VOLUME - 12, ISSUE - 02, FEBRUARY - 2023 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper

General Medicine

"PREVALENCE OF CORONARY ARTERY DISEASE IN TYPE-2 DIABETES MELLITUS PATIENTS AT A TERTIARY CARE CENTER"

Dr. Lalit Kumar	Junior Resident-3rd Year, Department Of General Medicine, Hind Institute Of Medical Sciences, Mau, Ataria, Sitapur
Dr. Nishant Kanodia	Professor And Head Of Department, Department Of General Medicine, Hind Institute Of Medical Sciences, Mau, Ataria, Sitapur
Dr. Atindra Bhardwaj	Junior Resident-3rd Year, Department Of General Medicine, Hind Institute Of Medical Sciences, Mau, Ataria, Sitapur
Dr. Suman Ganjir	Junior Resident-3rd Year, Department Of General Medicine, Career Institute Of Medical Sciences & Hospital, Lucknow.

ABSTRACT

Background: Cardiovascular disease (CVD) is a most frequently associated comorbidity in patients with type 2 diabetes (T2DM). CVD's prevalence has been rising over years. In type 2 diabetic patients, coronary artery disease (CAD) is commonly noticed at a later stage due to absence of symptoms. **Objective:** The present study will determine the prevalence of coronary artery disease in type 2 diabetes mellitus patients. **Method:** All patients having diabetes mellitus type 2 as per American Diabetes Association (ADA), visiting the out- patient department (OPD) and admitted in wards of Medicine department over a period of 18 months were included in the study.The diagnosis of asymptomatic CAD in type 2 diabetic patients is largely made based on the recommendations of the ADA. **Result:** The prevalence of CAD in diabetic patients is 42.2%. Diabetic patient less than 50 years of age are less prone to develop CAD. Male population is more prone to develop ASVD and its complications in days to come. The prevalence of CAD in obese diabetic patients is 52.4% as compared to normal diabetic patients. Diabetics in chronic phase have higher prevalence rate of CAD. The symptoms like chest pain, dizziness, sweating are associated with higher prevalence of CAD. **Conclusion:** A routine screening is needed for CAD in type 2 diabetes mellitus patients who have a longer duration (≥10 years) of diabetes even if they have no symptoms for CAD.

KEYWORDS : Diabetes mellitus, Coronary Artery Disease, Prevalence, BMI

INTRODUCTION

Diabetes is endemic in India. The international Diabetes Federation has estimated that India currently has more than 65 million people with type 2 diabetes and the numbers are poised to double in the next 20 years. It has been reported that the prevalence of diabetes among the highest in the World and comparable to the high prevalence countries of West Asia and the Pacific [1-2] cardiovascular diseases (coronary heart disease, stroke, peripheral arterial disease) are the major causes of morbidity and mortality in type 2 diabetes. It has been reported that 60-80% of patients with diabetes die of cardiovascular events[3,4] It is well-recognized that chronic hyperglycemia could further accelerate the development of endothelial dysfunction and the pathological process of atherosclerosis, resulting in more diffuse coronary artery lesions and worse clinical outcomes[5,6]. It has been found that endothelial dysfunction is also independently associated with asymptomatic myocardial ischemia in patients with T2DM[7]. However, it remains to be elucidated whether the relationship between impaired endothelial function and the severity of coronary artery disease is influenced by the status of glycemic control in type 2 diabetic patients.

The diagnosis of asymptomatic CAD in type 2 diabetic patients is largely made based on the recommendations of the American Diabetes Association (ADA). The ADA recommends that DM patients perform a treadmill exercise test (TMT) or a coronary artery angiography if they have additional cardiovascular disease (CVD) risk factors[8]. However, clinically severe CAD is often discovered in patients with fewer risk factors.

In view of the above facts the present study will carry forward and determine the prevalence of coronary artery disease in type 2 diabetes mellitus.

MATERIAL

Study design:

Cross sectional, prospective study.

Study Period:

It was done over a period of 18 months at Hind institute of medical sciences, Sitapur, after obtaining certificate of Institutional human ethics committee approval.

Study Population:

All patients having diabetes mellitus type 2 as per American Diabetes Association (ADA), visiting the out-patient department (OPD) and admitted in wards of Medicine department were included in the study.

Statistical Analysis:

The data has been entered in excel spreadsheet (Microsoft office) along with graphical representation, checked and substantially copied into spss version 20.0 for analysis. For comparison of categorical variables Chi-Square test will be used. Statistical significance was defined as a p value of <=0.05.

METHOD

Collection of data done by taking detail history, clinical examination and laboratory investigations through proforma for the study after taking informed consent.

All the diabetic patient attending to medicine OPD, were screened for the eligibility. The eligible patients were given an informed consent. The contestant participants were enrolled in the study, descriptive data of participants like name, age, personal history, occupation were obtained by interviewing, proper history were recorded of each of the patient on the pre designed and pretested proforma. They underwent a thorough physical examination. TMT

was done in all DM patients regardless of the numbers of CVD risk factors. Coronary arterial angiography was conducted in patients with positive or equivocal TMT results, for example, test discontinuation due to a decline in exercise ability. Results were taken from the first test if patients underwent tests more than once. This study was approved by the Hospital Ethics Committee, and informed consent for coronary angiography was obtained from all patients.

RESULT

A total of 204 patients were included in the study and the prevalence of CAD in diabetic patients was found to be 42.2%. Female diabetic patient less than 50 years of age are less prone to develop CAD.

1. Prevalence of CAD in diabetic patients

The prevalence of CAD in diabetic patients is 42.2%. Coronary artery disease is often asymptomatic in these patients until the onset of myocardial infarction or sudden cardiac death. Cardiovascular disease in diabetes patients is more severe, more complex and results in higher complication rates than in patients without diabetes.

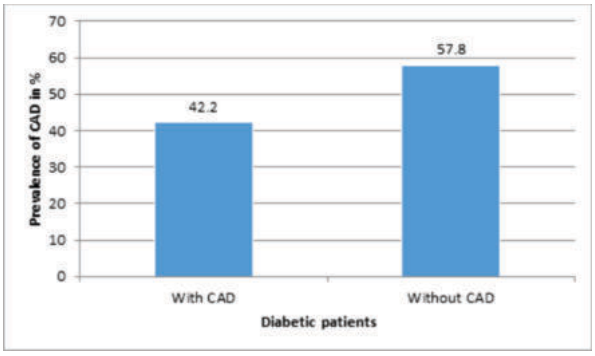

Fig. 1: Showing prevalence of CAD in diabetic patients

2. Association of Prevalence of CAD with age in diabetic patients

Distribution of coronary artery disease among the diabetic patients is 61.2% having age 61-70 years; 38.8% having age 50-60 years; 18.0% having age less than 50 years. This implies that diabetic patient less than 50 years of age are less prone to develop CAD. Persistent increased blood glucose level or chronic hyperglycemia is the important etiological factor leading to complications of DM.

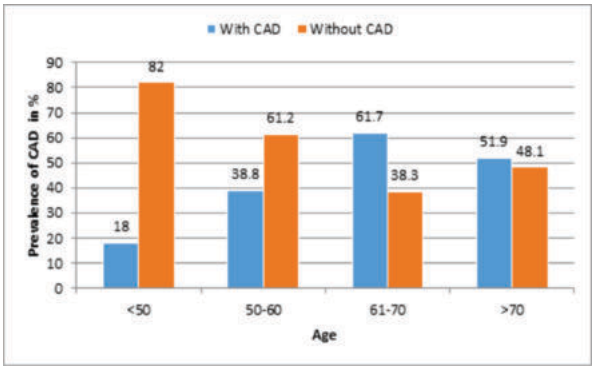

Fig. 2: Association of Prevalence of CAD with age in diabetic population

3. Association of Prevalence of CAD with gender in diabetic patients

The prevalence of CAD is more in male 47.1% in comparison to female 34.9% and thus male population is more prone to develop ASVD and its complications in days to come.

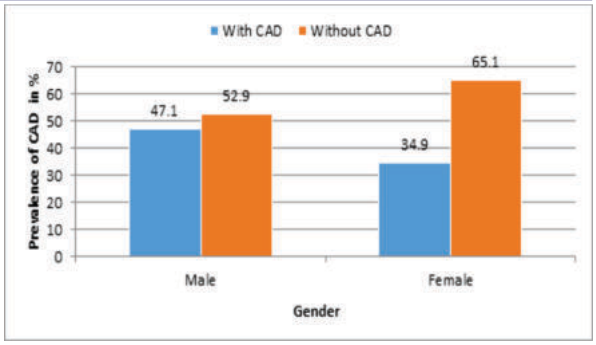

Fig. 3: Association of Prevalence of CAD with gender in diabetics

4. Association of Prevalence of CAD with BMI in Diabetic population

The prevalence of CAD in obese diabetic patients is 52.4% as compared to normal diabetic patients i.e 33.3%, thus diabetic obese patients are more prone to develop CAD. Insulin resistance in adipose tissue, lipolysis and FFA flux from adipocytes are increased and efficiently cleared by liver leading to increased VLDL-TG synthesis in hepatocytes and secretion from liver. This is also responsible for the Dyslipidemia found in type 2 DM. Dyslipidemia plays a vital role in the formation of ASVD.

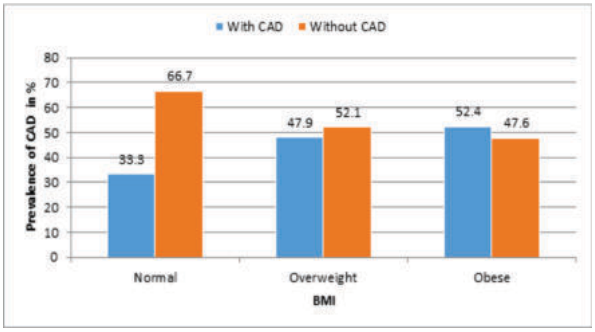

Fig. 4: Association of Prevalence of CAD with BMI in diabetics

5. Association of Prevalence of CAD with Duration of diabetes

The prevalence of CAD is 60% if duration of diabetes is more than 12 years while prevalence is 6.2% if the duration of diabetes is less than 6 years, it means that if disease (diabetes) is in chronic phase the prevalence rate of CAD is higher. Chronic hyperglycemia is the important etiological factor leading to complication of diabetes mellitus. Chronic hyperglycemia leads to formation of advanced glycosylation end products AGE; eg: pentosidine, glucosepane which binds to specific cell surface receptor and or the non-enzymatic glycosylation of intra and extra cellular proteins, leading to cross linkage of protein, accelerated Atherosclerosis, glomerular dysfunction and endothelial dysfunction.

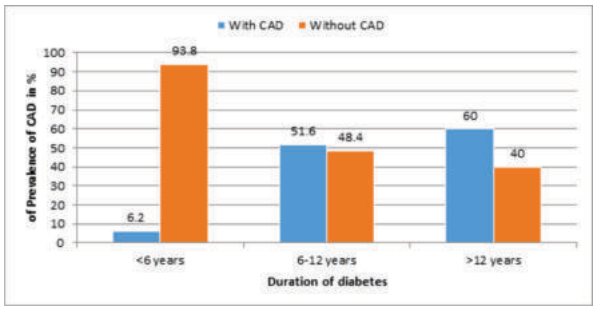

Fig. 5: Association of Prevalence of CAD with Duration of diabetes

6. Association of Prevalence of CAD with Clinical symptoms in diabetic population

The symptoms like chest pain, dizziness, sweating are associated with higher prevalence of CAD.

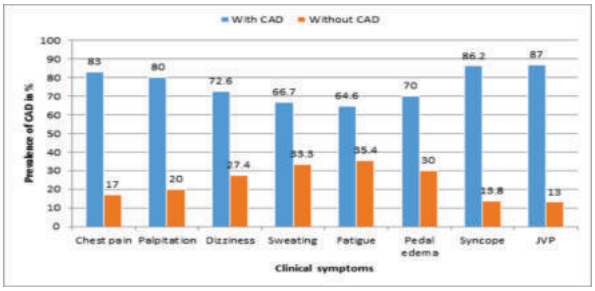

Fig. 6: Association of Prevalence of CAD with Clinical symptoms

DISCUSSION

Rates of atherosclerotic cardiovascular disease (ASCVD) are strikingly high in India compared to Western countries. For example, global burden figures from 2019 suggest that the prevalence of age standardized years of life lost due to cardiovascular diseases is at least two times higher in South Asia as compared to Western Europe and Australia. T2DM largely contributes to this burden with more than 70% of patients with T2DM dying due to ASCVD [9].

DM in general confers to a two-fold excess risk of vascular outcomes (coronary artery disease, ischaemic stroke, and vascular deaths) independent of other risk factors, with a relative higher risk for women than men and with early onset of diabetes[10].

The prevalence of CAD was among 42.2% patients in this study. In a review by Sakthivel et al[11] (2021), 17 studies reviled 21.1%(95% CI: 17.9-24.7%) prevalence of cardiovascular CVDs in patients with type 2 DM in India. Debele et al[12] (2021) found that the overall incidence rate of CVD per 100 person–years (PY) was 2.71 (95% CI=16.9–17.6). In the study by Regassa et al[13] (2021), the overall prevalence of CVD among T2DM patients was 42.51%, composed of hypertensive heart diseases (38.99%), heart failure (6.83%), and stroke (2.20%). The prevalence of cardiovascular disease in patients with type 2 DM in Iran in 17 studies with a sample size of 9656 was 37.4% (95% CI: 31.4-43.8). Based on meta-regression, there was a significant difference on the effect of year of conducting the study and sample size with the prevalence of cardiovascular disease in patients with type 2 DM in Iran ($p<0.001$). Artime et al[14] (2021) from their review reported that the prevalence of CVD among patients with T2DM ranged from 6.9 to 40.8%. The prevalence of coronary heart disease ranged from 4.7 to 37%, stroke from 3.5 to 19.6%, peripheral artery disease from 2.5 to 13.0%, and heart failure from 4.3 to 20.1%. In hospital CVD mortality rates ranged from 5.6 to 10.8%. Direct costs due to CVD in hospitalized patients with T2DM were increased ([50%) compared with patients without CVD. No studies analyzed indirect costs of CVD in patients with T2DM.

In the present study, about one third of patients were between 50-60 years of age (32.8%) followed by 61-70 (29.4%), <50 (24.5%) and >70 (13.2%) years. The mean age of patients was 57.62±10.87 year. In the study by Unnikrishnan et al[15] (2022), the mean age of patients was 48.3 ± 12.8 years of age. This study showed that the prevalence of CAD was highest among patients of age 61-70 years (61.7%) and was least among age <50 years (18%). There was significant ($p=0.0001$) association of Prevalence of CAD with age. McGurnaghan et al[16] (2019) observed that the prevalence rose from 15% (11 249/72 894) in those aged < 60 years to 53% (19 987/38 096) in those aged ≥ 80 years.

In the present study, the prevalence of CAD was higher among male patients (47.1%) than females (34.9%). However, there was no significant ($p>0.05$) association of Prevalence of CAD with gender. Unnikrishnan et al[15] (2022) found that based on the QRISK3 calculation, Indian diabetes patients had an average CVD risk of 15.3 ± 12.3%, (12.2 ± 10.1 vs. 17.1 ± 13.5 [$p< 0.001$] for females and males, respectively). Sakthivel et al[11] (2021) in their review found that women with DM were more prone CVD. In the study by McGurnaghan et al[16] (2019), the prevalence CVD was 29% (31 635/108 259) in women and 35% in men (48 962/140 141).

In the current study, the prevalence of CAD in obese diabetic patients is 52.4% as compared to normal diabetic patients i.e 33.3%. In an another study, it has been shown that overweight and obesity are highly prevalent in T2DM patients with high CV risk and that BMI and waist circumference are related to major cardiometabolic risk factors such as hypertension and elevated low-density lipoprotein cholesterol (LDL-C)[17].

CONCLUSION

The prevalence of CAD in diabetic patients is 42.2%. Diabetics in chronic phase have higher prevalence rate of CAD. Thus a routine screening is needed for CAD in type 2 diabetes mellitus patients who have a longer duration (≥10 years) of diabetes even if they have no symptoms for CAD for early detection of CAD and it`s treatment.

REFERENCES

1. International Diabetes Federation. 6th edition. IDF diabetes Atlas, 2013.
2. Anjana, RM et.al. The need for obtaining accurate nationwide estimates of diabetesprevalence in India: rationale for a national study on diabetes. Indian J Med Res. 2011;1133:369–80.
3. Huxley R, Barzi F and Woodward M. Excess risk of fatal coronary heart disease associated with diabetes inmen and women: meta-analysis of 37 prospective studies. British medical journal 2006;332:73–8.
4. Holman RR, Sourij H and Califf RM. Cardiovascular outcome trials of glucose lowering drugs or strategies in type 2 diabetes. Lancet 2014;383:2008–17.
5. Tuttolomondo A, Maida C and Pinto A. Diabetic foot syndrome: Immune-inflammatory features as possible cardiovascular markers in diabetes. *World J Orthop*. 2015;6(1):62–76.
6. Tuttolomondo A, Maida C, Pinto A. Diabetic foot syndrome as a possible cardiovascular marker in diabetic patients. *J Diabetes Res*. 2015;2015:268390.
7. Pinto A, Tuttolomondo A, Di Raimondo D, Fernandez P and Licata G. Risk factors profile and clinical outcome of ischemic stroke patients admitted in a Department of Internal Medicine and classified by TOAST classification. *Int Angiol*. 2006;25(3):261–267.
8. American Diabetes Association. Consensus development conference on the diagnosis of coronary heart disease in people with diabetes. Diabetes Care 1998;21:1551-1559.
9. Prabhakaran D, Jeemon P and Roy A. Cardiovascular Diseases in India: Current Epidemiology and Future Directions. Circulation 2016;133(16):1605–20.
10. Buse JB, .2019 Update to: management of hyperglycemia in type 2 diabetes, 2018. A consensus report by the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). Diabetes Care 2020;43:487–93.
11. Sakthivel PJ, Poornima P, Anantha JS.Meta-analysis on prevalence of cardiovascular diseases in patients with type 2 diabetes mellitus in India.IntJ Sci Rep2021;7(7):355-9.
12. Debele GR,et.al Incidence and Predictors of Cardiovascular Disease among Type 1 and Type 2 Diabetes Mellitus in a Tertiary Health Care Setting of Ethiopia: 8-Year Retrospective Follow-Up Study. Risk Management and Healthcare Policy 2021:14 1959–1968.
13. Regassa LD, Tola A and Ayele Y. Prevalence of Cardiovascular Disease and Associated Factors Among Type 2 Diabetes Patients in Selected Hospitals of Harari Region, Eastern Ethiopia. Front. Public Health; 2021;8.
14. Artime E, Romera I, Dı´az-Cerezo S and Delgado E. Epidemiology and Economic Burden of Cardiovascular Disease in Patients with Type 2 Diabetes Mellitus in Spain: A Systematic Review. Diabetes Ther 2021; 12:1631–1659.
15. Unnikrishnan AG,et.al. Cardiovascular risk in newly diagnosed type 2 diabetes patients in India. PLoS ONE 2022; 17(3).
16. McGurnaghan and Blackbourn LAK , Mocevic E, Haagen Panton U, McCrimmon RJ, Sattar N, Wild S and Colhoun HM. Cardiovascular disease prevalence and risk factor prevalence in Type 2 diabetes: a contemporary analysis. Diabet. Med 2019; 36: 718–725.

17. Masmiquel L, Leiter L, Vidal J, Bain S, Petrie J, Franek E, Raz I, Comlekci A, Jacob S. Gaal Lv: LEADER 5: prevalence and cardiometabolic impact of obesity in cardiovascular high-risk patients with type 2 diabetes mellitus: baseline global data from the LEADER trial. Cardiovasc Diabetol. 2016;15:29.