with frequent light movement, engaging in regular physical exercise and routinely checking BMI. Inclusion of different physical activities like indoor and outdoor games, sports, aerobic exercises can play a vital role. A range of physical activities from brisk walking for 150 minutes weekly to vigorous activity for 75 minutes weekly can be practiced along with regular sleeping time for at least 7 hours daily play a pivotal part to reduce obesity.

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