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The Impact Of Diabetes Mellitus On The Angiographic Burden Of Coronary Artery Disease: A Cross-Sectional Analysis

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Abstract

Background:

Coronary artery disease (CAD) is one of the top causes of death worldwide. In South Asia, people tend to develop CAD earlier and with more severe complications. Diabetes mellitus (DM) makes CAD worse through complicated changes in the body's metabolism. However, how diabetes, abnormal blood fats (dyslipidaemia), and CAD severity interact in this high-risk group has not been well studied.

Methods:

This study looked at 100 patients with CAD who had coronary angiography at Sylhet MAG Osmani Medical College Hospital in Bangladesh. One half of the patients did not have diabetes; the other half did. Through angiography, researchers obtained comprehensive health data from every participant including blood sugar levels, cholesterol, haemoglobin, and the state of their cardiac arteries. The Friesinger score measures CAD complexity from angiograms. Group comparisons for continuous variables were performed by the chi-square (χ^2) test. After that, they found which elements separately predicted diabetes in these subjects by means of statistical analysis.

Results:

The diabetic group had much higher rates of dyslipidaemia—80% compared to just 22% in non-diabetics. Their triglyceride levels were also raised (177.2 mg/dL versus 126.9 mg/dL), as was total cholesterol (180.4 mg/dL compared to 152.2 mg/dL). Angiograms showed more severe disease in diabetics, with 34% having three blocked vessels, compared to only 2% of those without diabetes. The analysis revealed that dyslipidaemia, age between 41 and 60, age over 60, higher random blood sugar, and higher triglycerides were all strong predictors of diabetes. Interestingly, higher haemoglobin levels appeared to lower diabetes risk, hinting at a possible protective role.

Conclusion:

This study highlights the crucial role of dyslipidaemia and older age in the development of diabetes among CAD patients. It needs for better management of metabolic health to reduce the severity of heart disease. The unexpected protective relation between haemoglobin and diabetes calls for more research. These findings provide important clues for doctors working with high-risk patients in South Asia.

Keywords: *Coronary artery disease, Diabetes mellitus, Dyslipidaemia, Blood sugar, Cholesterol, Haemoglobin, Angiograms, Bangladesh*

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I. Introduction

Cardiovascular disease (CVD) remains the top cause of death globally, accounting for nearly 32% of all fatalities, said the World Health Organization [1]. Coronary artery disease (CAD), which is a major type of CVD, occurs when fatty plaques block coronary arteries, reducing blood flow to the heart [1]. The global burden of CAD has surged over the last century. By 2030, cardiovascular diseases, primarily CAD, are expected to cause nearly 23 million deaths each year [1-2].

Recent data from Bangladesh show a significant cardiovascular risk among newly diagnosed type 2 diabetes patients, with a median QRISK3 score of 11.0%, highlighting the strong link between diabetes and heart disease in this group [3]. Globally, around 589 million adults were living with diabetes in 2024, and this number is expected to rise to 853 million by 2050, emphasizing the growing public health challenge posed by the disease [4]. At the same time, ischemic heart disease remains a leading cause of cardiovascular deaths worldwide, causing an estimated 19.41 million deaths in 2021, with CAD as the top cause of heart-related deaths in countries like the United States in 2022 [4].

South Asia, including India, Pakistan, Bangladesh, Sri Lanka, and Nepal, faces a heavier CAD burden than other regions [5]. Cardiovascular events strike South Asians 5 to 10 years earlier than Western populations [5]. This early onset hints at unique risks beyond traditional factors—possibly genetic, metabolic, or lifestyle-related [5-8]. Low HDL levels link to severe CAD, post-treatment complications, and higher death risk, especially in diabetic men [9]. Diabetes-related dyslipidaemia—high LDL cholesterol and triglycerides, low HDL cholesterol—worsens artery damage [10]. LDL oxidation promotes plaques, while HDL protects vessels [11].

Diabetes mellitus (DM) is a key modifiable risk factor for CAD. It fuels the build-up of artery plaques and disease progression [11]. In 2021, over 537 million adults worldwide had diabetes, mainly type 2, with numbers rising due to urban lifestyles and obesity [12]. High blood sugar damages blood vessels through inflammation and oxidative stress, speeding up plaque formation and instability [12]. Diabetics often show more widespread CAD and poorer outcomes [13].

The Friesinger score measures CAD complexity from angiograms. It helps doctors decide treatments and predict outcomes [14]. Diabetic patients tend to have higher Friesinger scores, indicating a heavier disease burden and worse prognosis [15]. Other metabolic syndrome traits—high blood pressure, central obesity, glucose intolerance—also add to CAD severity [16].

The connection between diabetes and CAD is well established as but the precise effect on disease severity among South Asians is not yet fully understood. Gaining this insight is crucial to enhance risk evaluation and treatment for diabetic patients with CAD. This study seeks to investigate the influence of diabetes on CAD severity through the Friesinger score and to evaluate associated metabolic risk factors in patients undergoing coronary angiography.

Rationale of the Study

CAD remains a leading cause of death worldwide. Its burden grows especially among people with diabetes. Though diabetes is a known risk factor, the detailed impact on the severity of artery disease is less understood. This is particularly true for South Asia, where CAD develops earlier and more severely than in the West, likely due to unique genetic and lifestyle factors.

Diabetes is rising rapidly around the world, showing no signs of slowing down. This increase brings with it metabolic complications that seem to complicate coronary artery disease. However, detailed data focusing on specific populations remain limited. Additionally, the impact of other factors linked to metabolic syndrome on the severity of CAD still requires more thorough investigation.

Detecting CAD early and accurately assessing risk in diabetic patients are crucial steps toward improving treatment outcomes. Gaining a clearer understanding of how blood sugar levels and lipid imbalances influence disease severity will enable doctors to provide more personalized and effective care.

In this study, we will explore how diabetes affects the severity of CAD by using the Friesinger score system. We will also examine related metabolic risk factors among patients undergoing coronary angiography. The insights gained are expected to improve risk evaluation and guide treatment decisions, particularly for high-risk populations in South Asia.

Study Objectives

General Objective

To determine the association between diabetes mellitus and the angiographic severity of coronary artery disease in patients undergoing coronary angiography.

Specific Objectives

● Compare the Coronary artery involvement between diabetic and nondiabetic CAD patients.
● Compare Friesinger scores (0–15) between diabetic and nondiabetic CAD patients.

- Assess the distribution of CAD types (single-, double-, triple-vessel disease) by diabetic status.
- Adjust for confounding factors (age, sex, BMI, hypertension, smoking, lipid profile) using multivariate regression.

II. Methods

Study Design and Setting

This was a cross-sectional study conducted at the Cardiology Department of Sylhet MAG Osmani Medical College Hospital, a major healthcare centre in northeaster Bangladesh. The research ran from January 2012 to December 2013 and involved patients who were undergoing coronary angiography to check the severity of their heart artery disease.

Study Population

The study included adult patients aged 18 or older who had confirmed coronary artery disease and were scheduled for angiography during the study period. Patients who agreed to participate and met the criteria were included.

The study included adults aged 18 and above who had been diagnosed with coronary artery disease through angiography. Participants had to be scheduled for angiography during the study period and provide written consent to join the research.

Patients were excluded if they had previously undergone coronary artery bypass surgery or angioplasty. Other reasons for exclusion included structural heart problems such as congenital defects or valve issues, heart muscle disease, kidney failure, LDL cholesterol levels above 130 mg/dL, use of cholesterol-lowering drugs, or if they declined angiography or refused to participate in the study.

Sample Size and Sampling

A method that is based on prevalence was used to estimate the sample size. This formula considered the national prevalence of coronary artery disease (CAD), which was 3.4%, a confidence level of 95% ($Z = 1.96$), and a margin of error of 5% ($d = 0.05$). This produced a needed sample size of about 50 individuals per category, therefore generating 100 patients overall. To guarantee balanced comparison groups, 50 patients with diabetes mellitus and 50 without diabetes were sought using a purposive selection method.

Study Groups and Variables

Based on their diabetes status, patients were divided into two groups: those without diabetes and with fasting blood sugar levels less than 126 mg/dL were classified as non-diabetics; those diagnosed with diabetes or with fasting blood sugar levels of 126 mg/dL were classified as diabetics. The research on a scale from 0 (absence of disease) to 3 (triple-vessel disease) that was focused on diabetes as the main variable along with critical outcomes assessed via the vessel score, which quantifies the number of coronary arteries exhibiting significant stenosis (70% or greater for LAD, RCA, LCX, and 50% or greater for LMCA). The Friesinger score, a composite metric ranging from 0 to 15, indicates the degree and distribution of arterial occlusion in major vessels. Secondary variables included several other factors, including age, gender, body mass index (BMI), hypertension, smoking habits, family history of heart disease, and cholesterol levels.

Data Collection

Researchers collected data through interviews, clinical exams, blood tests, and angiography after patients gave consent. They used a questionnaire to record personal details, health issues, and family history. Blood samples were taken after an overnight fast. These samples were tested for blood sugar and cholesterol levels.

Angiography was performed through the groin artery under sterile conditions. Two cardiologists, unaware of patients' other details, reviewed the scans to score disease severity.

Data Analysis

Data were entered and analysed using SPSS version 26.0. Continuous variables were expressed as (mean ± standard deviation), and categorical variables were presented as frequencies and percentages. Group comparisons for continuous variables were performed by Chi-square (χ^2) test. Multivariate logistic regression was used to evaluate the independent connection between diabetes mellitus and CAD severity. Treating diabetes status as the predictor variable, the outcome was high-severity CAD, defined by a Friesinger score ≥ 5. The model changed for age, sex, BMI, hypertension, smoking status, and lipid profile among important factors. One regarded as statistically significant a p-value of 0.05.

Ethical Considerations

The study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Ethical approval was obtained from the Institutional Review Board of Sylhet MAG Osmani Medical College. All participants provided written informed consent before enrolment. Confidentiality was maintained throughout the study by anonymizing data, and participants were informed of their right to withdraw at any point without any consequence to their clinical care.

III. Results

Our study found the complex relationship between patient characteristics, key biomedical markers, and the presence of diabetes mellitus (DM) in a group of 100 individuals diagnosed with coronary artery disease (CAD). To facilitate a comparative analysis, the participants were divided into two groups: Group A, which included 50 diabetic patients, and Group B, made up of 50 non-diabetic patients.

Table 1. Association Between Patient Characteristics, Biomedical Parameters, and Diabetes Mellitus in CAD Patients.

Variable	Group A (Diabetic)n (%) / Mean ± SD	Group B (Non-Diabetic) n (%) / Mean ± SD	Odds Ratio (95% CI)	p-value
Demographic & Clinical Characteristics				
Age Group				**0.004**
– ≤40 years	3 (6.0%)	15 (30.0%)	Ref	
– 41–60 years	34 (68.0%)	21 (42.0%)	8.10 (2.10–31.22)	
– >60 years	13 (26.0%)	14 (28.0%)	4.33 (0.97–19.40)	
Sex				1.000
– Male	31 (62.0%)	31 (62.0%)	1.00 (0.45–2.24)	
– Female	19 (38.0%)	19 (38.0%)	Ref	
Hypertension	32 (64.0%)	26 (52.0%)	1.64 (0.74–3.66)	0.224
Family History of CAD	18 (36.0%)	9 (18.0%)	2.56 (1.02–6.46)	0.043
Smoking	10 (20.0%)	9 (18.0%)	1.14 (0.42–3.10)	0.799
Dyslipidaemia	40 (80.0%)	11 (22.0%)	14.18 (5.41–37.16)	<0.001
Biomedical Parameters				
Age (years)	55.84 ± 10.43	50.94 ± 14.81	—	0.059
BMI (kg/m²)	24.96 ± 2.70	26.24 ± 5.14	—	0.124
Random Blood Sugar (mmol/L)	9.40 ± 3.74	6.07 ± 0.83	—	<0.001
HbA1C (%)	6.07 ± 1.68	5.41 ± 0.51	—	0.009
Creatinine (mg/dL)	1.28 ± 0.62	1.00 ± 0.14	—	0.003
Haemoglobin (g/dL)	12.39 ± 1.36	12.81 ± 1.30	—	0.113
Total Cholesterol (mg/dL)	180.42 ± 53.74	152.16 ± 42.92	—	0.005
LDL Cholesterol (mg/dL)	114.94 ± 42.35	103.82 ± 31.83	—	0.141
HDL Cholesterol (mg/dL)	34.80 ± 8.00	33.80 ± 3.47	—	0.419
Triglycerides (mg/dL)	177.24 ± 100.78	126.88 ± 46.84	—	0.002

Note: Data are presented as number of participants and percentage for categorical variables or as mean ± standard deviation (SD) for continuous variables. Odds ratios (ORs) with 95% confidence intervals (CIs) were calculated using the ≤40 years age group and female sex as reference categories. Statistical significance was assessed using chi-square or Fisher's exact test for categorical variables and independent t-tests for continuous variables. p-value <0.05 was considered statistically significant.

This study first examined baseline demographic and clinical attributes. A statistically significant disparity in age distribution occurred between the diabetic and non-diabetic cohorts (p=0.004). Notably, individuals aged 41–60 years constituted a significantly larger proportion of the diabetic group (68.0%) compared to their non-diabetic counterparts (42.0%), translating to a markedly increased odds of being diabetic (Odds Ratio [OR] 8.10, 95% Confidence Interval [CI] 2.10–31.22) when referenced against those aged ≤40 years. While patients older than 60 years also showed a higher representation in the diabetic group (26.0% vs. 14 (28.0%) in non-diabetics; OR 4.33, 95% CI 0.97–19.40), this finding contributed to the overall significant age-group association. Gender distribution, however, was comparable across both groups (p=1.000).

Several clinical factors showed strong links to diabetic status. A family history of coronary artery disease (CAD) was notably more common among diabetic patients (36.0%) compared to those without diabetes (18.0%) (OR 2.56, 95% CI 1.02–6.46; p=0.043). The most significant association was with dyslipidaemia, which affected 80.0% of diabetic individuals, in stark contrast to just 22.0% of non-diabetic individuals (OR 14.18, 95% CI 5.41–37.16; p<0.001).In contrast, traditional risk factors such as hypertension (64.0% in diabetics vs. 52.0% in non-diabetics; p=0.224) and smoking (20.0% in diabetics vs. 18.0% in non-diabetics; p=0.799) did not demonstrate a statistically significant linkage with diabetes in this specific patient population.

In this study, important biological markers revealed a different metabolic profile in persons having diabetes and coronary artery disease (CAD). Important health indicators were clearly greater for diabetic patients than for those without diabetes. For instance, compared to non-diabetic people (p<0.001), the average Random Blood Sugar level in diabetic patients was 9.40 ± 3.74 mmol/L, far higher than 6.07 ± 0.83 mmol/L. Comparatively, HbA1C levels were likewise raised in the diabetic CAD group at 6.07 ± 1.68% vs non-diabetics (p=0.009). Diabetics too had higher average serum creatinine levels, 1.28 ± 0.62 mg/dL compared to 1.00 ± 0.14 mg/dL in non-diabetic patients (p=0.003). Moreover, diabetic individuals had higher total cholesterol levels (180.42 ± 53.74 mg/dL against 152.16 ± 42.92 mg/dL; p=0.005) and triglycerides (177.24 ± 100.78 mg/dL against 126.88 ± 46.84 mg/dL; p=0.002). Although the average age of diabetic patients (55.84 ± 10.43 years) was somewhat greater than that of non-diabetic patients (50.94 ± 14.81 years), this difference was only barely statistically significant (p=0.059). Neither BMI (p=0.124), haemoglobin (p=0.113), LDL cholesterol (p=0.141), nor HDL cholesterol (p=0.419) showed any appreciable variations between the two groups.

Table 2. Association of Diabetes Mellitus with Coronary Artery Involvement and Type of CAD

Variable	Category	Non-Diabetic (%)	Diabetic (%)	Chi-square (χ^2)	p-value
Type of CAD				**39.864**	**< 0.001**
	Normal Coronary Arteries	41 (78.8%)	11 (21.2%)		
	Single Vessel Disease (SVD)	3 (37.5%)	5 (62.5%)		
	Double Vessel Disease (DVD)	5 (29.4%)	12 (70.6%)		
	Triple Vessel Disease (TVD)	1 (4.3%)	22 (95.7%)		
Coronary Artery Involvement				**50.735**	**< 0.001**
	Unstable Angina (UA)	41 (85.4%)	7 (14.6%)		
	NSTEMI	4 (9.8%)	37 (90.2%)		
	STEMI	5 (45.5%)	6 (54.5%)		

Note: Data are presented as number of participants and percentage. The chi-square (χ^2) test was used to assess associations between diabetes status (non-diabetic vs. diabetic) and the type of coronary artery disease (CAD) or clinical presentation. Statistical significance was set at p < 0.05. CAD categories include Normal Coronary Arteries, Single Vessel Disease (SVD), Double Vessel Disease (DVD), and Triple Vessel Disease (TVD). Clinical presentations include Unstable Angina (UA), Non-ST Elevation Myocardial Infarction (NSTEMI), and ST Elevation Myocardial Infarction (STEMI).

Examining the relation between diabetes and angiographic results, the study also found a significant correlation between the two (x^2=39.864, p=0.001). Patients with diabetes were more likely to have more severe kinds of CAD. Of those with Single Vessel Disease (SVD), 62.5% were diabetic; of those with Double Vessel Disease (DVD), 70.6% also had diabetes; and of those with Triple Vessel Disease (TVD), shockingly 95.7% also had diabetes. By contrast, just 21.2% in the diabetes group had normal coronary arteries; 78.8% of non-diabetic patients did. Furthermore, notable was the relationship between diabetes and clinical manifestation of coronary artery involvement (φ2=50.735, p=0.001). While diabetic individuals were more likely to show NSTEMI (90.2%), compared to 9.8% in non-diabetics, non-diabetic patients often reported unstable angina (UA). Of STEMI sufferers, 45.5% were non-diabetic and a small majority (54.5%) were diabetic.

Table 3: Association between DM and Vessel Score / Fiessinger Score

Variable	Non-Diabetic (n = 50)	Diabetic (n = 50)	Chi-Square	p-value
Number of Vessels Involved				<0.001
0 Vessels	41 (82.0%)	11 (22.0%)		
1 Vessel	3 (6.0%)	8 (16.0%)		
2 Vessels	5 (10.0%)	14 (28.0%)	χ^2 = 38.07	
3 Vessels	1 (2.0%)	17 (34.0%)		
Friesinger Score Category				<0.001

Score 0	41 (82.0%)	10 (20.0%)		
Score 1–4	0 (0.0%)	2 (4.0%)		
Score 5–9	3 (6.0%)	20 (40.0%)		
Score 10–15	6 (12.0%)	18 (36.0%)	$\chi^2 = 39.41$	

Note: Data are expressed as number of participants and percentage. The chi-square (χ^2) test was used to examine the association between diabetes status (non-diabetic vs. diabetic) and (1) the number of coronary vessels involved, and (2) Friesinger Score categories. A p-value <0.05 was considered statistically significant. The Friesinger Score is a cumulative angiographic score ranging from 0 (no disease) to 15 (severe disease), categorized as follows: 0 = no disease; 1–4 = mild disease; 5–9 = moderate disease; 10–15 = severe disease.

Table 4: Logistic Regression Analysis of Predictors and Biomarkers of Diabetes Mellitus

Variable	B	p-value	Exp(B)	95% CI for Exp(B)
Dyslipidaemia	3.081	<0.001	21.79	6.54 – 72.57
Age Group (41–60 yrs.)	2.076	0.003	7.97	2.05 – 30.98
Age Group (60+ yrs.)	1.491	0.045	4.44	1.03 – 19.08
Family History (FH)	1.149	0.056	3.16	0.97 – 10.27
Sex	0.788	0.198	2.20	0.66 – 7.31
Smoking	0.496	0.468	1.64	0.43 – 6.27
Hypertension (HTN)	-0.574	0.329	0.56	0.18 – 1.78
Age (Continuous)	0.030	0.066	1.03	0.998 – 1.07
BMI (Continuous)	-0.076	0.135	0.93	0.84 – 1.02
Random Blood Sugar (RBS)	0.854	<0.001	2.35	1.47 – 3.75
Triglycerides	0.016	0.031	1.02	1.001 – 1.031
Haemoglobin	-0.460	0.047	0.63	0.40 – 0.99
Creatinine	1.961	0.147	7.11	0.50 – 100.79
HbA1C	-0.180	0.621	0.84	0.41 – 1.71
Total Cholesterol	0.008	0.608	1.01	0.98 – 1.04
LDL Cholesterol	-0.014	0.457	0.99	0.95 – 1.02
HDL Cholesterol	0.066	0.260	1.07	0.95 – 1.20

Note: Results are derived from multivariable binary logistic regression analysis to assess predictors of diabetes status. B represents the regression coefficient; Exp(B) is the odds ratio (OR); and 95% CI represents the 95% confidence interval for the odds ratio. Categorical variables were coded as follows: reference groups were ≤40 years for age group, absence of dyslipidaemia, no family history of coronary artery disease, female sex, non-smoker, and no hypertension. Continuous variables include age, body mass index (BMI), random blood sugar (RBS), triglycerides, haemoglobin, creatinine, HbA1c, total cholesterol, LDL cholesterol, and HDL cholesterol. A p-value <0.05 was considered statistically significant.

Independent diabetes predictors in CAD patients were found by means of a multivariate logistic regression analysis. The strongest predictor turned shown to be dyslipidemia, which raises the diabetes risk by over 21 times (Exp(B) [OR] 21.79, 95% CI 6.54–72.57; p<0.001]. Age was also very important; people between the ages of 41 and 60 had over 8 times the risks of acquiring diabetes compared to those aged ≤40 years (OR 7.97, 95% CI 2.05–30.98; p=0.003). With OR 4.44, 95% CI 1.03–19.08; p=0.045, those over 60 had more than 4 times the chances. Strongly predictive were elevated Random Blood Sugar levels; each mmol/L increase in RBS increases the risks of diabetes by a factor of 2.35 (OR 2.35, 95% CI 1.47–3.75; p=0.001). Diabetes (OR 1.02 per mg/dL rise, 95% CI 1.001–1.031; p=0.031) was separately linked to higher triglyceride levels. Fascinatingly, greater hemoglobin levels were protective; they reduced the diabetes (OR 0.63, 95% CI 0.40–0.99; p=0.047). Other variables showing trends toward relevance were age (OR 1.03, 95% CI 0.98–10.27; p=0.056) and family history of CAD (OR 3.16, 95% CI 0.97–10.27; p=0.066). Still, covariates like sex, smoking, hypertension, BMI, creatinine, HbA1C, cholesterol, and HDL/LDL cholesterol did not show any statistical significance as diabetes predictors.

IV. Discussion

The main factors influencing diabetes mellitus (DM) in patients with coronary artery disease (CAD) were sought for in this study. The investigation revealed several important factors pointing to the complicated character of diabetes in these individuals. Notable variables were dyslipidemia, age, blood glucose levels, and lipid profiles; an interesting finding about hemoglobin levels was noted.

The most notable result was the strong link found between dyslipidemia and diabetes. Those with dyslipidemia were nearly twenty-one times more likely to acquire diabetes. This is consistent with modern studies pointing out dyslipidemia as the main component of metabolic syndrome and a major type 2 diabetes risk factor [17, 18]. Common diabetes traits like raised triglycerides, lower HDL cholesterol, and few, dense LDL particles are tightly linked to insulin resistance and malfunction of insulin-secreting cells [19]. Our results show that dyslipidemia is a major diabetes predictor in CAD patients.

Age also had rather great importance. While those over 60 showed more than fourfold increased risks, those between 41 and 60 had about eightfold higher odds of diabetes than those under 40. This fits well with accepted trends showing that declining insulin sensitivity and cumulative lifestyle consequences cause the risk of diabetes to increase with age [20, 21]. With growing frequency as one ages, coronary artery disease (CAD) is clearly more likely to strike anyone progressing in age.

One important predictor revealed as Random Blood Sugar (RBS) levels. Every elevation in RBS raised the risk of diabetes, which emphasizes the need to keep an eye on blood sugar levels even in view of other metabolic aspects [22]. Increased triglyceride levels, independently associated with diabetes, underline their importance in diabetic dyslipidemia and insulin resistance [23, 24]. Their importance in the model suggests that triglycerides support the identification of metabolic problems linked with diabetes in CAD patients.

One important result was the apparent protection against diabetes offered by higher hemoglobin levels. Although certain studies [9] link low hemoglobin to a higher risk of diabetes and negative outcomes in diabetes and coronary artery disease (CAD) [25], this protective effect calls for more research. This could indicate a healthier diet or a lack of chronic diseases like inflammation or renal disease [10], or it could show a random outcome needing more research on elements like iron level. Although this study is not definitive, a family history of CAD and growing age showed trends suggestive of a genetic link between the two disorders [26].

Fascinatingly, markers like hypertension, BMI, smoking, and HbA1C did not independently predict diabetes when other factors were included. The significant connection between HbA1C and RBS may help to explain its lack of independent relevance; dyslipidemia or other metabolic diseases may be the mediator of BMI's effect. Although smoking and hypertension compromise cardiovascular health, in this setting they did not really show themselves as direct diabetes predictors [27]. The cross-sectional design of the study limits its capacity to prove causality. The sample size and the single-center approach could restrict the relevance of the findings. Results could have been influenced by inadequate understanding of diabetes duration, medication, and lifestyle choices.

More long-term patient research is required to confirm these markers and improve knowledge of the role hemoglobin plays. These findings imply that establishing risk factors could help to identify undetected diabetes in CAD patients, therefore enhancing the treatment outcomes. The study identifies as main predictors of diabetes in individuals with coronary artery disease dyslipidemia, advanced age, higher random blood sugar, and higher triglycerides. One important result deserving of greater research is the possible protective function of higher hemoglobin levels. These revelations let doctors spot high-risk patients and customize screening and therapy.

V. Conclusion

Our study highlights a strong relationship between diabetes and the severity of coronary artery disease (CAD) in Bangladeshi patients. Those with diabetes showed more widespread and complex artery lesions. Key factors predicting diabetes in CAD patients included dyslipidaemia, which greatly increases diabetes risk, along with older age, high blood sugar, and elevated triglyceride levels. Higher haemoglobin levels seemed to provide some protection.

Limitations

This study has several limitations that should be considered. First, since it only examined patients at a single point, it cannot establish a causal relationship between diabetes and worsened heart disease—only that there is an association. Second, the findings may not apply to other areas or populations since only 100 patients from one hospital in north-eastern Bangladesh were studied. The study didn't consider how long patients had diabetes or what treatments they were receiving, both of which could affect their condition. Additionally, it did not closely investigate lifestyle factors such as diet, exercise, or medication adherence, all of which can significantly impact health outcomes.

The study excluded patients with very high cholesterol who were not taking cholesterol medications, which may have resulted in missing individuals with more serious heart issues. This is another concern. Additionally, some tests, such as HbA1C, did not demonstrate a clear link to diabetes, possibly due to the small sample size or variations in measurements. There is a need for more studies that include larger and more diverse populations to better understand these relationships. Future research should also further investigate how haemoglobin and other factors influence diabetes and heart disease.

Recommendations

Based on the study's findings, healthcare providers should focus on early detection and strong management of dyslipidaemia and blood sugar levels in patients with coronary artery disease, especially those who have diabetes. Since dyslipidaemia emerged as the strongest predictor of diabetes among these patients, regular checks of lipid levels and personalized treatments—like lifestyle changes and proper cholesterol-lowering medications—should be a key part of care. Screening for diabetes in middle-aged and older CAD patients is also important to spot high-risk individuals early, enabling timely treatment to slow disease progression and avoid complications.

The study also points to the need for more research on whether higher haemoglobin levels might protect against diabetes. This helps one to develop new nutrition or medicinal treatments, developing general metabolic condition by means of knowledge. Public health initiatives should raise awareness among South Asians regarding the relationship between metabolic illnesses and cardiovascular diseases. They must inspire healthy living by means of a balanced diet and regular exercise. One also has to refrain from smoking. Long-term, concurrently addressing many metabolic issues will improve health and lower heart disease in this high-risk population.

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