Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/jptcp.v31i4.5373

PREVALENCE OF DIABETES MELLITUS IN INDIVIDUALS DIAGNOSED WITH CORONARY ARTERY DISEASE (CAD) AND ITS ASSOCIATION WITH SITE OF ATHEROSCLEROTIC LESIONS

Dr. Saleem Ullah[1], Dr. Syed Javaid Iqbal[1*], Dr. Hassan Javed[2], Dr. Awais Hussain Kazim[3], Dr. Suleman Khan[4], Dr. Abdul Wadood Kakar[5]

[1]Consultant Cardiologist Siadu Group of Teaching Hospital, Saidu Sharif Swat and Kings International Hospital Saidu Sharif Swat, Pakistan
[2]Medical Officer, Health Department, Tehsil Head Quarter Hospital Sahiwal District Sargodha Punjab, Pakistan
[3]Senior Registrar, Cardiology Department, Wazirabad Institute of Cardiology, Wazirabad, Punjab, Pakistan
[4]Resident Physician, Medical A Ward Khyber Teaching Hospital Peshawar KPK, Pakistan
[5]Assistant Professor of Cardiology, Teaching Hospital Loralai, Pakistan

[*]**Corresponding Author:** Dr. Syed Javaid Iqbal
Email: bachadr@gmail.com

Abstract:
Objectives: To determine the prevalence of diabetes mellitus in individuals with CAD and to investigate its association with the site of atherosclerotic lesions.
Materials and Methods: This cross sectional study was conducted at Saidu Group of Teaching Hospitals (SGTH) and Kings International Hospital Saidu Sharif Swat, Pakistan. A total of 150 patients were enrolled from August, 2023 and January, 2024. Coronary angiography was performed on all patients by a consultant cardiologist with a minimum of 5 years of experience. This ensured standardized and reliable assessment of coronary artery disease (CAD) across the study population. Additionally, fasting blood sugar tests were conducted to confirm the presence of diabetes mellitus (DM) in the patients.
Results: The mean age of all patients was age of the patients was 50.82±9.66 years. Out of the total enrolled patients, 96 individuals (64.0%) were male, while the remaining 54 individuals (36.0%) were female. Hypertension was present in 73 patients (48.7%), with a smoking history observed in 48 patients (32.0%), and a family history of coronary artery disease (CAD) noted in 44 patients (29.3%). Regarding the distribution of atherosclerotic lesions, proximal lesions were detected in 88 individuals (58.7%), while mid to distal lesions were found in 62 individuals (41.3%). Diabetes mellitus (DM) was diagnosed in 60 patients (40.0%). Among these, 30 patients (34.1%) exhibited proximal lesions, and the same number of patients (48.4%) had mid to distal lesions, with a statistically significant p-value of 0.05.
Conclusion: It was concluded from the study that there is strong association between diabetes mellitus.

Key words: Coronary artery disease, DM, Atherosclerotic lesions

INTRODUCTION: Coronary artery disease (CAD), a common manifestation of atherosclerosis, poses significant health risks and remains a leading cause of morbidity and mortality worldwide.(1) Diabetes mellitus, particularly Type 2 diabetes, has emerged as a major risk factor for CAD, exacerbating the cardiovascular burden in affected populations. Cardiovascular diseases (CVD) have indeed become increasingly prevalent worldwide over the past 20 years.(2) They represent one of the leading causes of mortality globally, as reported by the World Health Organization (WHO) and various studies, including the one conducted by Timmis et al. in 2020.(3) Numerous studies have sought to elucidate the relationship between diabetes mellitus and CAD, aiming to understand not only the prevalence of diabetes among CAD patients but also its impact on disease progression and clinical outcomes. One key aspect of this relationship is the association between diabetes mellitus and the localization of atherosclerotic lesions within the coronary arteries. Diabetes substantially elevates the risk of developing cardiovascular diseases such as coronary artery disease (CAD), heart attack, stroke, peripheral arterial disease, and heart failure.(4) Individuals with diabetes face a notably higher risk approximately two to four times greater of developing cardiovascular diseases compared to those without diabetes.(5)

Recent studies has highlighted the intricate interplay between diabetes mellitus and the site of atherosclerotic lesions in CAD patients. Evidence suggests that individuals with diabetes may exhibit distinct patterns of coronary artery involvement compared to non-diabetic counterparts. Specifically, diabetic patients often present with more diffuse and extensive atherosclerotic lesions, affecting multiple coronary artery territories. Moreover, diabetic CAD patients frequently demonstrate a predilection for proximal coronary artery involvement, which may have implications for disease severity and therapeutic management.(6) The present study aims to address the gap in knowledge regarding the prevalence of diabetes mellitus among individuals diagnosed with CAD and its association with the localization of atherosclerotic lesions. Understanding this association is crucial for risk stratification, treatment planning, and improving clinical outcomes in patients with both diabetes and CAD. By elucidating the relationship between diabetes mellitus, CAD, and the site of atherosclerotic lesions, the study contributes to the broader understanding of cardiovascular complications in diabetic populations and informs more effective management strategies.

INTRODUCTION:

Objective:

To determine the prevalence of diabetes mellitus in individuals with CAD and to investigate its association with the site of atherosclerotic lesions.

MATERIALS AND METHODS:

Study Design: Cross sectional study

Study setting: Saidu Group of Teaching Hospitals (SGTH) and Kings International Hospital Saidu Sharif Swat, Pakistan

Duration of the study: The study duration was 6 month (from August, 2023 to January, 2024).

Inclusion Criteria:

- Patients diagnosed with coronary artery disease.
- Patients of age 30-70 years.
- Both gender.

Exclusion Criteria:

- Patients without confirmed coronary artery disease, including those with other types of heart disease such as valvular heart disease, cardiomyopathy, or congenital heart disease.

Methods:

The cross-sectional study took place at Saidu Group of Teaching Hospitals (SGTH) and Kings International Hospital Saidu Sharif Swat, Pakistan following approval from the hospital's ethical committee. We recruited 150 patients diagnosed with diabetes, assigning a unique identifier to each individual after obtaining informed consent. All patients underwent coronary angiography conducted by a consultant cardiologist with a minimum of five years' experience to diagnose both proximal and distal atherosclerotic lesions. Fasting blood sugar tests were also conducted to confirm the diagnosis of diabetes mellitus. Data collection utilized a pre-designed questionnaire. Statistical analysis was performed using SPSS version 25.

RESULTS:

The mean age of patients was 50.82±9.66 years, with 67(44.7%) patients in the age group of 30-45years, 49(32.7%) patients in the age group of 46-60 years and 34(22.7%) patients in the age group of >60 years. Out of total enrolled patients 96(64.0%) patients were male and the remaining 54(36.0%) were female. Hypertension, smoking history and family history of CAD was found in 73(48.7%), 48(32.0%) and 44(29.3%) patients respectively. Regarding the frequency of atherosclerotic site distribution, 88 individuals (58.7%) exhibited proximal lesions, while 62 individuals (41.3%) presented with mid to distal lesions. DM was found in 60(40.0%) of patients. The mean duration of CAD was 7.25+1.03 years.

Diabetes was detected in 30 patients (34.1%) with proximal lesions and 30 patients (48.4%) with mid to distal lesions, demonstrating a statistically significant p-value of 0.05. Within the age group of 30-45 years, 42 patients (47.7%) displayed lesions primarily in the proximal site, while 25 patients (40.3%) exhibited lesions in the mid to distal site. Among individuals aged 46-60 years, 24 patients (27.3%) had lesions predominantly in the proximal region, while 25 patients (40.3%) presented lesions in the mid to distal site. For patients aged over 60 years, 22 patients (25.0%) showed lesions primarily in the proximal site, whereas 34 patients (54.8%) exhibited lesions in the mid to distal site, with a p-value of 0.24. In terms of gender distribution, among males, 57 patients (64.8%) displayed proximal lesions, while 39 patients (62.9%) exhibited mid to distal lesions. Among females, 31 patients (35.2%) had proximal lesions, and 23 patients (37.1%) had mid to distal lesions, with a p-value of 0.81. In terms of smoking history, 28(31.8%) patients displayed proximal lesions, while 20(32.3%) patients exhibited mid to distal lesions with a p-value of 0.95.

Table 1: Characteristic of all the enrolled patients *(n=150)*

Variables	Frequency (Percentage)
Gender	
Male	96(64.0%)
Female	54(36.0%)
AGE GROUP	
30-45years	67(44.7%)
46-60 years	49(32.7%)
>60 years	34(22.7%)
Mean age (years)	50.82±9.66
Hypertension	73(48.7%)
Smoking history	48(32.0%)
Family history of CAD	44(29.3%)
Duration of CAD (YEARS)	7.25±1.03

Table 2: Frequency of DM and Site of atherosclerotic *(n=150)*

Variables	Frequency (Percentage)
DM	
Yes	60(40.0%)
No	90(60.0%)
Site of atherosclerotic	
Proximal lesions	88(58.7%)
Mid to Distal	62(41.3%)

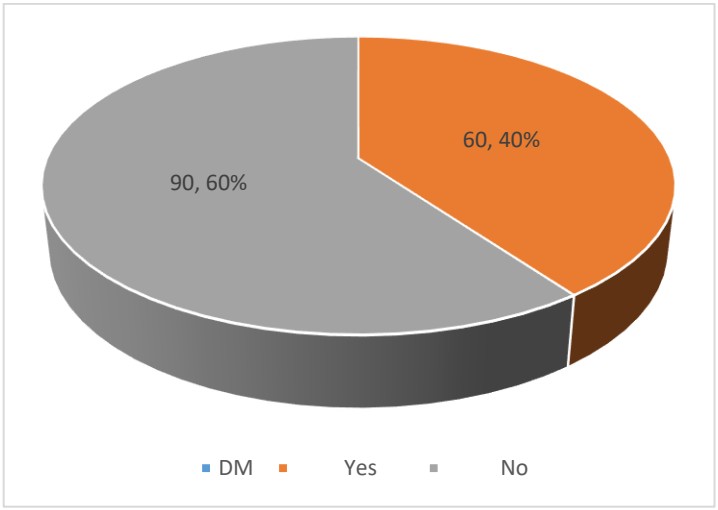

Fig 2: Frequency of DM

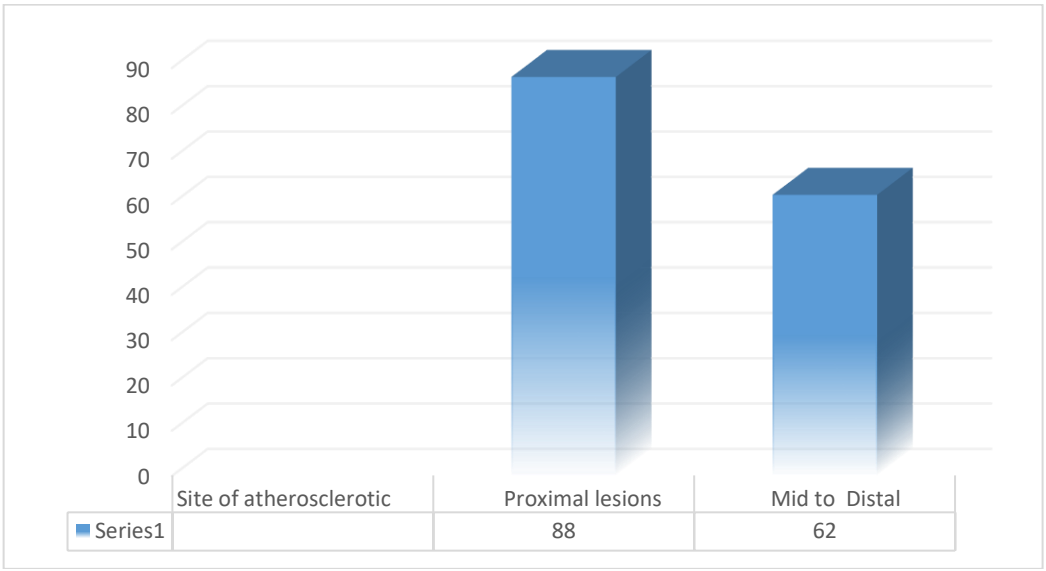

Fig 3: Frequency of Site of atherosclerotic

Table 3: Stratification of gender, DM, age group, duration of CAD, family history of CAD, hypertension and smoking history with respect to the site of atherosclerotic lesion

	Site of Atherosclerotic Lesion		
	Proximal	**Mid to Distal**	**P-value**
Gender			
Male	57(64.8%)	39(62.9%)	0.81
Female	31(35.2%)	23(37.1%)	
DM	30(34.1%)	30(48.4%)	0.05
Family history of CAD	26(29.5%)	18(29.0%)	0.94
Smoking history	28(31.8%)	20(32.3%)	0.95
Age groups			
30-45years	42(47.7%)	25(40.3%)	0.24
46-60 years	24(27.3%)	25(40.3%)	
>60 years	22(25.0%)	12(19.4%)	
Hypertension	39(44.3%)	34(54.8%)	0.20
Duration of CAD			
5-7 Years	48(54.5%)	37(59.7%)	0.53
8-9 Years	40(45.5%)	25(40.3%)	

Discussion:

Diabetes Mellitus (DM) and Coronary Artery Disease (CAD) are two common chronic conditions with significant implications for public health.(7) There's a well-established association between diabetes and CAD, with diabetes being a major risk factor for the development and progression of CAD.(8) However, the precise relationship between the frequency of diabetes in CAD patients and the site of atherosclerotic lesions remains an area of active research and clinical interest. Studies consistently demonstrate a higher prevalence of diabetes among patients with CAD compared to the general population. The Framingham Heart Study and other large-scale epidemiological investigations have shown that diabetes confers a two to four-fold increase in the risk of developing CAD.(9) Research has highlighted a robust correlation between diabetes mellitus and an elevated index of atheroma burden as well as extension score.(10) In our study, DM was observed in 60 patients, constituting 40.0% of the total sample. Specifically, diabetes was identified in 30 patients (34.1%) with proximal lesions and in 30 patients (48.4%) with mid to distal lesions. This distribution revealed a statistically significant p-value of 0.05, indicating a notable association between the presence of diabetes and the location of atherosclerotic lesions within the coronary arteries. In contrast to our study findings, Pathak et al. reported no discernible (CAD).(11) Our study findings were corroborated by the research conducted by Niazi GZK et al. (8), where 38.71% of patients were diagnosed with diabetes mellitus (DM). This similarity in the prevalence of diabetes mellitus between our study and theirs provides additional support for the association between diabetes and the distribution of atherosclerotic lesions within the coronary arteries, as observed in our investigation. The association between diabetes and the site of atherosclerotic lesions in CAD patients is complex and multifactorial. Several studies have suggested that diabetes may predispose individuals to develop atherosclerosis in specific arterial territories, including the coronary arteries. For instance, research has shown that diabetic patients are more likely to have multi-vessel CAD, indicating diffuse atherosclerotic involvement rather than focal disease. Additionally, diabetic CAD patients frequently exhibit more extensive and calcified coronary lesions, which may contribute to increased cardiovascular morbidity and mortality.

The study conducted by Parsa et al. stated that 33.6% of patients with proximal atherosclerotic lesions had diabetes, whereas only 10.4% of patients with mid or distal lesions had diabetes.(12) In contrast to our study findings, the research conducted by Parsa et al. (12) suggests that patients with proximal lesions are more likely to have diabetes compared to those with mid to distal lesions. However, it's

worth noting that in our study, both sites had an equal number of patients who developed diabetes. This disparity underscores the variability that can exist among different studies and highlights the importance of considering multiple sources of evidence when evaluating the relationship between diabetes mellitus and the location of atherosclerotic lesions within the coronary arteries. In a study conducted by Naghshtabrizi and colleagues (13), it was found that 42% of patients with proximal lesions had diabetes mellitus, while 38.5% of those with distal lesions were affected. This suggests a relatively higher prevalence of diabetes among patients with proximal lesions compared to those with distal lesions, although the difference in prevalence between the two groups is not substantial.

Conclusion:

The study concluded that a strong association exists between diabetes mellitus (DM) and coronary artery disease (CAD). Additionally, in our study, it was observed that an equal number of patients developed diabetes at both sites, indicating no significant difference in the prevalence of diabetes between patients with lesions in the proximal and mid to distal parts of the coronary arteries.

References:

1. Malakar AK, Choudhury D, Halder B, Paul P, Uddin A, Chakraborty S. A review on coronary artery disease, its risk factors, and therapeutics. Journal of cellular physiology. 2019;234(10):16812-23.
2. Einarson TR, Acs A, Ludwig C, Panton UH. Prevalence of cardiovascular disease in type 2 diabetes: a systematic literature review of scientific evidence from across the world in 2007–2017. Cardiovascular diabetology. 2018;17(1):1-19.
3. Timmis A, Townsend N, Gale CP, Torbica A, Lettino M, Petersen SE, et al. European Society of Cardiology: cardiovascular disease statistics 2019. European heart journal. 2020;41(1):12-85.
4. Sharma A, Mittal S, Aggarwal R, Chauhan MK. Diabetes and cardiovascular disease: inter-relation of risk factors and treatment. Future Journal of Pharmaceutical Sciences. 2020;6(1):1-19.
5. Shah AD, Langenberg C, Rapsomaniki E, Denaxas S, Pujades-Rodriguez M, Gale CP, et al. Type 2 diabetes and incidence of cardiovascular diseases: a cohort study in 1· 9 million people. The lancet Diabetes & endocrinology. 2015;3(2):105-13.
6. Arnold SV, Bhatt DL, Barsness GW, Beatty AL, Deedwania PC, Inzucchi SE, et al. Clinical management of stable coronary artery disease in patients with type 2 diabetes mellitus: a scientific statement from the American Heart Association. Circulation. 2020;141(19):e779-e806.
7. Aronson D, Edelman ER. Coronary artery disease and diabetes mellitus. Cardiology clinics. 2014;32(3):439-55.
8. Bittencourt C, Piveta VM, Oliveira CS, Crispim F, Meira D, Saddi-Rosa P, et al. Association of classical risk factors and coronary artery disease in type 2 diabetic patients submitted to coronary angiography. Diabetology & Metabolic Syndrome. 2014;6:1-8.
9. Muralidharan A. Evaluation of Coronary Heart Disease Risk Factors and Risk Stratification: A Study of 200 Asymptomatic Subjects attending Master Health Checkup: Stanley Medical College, Chennai; 2006.
10. Gobardhan SN, Dimitriu-Leen AC, van Rosendael AR, van Zwet EW, Roos CJ, Oemrawsingh PV, et al. Prevalence by computed tomographic angiography of coronary plaques in South Asian and white patients with type 2 diabetes mellitus at low and high risk using four cardiovascular risk scores (UKPDS, FRS, ASCVD, and JBS3). The American journal of cardiology. 2017;119(5):705-11.
11. Pathak S, Gajurel R, Poudel C, Shrestha H, Thapa S, Koirala P. Angiographic severity of coronary artery disease in diabetic and non-diabetic acute STEMI patients in a tertiary care centre of Nepal. Kathmandu University Medical Journal. 2021;19(4):410-4.
12. Zand Parsa A, Ziai H, Haghighi L. The impact of cardiovascular risk factors on the site and extent of coronary artery disease: cardiovascular topics. Cardiovascular Journal of Africa. 2012;23(4):197-9.

13. Naghshtabrizi B, Moradi A, Amiri J, Aarabi S, Sanaei Z. An evaluation of the numbers and locations of coronary artery disease with some of the major atherosclerotic risk factors in patients with coronary artery disease. Journal of Clinical and Diagnostic Research: JCDR. 2017;11(8):OC21.