FREQUENCY OF MULTI VESSEL CORONARY ARTERY DISEASE IN DIABETICS AND NON DIABETICS

Kashif Khan[a], Shafique Ur Rehaman[a], Khawaja Ehtesham Ahmad[a], Atif Nazir[a], Muhammad Abbas[b], Rabiya Nazir[b]

[a]Rawalpindi Institute of Cardiology, Rawalpindi, [b]Bacha Khan Medical College, Mardan.

ABSTRACT:

INTRODUCTION: *Diabetes mellitus leads to atherosclerosis resulting in development of cardiovascular diseases (CVD). Diabetes is increasing day by day which posing increased risk of stroke by two folds and the chance of myocardial infarction is increased by 3-5 times. The risk of CVD is 2 to 4 times higher in people with DM compared with those without diabetes.*

AIMS & OBJECTIVE: *To compare the frequency of multi vessel coronary artery disease (CAD) in diabetes and non-diabetic patients.*

MATERIAL & METHODS: *A descriptive cross sectional study was done at angiography department, Punjab Institute of Cardiology, Lahore over the duration of six months from 06-Jan-2014 to 08-Jul-2014. Total 400 cases fulfilling inclusion and exclusion criteria were enrolled. Participants were placed in two groups as per history of diabetes mellitus. Angiography of these patients was done and findings were noted.*

RESULTS: *Mean age of all the patients was 51.81±5.77 years. The age range of the patients was 40- 60 years. Mean age of males was 51.15±5.61 and that of females was 52.57±5.87 years. Males were 54% and females were 46%. There were 200(50%) diabetic patients while 200 (50%) patients were non diabetic. There were 186(46.5%) smokers while 214(53.5%) were not smokers. Angiography findings showed that LAD was involved in 241(60.25%), in 209(52.25%) patients LCX was involved, RCA involvement was observed in 197(49.25%) patients, RAMUS involvement was observed in 33(8.25%) patients and LMS was observed in 159(39.75%) patients. Most of the patients were observed with LAD and LCX involvement as compared to other coronary arteries. In diabetic patients multi vessel disease was present in 101(50.5%) patients while the remaining 99(49.5%) patients did not have multi vessel disease. Among non diabetic patients multi vessel disease was present in 67(33.5%) patients while it was absent in 133(66.5%) patients.*

CONCLUSION: *Diabetes mellitus is a major risk factor that contributes to development of coronary artery disease. Diabetic patients who presented with unstable angina they had more severe angiographically documented multi vessel disease as compared to non-diabetic patients.*

KEY WORDS: *Type 2 diabetes mellitus, un-stable angina, multi vessel disease, non diabetic.*

Correspondence : Khawaja Ehtesham Ahmad, Rawalpindi Institute of Cardiology, Rawalpinidi. Email: drsham786@gmail.com

INTRODUCTION:

There are multiple risk factors for the development of CAD. Diabetes mellitus (DM) is a main risk factor and is considered most important. World Health Organization (WHO) estimates that the figure will rise to 300 million in 2025. [1-3]

DM leads to atherosclerosis and thereby, cardiovascular diseases (CVD). The prevalence of DM is increasing day by day. DM increases the risk of stroke by two folds and the chance of myocardial infarction is increased by 3-5 times. The risk of CVD is 2 to 4 times higher in people with DM compared with those without diabetes. The frequency of diabetes was 53.4% in patients of CAD. [4-7]

In a study, multi vessel disease was reported in 48.7% diabetic patients and 34.7% in non-diabetic patients and the difference was statistically significant (p-value<0.001). But another study reported that there was multi vessel disease in 53.9% diabetic patients and 50.9% in non-diabetic patients which was quite insignificant (p-value=0.74). [7, 8]

Improvement in glycemic control markedly reduces the complications due to diabetes. In general, every percentage point drop in glycosylated hemoglobin (HbA1c) can reduce the risk of CVD by 40%.[7]   About 90% of patients suffering with CAD have at least one risk factor which can be modified from the following: tobacco use, hypertension, hyperlipidemia, physical inactivity, obesity and diabetes.[9,10] Non-modifiable risk factors are genetics, age race and gender. [11] Coronary artery disease is a reason over half of all the deaths caused by cardiovascular diseases. In 2005, the estimated occurrence of CAD in adults age 20 and older was 16 million (8.7 million males and 7.3 million females).[12] Globally, CAD is the main cause of death, about 3.8 million males and 3.4 million females have mortality due to cardiovascular complications.[13] Our research is designed to assess the frequency of multi vessel disease in diabetes mellitus. Significant adverse effect on coronary arteries is associated with type 2 diabetes, causing more multi vessel and extensive CAD as compared to non-diabetic patients.[14-15]

MATERIAL & METHODS:

This was a descriptive observational cross sectional study. It was carried out in the angiography department, Punjab Institute of cardiology Lahore. Duration of the study was six months from 06-Jan-2014 to 08-Jul-2014. The approval was taken from ethical committee. A total of 400 cases were enrolled and divided into two groups; 200 cases in each group is calculated with 80% power of test, 5% level of significance and taking expected percentage of multi vessel disease i.e. 48.7% in diabetic and 34.7% in non-diabetic patients presented with unstable angina undergoing angiography. Sample was taken by non-probability purposive sampling technique.

Patients of age range 40-80years of either gender, patients with angina symptoms, (Patients with chest pain, shortness of breath and positive exercise tolerance test) were included and coronary angiography was performed. All patients who had renal insufficiency (serum creatinine >1.5mg/dl and serum urea >44mg/dl), patients of STEMI (Assessed through ECG), all patients with previous MI or CABG (Through history and medical record), patients who had familial dyslipidemic syndrome (Determined by history), patients with homocysteinemia (determined by history) and significant liver disease (ALT>40IU, AST>40IU) or malignancy (through medical record) were excluded.

CASES

Type II diabetes Mellitus cases

Diagnosis of diabetes was made if fasting blood glucose level is more than 126mg/dl and 2 hours post prandial blood glucose is more than 200mg/dl. Patients of having diabetes <15years.

CONTROLS

Non diabetic cases

Cases were with fasting blood glucose level less than 126mg/dl and 2 hours post prandial blood glucose less than 200mg/dl.

DATA COLLECTION PROCEDURE:

A total 400 cases were enrolled from angiography ward. Demographic information (name, age, gender, contact) and informed consent were obtained. Patients were divided into two groups as per history of diabetes mellitus. There were 200 diabetic patients in group I and 200 non-diabetic patients in group II. The patients were shifted to

angiography lab. All angiographies were done by a single senior cardiologist. Angiographic findings were noted. If there were three or more than one vessel involvement, it was labeled as multi vessel disease (It is defined as involvement (>75% stenosis) of any three or more of the following four arteries: the left main artery, the left circumflex artery, the left descending artery and the right coronary artery on angiography). For left main stem mild disease was also considered. The data was analyzed using SPSS-17. Mean and standard deviation was calculated for age. Qualitative variables like gender, diabetes and multi vessel disease etc. were presented as frequency and percentage. Chi square test was used to compare the both groups. P-value < 0.05 was considered significant. Effect modifier like age (40-60years,

61-80years, >80years), gender (male/female), smoking status and duration of diabetes (1-5years, 5-10years, >10years) was controlled through stratification.

RESULTS:

Mean of age of all the patients was 51.81 ± 5.77 years. The range of age of the patients was 40- 60 years. Mean age of males was 51.15 ± 5.61 and that of females was 52.57 ± 5.87 years. Males were 54% and females were 46%. There were 200(50%) diabetic patients while 200(50%) patients were non diabetic. There were 186(46.5%) smokers while 214(53.5%) were non-smokers.

Angiography findings showed that LAD was involved in 241(60.25%), in 209(52.25%) patients LCX was involved, in 209(52.25%) patients LCX was involved, RCA involvement was observed

Table-1: Coronary angiography findings for LAD		Frequency	Percentage
LAD Involvement	Yes	241	60.25%
	No	159	39.75%
LCX Involvement	Yes	209	52.25%
	No	191	47.75%
RCA Involvement	Yes	197	49.25%
	No	203	50.75%
LMS Involvement	Yes	159	39.75%
	No	241	60.25%
Chi-Square Test=11.86, p-value= 0.001 (Significant: p-value<0.05)			

Table-2: Multi vessel disease in relation to diabetic status		Diabetes	
		Yes	No
Multi vessel disease	Yes	101(50.5%)	67(33.5%)
	No	99(49.5%)	133(66.5%)
Total		200	200
Chi-Square Test=11.86, p-value= 0.001 (Significant: p-value<0.05)			

in 197(49.25%) patients, RAMUS involvement was observed in 33(8.25%) patients and LMS was observed in 159(39.75%) patients. Most of the patients were observed with LAD and LCX involvement as compared to other coronary arteries.

In diabetic patients multi vessel disease was present in 101(50.5%) patients while the remaining 99(49.5%) patients multi vessel disease was absent. Among non-diabetic patients multi vessel disease was present in 67(33.5%) patients while it was absent in 133(66.5%) patients. According to

p-value significant association was present between multi vessel disease and diabetic status of patients. Multi vessel disease was significantly higher in diabetic patients as compared to non diabetic patients. i.e. (50.5% vs. 33.5%, p-value=0.001)

DISCUSSION:

Diabetes mellitus being the main risk factor of CAD adversely affects the clinical outcomes of the patients. The mortality rate is three to five times greater in diabetic patients as compared with non- diabetics, regardless of the cholesterol concentration. The two-year outcomes of diabetics hospitalized with unstable angina or non-Q wave infarction is worse than non diabetics. Patients with diabetes mellitus who undergo successful percutaneous coronary intervention have unfavorable outcomes like a higher frequency of re-stenosis of stents, a greater incidence of myocardial infarction or re-infarction, and a lesser survival rate. Similarly, diabetics after coronary artery bypass grafting have a two fold increase in mortality. In developing countries, diabetes is an epidemic with an estimated increase of more than 170% in China. [2]

In this study multi-vessel disease was more common in diabetic patients as compared to non-diabetic patients who presented with unstable angina. i.e. (50.5% vs. 33.5%). The difference was statistically significant (p-value=0.001) in another study reported higher frequency of multi-vessel disease in diabetic patients as compared to non diabetic patients. i.e. (44% vs. 16%).[16]

These findings are consistent with the findings of this study. But in this study among non diabetic patients multi-vessel disease among non diabetic was much lower than that of reported. i.e. (33.5% vs.49%)[6] with increasing duration of diabetes, the frequency of developing diabetic neuropathy increases and thereby, increased chance of silent myocardial ischemia. Silent ischemia is associated with delayed treatment and more complications. In a study it is reported that majority of diabetic patients have asymptomatic cardiovascular disease. This asymptomatic ischemic episodes could result in these patients later being diagnosed as non diabetic following the cardiac surgery at an advanced stage of CAD.[17]

These findings are also consistent with the results of this study, i.e. 50.5% diabetic patients were having multi vessel disease. Our findings in this study are consistent with those of angiographic studies in other populations in which patients with diabetes mellitus experienced more three-vessel disease than non diabetic patients. People with diabetes mellitus have a two to eight fold excess in cardiovascular mortality than people without diabetes. There is always controversy concerning whether the angiographic findings in diabetic or non-diabetic patients are different. The results show that there is greater severity and extent of angiographic proven CAD in diabetics than in non-diabetic patients. Thus type-II DM has an adverse effect on the anatomy of coronary arteries, causing multi-vessel and significant CAD than in non-diabetic patients.[9]

CONCLUSION:

Diabetes mellitus is a main risk factor that contributes to development of coronary artery disease. Diabetic patients who presented with unstable angina they had more severe angioghraphically documented multi vessel disease as compared to non diabetic patients.

References:

1. Ilić S, Deljanin-Ilić M, Stoičkov V. Frequency and characteristics of myocardial ischemia recorded during stress echocardiography in patients with high coronary risk. Vojnosanitetski pregled. 2011;68(5):393-8.

2. White WB BG, Bergenstal RM, Cannon CP, Cushman WC, Fleck P, et al. . Examination of Cardiovascular Outcomes with Alogliptin versus Standard of Care in Patients with Type 2 Diabetes Mellitus and Acute Coronary Syndrome (EXAMINE): A cardiovascular safety study of the dipeptidyl peptidase 4 inhibitor alogliptin in patients with type 2 diabetes with acute coronary syndrome. Am Heart J 2011;162(4):620-6.

3. Kalofoutis C, Piperi C, Kalofoutis A, Harris F, Phoenix D, Singh J. Type II diabetes mellitus and cardiovascular risk factors: Current therapeutic approaches. Exp Clin Cardiol. 2007 Spring;12(1):17-28.

4. Shah AM, Hung C-L, Shin SH, Skali H, Verma A, Ghali JK, et al. Cardiac structure and function, remodeling, and clinical outcomes among patients with diabetes after myocardial infarction complicated by left ventricular systolic dysfunction, heart failure, or both. American heart journal. 2011;162(4):685-91.

5. Booth GL, Kapral MK, Fung K, Tu JV. Relation between age and cardiovascular disease in men and women with diabetes compared with non-diabetic people: a population-based retrospective cohort study. The Lancet. 2006;368(9529):29-36.

6. Lewis EF, Velazquez EJ, Solomon SD, Hellkamp AS, McMurray JJ, Mathias J, et al. Predictors of the first heart failure hospitalization in patients who are stable survivors of myocardial infarction complicated by pulmonary congestion and/or left ventricular dysfunction: a VALIANT study. European heart journal. 2008;29(6):748-56.

7. SM. A-r. Evaluating coronary artery disease in type 2 diabetes mellitus and other Risk Factors by angiographic study. J Fac Med Baghdad. 2011;53(1):15-9.

8. Wu T-g, Wang L. Angiographic characteristics of the coronary artery in patients with type 2 diabetes. Experimental & Clinical Cardiology. 2002;7(4):199.

9. Oppenheimer GM. Profiling risk: The emergence of coronary heart disease epidemiology in the United States (1947–70). International journal of epidemiology. 2006;35(3):720-30.

10. McConnell TH. The nature of disease: Pathology for the Health professions: Lippincott Williams & Wilkins; 2007.

11. Dadkhah S, Sharain K. Epidemiology and Demography of Coronary Artery Disease. Short Stay Management of Chest Pain: Springer; 2009. p. 1-13.

12. Association AH. Heart Disease and Stroke Statistics: Our Guide to Current Statistics and the Supplement to Our Heart and Stroke Facts. 2008 Update At-a-Glance. Diunduh dari: http://www.americanheart org/downloadable/ heart/1265665152970DS diakses tanggal. 2010;2.

13. Mendis S, Puska P, Norrving B. Global atlas on cardiovascular disease prevention and control: World Health Organization; 2011.

14. Tyroler HA. Coronary heart disease epidemiology in the 21st century. Epidemiologic reviews. 2000;22(1):7-13.

15. Lloyd-Jones DM, Larson MG, Beiser A, Levy D. Lifetime risk of developing coronary heart disease. The Lancet. 1999;353(9147):89-92.

16. Hegde SS, Mallesh P, Yeli SM, Gadad VM, M GP. Comparitive angiographic profile in diabetic and non-diabetic patients with acute coronary syndrome. J Clin Diagn Res. 2014;8(9):MC07-MC10. doi:10.7860/JCDR/2014/9072.4851

17. Tsujimoto T, Kajio H, Takahashi Y, Kishimoto M, Noto H, Yamamoto-Honda R, Kamimura M, Morooka M, Kubota K, Shimbo T, Hiroe M, Noda M. Asymptomatic coronary heart disease in patients with type 2 diabetes with vascular complications: a cross-sectional study. BMJ Open. 2011 Jan 1;1(2).