ORIGINAL ARTICLE

Coronary Angiographic Findings between Diabetic and non-diabetic Patients in Coronary Artery Disease: A Comparative Study

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Abstract:

Background & Objectives: Coronary artery disease (CAD) accounts for the major risk factor of mortality in diabetes. Coronary angiography is the "gold-standard" technique for diagnosing and evaluating CAD. Material and Methods: The present study was undertaken at Border Guard hospital, Dhaka between the periods of November - 2017 to December 2021. Percutaneous coronary angiography (CAG) was performed in 204 consecutive patients with suggestive of ischaemic chest pain. The population consisted of 88 cases which are diabetic and 116 cases nondiabetic Results: We observed angiographic lesion among both groups comparing site & number of vessel(s) involvement and also average percentage of stenosis. The presence of coronary risk factors was not significantly different between the two populations. Total positive angiographic lesion was (61.5%) in both groups. Among the Diabetes mellitus patients positive CAG finding (69.3%). The recognized lesions were single vessel disease (SVD) 23 (26.1%), double vessel disease (DVD) 14 (15.9%), triple vessel disease (TVD) 24 (27.3%) percentage of vessel stenosis 82.63%. On the other hand, total positive angiographic lesion was 70 (53.4%) in non-diabetic group; among them single vessel disease (SVD) 30 (25.9%), double vessel disease (DVD) 15(12.9%), triple vessel disease (TVD) 17 (14.7%). No diffuse lesions was found and average vessel stenosis was 78.03%. The results of the angiographic finding suggest that diabetic patients have a higher incidence of coronary heart disease (CHD), DVD, TVD, diffuse lesion & marked stenosis of coronary vessel than non-diabetic patient. Conclusion: CAD in diabetics had considerably higher percent of severe and unpredictable presentation. This increased frequency of complex lesion morphology is more difficult to treat by definitive intervention like percutaneous transluminal coronary angioplasty (PCI) & coronary artery bypass graft (CABG). Diabetics have a higher risk factor profile and poor clinical outcome. Early diagnosis and appropriate management will reduce the risk of complication after the onset of disease.

Keywords: Coronary artery disease, Coronary angiogram, Diabetes mellitus, Non-diabetics.

Introduction:

Coronary artery disease (CAD) accounts for the major risk of mortality in diabetes. Diabetes mellitus (DM) is a well-established risk factor for development of coronary artery disease (CAD).[1,2] Coronary atherosclerosis is not only more prevalent in diabetic patients but also more severe. The reported prevalence of coronary artery disease in diabetic patients ranges from 9.5% to 55%,[3,4] whereas prevalence of 1.6% to 4.1% have been observed in the general population.[5,6] Incidence of heart diseases & ischaemic heart mortality was shown to be 4 times higher in people with Type-2 DM.[7] Type-1 DM was seen to be associated with at least a 10 fold increase as compared with people without diabetes.[8] In people with DM 40%, 15%, 10% death occur due to ischaemic heart disease (IHD), other heart diseases & cerebrovascular disease (CVD) respectively.[9] Several in vivo and postmortem studies have shown that diabetic patients have more diffuse and severe coronary artery disease than the general population.[1,10,11] In addition, the relative risk of

myocardial infarction (MI) is greater in diabetic patients than in the normal population.[12] The cause of this difference in the diabetic population is not well understood. But it is suggested that diabetic patients have several hematologic, and metabolic abnormalities not present in their non diabetic counterparts[13,14,15] that may predispose them to formation of more complex plaque. To date, very few studies, have attempted to explain these differences between diabetic and non-diabetic patients in our country. Thus, this cross-sectional study was designed to find out the morphological pattern of coronary lesion among diabetes mellitus and to compare with non diabetic cases.

Materials and Methods:

204 cases of males and females, who presented in the department of Cardiology, Border Guard Hospital, Dhaka, from November- 2017 to December -2021 were included in this study. Involved patients were selected on the basis of inclusion and exclusion criteria as mentioned below.

Study population Inclusion criteria:

All patients clinically diagnosed or documented to have CAD, who required coronary angiography (CAG) was taken as study population. Informed consent was taken from all patients. The grouping of study population. The study population was divided into two groups as follows

Group-1: Patients presented with features of ischaemic heart disease (IHD) & having DM (DM group)

Group-2: Patients presented with features of ischaemic heart disease (IHD) but without DM (non DM group)

Criteria for diagnosis of DM Group-1 (Diabetic CAD) Previously known diabetic or first time detected diabetic by American diabetic association (ADA) criteria, 2007, presenting with CAD.[16]

Criteria for diagnosis of non DM cases Patient do not meet the above ADA criteria's for confirmation of the diagnosis of DM.

Criteria for coronary artery disease (CAD) &Coronary Angiography (CAG)

1) Chronic stable angina pectoris with positive E.T.T (with or without previous MI)
2) Unstable angina pectoris
3) Atypical chest pain with positive E.T.T
4) After acute MI (with or without persistent angina)
5) Asymptomatic patient with noninvasive evidence of myocardial ischaemia (ECG, ECHO)
6) Post PTCA angina

Exclusion Criteria

1) Patient with hypertrophic or dilated cardiomyopathy
2) Patient with valvular heart disease
3) Patient with congenital heart disease
4) Patients having impaired fasting glucose level presenting with CAD. (FPG 110 mg/dl, PP-PG 140-200mg/dl) On recruiting the subjects into Group 1 and Group 2 following protocol is followed. History, Clinical Examination, patient stabilization, Anthropometric Measurement, Routine investigations, Specific investigations including Echocardiography Procedures, definitions and criteria were used in the study as per standard protocol (JNC-7, American diabetic association (ADA) criteria and others).[17, 18]

Coronary Angiographic (CAG) Procedure

A comprehensive analysis of Coronary Angiogram (CAG) was done; Severity & extent of arterial disease were measured by eye estimation. The pre requisites for CAG were followed according to the hospital protocol. Then morphological characteristics of lesion was analysed

a) Positive CAG- taken when coronary artery stenosis 50%
b) Negative CAG- taken when coronary artery stenosis < 50%

According to branches of coronary artery involvement

1) Single vessel disease (SVD) –one coronary artery involve
2) Double vessel disease (DVD)- two coronary artery involve
3) Triple vessel disease (TVD) -three coronary artery involve
4) Diffuse lesion –diffusely involved one or more coronary artery

Statistical analysis after processing all available information was done. The patients were grouped into those with or without DM having CAG. All parametric values were expressed as mean & nonparametric values were expressed in percentage (%). The significance of difference between two groups were determined by using unpaired student's 't' test, Pearson's chi-square test & 'z' test where applicable. 'P' value of less than 0.05 was considered to be significant.

Results

Total Number of patients studied -204 Diagnostic Yield (sensitivity) of CAG Distribution of

Table-I

Baseline characteristics of the patients (n=204)

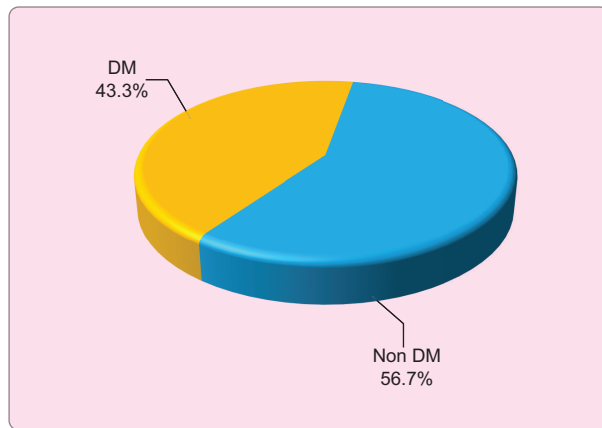| Variable	DM (n=88)	Non DM (n=116)	P value
Age	47.30±6.64	46.08±7.06	0.212
Male (n%)	79(89.8%)	114(98.3%)	0.934
Female (n%)	9(10.2%)	2(1.7%)	0.008
Smoking	43(48.9%)	56(48.3%)	0.008
BMI			
Normal	54(61.4%)	62(53.4%)	0.258
Over weight	34(38.6%)	54(46.6%)	

Fig.-1: *Distribution of patient undergone CAG*

Table-II

Clinical diagnosis of the patients (n=204)

Clinical diagnosis	DM (n=88)	Non DM (n=116)	P value
Stable Angina (n)	79(89.8%)	102(87.9%)	0.663
Post PTCA (n)	2(2.3%)	2(1.7%)	0.780
HTN (n)	70(79.5%	80(69%)	0.090
Dyslipidemia (n)	18(20.5%)	45(38.8%)	0.005
OMI	3(3.4%)	10(8.6%)	0.135
Hypothyroidism (n)	0(00)	6(5.2%)	0.030

Table-III

Bio-chemical and echocardiographic parameter of the patients (n=204)

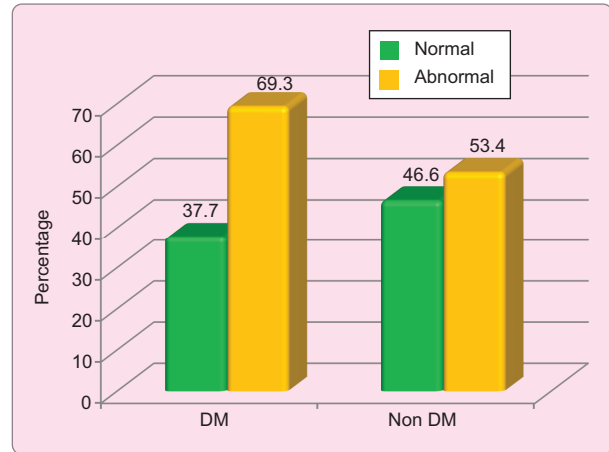| Bio-chemical parameter	DM (n=88)	Non DM (n=116)	P value
TC	184.67±40.10	188.50±35.32	0.470
TG	207.05±96.77	187.00±63.08	0.075
HDL	30.17±5.87	30.61±6.48	0.618
LDL	131.20±41.55	138.79±30.39	0.133
FBS	7.48±2.02	5.69±1.06	0.001
Serum creatinine	1.19±1.22	1.07±0.79	0.398
EF%	61.18±9.64	63.57±7.04	0.042

Fig.-2: *Distribution of patients angiographic lesion*

Table-IV

Percentage of vessel involvement of the study patients

Angiographic profile	DM (n=88)	Non DM (n=116)	P value
LM	9(10.2)	7(6%)	0.270
LAD	47(53.4%)	43(37.1%)	0.020
LCX	40(45.5%)	36(31%)	0.035
RCA	36(40.9%)	30(25.9%)	0.023

Table-V

Distribution of vessel (n=204)

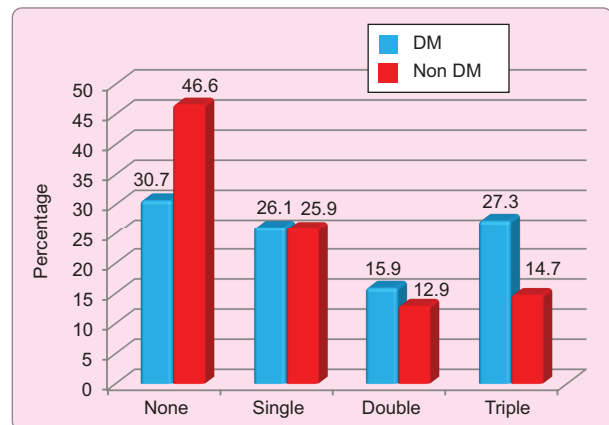| Vessel	DM (n=88)	Non DM (n=116)	P value
0	27(30.7%)	54(46.6%	0.059
Single	23(26.1%)	30(25.9%)	
Double	14(15.9%)	15(12.9%)	
Triple	24(27.3%)	17(14.7%)	
Average vessels	1.39±1.18	0.95±1.09	

Fig.-3: *Distribution of vessel (n=204)*

Discussion:

Cardiovascular diseases including CAD are more common among diabetics than among nondiabetics. In the present study, there was no significance difference between age in two groups (Diabetic and non-diabetic) P>0.05. Age difference between two groups and within groups among sex wise shows no significance (P>0.05). Singer DE observed that, diabetic were older and noted that females are commonly involved, which is in agreement with our study. Total 43 (48.9%) DM patient were smoker and 56 (48.3%) people were smoker in non DM. Normal BMI was 54 (61.4%) in DM and 62 (53.4%) in non DM. Over weight was 34 (38.6%) in DM and 102 (87.9%) were non DM. Hypertension and dyslipidaemia were observed 70 (79.5%), 18 (20.5%) respectively in DM patient and 80 (69%), 45 (38.8%) in non DM patient. Total positive angiographic lesion was (61.5%) in both groups. Among the Diabetes mellitus patients with positive CAG finding (69.3%), the recognized lesions were single vessel disease (SVD) 23 (26.1%), double vessel disease (DVD) 14 (15.9%), triple vessel disease (TVD) 24 (27.3%) percentage of vessel stenosis 82.63%. On the other hand, total positive angiographic lesion was 70 (53.4%) in non-diabetic group; among them single vessel disease (SVD) 30 (25.9%), double vessel disease (DVD) 15(12.9%), triple vessel disease (TVD) 17 (14.7%), no diffuse lesions was found and average vessel stenosis was 78.03%. The results of the angiographic finding suggest that diabetic patients have a higher incidence of coronary heart disease (CHD), DVD, TVD, diffuse lesion & marked stenosis of coronary vessel than non-diabetic patient. In a study by Henry et al.[19] and Sousa et al.[20] there was increased incidence of triple vessel disease, and more diffuse lesions were noted This finding was similar in other studies such as Mossavi et al.[21] Uddin et al.[22] Nicholls et al.[23] and Rana et al.[24] where they found the angiographic extent and severity of CAD was high in diabetic patients.

Conclusion

CAD in diabetics had considerably higher percent of severe and unpredictable presentation. This increased frequency of complex lesion morphology is more difficult to treat by definitive Intervention like percutaneous Transluminal coronary angioplasty (PCI) & coronary artery bypass graft (CABG). Diabetics have a higher risk factor profile and poor clinical outcome. Early diagnosis and appropriate management will reduce the risk of complication after the onset of disease.

Limitation of the study

Study Sample, due to the time constrains only 88 Diabetic and 116 Non diabetics were studied. Management of CAD has not been studied, which requires further research.

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