

Prevalence of cardiovascular disease in type 2 diabetes.¹Dr Um e Aimon, MBBS, King Edward Medical University, Lahore.²Dr Muhammad Abdullah, MBBS, Services Institute of Medical Sciences, Lahore.³Dr Bushra Naz, MBBS, Ameer Ud Din Medical College, Lahore.**Corresponding Author:** Dr Um e Aimon, MBBS, King Edward Medical University, Lahore.**Type of Publication:** Original Research Article**Conflicts of Interest:** Nil**Introduction**

The international federation has stated that almost 415 million people are suffering from diabetes in which 91% are having type 2 diabetes mellitus. 8.8% people in the overall world is suffering from type 2 diabetes and there are possibility of rising the number up to 642 million by 2040 ^[1]. With the passage of time the prevalence of type 2 diabetes has been increasing rapidly. Abraham et al conducted a study and reported that the prevalence of diabetes is 83.3% which is higher in males than females ^[2]. Diabetes is the one of major cause of cardiovascular disease which results in disability and death among many people ^[3]. CVD is more prevalent among those adults who are suffering from diabetes as compared to those without diabetes ^[4]. High fasting plasma glucose level is the major risk factor of developing CVD ^[5]. T2DM decreases the life expectancy by 10 years and one of the leading causes to death is CVD. Moreover people with T2DM are more prone to develop CVD than no diabetic people. A study conducted to calculate the death rates due to cardiovascular disease over 7 year period in patient with and without type 2 diabetes. People who had T2DM, the death rates were 15.4% to those who previously had no history of MI and 42.0% in patients having history of MI where as in patients who had no diabetes, the death rate were 2.1% and 15.9% respectively ^[6]. Literatures showed that the prevalence of T2DM is increasing along with the

risk of CVD. The risks of having CVD in 1952-1974 were 5.4% whereas in 1975 the risks were increased to 8.7% ^[7].

Another longitudinal study conducted on 881 patients with T2DM over 10 years, conclude that ratio due to CVD constantly increasing each year ^[8] the clinical burden that CVD complications have on T2DM, the focus on the joint management has been increased. Plasma glucose level control is the main management in T2DM to protect the micro vascular complications and CVD ^[9]. its role has not been yet cleared in T2DM ^[10]. to prevent micro vascular complications other risk factors must be under consideration. There must be reduction in glucose level, smoking cessation, diet, exercise, blood pressure, and plasma lipid level. There are so many treatment guidelines present to prevent the onset of CVD ^[11]. There are sverl treatment to reduce CVD in non-diabetic people specially to prevent major events such as non-fatal MO, stroke etc ^[12]

Following these regulatory requirements, several cardiovascular outcomes trials (CVOT) have been completed, which demonstrate that certain anti-diabetic treatments are associated with a lower risk of CVD ^[13].

CVD includes coronary artery disease (CAD), cerebrovascular disease (CBV), and peripheral vascular disease, the focus of this review was on CVD outcomes that are relevant to major cardiovascular events.

Therefore, the review specifically focused on the prevalence of CAD and CBV. CAD has many synonyms, including ischemic heart disease, coronary heart disease (CHD), atherosclerotic heart disease, and atherosclerotic CVD. Conditions within this category are stable angina pectoris, unstable angina pectoris, MI (also known as heart attack), and sudden cardiac death (SCD).

Methods

It was a cross sectional study. All the participants over age 40 years were included in the study.

Total 300 patients were recruited into the study who met the inclusion criteria. Prevalence rates were compared between male and female and between obese and no-obese patient. All the participants who previously had peripheral artery disease (PAD), rheumatic heart disease, cardiac dysrhythmias (e.g., atrial or ventricular fibrillation), or requirement for surgery such as coronary artery bypass grafting (CABG)/coronary revascularization were excluded.

Results

About half of the patients included in this study had obesity. The mean obesity was $43.6 \pm 17.0\%$, with a simple average of $39.0 \pm 15.7\%$. The most commonly used definition of obesity was a $\text{BMI} \geq 30 \text{ kg/m}^2$. Whereas the mean age 62.6 ± 6.6 . Literature reported that prevalence rates of CVD according to obesity, and found a positive relationship between obesity and increased prevalence rates of CVD. A study conducted by Bhatti et al found a positive correlation between obesity and CAD ($P=0.021$).^[14] Tamba et al. reported positive correlations between obesity and both CAD and stroke^[15]. Boonman-de Winter et al quantified the relationship between BMI and heart failure. The prevalence rate of heart failure was 39.8% (95% CI 32.2–45.4%) in patients with a $\text{BMI} \geq 30 \text{ kg/m}^2$ and 24.3% (95% CI 19.4–27.5%) in those with a $\text{BMI} <$

30 kg/m^2 , which represents a 65% increase due to obesity^[16]

Studies explored the relationship between increasing BMI and risk of CVD. According to Wentworth et al, for CAD in both males and females, the prevalence rate of CAD increased with each successive increase in BMI, with a five-fold increase between the lowest and highest categories [40 kg/m^2 (severe obesity)]^[17]

The difference was that prevalence rates in males were about double those for females in every BMI category. For the outcome stroke/transient ischemic attack (TIA) in males, only the highest category ($\text{BMI} > 40$) had elevated prevalence rates, which were about double those for the lowest category (BMI For females, prevalence rates of stroke/TIA increased in those who were overweight and had mild or moderate obesity but decreased for those with severe obesity. Finally, Glogner et al. had quite different results. They reported a steady increase in prevalence rates of MI from 6.86% in those with a BMI category of obesity. The highest category ($\text{BMI} \geq 40$) had a prevalence rate of 5.01%, which was 27% lower than those in the lowest category ($\text{BMI} \geq 40$) had a prevalence rate of 5.01%, which was 27% lower than those in the lowest category Thus, patterns vary quite widely, and studies often examined different outcomes^{[27][28]}

Discussion

The overall estimated result of prevalence of CVD in T2DM was 35.2%. One of the most common types of CVD was coronary artery disease and rarest was stroke 6.7%. Males were more prone to prevalent diseases than females. CAD was the leading factor of death in T2DM. Together with CVD age and obesity are major risk factors. Age as a risk factor

Age is the most definite risk factor for having cardiovascular disease. However, this statement is still under-debate. A study conducted by Alonso-Moran has

stated that the risk of developing stroke, myocardial infarction and heart failure increases with the increase in the age 5 years accordingly as compared with the age group 35-39 as a reference ^[19]. Similar study has also indicated that prevalence of heart failure increases as the age increases ^[20]. Literature has reported there is less prevalence of CVD in younger age as compared to older age but no age category reference was found ^[21]. Whereas some studies have reported that there is no relation between age categories ^[22].

Obesity

An independent risk factor for CVD is obesity which is closely associated with atherosclerosis, coronary artery disease and cardiac failure ^[23].

Obese and overweight patients are more prevalent towards type 2 diabetes mellitus and eventually develop cardiovascular disease ^[24]. Obesity is defined according to WHO, adult having BMI 30kg/m^2 as obese. Therefore BMI measure is to warn people about their risk of having obese which is associated with so many risk factors. Seven studies have reported the relationship between obesity and CVD risk whereas five of them has showed strong link between obesity and greater prevalence of CVD. One of these studies used lower BMI cut-of points to account for Asian populations in accordance with WHO recommendations on BMI for Asian populations and evaluated abdominal adiposity with waist circumference measurements to determine the prevalence of obesity ^[25].

Many studies have shown positive relation between increasing BMI and CVD; excluding one study in which they stated that women having severe obesity had reduced incidence of stroke ^[26] While the authors do not explain the reduced prevalence of stroke/ TIA, it may be explained by differences in vascular risk markers in men, such as pre-existing ischemic heart disease, age, and smoking ^[27]. Furthermore, the presence of gonadal steroids, most

notably estrogen, may lend a protective effect against stroke/TIA in women and it has been shown that adiposity is associated with increased levels of estrogen. Although obesity is identified as a risk factor for CVD, it is associated with a paradox in that mortality is lower in patients who are overweight or obese than in those whose BMI is normal or underweight ^[28]. Lee et al. reported that obesity provided a survival benefit to patients with heart failure who did not have comorbid diabetes, but not in patients who did have concomitant diabetes. In contrast, a group led by Abi Khalil examined a cohort of T2DM patients in seven countries in the Middle East, Gulf region, with acute heart failure ^[29]

Conclusion Cardiovascular disease is the major cause of death in patients who are having type 2 diabetes mellitus and have high prevalence of coronary artery disease.

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