

Comparison of Angiographic Findings in Diabetic and Non-Diabetic Female patients presenting with Acute Coronary Syndrome at a Tertiary Cardiac Care Center in Karachi, Pakistan

MUHAMMAD FAIZAN SIDDIQUI¹, HASSAN KHAN², MUHAMMAD RAHMAN KHALID³, ASAD ASLAM KOREJO⁴, FARWA FAIZAN⁵, AKRAM YOUSIF⁶

^{1,2}Senior Registrars, ⁶Postgraduate, National Institute of Cardiovascular Diseases, Karachi

^{3,4}Senior Registrar, Liaquat University of Medical & Health Sciences, Jamshoro

⁵Medical officer, Subhan Medical Centre, Karachi

Correspondence to: Hassan Khan, Email: dr.hassankhan@gmail.com, Cell: +923337116015

ABSTRACT

Objective: -To evaluate the angiographic differences in female patients and to compare the frequency of different angiographic findings in diabetic and non-diabetic female cases with acute coronary syndrome.

Place and Duration of Study: Department of Adult Cardiology, Tabba Heart Institute Karachi, Pakistan from 1st February 2018 to 31st August 2018

Study design: Cross-sectional study

Methodology: Two hundred patients presenting with acute coronary syndrome undergoing angiography with diabetes mellitus and non-diabetes mellitus were enrolled. Demographic profile of the cases was recorded. Angiography was performed by experienced cardiologist for all patients. Study outcome, number of vessels involved, type of vessels, was recorded for all patients. All the collected information was recorded using pre-designed structural questionnaire.

Results: 67% were diabetic and 23% were non-diabetic. In diabetic group single vessel disease was observed in 29 (23%), 2 vessel disease in 37 (29.4%) and 3 vessel disease in 49 (38.9%) while in non-diabetic group single vessel disease, 2 vessel disease and 3 vessel disease was observed in 24 (32.4%), 19 (25.37%) and 19 (25.7%) respectively (P=0.092). Three vessel disease involving LAD+ Circumflex+ RCA is 49 [38.88%] and 19 [25.67%] in diabetic and non-diabetic group respectively. Three-vessel disease was more prevalent in diabetics but it was not statistically significant (p=0.092).

Conclusion: Three vessel diseases is most frequently present as angiographic finding in female patients presenting with acute coronary syndrome.

Keywords: Acute coronary syndrome (ACS), Diabetes mellitus (DM), Unstable angina, ST-elevated myocardial infarction

INTRODUCTION

Diabetes mellitus is one of the most common illness overall positioning close to cardiovascular turmoil. It is assessed that, around 0.1 billion populaces are impacted with diabetes overall.¹ It is related with its acute and chronic problems. Heart difficulty is by a wide margin the commonest reason for death in diabetics.^{2,3} Despite the fact that, CAD and DM have been perceived as unmistakable elements for a long time, however their relationship was laid out just in 1870 after crafted by Seegen J, Der who stressed about the mortality related with coronary artery disease among this populace affected by DM.⁴

With an estimated prevalence of 463 million people (9.3%) in 2019, diabetes mellitus (DM) has emerged as a global pandemic. By 2030, it is predicted that there will be an estimated 578 million people living with DM. DM affects urban residents more than rural inhabitants and high-income nations more than low-income countries.⁵ The American Diabetes Association (ADA) estimated that in 2017, the cost of the disease in the United States alone increased by 26% over a 5-year period, with \$237 billion accounting for direct medical costs related to the management of the diseases and \$90 billion attributable to productivity loss.⁶ The National Diabetes Survey of Pakistan (NDSP) estimated that 26.3% of people in Pakistan had diabetes, of which 7.1% had just received a diagnosis and 19.2% had previously been known cases.⁷ Prevalence of diabetes mellitus was estimated to be 16.98% [16.44% -17.51%] in another population-based study of 18,856 participants, whereas the prevalence of pre-diabetes was 10.91% [10.46 -11.36%] based on HbA1c readings.⁸

Cardiovascular sicknesses are the main source of mortality and dismalness in diabetics. This combination is dual or multiple times as prone to foster cardiovascular sickness as the non-diabetic cases.⁹ The general gamble of CHD is a few overlays escalated in affected.¹⁰ Microvascular as well macrovascular complications in diabetics are obviously directly linked with glycemic control.¹¹

The literature most often witnesses that ongoing angina showed that the atherosclerotic plaques are not comparative in the both groups, yet the illness is complicated and serious in diabetics

as compared to non-diabetics.¹² Ambrose et al¹³ exhibited beforehand, through coronary angiography, an unmistakable sore in cases with temperamental angina contrasted with those with persistent stable angina. By and by, coronary angiography has not been in every case assessed in diabetic patients, particularly in female cases angina.

There are just couple of studies up until this point accessible contrasting the angiographic data of ACS in female patients with and without DM. We realize that the weight of ACS and DM in our populace is high especially with increasing age and assessment of disease autonomy is important for the better management of the disease. Therefore, this study is designed to compare angiographic findings in female diabetic and non-diabetic patients presenting with ACS in our center.

MATERIALS AND METHODS

This comparative cross-sectional study was conducted in Department of Adult Cardiology, Tabba Heart Institute Karachi, Pakistan from 1st February 2018 to 31st August 2018. Sample size of 200 was calculated using WHO sample size calculator version 2.0. female Patients aged between 18 to 60 years presenting with ACS syndrome undergoing angiography with DM and non-DM were included in the study, while patients with prior history of any cardiac related surgery and patients with chronic kidney disease were excluded.

The study was conducted after approval from CPSP. Approval of ethical review committee of Tabba Heart Institute was taken prior to the data collection. Required number of patients, fulfilling the inclusion criteria, undergoing angiography was included in this study consecutively at the Department of Adult Cardiology, Tabba Heart Institute Karachi, Pakistan. Demographic data was recorded and patient's history of DM, HTN and family history of IHD was noted. Diagnosis of ACS was made based on the criteria defined in operational definition. Angiography was performed by experienced cardiologist for all patients.

Study outcome, number of vessels involved, type of vessels, was recorded for all patients by principal investigator and all the collected information was recorded using pre-designed structural

questionnaire. Data was entered and analysis using SPSS version-21. Comparison between DM and Non-DM was done using Chi square test for number of vessels and type of vessels. P value of ≤ 0.05 was taken as significant. P value of ≤ 0.05 was taken as significant.

RESULTS

There were 126 (63%) diabetics and 74 (27%) non diabetics. The mean age was 52.71 ± 6.47 and 49.65 ± 9.43 years in diabetic and non-diabetic group respectively. The average height was 154.62 ± 9.84 and 150.9 ± 7.31 cm in diabetic and non-diabetic group respectively. The mean weight and BMI of both groups (Table 1). In diabetic group single vessel disease was observed in 29 (23%), 2VD in 37 (29.4%) and 3VD in 49 (38.9%) while in non-diabetic group SVD, 2VD & 3VD was observed in 24 (32.4%), 19 (25.37%) and 19 (25.7%) respectively [P=0.092] (Table 2).

Three vessel disease involving LAD+ circumflex+ RCA is 49[38.88%] and 19 (25.67%) in diabetic and non-diabetic group respectively. Among single vessel group, LAD is affected in 18 (14.28%) and 17 (22.97%) in diabetic and non-diabetic group respectively. In 2VD diabetic group, LAD + circumflex observed in 15 (11.9%), LAD + RCA in 16 (12.69%) and circumflex + RCA in 6 (4.76%), while in 2VD non diabetic group LAD + Circumflex observed in 9 (12.16%), LAD + RCA in 7 (9.45%) and circumflex + RCA in 3 (4.05%). No any vessel involved in n=11 diabetics and n=12 non-diabetics (Table 3). The frequency of different angiographic findings with respect to history of CAD, IHD and hypertension in both groups are shown in Table 4.

Table 1: Demographic characteristics in both groups (n=200)

Variable	Diabetic (n=126)	Non-diabetic (n=74)
Age (years)	52.71±6.47	49.65±9.43
Height (cm)	154.62±9.84	150.9±7.31
Weight (kg)	66.35±12.47	70.87±9.75
BMI (kg/m ²)	29.953±5.81	27.77±4.98

Table 2: Frequency of different angiographic findings in DM and non-DM females with ACS

No. of vessels involved	Diabetic		Non-diabetic		χ^2 value	P value
	No.	%	No.	%		
None	11	8.7	12	16.2	6.45	0.092
SVD	29	23	24	32.4		
2VD	37	29.4	19	25.37		
3VD	49	38.9	19	25.7		

Table 3: Type of vessels in diabetic and non-diabetic

Type of vessels	Diabetic (n=126)	Non-diabetic (n=74)
	No. (%)	No. (%)
SVD		
LAD	18 (14.28%)	17 (22.97%)
Circumflex	3 (2.38%)	2 (2.7%)
RCA	8 (6.34%)	5 (6.75%)
2VD		
LAD+ circumflex	15 (11.9%)	9 (12.16%)
LAD + RCA	16 (12.69%)	7 (9.45%)
Circumflex+RCA	6 (4.76%)	3 (4.05%)
3VD		
LAD+Circumflex+RCA	49 (38.88%)	19 (25.67%)
None	11 (8.73%)	12 (16.21%)

Table 4: Frequency of different angiographic findings with respect to history of CAD, IHD and Hypertension

Angiographic findings	Diabetic (n=126)		Non-diabetic (n=74)		P value
	Yes	No	Yes	No	
History of CAD	28	98	14	62	0.656
IHD	17	109	10	64	0.055
Hypertension	105	21	51	23	0.107

DISCUSSION

As per data in the year of 2000, diabetes mellitus was most prevalent in India (31.7 million) followed by China (20.8million) with

the United States (17.7 million).¹⁴ The pervasiveness of CHD ascends from 2% to its double in the general populace to 55% among diabetics. Death ratio from CHD in men is two times while in females it escalates from 4 to multiple times. The general mortality from coronary illness is two times in diabetics in comparison with non-diabetics. Cardiovascular addresses more than one-half of all expiries in both 1 and 2 DM.¹⁵

In this study, to evaluate the angiographic differences in female patients presenting with ACS and to compare the frequency of different angiographic findings in DM and non-DM female cases with ACS; total of 200 female patients aged between 18 to 60 years presenting with ACS syndrome undergoing angiography with DM and non-DM were enrolled. The mean age was 52.71 ± 6.47 and 49.65 ± 9.43 years in diabetic and non-diabetic group respectively. In our study, frequency of angiographic finding in female patients presenting with acute coronary syndrome were, three vessel diseases were observed in 34% women, two vessel disease 28%, single vessel was 27%. Type of vessel was also tabulated. Most common type vessel was LAD and RCA. In our study number of vessel were also observed with respect to diabetic and non-diabetic patients as well as controlled the effect of confounding variables but insignificant effect was observed for all confounding variables.

Sousa et al¹⁶ conducted 645 angiographies in eight and half years in 593 cases, among these 63% were non diabetic while 37% were diabetic, and in comparison, they noted fascinating finding in as per angiographic perspective that plaques in both groups were similar, while they observed poor prognosis in diabetics as compared to other group for short term as well for long term. Hegde³ observed in his research that acute coronary syndrome presents very soon in diabetic cases and the extent of CAD and occurrence of multi-vessel disease was comparatively much more in diabetics. He observed involvement of LAD more frequently, complete vessel occlusion was in 20% diabetics and 6% non-diabetics.

Bharath et al¹⁷ conducted case control study for one and half year, among those 250 diabetics was case and same number of non-diabetics was controls. Normal were 12.4%, single vessel affected were 37.6%, double vessel involved were in 28.8% and three vessels in 21.2%.while in our study three vessel disease was observed in 34% (68/200) women, two vessel disease 28% (56/200%) and single vessel in 27% (53/200). Rana et al¹⁸ also reported comparative data, involvement was higher in diabetics compared to non-diabetics SVD 19 vs. 14%, DVD 9 vs. 7%, and TVD 9 vs. 5%.Case control study conducted by Mukhopadhyay et al¹⁹ in eastern India among 200 sample, half were diabetics while remaining half non-diabetics, concluded that as much more burden of thrombus and higher syntax score. An Egyptian study concluded after studying 30 cases as per current perspective that diffuse disease, stenosis and the affection of the RCA was prevalent in diabetics.²⁰ An Indian study compared both by Gensini scoring system; among 144 cases, males have earlier age of presentation and higher acute coronary syndrome than females (72.9% vs 27.1%). Gensini score was higher in diabetics (45.2% vs 19.2%).²¹

Samiullah²² has conducted cross sectional observational study at NICVD Karachi, found higher HBA1c in group with left main coronary artery disease as compared to other group. Khan²³ at similar setup in NICVD Karachi found better results in young as compared to older ones.

Limitations of our study were single center study, small sample size, exclusion of cases aged above 60 year, advanced scores as Syntax and Gensini scoring were not applied in the study.

CONCLUSION

Three vessel diseases is most frequently present as angiographic finding in female patients presenting with acute coronary syndrome, most common type vessel involved were LAD and RCA.

REFERENCES

1. Boutayeb A, Boutayeb S. The burden of non communicable diseases in developing countries. *Int J Equity Health* 2005;4(1):1-8.
2. Chowdhary I, Sambyal V. Study of extent of involvement of various coronary arteries in diabetic and non-diabetic patients diagnosed with acute myocardial infarction. *J K Sci* 201; 18(3):132.
3. Hegde SS, Mallesh P, Yeli SM, Gadad VM. Comparative angiographic profile in diabetic and non-diabetic patients with acute coronary syndrome. *JCDR* 2014;8(9):MC07.
4. Nathan DM, Meigs J, Singer DE. The Epidemiology of cardiovascular disease in type 2 diabetes mellitus: how sweet it is or is it?. *Lancet* 1997;350:S4-9.
5. Saeedi P, Petersohn I, Salpea P, Malanda B, Karurangas, Unwin N, et al. Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: results from the International Diabetes Federation Diabetes Atlas. *Diabetes Res Clin Pract* 2019;157:107843.
6. Association Ad. Economic costs of diabetes in the us in 2017. *Diabetes care* 2018;41(5):917-28.
7. Basit A, Fawwad A, Qureshi H, Shera AS. Prevalence of diabetes, pre-diabetes and associated risk factors: second National Diabetes Survey of Pakistan (NDSP), 2016–2017. *BMJ Open* 2018;8(8):e020961.
8. Aamir AH, Haq Z, Mahar SA, Qureshi FM, Ahmad I, Jawa A, et al. Diabetes prevalence survey of pakistan (dps-pak): prevalence of type 2 diabetes mellitus and prediabetes using hba1c: a population-based survey from pakistan. *Bmj open*. 2019;9(2):e025300
9. Brochier ML, Arwidson P. Coronary heart disease risk factors in women. *Eur Heart J* 1998; 19(Suppl A): A45-52.
10. Grimaldi A, Heurtier A. Epidemiology of cardio-vascular complications of diabetes. *Diabetes Metab* 1999; 25(Suppl 3): 12-20.
11. Meigs JB, Singer DE, Sullivan LM, et al. Metabolic control and prevalent cardiovascular disease in non-insulin-dependent diabetes mellitus (NIDDM): The NIDDM Patient Outcome Research Team. *Am J Med* 1997; 102: 38-47.
12. Gaba MK, Gaba S, Clark LT. Cardiovascular disease in patients with diabetes: clinical considerations. *J Assoc Acad Minor Phys* 1999; 10: 15-22.
13. Ambrose JA, Winters SL, Stern A, et al. Angiographic morphology and the pathogenesis of unstable angina pectoris. *J Am Coll Cardiol* 1985; 5: 609-16.
14. Kaveeshwar SA, Cornwall J. The current state of diabetes mellitus in India. *Austr Med J* 2014; 7(1):45.
15. Berry C, Tardif JC, Bourassa MG. Coronary heart disease in patients with diabetes: part I: recent advances in prevention and noninvasive management. *J Am Coll Cardiol* 2007; 49(6): 631-42.
16. Sousa JM, Herrman JL, Teodoro M, Diogo S, Terceiro BB, Paola AA, Carvalho AC. Comparison of coronary angiography findings in diabetic and non-diabetic women with non-ST-segment-elevation acute coronary syndrome. *Arquivos Brasileiros de cardiologia* 2006; 86:150-5.
17. Bharath S, Gosavi S, Patange A, Botre A. Study of angiography findings in diabetic and non diabetic patients with cardiac symptoms. *ICJMR* 2019; 6(2): B9-13.
18. Rana JS, Dunning A, Achenbach S, Al-Mallah M, Budoff MJ, Cademartiri F, et al. Differences in prevalence, extent, severity, and prognosis of coronary artery disease among patients with and without diabetes undergoing coronary computed tomography angiography: results from 10,110 individuals from the CONFIRM (coronary CT angiography evaluation for clinical outcomes): an international multicenter registry. *Diabetes Care* 2012;35:1787–94.
19. Mukhopadhyay M, Sharma VS, Sahai S, Kar A, Ganguly K. Coronary angiography findings among diabetics and non diabetics presenting with acute coronary syndrome: a case-control study. *J Clin Diagnostic Res* 2022;16(3).
20. Marghany KA, El Baz MS, El Seddik-Tammam AB Hakeem MMA. Comparison of coronary angiographic findings in diabetic and non diabetic women in Upper Egypt with non ST segment elevation myocardial infarction. *J Am Sci* 2013;9(1):461-8.
21. Hasabi IS, Mudagall GS. A comparative study of angiographic severity of coronary artery disease in diabetic and non-diabetic patients with acute coronary syndrome by Gensini scoring system. *Int J Biomed Res* 2020; 11(04)
22. Samiullah JU, Saleemullah MA, Gulzar Ali Buriro NH. Comparison of Clinical and Angiographic Profiles of Patients with or without Left Main Coronary Artery Disease in Patients Undergoing Angiography for Acute Coronary Syndrome. *Pakistan Journal of Medical & Health Sciences*. 2022 Aug 2;16(05):1403-.
23. Khan R, Shaikh JK, Butt MH, Ahmed I, Raza A, Ashraf T. Clinical Presentation, Risk Factors, and Coronary Angiographic Profile of very Young Adults (≤ 30 Years) Presenting with First Acute Myocardial Infarction at a Tertiary Care Center Karachi. *Pakistan Journal of Medical & Health Sciences*. 2022 Aug 2;16(05):1396-.