

## ORIGINAL ARTICLE

**Prevalence of Obesity with its Associated Modifiable Risk Factors among Adolescents of Aged 17-24 Years: Cross-Sectional Study**

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**ABSTRACT**

**Objective:** This study aims to point out the association of modifiable risk factors and the prevalence and risk factors of overweight and obesity among adolescents aged 17-24 years.

**Study Design:** Cross-sectional descriptive study.

**Place and Duration of Study:** The study was conducted at the Department of Community Medicine, Combined Military Hospital (CMH) College Lahore, Pakistan from April 2022 to May 2022.

**Methods:** A cross-sectional study was performed on a sample size of 108 adult males through nonprobability convenient sampling in CMH Lahore Medical College, Lahore, Pakistan. HbA1c tests were conducted to check blood sugar. A questionnaire was distributed to collect data. SPSS software was used for the analysis of data using the Chi-square test.

**Results:** A total of 108 male cadets participated in the study. Mean age was 20.20 years  $\pm$  1.4 SD. The majority of participants were involved in physical activity and had healthy eating habits. Eighty-nine percent of respondents fall in the category of normal body mass index & 6.5% in the category of overweight & obese & 3.7% were underweight. Forty-seven percent of subjects were physically active for  $\leq$  3 days/week & 57.4% were engaged for  $>$  3 days/week. Fifty-seven percent of respondents had a screen time of 5-7 hours/day & 11.1% has  $>$  7 hours/day. Among 108 respondents, 37% had snacking habits in between meals 1-2 times/week & 20.4% has 3-4 times/week.

**Conclusion:** This study concludes that apart from non-modifiable risk factors, modifiable risk factors also have a major influence on the prevalence of overweight & obesity. Those who exercise & eat healthy have less risk of developing obesity as compared to those who have poor physical activity & unhealthy eating habits.

**Key Words:** *Body Mass Index, Obesity, Physical Activity, Prediabetes.*

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**Introduction**

Overweight & obesity have become one of the most challenging public health concerns of the 21<sup>st</sup> century especially among adolescents. Prediabetes is an early warning sign of type 2 diabetes in which

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the blood sugar level is higher than normal but not enough to be diagnosed as diabetes but known as impaired glucose tolerance. Approximately 96 million American adults are prediabetic which means 1 in 3 are suffering from prediabetes. Almost 80% of them are not aware of it.<sup>1</sup> Obesity is a far-reaching public health problem and adds up to 2.6 million deaths worldwide every year.<sup>2</sup> Overweight & obesity are associated with multiple health problems like cardiovascular complications, hypertension, and hyperlipidemia. Overweight adolescents exhibit a higher prevalence of

comorbidities relative to those of healthy weight.<sup>3</sup> Body Mass Index (BMI) between the 85-95<sup>th</sup> percentile is overweight & may be associated with prediabetes. A BMI greater than the 95<sup>th</sup> percentile is known as obesity.<sup>4</sup>

Globally, obesity has nearly tripled since 1975. According to Global Burden of Disease 2017, a fourfold rise is reported in the prevalence of obesity, from 4% to 18%.<sup>5</sup>

Adolescence is a critical stage of development, when most of the psychological and social changes take place, besides acquiring new lifestyle routines & habits that are the contributing factors of the health status in adulthood.<sup>6</sup> World Health Organization states that 3 out of 4 adolescents do not fulfill the minimum recommended proposal of physical activity. Moreover, unnecessary & uncontrolled food intake that is not parallel with physical activity will speed up the risk of fat accumulation and also create an obesogenic environment.<sup>7</sup>

In this current situation of lockdown, physical activity is almost none because of school closure, and online classes & adults are inclined towards a sedentary lifestyle. Stress and depression might have a part in increased snacking habits, longer screen time, and irregular sleep patterns, which are responsible for obesity.

Obesity has been declared as epidemic so it needs urgent management, especially in times when outside movements are restricted and young adults are at more risk of developing obesity because of reduced physical activity, more screen time on mobiles, and televisions, consumption of high glycemic index foods. An analysis by Mustelin established that children who were less physically active had a 1.35 times greater risk of obesity than those who routinely engaged in physical activity.<sup>8</sup>

The majority of the population is unaware of the risk factors related to obesity & has care less behaviors. A better knowledge & insight of the prevalence of adult overweight & obesity along with its determinants is mandatory to map out the effective strategies to combat obesity.<sup>9</sup> So the rationale of this study is to find out the relationship between the modifiable risk factors and prevalence of overweight & obesity in young adults in relation to physical activity and lifestyle practices. This study aims to

assess the association of modifiable risk factors, lifestyle practices with the prevalence of overweight and obesity among adolescents of aged 17-24 years.

## Methods

A descriptive cross-sectional study was conducted at the Department of Community Medicine, Combined Military Hospital (CMH) College Lahore, Pakistan from April 2022 to May 2022 after obtaining approval from the Ethical Review Board held on dated: 06<sup>th</sup> January 2022 vide letter no: 727/ERC/CMH/LMC. A pretested questionnaire with Cronbach's alpha value of 0.78 was used to collect the data. A total of 108 subjects participated in the study from various classes which included 30,31,27,20 from the first to fourth year consecutively. All were male cadets of aged 17-24 years, all cadets were included in the study, while non-cadets were excluded.

Data was collected to assess the level of physical activity, lifestyle, and dietary habits as independent variables. Overweight and obesity were taken as dependent variables and BMI was measured for this purpose. The blood sugar levels of the participants were assessed through HbA1c. Descriptive statistics were recorded in percentages and frequencies. Chi-squared test was used to evaluate the association between independent and dependent variables by using SPSS software version 22. A *P*-value of less than 0.05 was considered significant.

## Results

Out of 108 male respondents 32% belonged to 17-19 years of age, 47.2% were from 19.1-21 years and 20.3% were from 21.2-24 years of age while the average age was 20.20 ±1.426. Years of education wise 30,31,27, & 20 students belonged to 1st, 2nd 3rd & 4th year respectively. Family history of diabetes & BMI are mentioned. (Table-1).

A total of 89.8% of respondents fall in the category of normal BMI & 6.5% were obese with a mean BMI of 21.67±2.265. (Table-2).

The majority of respondents (94%) were having HbA1c within normal range (less than 5.7mg/dl).

**Table -1: Demographic data (n=108 )**

Demographics	Total	Percentage (%)
<b>Age</b>		
17-19 years	35	32
19.1 -21 years	51	47
21.1 -24 years	22	20.3
<b>Year of Study</b>		
First -year	30	27
Second year	31	28
Third year	27	25
Fourth -year	20	18.5
<b>Family history of diabetes</b>		
Father	18	16.6
Mother	13	12.0
Brother	1	0.9
<b>Body Mass Index (BMI)</b>		
Underweight	4	03.7
Normal	97	89.9
Overweight & obese	7	07.0

Five and half percent respondents had values corresponding to prediabetic range (5.7-5.9mg/dl) which is associated with obesity. (Figure.1).

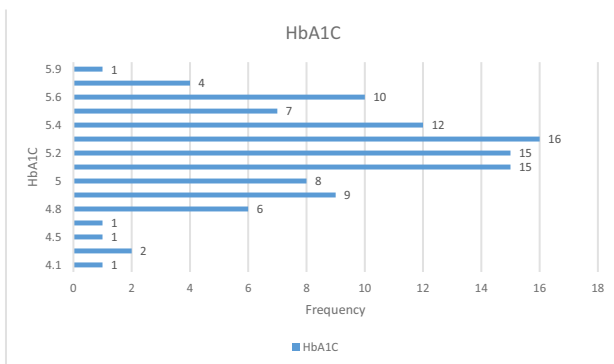
Among those respondents who were engaged in physical activity for less than 3 days, 43(40%) were nonobese & 3(2.7%) were obese, while those who

**Table-2: Distribution of participants based on age**

	n	Minimum	Maximum	Mean	Std. Deviation
Age	108	17	23	20.20	1.426
Body Mass Index (BMI)	108	17.50	34	21.6731	2.26539
Hba1c	108	4.100	5.900	5.20648	0.303

exercised for more than 3 days/week, 58(53.7%) were nonobese and 4(3.7%) were obese. (Figure.2). Out of non-obese respondents 34(31.48%) were

having < 3hours screen time, 55(50.95%) had 3-7 hours & 12(11%) had >7 hours/day screentime. While out of seven obese respondents, 1 had < 3 hours & 6 had 3-7 hours/ day screen time, *p*-value= 0.70. Among non-obese, 31% used to sleep for <5hours / day, 50% for 5-7 hours & 11% of respondents used to sleep for > 7 hours per day. Out of 7 obese one respondent used to sleep for <5 hours & six used to sleep for 5-7 hours daily. (Table-3). Out of 97(89.8%) respondents with normal BMI, 67% snacked rarely or between 1-2 days & 33% snacked between 3-4 days per week. Among 7(6.5%) obese respondents 57% snacked rarely or for less than 2

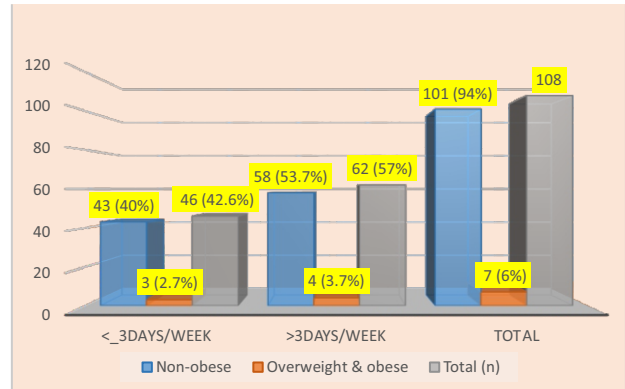


**Fig. 1: Levels of HbA1C among respondents**

days per week & 42.8% snacked between 3-4 days per week.

**Discussion**

In our study, the obese were physically less active as compared to non-obese who were physically more active and spent less time on screen. These findings are aligned with the study of Abida Sultana & Samia Tasnim which states that there is the relation between non-active videography and body mass, and this effect is more pronounced among young adults as compared to children. This unhealthy life



**Fig.2: Relationship between physical activity & obesity**

**Table-3: Association of obesity with screen time & sleep**

Screen time	Non-obese	Percentage %	Obese	Percentage %	P-value
< 3 hours	34	31.48	01	0.9	
3-7 hours	55	50.9	06	5.5	
>7 hours	12	11.11			
Total n=108	101	93.49	07	6.4	
<b>Sleep</b>	<b>Non-obese</b>	<b>%</b>	<b>Obese</b>	<b>%</b>	0.70
< 5 hours	34	31.4%	01	0.92%	
5-7 hours	55	50.9%	06	6.48%	
>7 hours	12	11.11%	00	00	
Total n =108	101		07		

style leads to an increase in disease burden like obesity, type-2 diabetes & hypertension worldwide.<sup>10,11</sup> In this study 85.7% obese respondents had screen time of 3-7 hours/day, and 14.2% had < 3hours/day. These findings are similar to another study which states that healthy life style helps to prevent the development of non-communicable diseases.<sup>12</sup>

Out of 97 respondents with normal BMI 67% snacked for 1-2 times/week & 33% for more than 3-4 times/week. The majority of adults have healthy eating habits which leads to healthy lifestyle. A study was conducted to assess & evaluate sleep duration, lifestyle changes & eating habits. Results showed that there was significant increase in eating salty snacks and sweets other than regular meals, an increase in sleep duration & sedentary lifestyle which increased body weight in 35% of children.<sup>13</sup> Covid-19 lockdown left its long-term effects on new generation especially on children by making them

physically less active, unhealthy eating habits & more screen time which increased their body weight & risk of having diabetes & hypertension later in life.<sup>14</sup> Our results coincide with a study in Poland revealing the positive intent of adults during lockdown which showed that optimum level of physical activity, and decreased intake of junk food & sweets either reduces or stabilizes the body weight. This positive nutritional behavior combined with more physical activity promotes & motivate other individuals to adopt a healthy lifestyle.<sup>15</sup> Reduced physical activities, increased screen time & junk food consumption have harmful consequences with a high prevalence of obesity & overweight.<sup>16,17,18</sup>

Studies showed that covid-19 lockdown restricted physical activity because of the closure of parks, gyms & schools which led them to stay home with less physical activity, more screen time & negative eating habits. All these factors made them prone to increased risk of developing obesity especially in children & adults.<sup>19, 20, 21</sup> Our study showed that the

majority of the respondents were nonobese, physically active & were observing healthy habits, while another study depicts that strict lockdowns led to increase in 30% body weight because 6.2% participants started consuming more meals and 35% spent more time on screens.<sup>22-24</sup>

A study on a population of Spain revealed that the younger age group people maintains their physical activity, less consumption of junk food & more consumption of healthy food even in covid-19 lockdown which kept them fit & healthy, reflecting their practices, which is similar to our study where our cadets were aware of the healthy eating habits, regular exercise to prevent obesity.<sup>25</sup>

### Conclusion

This study concludes that majority of respondents were physically active & were non-obese. They had less screen time & healthy eating practices, thus reducing the risk of obesity. Unhealthy eating practices contribute to high BMI & put adults at risk of obesity.

### Limitations

This study is limited to a group of male participants who remained physically active & had healthy eating habits. This narrows down results to normal & cannot indicate an obesogenic environment in adults who are at risk of developing obesity in the near future. A study design should be opted to assess the modifiable risk factors of obesity in a wider population.

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#### Authors Contribution

**SH:** Idea conception, data collection, data analysis, results and interpretation, manuscript writing, and proofreading

**TR:** Idea conception, study designing, data analysis, results and interpretation, manuscript writing, and proofreading

**AA:** Data collection, manuscript writing, and proofreading

**SA:** Data collection, data analysis, results and interpretation, manuscript writing, and proofreading

**SMHT:** Data collection, manuscript writing, and proofreading

**TM:** Data collection, manuscript writing, and proofreading