ORIGINAL ARTICLE

Risk Factors of Obesity in the Adult Population of Pakistan

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ABSTRACT

Objective: This study was conducted to find the prevalence of obesity in Pakistan and establish the link to know associated risk factors of obesity within the obese population.

Study Design: Cross-sectional study.

Place and Duration of Study: The study was carried out in the Functional Genomics Laboratory at the Department of Biosciences, COMSATS University, Islamabad, Pakistan from November 2017 to December 2021.

Methods: A survey of 1061 individuals (55.97% males and 44.03% females) was conducted which was a national representation of the Pakistani population. The data variables were presented as numbers and analyzed by Chi-square.

Results: Among our study population, 16.71% were obese, 22.9% overweight, and 36.28% had normal body mass index (BMI). Out of 177 obese participants, 63.27% were in Class 1, 25.43% were in Class 2, and 11.3 % were classified as Class 3 obesity. Among obese, males and females were 57.63% and 42.37% respectively. Individuals aged 26-39 were found to be more obese than other age groups. A total of 31.64% of obese individuals were in the age group 18-25, 42.36% were in adulthood (26-39), 15.26% were in middle age (40-54) and 10.74% were in old age (55 and above). Most of the respondents were not suffering from any metabolic disease (81.53%), and 18.47% presented one or more than one metabolic disease. Metabolic complications, smoking, and history of obesity, dietary intake, and physical activity were found significantly associated with health status.

Conclusion: Increase in obesity among Pakistani adults was presented equally in both genders and in all regions. It is significantly associated with several risk factors including history of obesity, physical activity, and dietary intake.

Keywords: *Obesity, Pakistani Population, Prevalence, Risk Factors.*

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Introduction

Obesity is the accumulation of excess fats in the body. When the expenditure of energy is less than the intake of energy, it results in the deposition of triglycerides in the adipose tissues.[1] It is declared a major public health problem and global epidemic by the World Health Organization (WHO), which is a contributing factor in almost 112,000 annual deaths.[2] Obese individuals suffer from a greater risk for multiple health diseases e.g., gallbladder disease, hypertension, type 2 diabetes mellitus, high cholesterol, coronary heart diseases, stroke, osteoarthritis, respiratory problems, sleep apnea,

colon, breast, and prostate cancer. The association of obesity with these diseases poses a serious threat to the economy. Children who have a high body mass index (BMI) are more prone to insulin resistance than children with a normal BMI.[3] This is an alarming situation because insulin resistance can cause diabetes and hypertension. Furthermore, obese children usually grow up into obese adults. Studies show that 2 to 5-year-old children with a high BMI have great chances to become obese adults.[4] Moreover, apart from physical diseases, obese individuals are more likely to suffer from social stigmatization and many psychological problems.[5]

Likewise, obesity is a major epidemiologic challenge, costs the United States of America (USA) $150 billion annually. In the USA 60% of adults are overweight or obese.[6] In Pakistan, it has long been believed that many of its inhabitants suffer from malnutrition. However, Pakistan ranks 9th out of 188 countries in obesity[7] with 13% obesity and 25% overweight burden.[8] In villages, for the age group 25-44, 9% of men and 14% of women are obese, while in cities the percentage is even higher; 22% for men and 37% for women. For the age group 45-64 in rural areas, 11% of men and 19% of women are obese, whereas in urban areas 23% of men and 40% of women are obese.[9]The BMI is defined as the weight in kilograms (kg) divided by height in meters squared (m^2). According to the World Obesity Federation (World Obesity), formerly the International Association for the Study of Obesity and the International Obesity Task Force, overweight is defined as a BMI of 25-29.9 kg/m², and a BMI ≥ 30 kg/m² defined obesity for the Caucasian population. However, it has been suggested that the BMI >27 kg/m² and >23 kg/m² as obese and overweight, respectively, for the Asian population.[10] The highest rate of obesity and its associated diseases in a developing country like Pakistan is very serious. The growing epidemic poses a threat to the economy of the country. Numerous studies indicate that obesity affects a person's work performance and productivity. High BMI reduces spontaneous movement and results in diseases.[11] An ill person, therefore, requires more health care and thus becomes a burden to the economy.[12] With the improvement in access to food, decrease in physical activity and increase in consumption of junk diets, the risk of obesity has increased in developing countries. Previously, people had to do strenuous labor to gather food, but with the advancement in technology that is no longer the case.[13,14] Several factors like urbanization, changing dietary pattern, physical activity, genetic factors, and health condition plays a crucial role in causing obesity.[15-17] Hence, it is important to identify possible causes of obesity in developing countries like Pakistan where poverty is prevalent and medical facilities are very limited. To the best of our knowledge, the data on the prevalence of adult obesity in Pakistan is limited so we conducted this study to find the prevalence of obesity in the Pakistani adult population.

Methods

Study Area

The data was collected from all regions of Pakistan i.e., Punjab, Sindh, Baluchistan, Gilgit Baltistan, Azad Jammu and Kashmir, and Islamabad Capital Territory. The population of each region varies; however, Punjab is the most populous one. Each region has distinct and diverse climatic conditions and environmental factors. The data collected from each region is presumably a collective representation of their population.

Study Design and Approval

The study design was a descriptive cross-sectional study and was approved by the ethics review board, held on October 24, 2017 vide letter no: CUI/Bio/ERB/10-17/01. The questionnaire was shared online through different social media sites as well as distributed as printed copies in different places e.g., hospitals, construction sites, markets, public parks, different households, and universities. Both qualitative and quantitative information was collected in this study. Illiterate people were interviewed, and their responses were filled in by the researchers. A total of 1061 responses were collected.

Socio-Demographic Characteristic Assessment

The questionnaire was translated into English as well as in Urdu for a better understanding of the required material. The collected data was analyzed to determine the risk factors that might be directly or indirectly involved in obesity. The record has been displayed in narrative texts and tables. The following are the items included in the questionnaire.

- Weight and height of a person to determine BMI and previous history of obesity in the family (to know genetic link).
- The socio-demographic background of the respondent, which includes age, gender, occupation, marital status, and region.
- Physical Activity, smoking status, dietary intake, and metabolic complications of the respondent.

The BMI of <18 kg/m², 18-24.9 kg/m², 25-29.9 kg/m² and ≥30 kg/m² were considered as underweight, normal, overweight, and obese respectively. Furthermore, the BMI of 30-34.9 kg/m² was defined as Class I, 35-39.9 kg/m² as Class II, and ≥40 kg/m² as Class III obesity. In this survey, after calculating the BMI of every adult individual, respondents with BMI less than the normal range were listed as underweight and individuals with BMI more than 30 were included in the category of obese.

Statistical Analysis

Statistical analysis was performed using the OriginPro®2015 software. The Chi-Square test was performed for each factor mentioned in the survey. The level of significance was set at $P < 0.05$. The relationships between these factors influencing obesity were analyzed and presented in tables.

Results

Characteristics of Participants

The sample size was very diverse consisting of normal, overweight, obese, and underweight individuals. There was a total of 1061 respondents, out of which 256 (25.07%) were underweight, 385 (37.70%) had a normal BMI, 243 (23.8%) were overweight and 177 (16.6%) were obese. Out of 1061 participants, 55.97% were male and 44.03% were females. The majority of participants were unmarried (65.22%) and 34.78% were married. The majority (56.14%) of respondents were of the age group 18-25. Only 10.56% of respondents were smokers and 89.44% were nonsmokers. Moreover, most of the people consumed proteins (36%), fats (17.34%) and fibers (15.83%). Only a small majority of the participants ate healthy carbs (9.43%) which included high-fiber carbohydrates and unhealthy carbs (7.65%) which included low fiber carbohydrates. A sedentary lifestyle was observed in 56.15% of participants whereas 26.87% of participants exercised less than 15 minutes and 16.98% exercised more than 15 minutes per day. A vast majority of students (58.06%) participated in the survey however others were businessmen (3.2%), housewives (8.96%), and 21.39% were employed. Most of the respondents presented no metabolic disease (81.53%), while 18.47% had one or more than one metabolic disease (Table 1).

Prevalence of Obesity

Out of 1061, a total of 177 participants were obese which makes up 16.71% of the total sample size. Moreover, out of 177 obese individuals, 63.27% were in Class 1 (BMI 30-34.9), 25.43% were in Class 2 (BMI 35-39.9) and 11.3 % were in Class 3 (BMI ≥40) of obesity. 57.63% of males and 42.37% of females were obese. Obese individuals 31.64% were in the age group 18-25 years, 42.36% were in 26-39 years, 15.26% were in middle age (40-54 years) and 10.74% were old (55 years and above) (Table 2).

Discussion

Obesity is a major public health problem in developing countries like Pakistan. There is no data available on the overall obesity prevalence in the adult population of Pakistan. So, the aim of this research was to find the prevalence of obesity as well as the relationship of obesity with multiple risk factors. The prevalence of obesity in our sample was 16.71%, which is alarming. Women are prone to obesity because mostly they are housewives and have sedentary lifestyles. Moreover, women who have polycystic ovary syndrome (PCOS) are often obese and have a high level of hormones called androgens thus 50% of women with PCOS are overweight and obese.[18,19] We observed that gender influences BMI and is a risk factor for obesity.[20] Interestingly, in our data, we observed that males were 2.5% more obese than females. A study conducted by Kapantais et al. showed that this is true in most developed countries e.g., Greece and Spain where more social pressure is put on women to stay thin as compared to men. This results in a greater disparity between the weights of both genders.[21] In Pakistan, an added factor could be that most males are employed, and they have very little time to engage in physical activities e.g., going to the gym or playing a sport. Moreover, our data showed that more married individuals are obese as compared to unmarried individuals. Possible causes of greater

Table 1: Frequency distribution of individuals according to BMI classification (n=1061)

Variable	Underweight	Normal	Overweight	Obese	*P*-value
Gender					
Male	214 (20.16%)	158 (14.89%)	120 (11.31%)	102 (9.61%)	<0.01
Female	42 (3.95%)	227 (21.39%)	123 (11.59%)	75 (7.1%)	
Age					
Young adults (18- 25)	216 (20.34%)	223 (21.02%)	101 (9.52%)	56 (5.26%)	
Adulthood (26-39)	33 (3.11%)	131 (12.35%)	99 (9.33%)	75(7.1%)	<0.01
Middle age (40-54)	5 (0.47%)	17 (1.6%)	26 (2.45%)	27 (2.55%)	
Old age (55- Above)	2 (0.19%)	14 (1.32%)	17 (1.6%)	19 (1.79%)	
Marital status					
Married	27 (2.55%)	123 (11.59%)	120 (11.31%)	99 (9.33%)	<0.01
Unmarried	229 (21.58%)	262 (24.69%)	123 (11.59%)	78 (7.36%)	
Occupation					
Student	208 (19.61%)	238 (22.43%)	106 (9.99%)	64 (6.03%)	
Business	0 (0%)	6 (0.56%)	15 (1.41%)	13 (1.23%)	
Employed	28 (2.64%)	83 (7.82%)	63 (5.93%)	53 (5%)	<0.01
Housewife	11 (1.04%)	20 (1.89%)	33 (3.11%)	31 (2.92%)	
Other	9 (0.85%)	38 (3.58%)	26 (2.45%)	16 (1.51%)	
Region					
KPK	16 (1.51%)	21 (1.98%)	20 (1.89%)	14 (1.32%)	
Punjab	125 (11.78%)	166 (15.65%)	109 (10.27%)	66 (6.22%)	<0.01
Baluchistan	6 (0.57%)	26 (2.44%)	14 (1.32%)	16 (1.51%)	
Sindh	15 (1.41%)	57 (5.37%)	46 (4.34%)	48 (4.52%)	
Kashmir/Gilgit Baltistan	17 (1.6%)	14 (1.32%)	8 (0.75%)	2 (0.19%)	
Federal	77 (7.26%)	101 (9.52%)	46 (4.34%)	31 (2.92%)	
Metabolic Complications					
No	231 (21.77%)	331 (31.2%)	185 (17.44%)	118 (11.12%)	
Yes - 1	17 (1.6%)	44 (4.14%)	40 (3.77%)	43 (4.06%)	<0.01
Yes > 1	8 (0.75%)	10 (0.94%)	18 (1.7%)	16 (1.51%)	
Smoking					
No	245 (23.1%)	343 (32.33%)	215 (20.26%)	146 (13.75%)	<0.01
Yes	11 (1.04%)	42 (3.96%)	28 (2.64%)	31 (2.92%)	
Dietary Intake					
Protein	97 (9.14%)	148 (13.95%)	80 (7.54%)	57 (5.37%)	
Unhealthy Carbohydrates	11 (1.04%)	27 (2.55%)	23 (2.17%)	20 (1.89%)	
Healthy Carbohydrates	24 (2.26%)	37 (3.49%)	18 (1.7%)	21 (1.98%)	
Fibers	50 (4.71%)	71 (6.69%)	29 (2.73%)	18 (1.7%)	<0.01
Vegetables	50 (4.71%)	54 (5.09%)	31 (2.92%)	11 (1.03%)	
Fats	24 (2.26%)	48 (4.52%)	62 (5.84%)	50 (4.72%)	
Physical Activity					
Sedentary	141 (13.27%)	187 (17.62%)	151 (14.23%)	117(11.03%)	
<15 Minutes	70 (6.6%)	115 (10.84%)	63 (5.94%)	37 (3.49%)	<0.01
>15 Minutes	45 (4.24%)	83 (7.83%)	29 (2.73%)	23 (2.18%)	
Obesity History					
Yes	63 (5.94%)	144 (13.57%)	128 (12.06%)	111(10.46%)	<0.01
No	193 (18.19%)	241 (22.72%)	115 (10.84%)	66 (6.22%)	

Note: KPK = Khyber Pakhtunkhwa

Table. 2 Frequency distribution by BMI Categories (n=177)

Variables	Class 1	Class 2	Class 3	*p*-Value
Gender				
Male	62 (35.03%)	28 (15.82%)	12 (6.78%)	0.71477
Female	50 (28.24%)	17 (9.61%)	8 (4.52%)	
Age				
Young adults (18- 25)	43 (24.29%)	8 (4.52%)	5 (2.83%)	0.23188
Adulthood (26-39)	44 (24.85%)	23 (12.99%)	8 (4.52%)	
Middle age (40-54)	14 (7.91%)	8 (4.52%)	5 (2.83%)	
Old age (55- Above)	11 (6.22%)	6 (3.39%)	2 (1.13%)	
Metabolic Complications				
No	84 (47.46%)	26 (14.69%)	8 (4.52%)	0.00123*
Yes -1	22 (12.43%)	15 (8.48%)	6 (3.39%)	
Yes >1	6 (3.38%)	4 (2.26%)	6 (3.39%)	
Obesity History				
Yes	71 (40.11%)	27 (15.26%)	13 (7.35%)	0.90099
No	41 (23.16%)	18 (10.17%)	7 (3.95%)	

Note: **P value < 0.05*

prevalence amongst married people can be pregnancy, overeating, and lack of exercise. A Scottish survey studied 22 couples approximately three months before and after moving in with a spouse. It showed that women gained an average weight of 1.54 kg and men gained an average weight of 1.63 kg after living with their spouses.[22] Our data also supported the findings that marital status is a risk factor for obesity.

We observed that the participants with a history of obesity in the family are more obese than those without any history of obesity. This strengthens the fact that genetic factors contribute to obesity.[23,24] In an observational study, data was collected from 247 pairs of identical twins, of which 154 pairs grew up together while 93 pairs were adopted by different parents. It was observed that the identical twins had the same weight irrespective of whether they grew up together or not.[25] Therefore, genetics is a risk factor for obesity.[26] Our data showed that the occurrence of obesity was more profound in the population group of 26-39 years. Possibly due to the less physical activity observed in housewives, employed. Most individuals in middle and old age were obese. The muscle content in the body decreases with age.[27] The decrease in muscle mass and increase in fat mass is due to the decrease in testosterone levels.[28,29] We also found that 2.92% of smokers were obese whereas 13.75% of non-smokers were obese. However, there is no positive association of obesity with smoking. This is contrary to popular belief that smoking is linked to obesity and in this research; smoking is not proven to be a risk factor for obesity. According to our data, physical activity (P <0.05) plays a significant role in controlling obesity, out of 16.71% obese individuals, 11.03% individuals had a sedentary lifestyle while only 5.69% were obese with some physical activity. The incidence of obesity depends on the active and sedentary lifestyle.[30]

Region-wise, Punjab and Sindh have more overweight and obese cases than the rest of the regions. Individuals from different regions are at different risk of obesity.[31] The diverse environmental factors in different provinces might have played a role in the differences in BMI. The BMI of people with different economic conditions was more or less the same; the difference between them was non-significant. Moreover, dietary habits seem to impact body weight. Food rich in fats influences BMI as

observed in our data and supported by other studies.[32-34] Participants who intake high-fat food had greater body weights, and their mean BMI was significantly different from those who consumed food other than fat. Pakistani food is usually high in fat content and is composed of meat and fats.[35] In addition, we have observed an increased consumption of junk diet by the Pakistani population was identified as a major risk factor for obesity.[36-38]

Conclusion

The prevalence of obesity (16.71%) and undernutrition (24.11%) in our data was at an alarming ratio. This raises the concern of a double burden on the economy. Alongside undernutrition and micronutrient deficiency, we now must deal with the issue of obesity as well. We foresee that the prevalence of obesity might increase in the future if serious measures are not taken, and the risk factors of obesity are not controlled. There is a need to conduct extensive research into the growing epidemic of obesity and find solutions at the government level.

Limitations

This study includes self-reported data in the form of surveys. There are chances that the data is exaggerated because, in self-reporting, respondents may hide their details, consciously or unconsciously. These biases may affect the results and true interpretation of the population data.

Recommendations

Individuals should be taught the importance of a balanced diet and the hazards of being overweight and obese. This is extremely important for the elderly and everyone above 25 years of age, as older people are more susceptible to being overweight. Obesity is associated with many metabolic diseases. Pakistan is a developing nation and with every passing decade, it is advancing in technology and resources. The development brings increased urbanization and a sedentary lifestyle. More in this era of globalization, we see an import of 'Western' foods rich in fats and carbs into Pakistani culture, especially in urban areas. A balanced healthy diet with appropriate physical activity is recommended to control weight. Obesity awareness programs at the government level can educate individuals to maintain a healthy lifestyle. All these changes not only bring about obesity but also the associated chronic diseases. Thus, to counter this threat to the economy and for the physical well- being of people, there is an urgent need to prioritize research into the treatment, etiology, prevention, and control of obesity.

Authors Contribution

RMNN: Data collection, data analysis, results and interpretation, manuscript writing and proof reading
AK: Data collection, data analysis, results and interpretation, manuscript writing and proof reading
STAH: Study designing, data analysis, results and interpretation
AN: Idea conception and study designing
AL: Idea conception and study designing
MJK: Idea conception and study designing

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