Original Research Article

FREQUENCY OF DIABETES MELLITUS IN PATIENTS WITH CORONARY ARTERY DISEASE AND ITS ASSOCIATION WITH SITE OF ATHEROSCLEROTIC LESIONS

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Abstract: *This study aimed to evaluate the frequency of diabetes mellitus in coronary artery disease patients and its association with the site of the atherosclerotic lesion. A comparative cross-sectional study was conducted in the Department of cardiology, CPE Institute of Cardiology, Multan, from 20 August 2019 to 19 February 2020. A total of 234 CAD patients referred for coronary angiography were selected for the study by non-probability consecutive sampling. All patients underwent coronary angiography. Diagnosis of proximal and distal atherosclerotic lesions and diabetes mellitus. All the data were analyzed by SPSS version 23. Diabetes was found in 77 (49%) patients with proximal lesions and 19 (20.90%) patients with mid to distal lesions. This difference was statistically significant with a p-value of <0.001. Of having age 53-70 years, 74 were found in proximal lesions, and 49 patients had mid to distal site lesions with a statistically insignificant p-value of 0.308. In females, 62 patients had proximal lesions, and 16 had mid to distal lesions. This difference was statistically significant with a p-value of <0.001. Stratification was also performed based on BMI, duration of CAD, hypertension, smoking, and family history of CAD. No significant association was found between these variables and the site of the lesion. Diabetes mellitus is significantly associated with the higher frequency of proximal lesions in coronary artery disease cases.*

Keywords: Coronary artery disease, atherosclerotic lesions, diabetes mellitus, cardiovascular diseases

Introduction

Cardiovascular diseases have been increasingly prevalent worldwide, especially for the las 20 years (Einarson et al., 2018; Ohno et al., 2018). Due to this, they are one the diseases with the highest mortality rate all over the globe, as reported by the WHO report (Timmis et al., 2020). Among these cardiovascular diseases, coronary artery disease is the most life-threatening and dreadful disease with the highest treatment costs (Glovaci et al., 2019). Diabetes is a significant independent risk factor for cardiovascular diseases in both genders. Its prevalence is also increasing daily, with an estimated 350 million diabetics by 2030 (Townsend et al., 2022). Diabetes increases the risk of CVD by 2 to 4 folds compared to nondiabetic individuals (Al-Salameh et al., 2020; Vega-López et al., 2018). Khan et al. reported diabetes mellitus in 30% of patients with CAD (Khan et al., 2016). Some studies have shown that diabetes correlates with the site of atherosclerotic lesions. Parsa et al. reported diabetes in 33.6% of subjects with proximal atherosclerotic lesions and 10.4% of patients having mid or distal lesions (Zand Parsa et al., 2012). Another study by Naghshtabrizi et al. found diabetes mellitus in 42%

of patients with proximal lesions and 38.5% with distal lesions (Naghshtabrizi et al., 2017). Proximal lessons are associated with a high mortality rate. Because very little work has been published regarding the association of diabetes mellitus with the site of atherosclerotic lesions. The study was conducted to evaluate the frequency of diabetes mellitus in coronary artery disease patients and its association with the site of the atherosclerotic lesion.

Methodology

A comparative cross-sectional study was conducted in the Department of Cardiology, CPE Institute of Cardiology, Multan, from 20 August 2019 to 19 February 2020. A total of 234 CAD patients referred for coronary angiography were selected for the study by non-probability consecutive sampling. Patients ages 35-70 years, both male and female, were included in the study. Patients who planned to re-do angiographic procedures and those who had normal coronary arteries on angiography were excluded. All the patients gave informed consent to participate in the study. The ethical board approved the study

design of the hospital. Data regarding patients' age, gender, detailed clinical histories such as the presence of co-morbid conditions and duration of CAD, and laboratory investigations (for measurement of fasting blood sugar levels) were taken of all patients. All patients underwent coronary angiography. A consultant cardiologist with at least 3 years of post-fellowship experience diagnosed proximal and distal atherosclerotic lesions. The diagnosis of diabetes mellitus was also made. Data regarding risk factors of coronary artery disease was also collected. All the data were analyzed by SPSS version 23. Continuous variables like age, duration of CAD, height, weight, and BMI were represented as mean and standard deviation. Categorical variables were presented by using frequency and percentage. A chi-square test was performed to assess the association of diabetes mellitus with the site of atherosclerotic lesion (proximal vs. non-proximal lesion). Effect modifiers such as gender, duration of CAD, BMI, hypertension, age, smoking history, and family history of CAD were controlled by stratification. A Chi-square test was applied again after stratification to determine the effect on the site of the atherosclerotic lesion. P- value ≤ 0.05 was regarded as statistically significant.

Results

The mean age was 52.86±10.32 years included in this study. The mean duration of CAD was 7.21±10.32 years. The minimum duration of CAD was 01 year, and the maximum was 12 years. The mean height was 161.64±10.47 cm. The mean weight of patients was 65.52±10.85 kgs. The mean BMI was 25.08±3.33 kg/m2. The highest BMI was 18.40 kg/m2, and the lowest BMI was 34.68 kg/m2 (Table 1).

Table 1 Demographic of study population

Variables	Mean	S.D.
Age (Years)	52.86	10.32
Duration of CAD (Years)	7.21	3.26
Height (cm)	161.64	10.47
Weight (Kg)	65.52	10.85
BMI (Kg/m^2)	25.08	3.33

There were more males as compared to females. There were 170 (68.65%) male and 78 (31.45%) female patients (Figure I). Ninety-six patients (38.71%) were diagnosed with diabetes mellitus versus 152 (61.29%) patients who were not diagnosed with diabetes mellitus. Hypertension was diagnosed in 132 (53.23%) and not in 116 (46.77%) patients. 97 (39.11%) out of 248 patients were smokers. A family history of CAD was found in 66

(26.61%) and not in 182 (73.39%) patients. On the frequency of site of atherosclerotic, there were 157 (63.31%) with proximal lesions and 91 (36.69%) with mid to distal lesions.
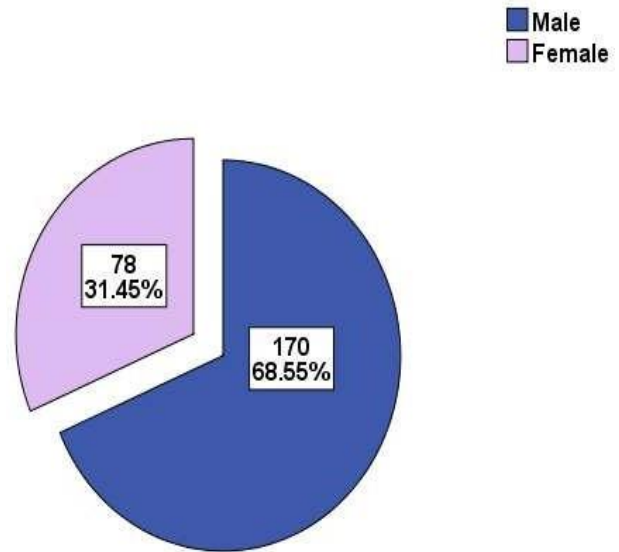
Figure I: Frequency of gender

Diabetes was found in 77 (49.00%) patients with proximal lesions and 19 (20.90%) patients with mid to distal lesions. This difference was statistically significant with a p-value of <0.001 (Table 2). Stratification of age was performed; in the age group of 35-52 years, there were 83 in the proximal site of the lesion and 42 in the mid to distal site of the lesion. Of having age 53-70 years, 74 were found in proximal lesions, and 49 patients had mid to distal site lesions with a statistically insignificant p-value of 0.308 (Table 2). On the frequency of gender, in males, 95 were found to have proximal lesions, and 75 patients had mid to distal lesions. In females, 62 patients had proximal lesions, and 16 had mid to distal lesions. This difference was statistically significant with a p-value of <0.001 (Table 2). Stratification was also performed based on BMI, duration of CAD, hypertension, smoking, and family history of CAD. No significant association was found between these variables and the site of the lesion.

Discussion

We conducted a study to determine the association between CAD risk factors and the position of atherosclerotic lesions. Studies have indicated a strong association between diabetes mellitus and a high index of atheroma burden and extension score (Gobardhan et al., 2017; Godoy et al., 2020). Pathak

and his colleagues reported no association between diabetes and the severity of coronary artery disease (Pathak et al., 2021).

Table 2 Stratification of diabetes mellitus, age, gender, BMI, duration of CAD, hypertension, smoking history, and family history of CAD to determine their association with the site of atherosclerotic lesion

Variable	Site of Atherosclerotic Lesion		P-value
	Proximal	Mid to Distal	
Diabetes Mellitus			
Yes	77	19	
No	80	72	<0.001
Age Group			
35-52 Years	83	42	
53-70 Years	74	49	0.308
Gender			
Male	95	75	
Female	62	16	<0.001
BMI			
$\leq$29.99 Kg/m^2	91	37	0.009
$\geq$25.00 Kg/m^2	66	54	
Duration of CAD			
1-7 Years	82	42	0.356
8-12 Years	75	49	
Hypertension			
Yes	78	54	0.142
No	79	37	
Smoking history			
Yes	53	44	0.023
No	104	47	
Family history of CAD			
Yes	54	12	<0.001
No	103	79	

In the present study, we determined the association of diabetes with the localization of CAD. We found a significant association between diabetes with proximal lesions in CAD patients. We found diabetes mellitus in 77 (49%) patients with proximal lesions versus 19 (20.90%) patients with mid to distal lesions. A study was conducted by Parsa et al. on the association of risk factors with the site and severity of atherosclerotic lesions (Zand Parsa et al., 2012). The authors reported diabetes in 33.6% of patients having proximal atherosclerotic lesions and in 10.4% of patients having mid or distal lesions. Moreover, these authors also found a significant association between diabetes with the severity of CAD. The authors found a higher frequency of TVD in diabetic

patients than nondiabetic patients. Another study by Naghshtabrizi and his colleagues found diabetes mellitus in 42% of patients with proximal lesions and 38.5% with distal lesions (Naghshtabrizi et al., 2017). The authors found a significantly higher proportion of proximal lesions in RCA and LAD. While the difference was insignificant in LCX. The authors also found a higher frequency of LMS involvement in diabetic patients. 88% versus only 22% in nondiabetic patients. A proximal involvement has been reported while studying the site of coronary artery involvement. However, this association with diabetes was not statistically significant (Manfrini et al., 2020; Samman Tahhan et al., 2018). Coronary angiographic localization, the number of vessels affected, and diabetes mellitus are associated with all-cause mortality. The fact that patients undergoing angiography were more likely to have proximal lesions suggests that diabetes mellitus data can play a role in risk prediction and prognosis in ACS, which has been shown in patients following percutaneous interventions. An other study has also highlighted diabetes as a coronary artery disease risk factor (Chow et al., 2011).

Conclusion

Diabetes mellitus is significantly associated with the higher frequency of proximal lesions in coronary artery disease cases.

Conflict of interest

The authors declared absence of conflict of interest.

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