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INTRODUCTION

Body mass index is a value derived from mass and height of individual.^{1,2} BMI is defined as a body mass derived from weight in kilo grams which is divided by height in meter square.^{1,2} Its units are kg per m². Normal value of BMI is 18.5 to 24.9.¹⁻³

BMI is classified as people having BMI in range of 25 to 29.9 are considered as overweight, whereas people having BMI 30 to 34.9 are considered as class 1 moderate obese, people having BMI 35 to 39.9 considered as class 2 severe obese, people having BMI 40 to 45.9 considered as very severe obese.^{1,2,4,5} WHO regards a BMI of less than 18.5 as underweight.^{3,6}

PATTERN OF BMI AND ASSOCIATED FACTORS IN RESIDENTS OF HUSSAINABAD AGED 15 YEARS AND ABOVE.

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ABSTRACT... Objectives: To study the pattern of BMI and associated factors in residents of Hussainabad aged 15 years and above. **Study Design:** Cross-sectional study. **Setting:** Community Medicine, Independent Medical College, Faisalabad. **Period:** 15th April to 23th August 2017. **Material & Methods:** A sample of 410 was obtained using Open Epi software. Participants were selected by convenience sampling. Data was collected by self-administered questionnaire. **Results:** Out of total 410 study participants, 250 (61%) were males and 160 (39%) were females. 258 (62.9%) participants were found having BMI in the range of overweight and obesity, 6 (1.4%) participants were underweight and the remaining 146 (36%) participants were having normal BMI range. Amongst 258 overweight/obese people, 83 (20.2%) people were overweight, 112 (27.3%) moderate obese, 30 (7.3%) severe obese and 33 (8.1%) very severe obese. Overall 175 (42.7%) people were suffering from obesity. 249 (60.7%) people were in habit of eating in between meals and 161 (39.3%) were not used to eating in between meals. 95 (23.1%) people eat four times a day and 55 (13.4%) people eat more than four times a day. Likeness and increased frequency of rice and meat [136 (33.2%) and (130 (31.7%)] was more than vegetables and pulses [(91 (22.2%) and (53 (12.9%)] respectively. 157 (38.3%) people were having nocturnal eating habits. 194 (47.3%) admitted of liking the sweets and sweet foods and 170 (41.5%) people admitted of eating more under stressful conditions. 130 (31.7%) participants don't do any kind of physical activity. **Conclusion:** This study describes a high frequency of obesity among population of Hussainabad. Numerous health risk practices were identified including unhealthy dietary habits, eating sweet foods, increased meal frequency, snacking behavior and lack of physical activity.

Key words: BMI, Obesity, Over Weight.

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Obesity is a risk factor for a number of diseases which include high blood pressure, type 2 diabetes, chronic heart diseases, stroke, gall stones and osteoarthritis, poor outcomes of pregnancy and cancers.^{4,7-9}

Factors which predispose people to obesity include genetic predisposition, ethnicity, gender, old age, high socioeconomic status, certain dietary behaviors such as consumption of red meat, high calorie diet, sedentary lifestyle and alcohol use.^{9,10}

Worldwide, obesity has become three times more between 1975 and 2016.^{2,11} Number of overweight adults that is whose BMI is 25 kg/m² or more than

25 kg/m² is around 2 billion and out of these people, 650 million people fall in the category of obesity.¹¹ From the analysis of these numbers, it is found that 39% of world's adult population is overweight and among them 13% are having BMI of 30kg/m² or more that is obese.^{2,11} Numbers of overweight and obese is increasing among children under the age of 5 years and also among adolescents aged 5-15 years.^{2,11} If current trend of overweight and obesity continues, it is estimated that by the year 2025, around 2.7 billion adults of the world will be suffering from overweight and among them, more than 1 billion will be having obesity.¹¹

Like developed countries, increased BMI is also increasing becoming a public health problem in developing countries too. In fact in developing countries, current increased mean BMI is soon expected to surpass the developed countries mean BMI. Change in dietary habits, decrease in physical activity levels and socio-economic status are among the many other factors interacting with each other in a complicated web contribute to rise of BMI in both developing and developed countries.^{12,13}

Like rest of the world, Pakistan has also suffered from the epidemic of overweight and obesity.^{14,15} Females and urban populations are affected with overweight and obesity more than males and urban population.¹⁵ Around 49% females and 34% males are overweight and obese in Pakistan.¹⁶ The trend of overweight and obesity is spreading in lower socioeconomic strata of society too.¹⁶ Given the high prevalence of overweight/obesity in Pakistan and its association with number of different medical diseases, this article aims at studying the pattern of BMI in residents of Hussainabad, an area of Faisalabad and associated factors linked with BMI.

Objectives

1. To study the pattern of BMI in residents of Hussainabad of aged 15 years and above.
2. To study the factors linked with BMI.

Body Mass Index (BMI)

In this study, World Health Organization (WHO)

classification of BMI which is applicable worldwide is taken as reference value.

MATERIALS AND METHODS

A cross sectional study done from April to August of 2017 in Community Medicine, Independent Medical College, Faisalabad. Sample size was calculated electronically using open Epi software, keeping a confidence interval of 95%. A sample size of 410 was obtained. All residents of Hussainabad of age 15 years and above who are willing to participate in the study were included in our study. Participants were selected by convenience sampling. Data was collected by self-administered questionnaire. Questionnaire was adapted from various studies conducted previously & pre-tested on 10 people. Verbal and written consent was taken before administration of questionnaire. Data was entered and analyzed using the statistical package for social sciences (SPSS) version 19.

RESULTS

Among total number of 410 participants of our study, 250(61%) were males and 160(39%) were females. The age of 322 (78.5%) participants was below 40 and 88 (21.5%) above 40. Among the participants, income of 163(39.8%) people was below 20,000 and 247(60.2) above 20,000. Out of 410 people, 403 (98.3%) were married and 7(1.7%) unmarried and 372 (90.8%) were educated and 38 (9.2%) illiterate.

BMI of 146 (35.6%) people was found to be in the normal range and 258 (62.9%) were found to be overweight and obese. Amongst 258 overweight/obese people, 83 (20.2%) people found to be overweight, 112 (27.3%) moderate obese, 30 (7.3%) severe obese and 33 (8.1%) very severe obese. Overall 175 (42.7%) people were suffering from obesity. Only 6(1.4%) people were found to be having BMI in the category of underweight. (Table-I)

Regarding body physique, 152 (37.1%) participants replied that they think their body physique is normal while 258 (62.9%) people considered themselves as overweight/obese. Majority of people that is 338 (82.4%) knew that

obesity is harmful for health while only 72 (17.6%) did not consider obesity harmful for health.

About causes of obesity, out of 258 overweight people, 120 (46.6%) people chose the option of doing too little exercise as the cause of overweight/obesity while 60 (23.2%) thought it is because of too much eating. 36 (13.9%) participants replied that their overweight is because of taking medicines and 24 (9.3%) blamed their overweight to their disease. Only 18 participants (7.0 %) referred to their genetics as cause of their overweight/obesity (Table-II).

Regarding taking food in between meals, 249 (60.7%) people were in habit of eating in between meals and 161 (39.3%) were not used to eating in between meals. 69 (16.8%) people take meal twice a day, 191 (46.6%) people three times a day, 95 (23.1%) people four times a day and 55 (13.4%) people take meal more than four times a day.

123 (30%) people eat fast food once a week, 94 (22.9%) twice a week, 83 (20.2%) three times a week and 67(16.3%) people more than three times a week. Only 43 (10.5%) people were not in habit of taking fast food (Table-III).

Study showed people like to eat rice and meat more than the pulses and vegetables and fruits. 136 (33.2%) people replied rice as the food eaten by them the most and 130 (31.7%) answered meat as the most eaten food. 91 (22.2%) people replied vegetable and fruits as the most frequently consumed food while only people 53 (12.9%) answered pulses as the most frequently consumed food (Table-IV). 69 (16.8%) participants eat twice a day, 191 (46.6%) three times a day, 95 (23.1%) participants take meals four times a day and 55 (13.4%) are in habit of eating more than four times a day. 249 (60.7%) participants were found to eat in between meals (snacking behavior).

Out of 410 participants of the study, 157 (38.3%) people have nocturnal eating habit. Quite a majority of participants that is 194 (47.3%) admitted of liking the sweet foods. 240 (58.5%)

people don't like to eat when they are stressed but 170 (41.5%) people admitted of eating more under stressful conditions

Out of 410 people who are under the study a major part of 280 (68.3%) people doing physical activity and 130 (31.7%) don't do any kind of physical activity.

BMI	Fre- quency	Per- centage	BMI Classification
<18.5	6	1.5%	Underweight
18.5-24.9	146	35.6%	Normal weight
25-29.9	83	20.2%	Overweight
30-34.9	112	27.3%	Moderate obese
35-39.9	30	7.3%	Severe obese
40 and more	33	8.1%	Very severe obese
Total	410	100%	

Table-I. Classification of body weight of participants according to normal, underweight, overweight and obesity:

Cause	Frequency	Percentage
Too much food	60	23.2
Too little exercise	120	46.6
Medicine	36	13.9
Disease	24	9.3
Genetically	18	7.0
Total	258	100

Table-II. Responses of people 'What you think what is the cause of your overweight/obesity?'

Fast food in week	Frequency	Percentage
Once a week	123	30.0
2 times	94	22.9
3 times	83	20.2
more than 3 times	67	16.3
Not even once	43	10.5
Total	410	100.0

Table-III. Frequency of taking fast food per week:

Type of Food	Frequency	Percentage
Rice	136	33.2
Pulses	53	12.9
Vegetables and fruits	91	22.2
Meat	130	31.7
Total	410	100.0

Table-IV. Type of food eaten the most:

DISCUSSION

The prevalence of overweight and obesity in this study were 20.2% and 42.7% respectively. Similar study carried out in Nigeria found prevalence of overweight and obesity 14.8% and 1.3% respectively.³ These alarming high rates of overweight and obesity in our society compared to lower rates in African Nigerian community clearly indicate the negligence of our community towards their health. These high rates are in spite of the fact that majority of study participants (82.4%) know the harmful effects of obesity. This reflects that knowledge failed to impact our community behavior towards their health.

Among 258 people who are overweight and obese, nearly half (46.5%) of the people do very little exercise. Overall 64.9% people showed their dietary preference of eating rice and meat more than vegetables and pulses. Both rice and meat are high calorie foods and contribute to weight gain.¹⁷ This combination of physical inactivity and preferences of high calorie foods are giving rise to epidemic of obesity in our society. Physical inactivity and high calorie foods lead to long term weight gain and this has been proved in a study conducted in USA.¹⁷

Intake of taking fast food is increasing in the community. Only 10.5% participants of the study were not in habit of eating fast food. Rests of the participants consume fast food quite regularly in their daily life. Modern dietary pattern especially fast food intake is highly linked with obesity as proved in a study conducted in china.¹⁸ This high intake of fast food shows lack of awareness of people of eating healthy and balanced diet. Among many reasons of increased fast food intake, one of the reasons might be that it is becoming easily available round the clock and

cheap. That’s why people of all socioeconomic status can afford it. Physical inactivity, preference of rice and meat over vegetables and increased fast food intake are contributing to increase in trend of overweight and obesity.

Frequency of eating four and more than four times a day found in 150 (36.5%) participants and nocturnal eating habits found in 157 (38.3%) participants is quite significant and alarming as both of these habits contribute to weight gain and obesity. This has been proved in a study conducted in United States that describes higher meal eating frequency and snacking behavior does lead to weight gain and obesity.¹⁹ The greater the eating frequency per day and snacking behavior, the higher is the chances of overweight and obesity as suggested in the study conducted in United states.¹⁹ Likeness of eating sweet foods by 194 (47.3%) participants and eating more under stress conditions by 170 (41.5%) participants is worrisome. Two studies conducted on Brazilian students and another study conducted on British students also showed that people do like to eat more under stressful conditions and are more inclined to eat unhealthy foods like sweet foods.²⁰⁻²² However few studies were unable to find the significant effect of stress on increased food consumption.^{23,24}

38% respondents have nocturnal eating habits. In a study conducted in Italy, researchers found that nocturnal eating is positively linked with increased BMI and were of the view that nocturnal eating is an underestimated risk factor for increased BMI.²⁵ On the other hand, another study was unable to find the positive link between the nocturnal eating and increased BMI but did find positive association between nocturnal eating and depression.²⁶ Nocturnal eaters suffer from disturbed and short sleep cycles.^{27,28} Disturbed and short sleep cycles are themselves an independent predisposing factors for increased BMI.²⁸ So probably nocturnal eating leads to disturbed sleep; this short and disturbed sleep itself predisposes the person to eat more. This perpetuates the eating behavior and ultimately leads to increased BMI and thus obesity.

STRENGTHS AND LIMITATIONS

One of the major strength of this study is that it describes the participant's weight according to WHO classification of BMI and categorizes participant's obesity into the three categories of obesity. To authors' knowledge, To authors' knowledge, very limited studies have described the prevalence of three categories of obesity in Pakistan. Further studies are needed to be conducted to explore each of the associated factors linked with abnormal BMI in detail in our local setting.

CONCLUSION

High percentage of our study participants (62.9%) had abnormal BMI (overweight and obese). 64.9% participants admitted of eating more and preferring meat and rice over vegetables and fruits. 60.7% were found to have snacking behavior, 38.3 % had nocturnal eating habits, 41.5% eat more under stressful conditions, and 31.7% participants don't do any kind of physical activity. Only 10.5% participants do not eat fast food while rests of the participants like to eat fast food weekly in varying frequencies.

RECOMMENDATIONS

Proper and extensive health education campaigns are needed to educate the people focusing on encouraging them to adapt healthy lifestyle practices, balance dietary habits, weight adjustments according to their BMI and encouraging them to do physical activity.


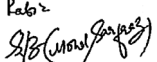
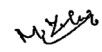


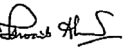
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2	Rabia Arshad Usmani	Analysis.	Rabia 
3	Muhammad Sarfraz	Data collection.	
4	Muhammad Zakria	Literature search.	
5	M. Umar Ghafoor	References.	
6	Marriam Nazir	Reviewed the study.	Marriam Nazir 
7	Shoaib Ahmad Malik	Critical revision.	