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Risk Factors of Cardiovascular Disease and Its Effects on Obesity in Patients of Quetta District, Balochistan, Pakistan

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ABSTRACT

Globally, cardiovascular disease (CVD) is a significant public health concern, particularly affecting young adults. Heart failure, coronary artery disease, myocardial infarction, atherosclerosis, cardio-myopathy, peripheral artery disease, cardiac arrest, and angina pectoris are a few of the ailments related to the cardiovascular system. The purpose of this study was to look into how common CVD risk factors are and how they affect young adults' obesity (under 40) in Quetta, Pakistan, exploring both overall prevalence and gender differences. In the Balochistan Province of Pakistan's Quetta area, from October 2022 to December 2022, an observational cross-sectional study on CVD and its varieties was conducted. There were 263 people in total, with an average age of 28.03 years, 168 of whom were men and 95 of whom were women. Seventy-six percent of all people had at least one CVD risk factor. Just 24% of people had no risk factors for CVD. Two risk factors were present in 24% of the patients, three in 11%, and more than three in up to 18% of the patients. Increased LDL concentrations (normal level <130 mg/dl) were the least common risk factor, accounting for 6% of cases. Increased TC concentrations (normal level <200 mg/dl) and hyperglycemia (7%), on the other hand, were the most common. In conclusion, CVDs are a major public health problem that is closely linked to fatness. High lipids and blood pressure are CVD risk factors, and diabetes, are often associated with obesity. Therefore, managing obesity is a key strategy for preventing and managing CVDs. This can be achieved through a combination of healthy diet, regular exercise, and medication when necessary. It is essential that healthcare providers take a holistic approach to managing patients with these conditions, addressing both the underlying CVDs and any associated obesity, in order to achieve optimal outcomes.

1. INTRODUCTION.

The world's population poses a significant health risk. One of the main causes of cardiovascular disease and cardiovascular-related morbidity and mortality worldwide, hypertension is responsible for almost 7.6 million deaths annually (Bello et al.,2020). According to technical definitions, obesity is the abnormal build-up of more than 20% more body fat than a person's ideal body weight. The main cause of excessive overweight and obesity is an imbalance between energy expenditure and consumption. Excessive weight gain is the main cause of high blood pressure or hypertension, especially if it is accompanied by a rise in visceral adiposity (Jiang et al.,2016).

Arterial hypertension, which is characterized by the activation of the renin-angiotensin system and the sympathetic nervous system, is linked to obesity (Balakumar et al.,2021). The body mass index (BMI) measures how much bone, muscle, and fat are present in an individual's bodily mass. One can calculate a person's BMI by dividing their body mass (kg) by their height (m^2). The four BMI categories are underweight, average weight, overweight, and obese.

The disorders of the cardiovascular system include angina pectoris, heart failure, coronary artery disease, myocardial infarction, atherosclerosis, cardio-myopathy, peripheral artery disease, and cardiac arrest (Wang et al.,2016). It has been discovered that high lipid profile levels can have serious consequences, including the development of heart disease and stroke, if proper lifestyle changes and preventive measures are not made (Heiland, 2018). The likelihood of based on race, one's risk of getting high blood pressure could increase ethnicity, and age, and hypertension can also manifest genetically (Kharbanda et al.,2019).

Those who acquire CVD include experience severe pain that lowers their superiority of life, but they also heavily strain their families and society financially. Additionally, greater rates of harms were associated with weight loss drugs but not behavior-based interventions. A correlation exists between CVD risk, its risk variables, and overall mortality for BMI and waist circumference (Ma et al.,2021). Therefore, finding a suitable method to reduce CVD risk factors and incidence, particularly one that doesn't involve drugs, is crucial from a practical standpoint. MCT (moderate-intensity continuous training) is frequently regarded as an efficient method of lowering CVD risk factors (Su et al.,2019).

In previous large-scale epidemiological studies using the aforementioned definition, prevalence rates for obese adults in Europe and the United States ranged from 12% to 17%. (Pimpin et al.,2018). Cardiovascular diseases are a significant public fitness issue in

Pakistan, and the incidence of these conditions is rising. About 16.7 million people died from CVDs in 2000 and 17 million in 2008, with more women suffering fatalities (WHO 2011). In developed nations, this illness kills 25% of people overall, but it kills 80% of people in middle- and low-income nations. As a result of CVD, 85% of all impairments worldwide are also caused. Every year, CVDs claim the lives of 250,000 women in the USA. People on the Asian subcontinent is particularly vulnerable to CADs, which result in numerous fatalities. In developing nations, women have a higher risk of CVDs than men do (Zubair et al.,2018).

According to (Niiranenb & Vasan 2016) the epidemiological statistics, cardiovascular disease (CVD) is the main reason people die and become disabled. In recent years, one of the most successful approaches to enhance cardiorespiratory fitness and lower risk factors for CVD has been high-intensity interval training (HIIT), which consists of short but continuous bouts of extremely low intensity exercise (Terada et al.,2016).

Wells et al., (2020) reported that in comparison to the rest of the globe, South Asians have a 50% to 3000% higher prevalence and are more at risk. In Pakistan, where the disease affects more than 30% of people over the age of 45, even more people have CAD than usual (Shahid et al.,2017). The most recent WHO reports state that one of Pakistan's top non-communicable killers, cardiovascular disease (CVD), includes CAD as a serious form (Islam et al.,2016).

Kouvari et al., (2019) stated that in the initial CVD control, metabolically benign obesity continues to be a scientific area of intense debate. The metabolically benign obesity may not be as benign a condition as previously believed, according to recent meta-analytic results, highlighting the fact that prior literature offers insufficient proof of the raised CVD risk that it may promote.

WHO (2018) reported that a considerable proportion of MHO individuals might not have fully determined the related CVD risk brought on by their underlying illness. An estimated 650,000 million individuals globally were overweight in 2016. There is a symbiotic relationship between obesity and CVDs, whereby obesity increases the risk of developing CVDs and CVDs increases the risk of obesity. The mechanisms underlying this association

include inflammation, insulin resistance, endothelial dysfunction, oxidative stress, and several other pathways (Chrostowska et al., 2013).

Over 650 million adults and 100 million children were classified as obese in 2016, making obesity a major global public health concern (Tacon et al., 2020). Numerous health issues, such as diabetes, hypertension, dyslipidemia, and CVDs, are linked to obesity (Nankam et al., 2020). Numerous studies have examined the effects of obesity on various cardiovascular system components. As per Hall et al. (2022), a higher incidence of coronary artery disease (CAD), which is characterized by plaque buildup in the coronary arteries, is linked to obesity.

2. MATERIALS AND METHODS

2.1. Study Design

The Board of Advance Studies and Research of the University of Balochistan in Quetta authorized the study protocol. From October 2022 to December 2022, a cross-sectional observational study on CVD and its types was conducted in the Quetta area of Pakistan's Balochistan Province. The survey included patients with cardiac conditions from all age groups. All of the patients' clinical information as well as family histories were investigated.

2.2. Sample collection

For each patient, a 5-milliliter venous blood sample was obtained, and the levels of serum urea and creatinine were measured. For the purpose of urine analysis, a 10-milliliter urine specimen was taken from each case. When traces of proteinuria on a dipstick were greater than the reference level, proteinuria was deemed significant.

Every aspect of their clinical history and details, physical characteristics, work schedule, way of life, and eating habits were gathered using a carefully crafted questionnaire. In order to obtain blood samples from them, the individuals were asked to supply samples following a 12-hour fast. They were given venous blood draws, and the blood was gathered in BD® vacutainers with crimson caps. The blood was then centrifuged at 1000–4000 rpm after clotting at room temperature for roughly 15–30 minutes.

When the clot was eliminated, serum was collected in sterilized Eppendorf tubes from the supernatant. Using the corresponding kits made by Human®, Germany, the serum levels of HDL, triglycerides, and cholesterol were measured in line with a standard method. On the SPECORD® 200 plus UV/visible spectrophotometer, the lipid profile was estimated (Analytik Jena, Germany). Using IBM-SPSS version 25, the information gathered based on anthropometric data and serum analysis (2017).

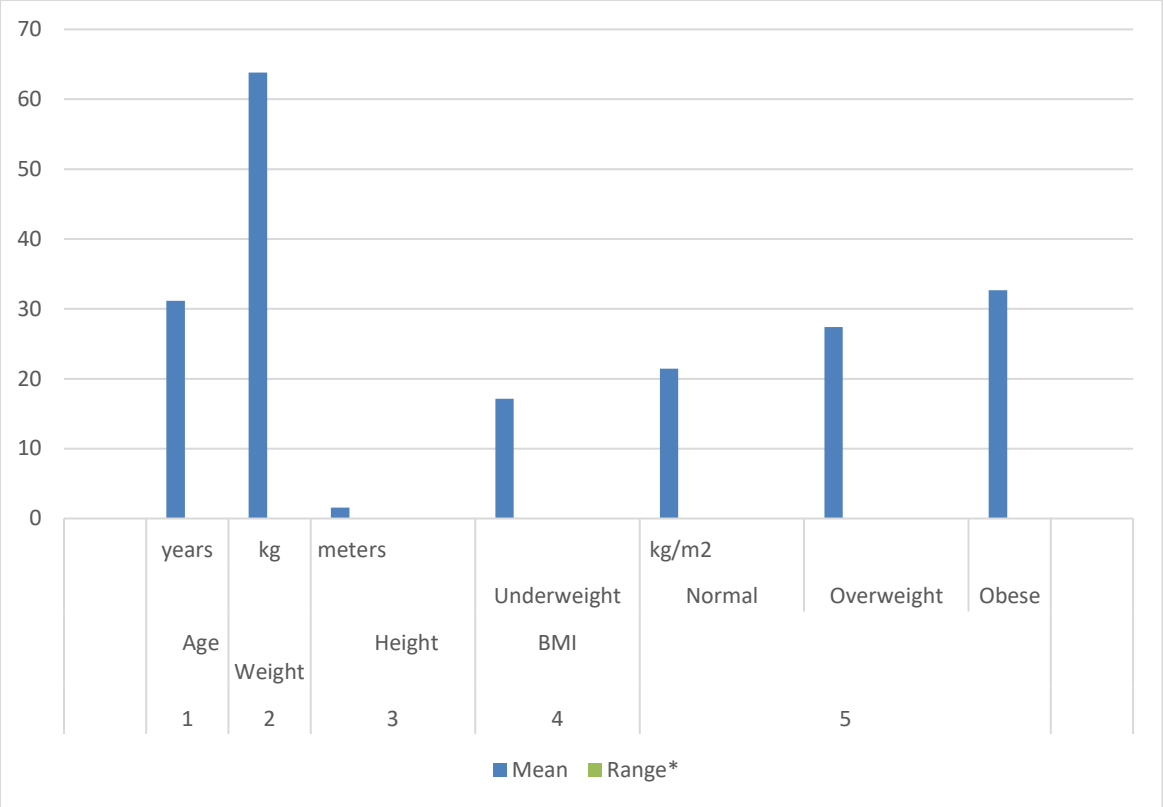

Figure No.1: Participants in the study's anthropometric measures

Table No.1: Participants in the study's anthropometric measures

S. No:	Factors		Units	Mean	Range*
1.	Age		years	30.06	20-58
2.	Weight		kg	62.8	38-111
3.	Height		meters	1.47	1.58-1.602
4.	BMI	Underweight		16.16	13.1-17.6
5.		Normal	kg/m^2	22.46	18.15-24.8
		Overweight		26.39	25.6-29.77
		Obese		33.66	29.95-40.28

2.3. Selection criteria

The deceased were not included. In this study, all age groups were covered. Also included were healthy family members. Additionally, people with other medical problems were taken into account.

2.4. Physiological and Biochemical Analysis

The Body mass index (BMI), triglycerides, low-density lipoprotein (LDL), high-density lipoprotein, blood pressure, and (HDL). The association between individual obesity changes and the prevalence of myocardial infarction and ischemic heart disease was investigated. Weight in Kg divided by Height in M2 yields BMI. An automatic digital blood pressure cuff was used to determine the systolic and diastolic pressure. Using spectrophotometer kits, the lipid profile was carried out.

2.5. Statistical Analysis

For the statistical study, SPSS® software version 20 was used to run non-parametric tests. The data were examined using ANOVA, chi-square test, and t test. The prevalence of illnesses in both genders, the age at which diseases first appear, the proportion of patients who have received treatment compared to those who have not, and the prevalence of the disease by gender were all determined using this program.

3. RESULT

There was total 263 individuals in all, 168 of whom were men and 95 of whom were women, with an average age of 28.03 years. Of all the individuals, 76% had at least one risk factor for cardiovascular disease. Of the participants, just 24% had no cardiovascular disease risk factor. Twenty-four percent of the participants had two risk factors, 11% had three, and up to 18% had more than three. The most common risk factor was an entirely inactive lifestyle, which affected up to 74% of subjects. Overall, 44% of individuals had central obesity, defined as a waist circumference of >80 cm for women and >90 cm for males. With 6% of cases, elevated LDL concentrations (normal level <130 mg/dl) were the least frequent risk factor. Conversely, the most prevalent conditions were hyperglycemia (7%), and elevated TC concentrations (normal level <200 mg/dl). Table 2 and Figure 2 display the overall frequency of risk variables for every research participant.

Table No. 2: Cardiovascular disease and risk factors overall in study participants.

Risk factors for an individual	**Number of individuals with risk factor (N = 263)**	**Frequency (%)**
Obesity	78	30%

Central obesity	116	44%
Hypertension	89	34%
Increased TC	19	07%
Increased LDL	15	06%
Increased TG	92	35%
Hyperglycemia	18	07%
Less than required HDL	70	26%
Inactive lifestyle	195	74%

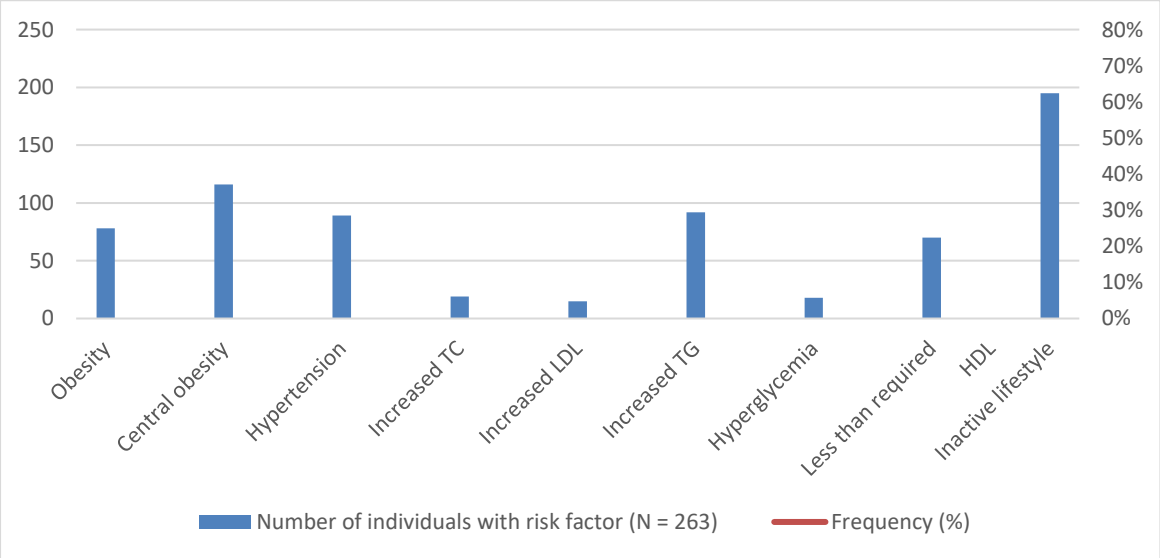

Figure No.2: Cardiovascular disease and risk factors overall in study participants.

Compared to male subjects, female subjects were more likely to be obese overall (BMI >25) and centrally. Despite not reaching statistical significance. Additionally, female subjects had higher total cholesterol (p=.01). The findings for hypertension were consistent with the majority of research conducted, showing that 40% of men and 22% of women had hypertension (systolic blood pressure > 140 mmHg), respectively. Although there was no significant difference in LDL concentrations, male subjects had higher LDL levels. The results were significant (0.0001), with males having considerably greater triglyceride levels (normal level < 150 mg/dl). Hyperglycemia (normal blood glucose range of 100-140 mg/dl) was twice as common in males (8%) as in girls (4%), and the difference was statistically

significant (p=0.01). Table 3 and Figure 3 illustrate the shift in the frequencies of modifiable risk factors between study participants who were male and female.

Table No.3: Comparing personal risk variables by gender

Individual risk factors related to gender	Male Total (N = 168)	Female Total (N = 95)	P-value
Obesity	49 (29%)	29 (30%)	0.61
Central obesity	58 (35%)	58 (61%)	0.071
Hypertension	68 (40%)	21 (22%)	0.0002
Increased TC	07 (4%)	12 (13%)	0.0012
Increased LDL	11 (6%)	04 (4%)	0.65
Increased TG	78 (46%)	14 (14%)	0.001
Hyperglycemia	14 (8%)	04 (4%)	0.015
Less than required HDL	45 (27%)	25 (26%)	0.0002
Inactive lifestyle	113 (67%)	82 (86%)	0.0005

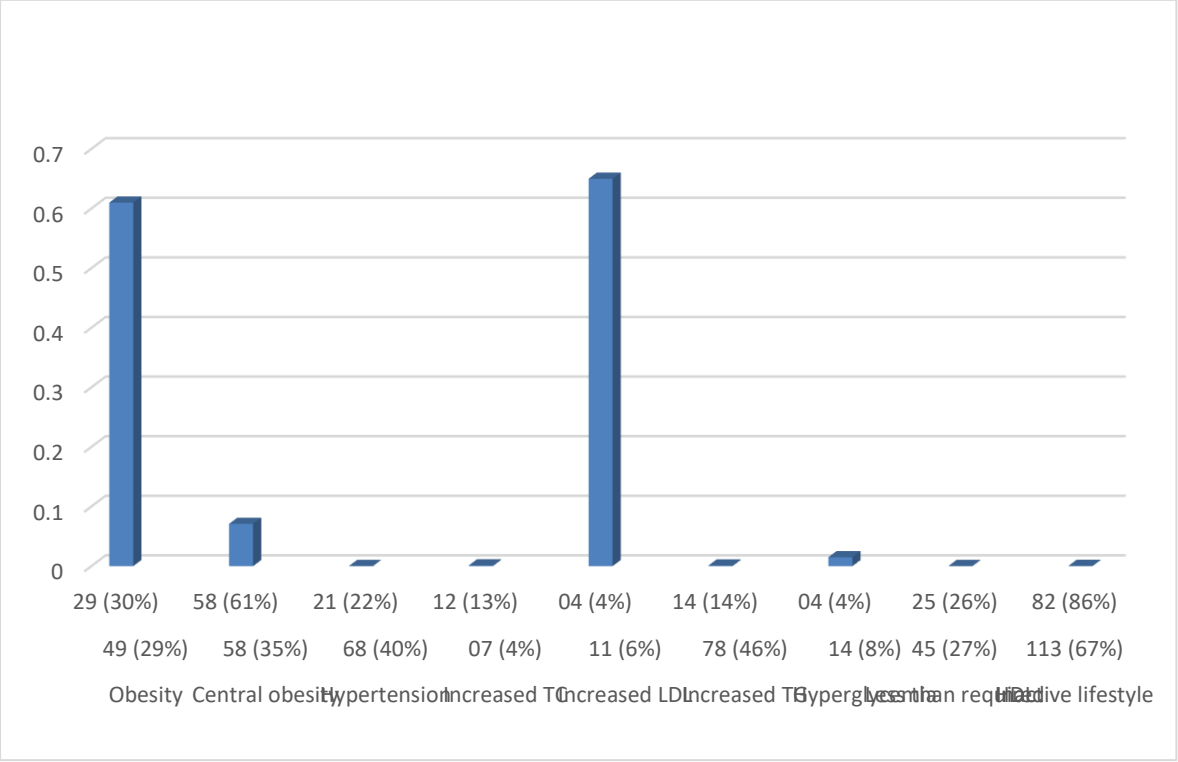

Figure No.3: Comparing personal risk variables by gender

4. DISCUSSION

This study set out to determine the prevalence of threat factors among young individuals (those under 40). Gender differences between men and women were also investigated. Most of the study's findings are consistent with prior research. Given their higher risk factors, men are more likely to develop CVDs. According to Saleheen & Frossard's (2004) analysis of all diagnosed myocardial infarction patient records, 16.1% of the patients were younger than 40. Ninety-three percent of the patients were men. The risk increases with age and is higher in men.

Fatality is the root cause of cardiovascular disease. Pakistan came in ninth place globally for obesity. In this study, obesity was a significant risk factor for CVD. 30% of BMI users were overweight or obese. Obesity rates were lower in men (29%) than in women (30%). The current study's findings are in line with those of previous revisions from Pakistan, which found that, among young adults, obesity accounted for 25 to 35% of cases and that, with a very small margin of error, women were more likely than men to be obese (Nanan 2002). The waist circumference of women was higher than that of men, and it grew with age. According to Noor et al. (2007), these findings are consistent with previous research showing that women's waist circumferences rise with age.

Obesity increases the likelihood of developing additional risk factors, including diabetes, hypertension, and hypercholesterolemia. It poses a significant risk for CVD. Obese people are more likely to have high blood pressure, high cholesterol, and insulin resistance, all of which can damage blood vessels and raise the risk of cardiovascular disease (CVD) (Granger et al.,2010). Additionally, obesity can cause structural changes in the heart, such as left ventricular hypertrophy, which can also increase the risk of CVD.

According to Marseglia et al. (2014), extra body fat, especially in the waist area, can release inflammatory cytokines and other substances that can worsen inflammation. CVD may develop as a result of oxidative stress and endothelial dysfunction. Consequently, it's critical to keep a healthy weight and control other CVD risk factors, which lowers the risk of CVD by controlling conditions like diabetes, high cholesterol, and high blood pressure. A nutritious diet, consistent exercise, and prescription drugs from a medical professional can help achieve this.

5. CONCLUSION

In conclusion, CVDs are a major public health problem that is closely linked to fatness. High lipids and blood pressure are CVD risk factors, and diabetes, are often associated with obesity. Therefore, managing obesity is a key strategy for preventing and managing CVDs. This can be achieved through a combination of healthy diet, regular exercise, and

medication when necessary. It is essential that healthcare providers take a holistic approach to managing patients with these conditions, addressing both the underlying CVDs and any associated obesity, in order to achieve optimal outcomes. Due to the higher prevalence of three risk factors (obesity, central obesity, and total cholesterol) in females and the prevalence of four risk factors (hypertension, elevated TG, raised LDL, and hyperglycemia) in males, the former was somewhat more likely than the latter to acquire CVDs at a young age. This may entail medication and other interventions as needed, along with lifestyle adjustments like diet and exercise regimens.

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