ISSN (P&E): 1996-7195, (O): 2957-899X DOI: https://doi.org/10.53350/pjmhs02026205.4

ORIGINAL ARTICLE

Comparison of Angiographic Findings in Diabetic Versus Non-Diabetic Women Presenting with Acute Coronary Syndrome

MUHAMMAD OSAMA RIAZ[1], MUHAMMAD AMJAD FAROOQ[2], MINAHIL BINTE TARIQ[3], FATIMA-TUL-ZAHRA[4], MUHAMMAD FAHAD SHAHID[5], ISTEHSAN AHMED[6]

[1]Medical Officer Medicine, SIDER, Shalamar Hospital, Lahore
[2]PGR Medicine, Arif Memorial Teaching Hospital/Rashid Latif Khan University Lahore.
[3]Final Year MBBS, Rashid Latif Medical College, Lahore. **Email:** minahiltariq60@gmail.com
[4]Final Year MBBS, Medical Student, Rashid Latif Medical College, Lahore.
[5]Medical Officer, Pakistan Kidney Liver Institute, Lahore. **Email:** fahadshahid629@gmail.com
[6]House Officer (Paediatrics), Services Hospital, Lahore. **Email:** Istehsanahmed3@gmail.com
Correspondence to: Dr Muhammad Amjad Farooq, **Email:** amjadsmdc@gmail.com

This article may be cited as:
Riaz MO, Farooq MA, Tariq MB, Zahra FT, Shahid MF, Ahmed I; Comparison of Angiographic Findings in Diabetic Versus Non-Diabetic Women Presenting with Acute Coronary Syndrome. Pak J Med Health Sci, 2026; 20(05): 17-24.

Received: 02-02-2026
Accepted: 15-05-2026
Published: 30-05-2026

ABSTRACT

Background: Diabetes mellitus is a known risk factor of coronary artery disease and it may include the severity and complexity of the coronary involvement in women with acute coronary syndrome (ACS). Women have still been underrepresented in cardiovascular investigations and there is a paucity of evidence to support specifically angiographic disparities between diabetic and non-diabetic women with ACS. The objective is to make a comparison of angiographic findings in diabetic and non-diabetic women with ACS presentation.

Methodology: This was a comparative cross-sectional study that was carried out with 180 female patients who were admitted with ACS with undergone coronary angiography. Two equal groups of patients diabetic (n=90) and non-diabetic (n=90) were identified. The demographic features, cardiovascular risk factors, clinical presentation, angiographic findings were registered. Coronary angiography results such as number of vessels involved, culprit vessel, Lesion morphology, left main disease and treatment strategy were compared among the two groups. Data analysis was done with the SPSS version 26.

Findings: The mean age of diabetic females was significantly older compared to non-diabetic females (61.8±9.4 vs 57.1±10.2 years, p=0.002). The prevalence of hypertension, dyslipidemia and obesity was significantly higher in diabetic patients. The prevalence of triple-vessel disease was markedly higher in diabetic women (34.4 vs 13.3) as compared to single-vessel disease in non-diabetic women (42.2 vs 22.2) (p<0.001). In non-diabetic patients, normal or non-obstructive coronaries were found to be more prevalent (20.0% vs 6.7%). The left main involvement was also more common in diabetics (7.8% vs 3.3%). Calcium and diffuse lesions were much more prevalent in diabetic women. The median angiographic severity score was much greater in diabetics (48.6±21.3 vs 31.4±18.7, p<0.001). Cardiac bypassing was frequently necessary in diabetics.

Conclusion: Female diabetic vs. non-diabetic patients with ACS exhibited more comprehensive and intricate coronary artery disease manifested by higher levels of multivessel disease, diffuse lesions, calcification, left main involvement, and angiographic severity. The results underscore the importance of early risk stratification and preventive management of diabetic women through aggressive management.

Keywords: Acute coronary syndrome; diabetes mellitus; coronary angiography; coronary artery disease; women; multivessel disease; percutaneous coronary intervention; coronary artery bypass grafting.

INTRODUCTION

Acute coronary syndrome (ACS) is among the most prevalent causes of morbidity and mortality globally and still presents a significant health issue to the general population due to significant improvements in cardiovascular prevention, diagnosis and treatment. ACS is a group of clinical disorders with acute myocardial ischemia caused by ST-segment elevation myocardial infarction (STEMI), non-ST-segment elevation myocardial infarction

(NSTEMI), and unstable angina (UA). These disorders are mainly as a result of rupture or erosion of an atherosclerotic plaque with resultant formation of thrombus, which causes partial or total occlusion of coronary circulation. Earlier diagnosis, early risk stratification, and rapid coronary revascularization has greatly enhanced survival rates, but ACS still contributes to much cases of disability, recurring heart attacks and patients dying too soon across the entire world.[1,2].

The genetic, metabolic, inflammatory, and environmental factors interact in a complex manner to produce coronary artery disease (CAD), also known as the pathological process underlying ACS. Conventional cardiovascular risk factors like aging, high blood pressure, diabetes mellitus, lipid abnormalities, obesity, smoking of cigarettes and a history of premature CAD in family history play important roles in initiation and progression of atherosclerosis. One of these, diabetes mellitus has become one of the most potent predictors of the onset and progression of coronary artery disease, when independent variables are considered.

Diabetes mellitus has been growing exponentially within the last twenty years, with most of the spread driven by urbanization, inactive lifestyles and poor eating habits as well as rising obesity rates. The International Diabetes Federation indicates that currently the number of adult patients with diabetes is over 530 million, and the condition is projected to increase significantly during the next several decades.[5] Diabetics are approximately twice or four times more likely to develop coronary artery disease than the general population, and cardiovascular disease ranks as the primary cause of mortality among diabetics.

The acute coronary syndrome in women is a special and often unidentified population in cardiovascular medicine. In the past, women were relatively shielded against coronary artery disease due to cardioprotection of endogenous estrogen prior to menopause. Nevertheless, this cover is significantly reduced with diabetes mellitus. Extensive epidemiological research has established that diabetes is a major disproportionate predisposing factor of myocardial infarction and heart failure as well as cardiovascular mortality in women, compared to men. Women and their diagnosis and treatment of ACS is especially problematic due to women tending to exhibit more atypical symptoms (and signs) of the disease, including fatigue, dyspnea, nausea, epigastric discomfort or even neck and jaw pain instead of the more typical symptoms associated with ACS, of central chest pain. Such unusual clinical presentations often result in a delayed diagnosis, lack of recognition, and late start of evidence-based therapy.[5-6]

Coronary angiography is the method of choice to assess the amount of anatomy and the intensity of the coronary artery disease. It gives the critical data on the diseased vessel count, location of culprit lesions, the level of coronary stenosis, morphology and coronary calcification of lesions and the general complexity of the disease. Angiographic results have been instrumental in the process of arriving at the most proper method of management to use and this could be conservative medical treatment, percutaneous coronary intervention (PCI) or coronary artery bypass grafting (CABG). A number of international research have continuously shown that diabetic patients are predisposed to multivessel disease, diffuse coronary involvement, left main coronary artery disease and complex lesion morphology than non-diabetic patients.[7-8]

Thus, the current research was done to compare angiographic data of diabetic and non-diabetic female patients who reported to the Department of Cardiology at the Mayo hospital in Lahore with acute coronary syndrome. It is hoped that by comparing the differences in coronary artery involvement, lesion features, severity of the disease, as well as therapeutic approaches, the present study will offer locally applicable evidence that can be used to optimize risk stratification in diabetic women with acute coronary syndrome, optimize therapeutic decision-making, and enhance cardiovascular outcomes.

MATERIAL & METHODS

Design and Setting of the study

The study was a comparative cross-sectional hospital-based cross-sectional study, done in the Department of Cardiology, Mayo Hospital, Lahore, Pakistan, between a span of twelve months, between January 2024 and December 2024. Mayo Hospital is a tertiary care teaching hospital and one of the largest hospitals in Pakistan and also affiliated with King Edward medical University. It is a primary referral centre to cardiovascular diseases with high patient numbers with acute coronary syndrome (ACS) referred to it by Lahore and its environs. The aim of the study was to provide a correlation of angiographies in diabetic and non- diabetic women who reported ACS and had a coronary angiography performance during their hospital stay.

Study Population

The targeted population is a cohort of adult women who were hospitalized with a diagnosis of acute coronary syndrome, such as ST-segment elevation myocardial infarction (STEMI), non ST-segment elevation myocardial infarction (NSTEMI) and unstable angina. There were two groups of patients based on whether they were diabetic or not. The diabetic group consisted of women who had a pre-existing diagnosis of diabetes mellitus or had been recently

diagnosed with diabetes as specified by the American Diabetes Association (ADA), and the comparison group consisted of those that were not diabetic.

Sample Size and Sampling Technique.

The study enrolled a number of 160 female patients in a continuity sampling method other than his probabilistic method. The population of women with diabetes and non-diabetes was recruited in separate batches until the target population was attained. The expected difference between the prevalence of the multivessel coronary artery disease between diabetic and non-diabetic patients in the present study was used to decide the size of the sample based on literature published in the past with a confidence level set at 95 percent, a study power of 80 percent, and the expected results. There was an extra allowance to cover any incomplete records and potential exclusions.

ELIGIBILITY CRITERIA

Inclusion Criteria

Women aged 30 years and above reporting with acute coronary syndrome and having diagnostic coronary angiography in the index hospital stay were deemed eligible to be included. The Fourth Universal Definition of Myocardial Infarction, pitting consultant cardiologists, diagnosed acute coronary syndrome through clinical presentation, electrocardiographic results, and high cardiac biomarkers. The study only included patients that completed written informed consent.

Exclusion Criteria

They were also not eligible if they had a previous history of coronary artery bypass graft, congenital heart disease, or significant valvular heart disease, cardiomyopathy, myocarditis, previous heart transplantation, chronic inflammatory or autoimmune disease, end-stage renal disease on dialysis, pregnancy, or incomplete clinical or angiographic record. Patients who refused to participate were also locked out of the study.

Data Collection Procedure

The identification of eligible patients was done as soon as they were admitted in the cardiology department. Demographic, clinical, laboratory, and angiographic data, after informed, written approval and after ensuring the written informed consent, were collected through structured, pretested, data collection proforma by trained investigators. Demographic data contained the age, residential area, body mass index, smoking status, and the family history of coronary artery disease. Clinical variables consisted of hypertension, dyslipidaemia, duration of diabetes mellitus, the presenting symptoms, blood pressure, heart rate, and type of an acute coronary syndrome. Lab tests based on fasting blood glucose, glycated hemoglobin (HbA1c), serum creatinine, full lipid profiles and cardiac biomarkers were procured through the central lab of the hospital. The medical records of the patients also provided the echo cardiography results especially the left ventricular ejection fraction (LVEF).

Coronary Angiography

Multidisciplinary experienced consultant interventional cardiologists carried out diagnostic coronary angiography either over the radial or femoral artery as dictated by the institution protocol. Every angiographic exercise was conducted within standard aseptic condition with the help of digital angiographic equipments. Two senior cardiologists were blinded to the diabetic status of the participants and the coronary angiograms were independently reviewed. Where there was disagreement, a joint review formulated a consensus opinion. The angiographic was done, which involved, identification of the culprit vessel, extent of luminal stenosis, disease of the coronary vessels, and the existence of left main coronary artery disease. Common angiography was used to further classify coronary artery disease into single-vessel disease, double-vessel disease, triple-vessel disease, diffuse coronary artery disease, or chronic total occlusion.

Outcome Measures

The major finding of the research was to contrast the angiographic features of the diabetic and non-diabetic women who had acute coronary syndrome. Secondary outcomes were frequency of multivessel coronary artery disease, prevalence of affected coronary arteries, degree of coronary stenosis, left ventricular systolic function and clinical outcome in the hospital, such as heart failure, cardiogenic shock, cardiac arrhythmias, and mortality whenever possible.

Statistical Analysis

Statistical Package of the Social Sciences (SPSS) version 26.0 was used to enter, clean and analyze the data. During data entry, data were entered twice to ensure data quality, and to verify records before analysis, records were randomly checked. Normality of the continuous variables was checked using the Shapiro wilk test and where data was normally distributed, the mean, standard deviation (SD) was used and where data was skewed, the median with an interquartile range (IQR) was analyzed. The frequencies and percentages are used to represent the categorical variables.

The independent-samples Student t-test of continuous variables of normal distribution was used to compare diabetic and non-diabetic women, and the Mann Whitney U test was used to compare skewed data.

Comparisons of the categories were done using Chi-square test or Fisher information test in case the anticipated cells were less than five. Various variables proved to be of clinical importance or a p-value of less than 0.10 on univariate analysis were included in a multivariable logistic regression model to determine independent predictors of multivessel coronary artery disease.

RESULTS

The study included a total of 180 female patients who came with a history of acute coronary syndrome (ACS). Out of these 90 (50.0) were women with diabetes mellitus and 90 (50.0) were non-diabetic women. Comparative analysis revealed that diabetic women had much more conventional cardiovascular risk factors and more developed coronary artery disease on the coronary angiography than non-diabetic women. Even though there was no notable difference in clinical presentation of ACS in both groups, diabetic patients always exhibited more severe and diffuse coronary involvement, which suggests the detrimental effects of diabetes mellitus on the severity and complexity of the coronary atherosclerosis.

Baseline Demographic and Clinical Characteristics

Table 1 contains the demographic and clinical characteristics of the study population on the baseline. The average age of women with diabetes was 61.8/9.4 years and was significantly above that of non-diabetic women (57.1/10.2 years, p=0.002). This observation means that the diabetic women engaged in the acute coronary syndrome attained later age and had come with stronger load of cardiovascular risk factors over an extended time. The statistical significance was 0.009, with 68 (75.6) diabetic women having hypertension in comparison to 49 (54.4) women who did not have diabetes. Similarly, there was a significant difference in dyslipidemia between diabetic and non-diabetic patients (60.0% vs. 42.2; p=0.031), and close to 50% of the diabetic women (45.6) were obese in comparison with non-diabetic women (only 28.9%). On the other hand, there was no significant difference in prevalence of current smoking (15.6% vs. 11.1%; p=0.381) and positive family history of coronary artery disease (17.8% vs. 23.3%; p=0.354) between the two groups.

The distribution of ACS presentation is shown in Table 2. The most commonly expressed cases of NSTEMI among diabetic women (42 patients or 46.7%), and STEMI among non-diabetic women (41.1% vs. 31.1%). Angina unstable was the cause of presentation in 22.2% in both groups. Where diabetic women were found to more often present with NSTEMI and non-diabetic women with STEMI, the difference was not statistically significant (p=0.170).

Among diabetic women NSTEMI was the most common pattern of clinical showing, and STEMI was a little more frequent in non-diabetics. Nevertheless, lack of statistical significance indicates that diabetes mellitus did not have a significant effect on first mode of ACS presentation. The dissimilar frequency of NSTEMI in diabetic women can be indicative of diffuse coronary artery disease and microvascular impairment which is common theme amongst diabetic cardiovascular disease. In Table 3, be it due to coronary angiographic findings, the summary is presented. The overall coronary artery disease was seen to differ significantly between diabetic and non- diabetic women (p<0.001).

It was only found that the coronary arteries of most of the diabetic women were normal or non-obstructed in only 6.7% whereas its case was 20.0% in non-diabetic women. Likewise, non-diabetic patients had a much higher incidence of single-vessel disease (42.2% vs. 22.2%). On the other hand, there were significantly greater frequencies of multivessel coronary artery disease in diabetic women. There was an incidence of double-vessel disease among diabetic women of 28.9 vs. non-diabetic women of 21.1 and triple-vessel disease among the diabetic women of 34.4 vs. non-diabetic women of 13.3. The prevalence of the left main coronary artery disease was more common in diabetic women (7.8 vs. 3.3).

The results of these studies are rather persuasive that diabetes mellitus relates to a faster development of diffuse coronary atherosclerosis and higher anatomical complexity of the disease. Table 4 depicts the culprit vessel that caused ACS. Left anterior descending (LAD) vessel was the predominant affected vessel both in diabetic (43.33) and non-diabetic (37.83) women. The worse frequencies were similar in right coronary artery and left circumflex artery in both groups. A significant numerical disparity in the presence of left main coronary artery involvement exists in diabetic women (7.8%) versus non-diabetic women (3.3), but the lack of an obstructive culprit lesion happened more often in non-diabetic patients (10.0 vs. 5.6). On the whole, there were no significant differences in these (p=0.482).

The LAD artery was the most common culprit vessel regardless of the presence or absence of diabetes and this is the evidence of its known contribution to acute coronary syndromes. Despite a higher prevalence of left main involvement in diabetic women, there was no significant difference in the distribution of culprit vessels between groups. This is an indication that the scope and nature of coronary disease is highly determined by diabetes and not the anatomical site of the lesion culprit. Lesion Characteristics Among Patients with Obstructive Coronary Artery Disease

Diabetic women exhibited a much more complicated angiograph lesion in patients with obstructive coronary

artery diseases (Table 5). Diabetic women had a high incidence of diffuse coronary disease (54.8) vs. non-diabetic women (33.3) (p=0.004). Similarly, diabetic patients had much greater calcified lesions (34.5% vs. 19.4; p=0.032). The bifurcation lesions were higher in diabetic women (20.2 vs. 12.5), however, this was not statistically significant (p=0.190). Likewise, total occlusion/thrombotic lesions were seen in both groups without statistically significant difference (p=0.262).

A high prevalence of diffuse and calcified lesions of the coronary in diabetic women suggests more advanced and chronic atherosclerotic disease. Procedural complexity in the process of coronary intervention can be at times aggravated by calcification and diffuse involvement and is linked to worse clinical outcomes. Despite the fact that the prevalence of bifurcation lesions in diabetic patients was statistically insignificant, it can be argued that further studies (perhaps conducted with a significantly larger sample size) should be done to establish the correlation of these two conditions.

Diabetic women had a much greater mean angiographic severity score than non-diabetic women (48.6 ± 21.3 vs. 31.4 ± 18.7; p=0.001) as depicted in Table 6.

Concerning treatment plan, referred coronary artery bypass grafting (CABG) was significantly higher in diabetic women (24.4% vs. 10.0%; p=0.018) who had more multivessel disease percussion. Medical management was, on the other hand, much more prevalent in non-diabetic women (38.9% vs. 16.7%; p=0.002). The rate of patients who were subjected to percutaneous coronary intervention (PCI) was similar in both groups (58.9% vs. 51.1; p=0.296).

Angiographic disease severity was considerably more in diabetic women compared to non-diabetic women and this had a direct impact on clinical management decisions. The increased CABG referral rate in diabetic patients is indicative of the increased disease frequency in multivessel and complex coronary artery disease where surgery is frequently more desirable in revascularization. Finally, women without diabetes were more often treated in a conservative fashion since they often had a less extensive coronary involvement. The similar PCI rates reveal that percutaneous intervention was still a key mode of treatment in the two groups, regardless of the disparities in the complexity of diseases. Comprehensively the paper has shown that diabetes mellitus is closely linked to widespread, diffusive, and calcified and anatomically complicated coronary artery disease in women with acute coronary syndrome. The findings highlight how coronary atherosclerosis among diabetic women is aggressive in nature and the importance of effective cardiovascular risk assessment and early invasive management in the vulnerable group.

Table 1. Baseline Characteristics of the Study Population

Variable	Diabetic (n=90)	Non-diabetic (n=90)	p-value
Age (years), mean ± SD	61.8 ± 9.4	57.1 ± 10.2	0.002
Hypertension	68 (75.6%)	49 (54.4%)	0.009
Dyslipidemia	54 (60.0%)	38 (42.2%)	0.031
Obesity	41 (45.6%)	26 (28.9%)	0.034
Current smoker	14 (15.6%)	10 (11.1%)	0.381
Family history of CAD	16 (17.8%)	21 (23.3%)	0.354

Table 2. Clinical Presentation of Acute Coronary Syndrome

Presentation	Diabetic (n=90)	Non-diabetic (n=90)	p-value
STEMI	28 (31.1%)	37 (41.1%)	
NSTEMI	42 (46.7%)	33 (36.7%)	0.170
Unstable angina	20 (22.2%)	20 (22.2%)	

Table 3. Angiographic Extent of Coronary Artery Disease

Angiographic finding	Diabetic (n=90)	Non-diabetic (n=90)	p-value
Normal/non-obstructive coronaries	6 (6.7%)	18 (20.0%)	
Single-vessel disease	20 (22.2%)	38 (42.2%)	
Double-vessel disease	26 (28.9%)	19 (21.1%)	<0.001
Triple-vessel disease	31 (34.4%)	12 (13.3%)	
Left main disease	7 (7.8%)	3 (3.3%)	

Table 4. Culprit Vessel Distribution

Culprit vessel	Diabetic (n=90)	Non-diabetic (n=90)	p-value
LAD	39 (43.3%)	34 (37.8%)	
LCX	16 (17.8%)	19 (21.1%)	
RCA	23 (25.6%)	25 (27.8%)	0.482
Left main	7 (7.8%)	3 (3.3%)	
No obstructive culprit identified	5 (5.6%)	9 (10.0%)	

Table 5. Lesion Characteristics Among Patients with Obstructive CAD

Lesion characteristic	Diabetic (n=84)	Non-diabetic (n=72)	p-value
Diffuse disease	46 (54.8%)	24 (33.3%)	0.004
Calcified lesions	29 (34.5%)	14 (19.4%)	0.032
Bifurcation lesion	17 (20.2%)	9 (12.5%)	0.190
Total occlusion/thrombotic lesion	18 (21.4%)	21 (29.2%)	0.262

Table 6. Angiographic Severity and Management Strategy

Variable	Diabetic (n=90)	Non-diabetic (n=90)	p-value
Severity score (mean ± SD)	48.6 ± 21.3	31.4 ± 18.7	<0.001
Managed medically	15 (16.7%)	35 (38.9%)	0.002
PCI performed	53 (58.9%)	46 (51.1%)	0.296
Referred for CABG	22 (24.4%)	9 (10.0%)	0.018

DISCUSSION

In the current research, the angiographic features of diabetic and non-diabetic women with acute coronary syndrome (ACS) in a tertiary care cardiac center were compared. The outcomes prove that there are much more severe coronary artery diseases and complex in anatomy related to diabetes mellitus in women patients. Diabetic patients were older, more likely to have hypertension, dyslipidemia, obesity, and showed greater extent of coronary atherosclerosis with multivessel, diffuse disease, calcified lesions, and higher angiographic severity scores as compared to non-diabetic women.

The fact that diabetes mellitus is one of the most predictive independent determinants in coronary artery disease and other adverse cardiovascular effects is not new. Persistent hyperglycemia leads to endothelial impairment, oxidative stress, systemic inflammation, platelet activation, and accelerated atherosclerosis, which eventually leads to diffuse coronary hostage and plaque weight. These pathophysiological processes underlie why diabetic patients frequently have more advanced coronary artery disease when they have their first acute coronary event than those who do not have diabetes.[8-10]

Among the key results of the current research was the finding that diabetic women were quite older, and there existed a significantly higher rate of hypertension, dyslipidemia and obesity in them than in non-diabetic women. These findings are in line with the proven hypothesis that diabetes is rarely a stand-alone condition but is accompanied by several cardiovascular risk factors which work together to enhance the rate at which atherosclerotic cardiovascular disease can advance. Co-occurring hypertension, abnormal lipid metabolism, and obesity add to endothelial damage, chronic vascular inflammation, and cumulative plaque, further exacerbating the severity and complications of coronary artery disease. Several reports within the large international registries and observational studies show these same characteristics in which diabetic patients always exhibited a more significant profile of conventional cardiovascular risk factors than a non-diabetic did.[10-12]

The increase in the prevalence of multivessel disease in the current study is biologically plausible. Diabetes enhances the process of lipid deposition in the arterial wall due to sustained hyperglycemia, insulin resistance, endothelial malfunction, oxidative stress, and trigger of inflammatory pathways. These metabolic imbalances favor the development of diffuse plaque which targets various coronary vessels and not focal stenosis. As a result the diabetic patients usually need more complicated revascularization techniques and have worse long-term cardiovascular outcome. [1]Another clinical outcome of clinical importance was the increased prevalence of left main coronary artery disease in diabetic women. Though left main disease constituted a limited proportion of the angiographic results, it was highly prevalent as compared to non-diabetic women. Left main coronary artery disease has a considerable prognostic impacting due to most of the blood serves a large rely on the myocardium, and even minor degrees of stenosis have been connected to high risks of heart failure and predetermination of myocardial infarction as well as cardiovascular death. The fact that left main disease is prevalent in the diabetic patients is thus

indicative of the fact that the diabetic coronary atherosclerosis is aggressive. Similar results were found by Morgan et al., and it was concluded that diabetic patients often have smaller caliber of coronary vessels, diffuse plaque, and more complex lesions, which complicate the process of percutaneous and surgical artery revascularization.[12-15]

In diabetic patients having obstructive coronary artery disease, more than half were found to have diffuse disease and only one in three had a calcified lesion. In contrast, these lesion features were significantly worse in non-diabetic patients. Coronary calcification is a known indicator of severe atherosclerosis and is linked to higher complexes of the procedures, poor enlargement of stents, restenosis, and negative postoperative cardiovascular prognoses. The greater incidence of diffuse and calcified lesions in diabetic women is also in line with prior studies indicating that chronic exposure to hyperglycemia facilitates vascular smooth muscle cell malfunctioning, medial arterial calcification, chronic inflammation and calcified coronary remodeling. These pathogenic events result in diffuse coronary constriction as opposed to localized focal coronary lesions, which makes coronary intervention more complex and often debilitating the treatment of surgical revascularization.[15-17]

A notable finding of the current research was that of the non-diabetic females, the proportion of non-obstructive or normal coronary arteries was greater. About one-fifth of non-diabetic patients reportedly had normal coronary arteriography although they exhibited the symptoms of acute coronary syndrome. This observation can be related to current knowledge about ischemic heart disease in women. Women, in contrast to men, have an increased likelihood of developing myocardial ischemia caused by coronary microvascular dysfunction, endothelial dysfunction, coronary vasospasm, spontaneous coronary artery dissection, or erosion of plaques instead of obstruction to the coronary artery by the developed factors.[16-18] This finding could be relevant to explain why a larger percentage of non-diabetic women exhibited non-obstructive coronary angiograms in this study.

This observation is in line with many angiographic studies that show that LAD is the most affected coronary artery in patients with acute coronary syndrome due to the existence of large myocardial territory and the capacity to develop atherosclerotic plaques. Although there was no significant change in the distribution of culprit vessels between the two groups, diabetic women had a slightly higher prevalence of left main culprit lesions and diffuse coronary involvement, which further validates the idea that diabetes has an oversized influence on disease severity as opposed to disease location.[19-20]

The clinical implication of the current study pertains to treatment plan. The coronary artery bypass grafting was much more common in diabetic women, but non-diabetic women were more commonly treated by non-surgery medical issue management.

The markedly greater angiographic severity score in women with diabetes is an additional convincing indication of the negative influence of diabetes on the development of coronary artery disease. Greater angiographic severity scores have repeatedly been related to greater mortality, repeat myocardial infarction, heart failure, and repeat revascularization subsequent to acute coronary syndrome. This therefore implies that the problem of diabetic women with advanced coronary artery disease needs to be identified early to facilitate individual risk stratification and appropriate therapeutic decisions.

The results of the current research are also supportive to the developing evidence that women with diabetes represent a very vulnerable cardiovascular sub-group. Traditionally, women have been viewed as comparatively safeguarded against coronary artery disease throughout the premenopausal phase, but diabetes undermines this biological edge to a great extent. A number of researchers have shown that compared to men, diabetes predisposes cardiovascular mortality among diabetic women more significantly due to patients having more diffuse coronary disease, late diagnosis, atypical symptoms and increased metabolic risk factor load. 20 These findings highlight the necessity of aggressive methods of cardiovascular risk-reduction efforts and early invasive assessment of diabetic women presenting with symptoms consistent with acute coronary syndrome.

The strong points of the current study are that direct angiographic comparison is drawn between diabetic and non-diabetic women, diagnostic gold standard of coronary angiography is utilized, and a well-defined group of the study population of a large tertiary care referral hospital is included. Such results provide some potentially useful regional data that could investigate how diabetes impacts the severity of coronary artery disease in women, a group that is still underrepresented in the cardiovascular literature. Nevertheless, there are a number of limitations that should be considered. To begin with, it was a single-centre cross-sectional comparative study, and therefore, it might restrict its generalizability to other healthcare facilities. Second, the cross-sectional design does not allow the determination of the causal relation between the angiographic disease severity and angiographic disease and diabetes mellitus. Thirdly, there was no evaluation of long-term clinical outcomes, such as recurrent myocardial infarction, repeat revascularization, and mortality. Lastly, newer angiographic scoring systems like SYNTAX score or the Gensini score were not used and this might have given

more complete picture on the complexity of the lesion. In spite of such restrictions, this study presents significant evidence that diabetes mellitus is closely linked with greater levels of and anatomically intricate coronary artery disease in women who present with acute coronary syndrome. The results indicate the need to provide a thorough approach to cardiovascular risk evaluation, vigorous alteration of the metabolic risk factors, and prompt invasive testing in diabetic women, to enhance clinical outcomes and lower the risk of ischemic heart disease burden.

CONCLUSION

This work has shown that the female diabetic mellitus with acute coronary syndrome had a much worse and complicated coronary artery disease than non-diabetic women did. Multivessel and diffuse and calcified lesions, left main involvement, and increased angiographic severity were more prevalent in diabetic patients thus increasing the number being referred to undergo coronary artery bypass grafting. The results underscore the detrimental effect of diabetes on coronary artery disease and the need to actively stratify the risk early, vigorously control cardiovascular risk factors, and timely invasive assessment to enhance clinical outcomes in diabetic women with acute coronary syndrome.

DECLARATION

Conflict of Interest: The authors declare no conflict of interest.

Funding: This research did not receive any external funding.

Author's Contribution: All authors contributed equally in the complication of current study.

Acknowledgments: The authors express their sincere gratitude to all colleagues and participants for their valuable contributions to this study.

Data Availability Statement: The data that supports the findings of this research are available on request from Corresponding Author.

REFERENCES

1. Collet JP, Thiele H, Barbato E, Barthélémy O, Bauersachs J, Bhatt DL, et al. 2023 ESC Guidelines for the management of acute coronary syndromes. Eur Heart J. 2023;44(38):3720-3826.
2. Amsterdam EA, Wenger NK, Brindis RG, Casey DE Jr, Ganiats TG, Holmes DR Jr, et al. 2014 AHA/ACC guideline for the management of patients with non-ST-elevation acute coronary syndromes. Circulation. 2014;130(25):e344-e426.
3. Mehta LS, Beckie TM, DeVon HA, Grines CL, Krumholz HM, Johnson MN, et al. Acute myocardial infarction in women: A scientific statement from the American Heart Association. Circulation. 2016;133(9):916-947.
4. Vogel B, Acevedo M, Appelman Y, Merz CNB, Chieffo A, Figtree GA, et al. The Lancet women and cardiovascular disease Commission: reducing the global burden by 2030. Lancet. 2021;397(10292):2385-2438.
5. International Diabetes Federation. IDF Diabetes Atlas. 10th ed. Brussels: International Diabetes Federation; 2021.
6. Low Wang CC, Hess CN, Hiatt WR, Goldfine AB. Clinical update: cardiovascular disease in diabetes mellitus. Circulation. 2016;133(24):2459-2502.
7. Cosentino F, Grant PJ, Aboyans V, Bailey CJ, Ceriello A, Delgado V, et al. 2019 ESC Guidelines on diabetes, pre-diabetes, and cardiovascular diseases developed in collaboration with the EASD. Eur Heart J. 2020;41(2):255-323.
8. Virani SS, Alonso A, Aparicio HJ, Benjamin EJ, Bittencourt MS, Callaway CW, et al. Heart disease and stroke statistics—2021 update: A report from the American Heart Association. Circulation. 2021;143(8):e254-e743.
9. Ibanez B, James S, Agewall S, Antunes MJ, Bucciarelli-Ducci C, Bueno H, et al. 2017 ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation. Eur Heart J. 2018;39(2):119-177.
10. Lawton JS, Tamis-Holland JE, Bangalore S, Bates ER, Beckie TM, Bischoff JM, et al. 2021 ACC/AHA/SCAI Guideline for coronary artery revascularization. Circulation. 2022;145(3):e18-e114.
11. Neumann FJ, Sousa-Uva M, Ahlsson A, Alfonso F, Banning AP, Benedetto U, et al. 2018 ESC/EACTS Guidelines on myocardial revascularization. Eur Heart J. 2019;40(2):87-165.
12. Knuuti J, Wijns W, Saraste A, Capodanno D, Barbato E, Funck-Brentano C, et al. 2019 ESC Guidelines for the diagnosis and management of chronic coronary syndromes. Eur Heart J. 2020;41(3):407-477.
13. Gulati M, Levy PD, Mukherjee D, Amsterdam E, Bhatt DL, Birtcher KK, et al. 2021 AHA/ACC Guideline for the evaluation and diagnosis of chest pain. Circulation. 2021;144(22):e368-e454.
14. Reynolds HR, Shaw LJ, Min JK, Page CB, Berman DS, Chaitman BR, et al. Association of coronary angiography findings with outcomes in women presenting with suspected ischemic heart disease. Circulation. 2021;143(7):624-640.
15. Liu Y, Yang YM, Zhu J, Tan HQ, Liang Y, Li JD. Impact of diabetes mellitus on clinical characteristics and outcomes among women with acute coronary syndrome. BMC Cardiovasc Disord. 2020;20:286.
16. Hegde SS, Mallesh P, Yeli S, Shetty R. Coronary angiographic profile in diabetic and non-diabetic patients presenting with acute coronary syndrome. J Clin Diagn Res. 2017;11(9):OC20-OC24.
17. Melidonis A, Dimopoulos V, Lempidakis E, Hatzizacharias A, Stefanidis A. Coronary angiographic findings in diabetic and non-diabetic patients with acute coronary syndromes. Hellenic J Cardiol. 2005;46(2):119-126.
18. Fihn SD, Blankenship JC, Alexander KP, Bittl JA, Byrne JG, Fletcher BJ, et al. 2014 ACC/AHA/AATS/PCNA/SCAI/STS focused update of the guideline for diagnosis and management of patients with stable ischemic heart disease. Circulation. 2014;130(19):1749-1767.
19. Fox KAA, Goodman SG, Klein W, Brieger D, Steg PG, Dabbous O, et al. Management of acute coronary syndromes: variations in practice and outcome. Findings from the Global Registry of Acute Coronary Events (GRACE). Eur Heart J. 2002;23(15):1177-1189.
20. Yusuf S, Hawken S, Ôunpuu S, Dans T, Avezum A, Lanas F, et al. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. Lancet. 2004;364(9438):937-952.