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A SYSTEMATIC STUDY TO DETERMINE THE PREVALENCE OF CARDIOVASCULAR DISEASE IN TYPE 2 DIABETES MELLITUS-A REVIEW ARTICLE

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Abstract:
The international federation state that, 415 million people have diabetes, in which 91% have type 2 diabetes (T2DM). The overall world's population suffering from type 2 diabetes is 8.8% that too would rise to 642 million by 2040. Prevalence of type 2 diabetes mellitus has been increasing quickly with the passage of time. A study conducted by Abraham et al report that the incidence of the diabetes is 83.3% and higher in males than females. Cardiovascular disease is one of the major cause of death and causing disability among people suffering from diabetes. Adults who have diabetes have more prevalence of CVD as compared to adults without diabetes. And the risk of developing CVD increases continuously with rising fasting plasma glucose level. 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.

Methods: This study was based on systematic review. 57 articles were reviewed. All the participants' age more than 18 having diabetes were included in this study. 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.

Conclusion: CVD is one of the major cause of death in T2DM with coronary artery disease having the high prevalence.

Key words: *Prevalence, Cardiovascular disease, Type 2 diabetes mellitus.*

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INTRODUCTION:

The international federation state that, 415 million people have diabetes, in which 91% have type 2 diabetes (T2DM). The overall world's population suffering from type 2 diabetes is 8.8% that too would rise to 642 million by 2040 [1]. Prevalence of type 2 diabetes mellitus has been increasing quickly with the passage of time. A study conducted by Abraham et al report that the incidence of the diabetes is 83.3% and higher in males than females [2]. Cardiovascular disease is one of the major cause of death and causing disability among people suffering from diabetes [3]. Adults who have diabetes have more prevalence of CVD as compared to adults without diabetes [4]. And the risk of developing CVD increases continuously with rising fasting plasma glucose level [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] [10]. Its role has not been yet cleared in T2DM. [11][12][13].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 [14]. There are several treatments to reduce CVD in non-diabetic people specially to prevent major events such as non-fatal MO, stroke etc. [15] [16]

Following these regulatory requirements, several cardiovascular outcomes trials (CVOT) have been completed, which demonstrate that certain antidiabetic treatments are associated with a lower risk of CVD [17-20].

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:

This study was based on systematic review. 57 articles were reviewed. All the participants' age more than 18 having diabetes were included in this study. 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.

Obese versus non obese and males versus females:
About half of the patients included in this study had obesity. The most commonly used definition of obesity was a BMI≥30 kg/m2. 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). [21][22][23]

Tamba et al. reported positive correlations between obesity and both CAD and stroke [24]. Boonman-de Winter et all quantified the relationship between BMI and heart failure. The prevalence rate of heart failure was 38.7% (95% CI 31.2–46.1%) in patients with a BMI ≥ 30 kg/m2 and 23.4% (95% CI 19.4–27.5%) in those with a BMI < 30 kg/m2, which represents a 65% increase due to obesity [25].

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/m2 (severe obesity).[26]

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 (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 (BMI≥40) had a prevalence rate of 5.01%, which was 27% lower than those in the lowest category (BMI ≥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 32.2%. One of the most common type of CVD was coronary artery disease and rarest was stroke 7.6%. 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: Age is a well-defined risk factor for CVD. Some studies support this idea whereas some might not. Alonso-Moran state that the risk of having MI, stroke, heart failure increased with the increase in 5 year category as compared with age group 35-39 used as reference [29]. Another study similarly report that the prevalence of heart failure increase with the increase of age [30]. Studies have reported that younger patients have less prevalence rates than older patients but they gave not given any age category to relate [31]. Whereas some studies have reported that there is no relation between age categories [32].

Obesity: Obesity is an independent risk factor for CVD and strongly linked with coronary artery disease, atherosclerosis, and cardiac failure [33]. The prevalence of T2DM has been seen in overweight and obese patients; moreover they are more prone to develop cardiovascular diseases [34]. Obesity is defined according to WHO, adult having BMI 30lg/m2 as obese. Therefore BMI measure is to warn people about their risk of having obese which is associated with so many risk factors [35].

Seven studies investigated the relationship of obesity and CVD risk. Five of them showed the direct relation between obesity and high prevalence of CVD [36].

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 [37]. Overall, the studies found a positive relationship between increasing BMI and CVD; except in one study, where women with severe obesity had a reduced prevalence of stroke [38]. 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 [40]. 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 [41]. 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 2492 T2DM patients in seven countries in the Middle East, Gulf region, with acute heart failure [42].

CONCLUSION:
CVD is one of the major cause of death in T2DM with coronary artery disease having the high prevalence.

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