Section: General Medicine

Original Research Article

STUDY OF PROFILE OF NEWLY DIAGNOSED DIABETES MELLITUS IN PATIENTS OF ACUTE CORONARY SYNDROME

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ABSTRACT

Background: Diabetes mellitus (DM) is a significant risk factor for acute coronary syndrome (ACS), often remaining undiagnosed until a cardiovascular event occurs. This study aims to evaluate the clinical features, risk factors, complications and outcomes of newly diagnosed DM in patients presenting with ACS.

Material and Methods: This prospective cross-sectional study was conducted over 18 months (2021–2024) in the Department of General Medicine at a tertiary care hospital. A total of 100 ACS patients (STEMI, NSTEMI, unstable angina) with newly diagnosed DM were included. Patients <18 years, previously diagnosed with diabetes, or who did not provide consent were excluded. Data collection included clinical symptoms, demographic parameters, risk factors, BMI, waist circumference, blood investigations, lipid profiles, ECG, echocardiography, and ACS treatment outcomes.

Results: Among ACS patients with newly diagnosed DM, 58% were male, and 42% were female. The most affected age group was 61-70 years (45%), with STEMI being the predominant presentation (68%). The majority (69%) were obese, and hypertension (37%) and dyslipidemia (27%) were common comorbidities. The mean HbA1c was 10.73%±2.66%, indicating poor glycemic control. Complications included recurrent ischemia (23%), cardiogenic shock (20%), and heart failure (14%), with a mortality rate of 5%.

Conclusion: The present study underscores the multifaceted nature of ACS in patients with newly diagnosed DM, characterized by significant comorbidities and high rates of severe complications. Early screening, lifestyle interventions, and optimized treatment strategies are essential to improving outcomes.

Keywords: Acute Coronary Syndrome; Newly Diagnosed Diabetes Mellitus; STEMI; NSTEMI; Unstable angina; Dyslipidemia; HbA1c; Cardiogenic shock.

INTRODUCTION

Diabetes mellitus is a chronic and complex metabolic disorder with a multifaceted pathogenesis. It is primarily characterized by high blood sugar levels, or hyperglycemia, which occurs due to impairments in insulin secretion, insulin action, or a combination of both. This elevated blood glucose can present in different forms and leads to dysfunctions in the metabolism of carbohydrates,

fats, and proteins. Prolonged hyperglycemia is linked to various microvascular and macrovascular complications, which are the main contributors to the morbidity and mortality associated with diabetes.[1] However, microvascular disease is the basis for three common and severe complications of diabetes: retinopathy, nephropathy, and neuropathy. Macrovascular disease, on the other hand, is characterized by atherosclerosis of large vessels, which can lead to conditions such as angina pectoris and myocardial infarction, transient ischemic attacks and strokes, and peripheral arterial disease.[2] Patients with stress hyperglycemia have higher mortality and longer hospital stays than those with known diabetes or normal glucose levels. Their outcomes are worse than diabetic patients with similar hyperglycemia, influenced by factors like underlying conditions and infection risk. Non-diabetic individuals with stress hyperglycemia have a 3.9-fold higher mortality risk after myocardial infarction compared to normoglycemic non-diabetics. A similar trend is seen in stroke cases. In tertiary care centers, many ACS patients present with newly diagnosed diabetes and suffer complications like arrhythmia, heart failure, and cardiogenic shock, increasing morbidity and mortality.[3-5] Though much of data is available about the patients with pre-existing diabetes but data about new onset diabetes in ACS patients and its impact on their outcomes is very limited. Hence the present study had carried out to know clinical study profile of newly diagnosed DM in patients of ACS, so as early know the complications & early intervention or treatment was given to prevent morbidity & mortality.

MATERIALS AND METHODS

After obtaining Institutional Ethical Committee approval and written informed consent from all the patients, this prospective cross-sectional study was conducted in the Department of General Medicine at a tertiary care hospital over a period of 18 months from 2021 to 2024. A total of 100 patients admitted to the medicine wards and ICCU with newly diagnosed diabetes mellitus and acute coronary syndrome (STEMI or NSTEMI), unstable angina, and significant ST-T wave changes on ECG, who were more than 18 years of age, were included in the study. Patient age less than 18 years, known to have diabetes and who has not given the consent were excluded from the study.

Data was collected from patients admitted through OPD and casualty to the medicine wards and ICCU, who had a history of polyuria, polydipsia, polyphagia, chest pain, breathlessness, sweating, vomiting, palpitations, atypical chest pain, weakness, urinary tract infection, or altered sleep. They underwent a general examination, including weight, height, BMI, and waist circumference assessment. Demographic parameters and risk factors such as smoking, hypertension, hyperlipidemia, and obesity were noted. All patients underwent a series of investigations, including a complete blood count (CBC) assessing hemoglobin, total leucocyte count (TLC), and differential leucocyte count (DLC). Liver function tests included bilirubin levels, SGOT, and SGPT. Kidney function was evaluated through blood urea and serum creatinine levels. Electrolyte balance was assessed with serum sodium and potassium. Blood glucose levels were measured using random blood sugar (>200 mg/dl for diabetes), fasting blood sugar (<100 mg/dl normal, 100-125 mg/dl pre-diabetes, >125 mg/dl diabetes), and postprandial blood sugar (<140 mg/dl normal, 140-200 mg/dl pre-diabetes, >200 mg/dl diabetes). HbA1c levels were recorded (<5.6% normal, 5.7-6.4% pre-diabetes, >6.4% diabetes). Lipid profile analysis included total cholesterol (<200 mg/dl), triglycerides (<150 mg/dl), HDL (>60 mg/dl), and LDL (<100 mg/dl). ECG findings were noted for changes suggestive of unstable angina, NSTEMI, or STEMI.

Additional investigations included Troponin I (normal: 0-0.04 ng/ml), CPK-MB (normal: 0-7.5 ng/ml), 2D echocardiography (where required), and abdominal ultrasound (where required). Risk factors and comorbidities assessed included smoking (≥10 cigarettes/day for >6 months), dyslipidemia (TC >240 mg/dl, TG >150 mg/dl, HDL <40 mg/dl in men and <50 mg/dl in women, LDL >130 mg/dl), family history of diabetes or cardiovascular disease, hypertension (BP >130/90 mmHg on >2 occasions or a history of hypertension on medication), obesity (BMI >24.9 kg/m^2), and increased waist circumference (men >90 cm, women >80 cm). Treatment for newly diagnosed diabetes in ACS patients included oral hypoglycemic agents, injectable insulin, and lifestyle modifications. ACS management involved dual antiplatelet therapy, statins, beta-blockers, and ACE inhibitors. Complications observed included congestive heart failure, cardiogenic shock, recurrent ischemia, bleeding (intracranial, hematemesis, nasal), stroke, and death.

Statistical Analysis

Data were analyzed using IBM SPSS Version 20.0. Descriptive statistics were presented as numbers and percentages. The association between two non-parametric variables was evaluated using the Pearson Chi-square test. Proportional comparisons were performed using the Z-test for two-sample proportions. Fisher's exact test was used for 2×2 tables. The odds ratio (with Mantel-Haenszel common odds ratio), univariate and multivariate logistic regression analyses were conducted to identify predictive variables and obtain ROC curves. A p-value <0.05 was considered statistically significant.

RESULTS

This study included 100 ACS patients with newly diagnosed DM. The majority were male (58%), while females accounted for 42%. The most affected age group was 61-70 years (45%), followed by those over 70 years (23%). Regarding BMI, the maximum i.e., 69% were obese (BMI >25), (Table 1). The mean BMI was 27.97±4.05 kg/m², and the mean waist circumference was 97.67±5.7 cm.

Table 1: Socio-demographic Data of Newly Diagnosed DM in Patients with ACS

Socio- demographic data		No of patients	Percentage
Age group (years)	<30	01	1.0
	31-40	03	3.0
	41-50	11	11.0
	51-60	16	16.0
	61-70	45	45.0
	>70	23	23.0
Gender	Male	58	58.0
	Female	42	42.0
BMI (Kg/m^2)	18.5-22.9	13	13.0
	23-24.9	18	18.0
	>25	69	69.0

Among ACS patients with newly diagnosed DM, 30% were smokers, 6% used tobacco, and 16% consumed alcohol. Hypertension was present in 37%, dyslipidemia in 27%, obesity in 69%, and 43% had a family history of diabetes or CAD, with obesity being the most prevalent risk factor. [Table 2]

Table 2: Addictions and risk factors distribution

Addictions and risk factors		No of patients	Percentage
Addictions	Smoking	30	30.0
	Tobacco	06	6.0
	Alcohol	16	16.0
Risk Factors	Hypertension	37	37.0
	Dyslipidemia	27	27.0
	Obesity	69	69.0
	Family h/o DM, CAD	43	43.0

The majority (68%) had STEMI (39 males, 16 females), while unstable angina was present in 18% (11 males, 7 females), and NSTEMI accounted for 14% (8 males, 6 females), highlighting STEMI as the predominant type as depicted in figure 1.

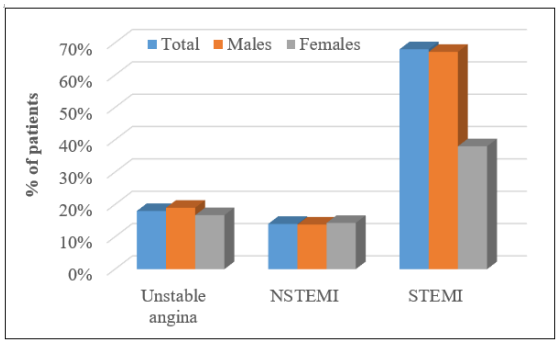

Figure 1: Type of ACS in a case of ACS with newly diagnosed DM

Chest pain was the most frequent symptom (90%), followed by sweating (40%), dyspnea (30%), weakness (25%), vomiting (20%) as shown in figure 2.

The mean systolic blood pressure was 137.9±25.11 mmHg, and the mean diastolic blood pressure was 90.9±12.42 mmHg.

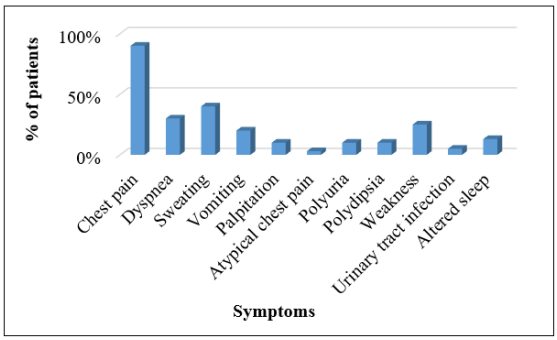

Figure 2: Symptoms in a case of ACS with newly diagnosed DM

Table 3 presents the laboratory parameters of ACS patients with newly diagnosed diabetes mellitus. The results indicate poor glycemic control (HbA1c: 10.73±2.66) and dyslipidemia, with elevated total cholesterol (234.93±14.48 mg/dL) and LDL level (135.33±8.51 mg/dL).

Table 3: Laboratory parameters distribution

Laboratory parameters		Mean	SD
Blood Sugar	Fasting blood sugar	184.23	33.68
	Postprandial blood sugar	296.61	37.68
	Random blood sugar	309.53	54.18
	HbA1c	10.73	2.66
Lipid profile (mg/dl)	TC	234.93	14.48
	TG	175.88	14.67
	HDL	46.23	2.98
	LDL	135.33	8.51

The recurrent ischemia was the most common complication (23%), followed by cardiogenic shock (20%) & heart failure (14%) as depicted in figure 3. A mortality rate was 5%.

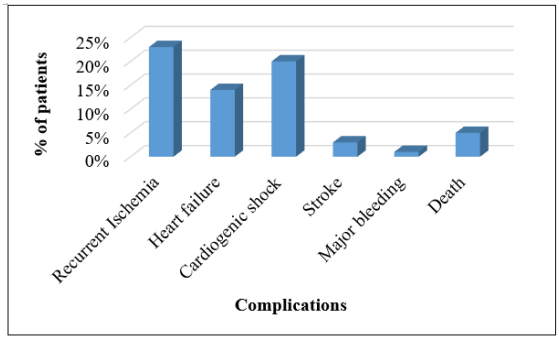

Figure 3: Complications in a case of ACS with newly diagnosed DM

DISCUSSION

The present study on ACS with newly diagnosed diabetes mellitus showed a male predominance (58%) with a more balanced gender ratio (1.4:1) compared to previous studies by de la Hera JM et al. (81.8% males, 4.5:1),[6] and Ashraf et al. (72.4% males, 2.6:1).[7] The majority of patients (45%) were aged 61-70 years, indicating an older population than in Khan S. et al study.[8] Obesity was highly prevalent (69%), surpassing findings from Babu S. et al.[9] The mean BMI (27.97) and waist circumference (97.67 cm) suggest a strong association between central obesity and cardiovascular risk, emphasizing the need for targeted interventions in this high-risk group. Our study identifies smoking as a significant risk factor, though less prevalent than study by Talikoti S. et al,[10] while alcohol and tobacco use were lower. Hypertension (37%) was less common compared to other studies.[6,11] Dyslipidemia was observed in 27% of patients, lower than de la Hera JM et al (54.5%),[6] Bjarnason et al (47.8%),[11] and Ding Q (85%),[12] indicating variability across populations. Obesity was prevalent in 69% of patients, significantly higher than de la Hera JM et al (35.1%),[6] and Ding Q (54.2%),[12] highlighting obesity as a major risk factor. Family history of DM and CAD (43%) was lower than in some reports,[6,11-13] but remained a notable concern. These findings highlight obesity as a key contributor to cardiovascular risk, emphasizing the need for targeted management strategies.

STEMI was the most common ACS type (68%), similar to Ahmed N et al (74%),[14] indicating its major prevalence. Unstable angina was seen in 18%, lower than Bjarnason et al (34.8%),[11] but higher than Ahmed N et al (12.4%).[14] NSTEMI was reported in 14%, significantly lower than Bjarnason et al (30.4%),[11] and Ahmed N et al (46.7%).[14] Chest pain was the most common symptom (90%), followed by sweating (40%), dyspnea (30%), weakness (25%), vomiting (20%). Palpitations were noted in 10%, polyuria and polydipsia (10% each), weakness was reported in 25%. UTI was present in 5%. These findings were comparable with the study done by Babu S. et al,[9] Talikoti S. et al,[10] and Brieger D et al.[15] The mean systolic and diastolic blood pressure was 137.9±25.11 mmHg and 90.9±12.42 mmHg respectively which was correlated with the study done by Bjarnason et al[11], Ding Q et al,[12] and Singhal A et al.[16]

The mean fasting blood sugar was 184.23 mg/dl, indicating poorer glycemic control. The mean postprandial blood sugar was 296.61 mg/dl, and the mean random blood sugar was 309.53 mg/dl. However, the mean HbA1c was 10.73%, markedly higher than Singhal A. et al (7.03%),[16] and Alam M.S. et al (7.45%),[17] reflecting chronic hyperglycemia and increased risk for complications. The distribution of HbA1c levels showed that 9% of patients had HbA1c between 6.5-7%, 23% of patients within the 7.1-9% range whereas maximum i.e., 68% of patients had HbA1c >9.1% highlighting severe hyperglycemia which is in accordance with the study conducted by Khan S. et al.[8] The mean total cholesterol was 234.93 mg/dl, indicating borderline high levels. Triglycerides averaged 175.88 mg/dl, indicating elevated triglycerides as a cardiovascular risk factor. The mean HDL was 46.23 mg/dl, and the mean LDL was 135.33 mg/dl. These findings are consistent with studies by Bjarnason et al,[11] and Singhal A. et al.[16] Overall, the lipid profile suggests a high cardiovascular risk in this population, emphasizing the need for improved lipid control in patients with ACS and newly diagnosed DM.

The recurrent ischemia was the most common complication (23%), followed by cardiogenic shock (20%) & heart failure (14%), while death occurred in 5%, stroke in 3%, and major bleeding in 1%. These findings were comparable with the study done by Alnemer KA et al,[18] and Shehab A et al.[19]

The present study provides valuable insights into the clinical profile of patients with ACS and newly

diagnosed DM, but several limitations should be considered. The small sample size of 100 patients may limit the generalizability of the findings, and the single-center design may not fully represent diverse patient populations. The cross-sectional nature of the study restricts the ability to establish causal relationships and assess long-term outcomes. Additionally, potential selection bias and the reliance on clinical records and patient self-reports may introduce inaccuracies. The study also lacks a control group, limiting comparisons with non-DM patients, and does not address other important factors like lifestyle, genetics, or socioeconomic status. Addressing these limitations in future research could help to strengthen the findings and provide more comprehensive insights into the management and outcomes of patients with ACS and newly diagnosed diabetes mellitus.

CONCLUSION

In conclusion, this study emphasizes the high-risk nature of acute coronary syndrome in patients with newly diagnosed diabetes mellitus, with significant comorbidities and severe complications. The findings highlight the need for early detection, targeted interventions, and lifestyle changes to manage obesity, hypertension, and dyslipidemia. With a predominance of male patients and high rates of recurrent ischemia, cardiogenic shock, and heart failure, comprehensive management strategies are essential to improve outcomes in this vulnerable population.

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