In-Hospital Outcome Of Unstable Angina Patients With And Without Diabetes Mellitus

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Abstract

Introduction: *Cardiovascular diseases (CVDs) are a significant health concern worldwide, with unstable angina (UA) being a critical subset requiring immediate attention. Diabetes mellitus is a known risk factor for CVDs, including UA. However, the impact of diabetes on the outcomes of patients with UA in Bangladesh is not well-studied.*

Methods: *This prospective observational study was conducted in Bangladesh, involving 200 participants with UA, categorized into two groups based on their diabetes status. Group-1 included 100 patients with diabetes, and Group-2 included 100 patients without diabetes. The study analyzed the sociodemographic characteristics, clinical history, clinical presentations, investigative findings, and outcomes of the participants.*

Result: *The mean age of participants was 56.20 ± 9.11 years in Group 1 (diabetic) and 52.88 ± 9.79 years in Group 2 (non-diabetic). Males constituted 75% and 86% of Group 1 and Group 2, respectively. All participants in Group 1 had diabetes, as per the study design. Anemia was present in 28% of Group 1, compared to 12% in Group 2 (P = 0.005). Blood glucose levels were significantly higher in Group 1 (168.90 ± 59.93 mg/dl) compared to Group 2 (90.30 ± 14.36 mg/dl) (P < 0.001). Serum creatinine was also significantly higher in Group 1 (1.02 ± 0.22 mg/dl) compared to Group 2 (0.93 ± 0.21 mg/dl) (P = 0.003). In terms of outcomes, 72% of Group 2 improved and were discharged compared to 53% of Group 1 (P = 0.008). Recurrent chest pain and myocardial infarction were significantly higher in Group 1 at 28% and 10% respectively, compared to 16% and 1% in Group 2 (P = 0.041 and P = 0.005, respectively).*

Conclusion: *The findings underscore the significant role of diabetes in exacerbating the condition of UA, leading to poorer outcomes. These findings highlight the importance of comprehensive management strategies for patients with UA, particularly those with diabetes. Further research is needed to explore the underlying mechanisms of the observed associations and to develop targeted interventions for this population.*

Keywords: *Cardiac, Coronary, Angina, Diabetes*

I.   INTRODUCTION

Cardiovascular diseases (CVDs) are a significant global health concern, with an increasing incidence rate that has led to substantial morbidity and mortality.(1) These diseases, which include conditions such as coronary artery disease, heart failure, and arrhythmias, have a profound impact on the quality of life of patients and place a considerable burden on healthcare systems worldwide.(2) Among the various types of CVDs, coronary artery disease, particularly Unstable Angina (UA), is of significant concern. UA is a clinical syndrome that falls under the umbrella of acute coronary syndrome. It is characterized by chest pain or discomfort due to insufficient blood

flow and oxygen to the heart, often resulting from partial or transient blockage of the coronary arteries.(3) The severity of UA can vary, but it is often a signal of an impending heart attack, necessitating immediate medical attention and management.(4) The risk factors contributing to the development of UA are multifaceted and include both modifiable and non-modifiable factors. Modifiable risk factors include hypertension, hyperlipidemia, diabetes, smoking, and obesity. These factors can lead to the formation of atherosclerotic plaques in the arteries, which can rupture and cause UA.(5) Non-modifiable risk factors include age, gender, and genetic predisposition.(6) The management of UA is a complex process that involves a combination of lifestyle modifications and pharmacological interventions. Lifestyle modifications include smoking cessation, dietary changes, and increased physical activity. These changes aim to reduce the overall cardiovascular risk and prevent the progression of the disease.(6) Pharmacological interventions, on the other hand, aim to alleviate symptoms and prevent further cardiac events. These can include antiplatelet drugs, beta-blockers, and statins, among others.(3) Diabetes mellitus is a significant risk factor for various CVDs, including UA. It leads to changes in the blood vessels that promote atherosclerosis and clot formation, increasing the risk of UA.(7) Moreover, individuals with diabetes often have other comorbid conditions such as hypertension and hyperlipidemia, which further increase their risk.(8) The intersection of diabetes and UA is particularly relevant in Bangladesh, a country with a high prevalence of both conditions. Despite the high prevalence, there is a lack of comprehensive studies investigating the impact of diabetes on UA outcomes in the Bangladeshi population. This gap in knowledge underscores the need for the proposed study, which aims to compare the in-hospital outcomes of UA patients with and without diabetes mellitus in Bangladesh. The findings of this study will contribute to the existing body of knowledge on UA and diabetes, particularly in the context of Bangladesh. It will provide valuable insights into the management and prognosis of UA in patients with diabetes, potentially guiding future treatment strategies and improving patient outcomes. This study is of significant importance, given the high burden of CVDs and diabetes in Bangladesh and the potential for improved patient outcomes through targeted interventions.

II.   METHODS

This prospective observational study was conducted at the Department of Cardiology, Abdul Malek Ukil Medical College, Noakhali, Bangladesh, over one year from January 2022 to December 2022. A total of 200 adult patients diagnosed with Unstable Angina (UA) were selected using a purposive sampling technique from those admitted at the study place during the study period. Patients with other forms of cardiovascular diseases or those who had undergone any form of cardiac intervention recently were excluded. The participants were divided into two groups: Group 1 (n=100) consisted of UA patients with a confirmed diagnosis of Diabetes Mellitus (DM), and Group 2 (n=100) included UA patients without DM. The diagnosis of DM was confirmed through medical history, current medication use, or laboratory tests. Data was collected using a structured questionnaire that captured demographic details, medical history, clinical presentation, and in-hospital outcomes. The primary outcome was the in-hospital outcome, including improvement and discharge, recurrent chest pain, myocardial infarction, heart failure, cardiogenic shock, arrhythmia, and death. Each patient was treated according to their individual requirement, and treatment information was not specifically recorded for the purpose of the present study. Patients were followed-up till their discharge from the study place or mortality. Statistical analysis was performed using appropriate tests. Categorical variables were compared using the Chi-square test. A p-value of less than 0.05 was considered statistically significant. The study adhered to the ethical guidelines of the Declaration of Helsinki and received approval from the Institutional Ethics Committee. Informed consent was obtained from all participants.

III.   RESULTS

Table 1: Distribution of participants by sociodemographic characteristics (N=200)

Variables	Group 1 (n=100)	Group 2 (n=100)	P-Value
Age			
31-40	1	12	
41-50	31	30	
51-60	48	42	0.065
61-70	14	12	
71-80	5	3	
81-90	1	1	
Mean Age	56.20 ± 9.11	52.88 ± 9.79	**0.014**
Gender			

Male	75	86	**0.050**
Female	25	14	
Occupation			
Service	69	72	**0.038**
Housewife	24	11	
Business	3	11	
Cultivator	2	2	
Unemployed	2	4	
Family History of ischemic heart disease			
No	48	69	**0.003**
Yes	52	31	

In terms of age distribution, the majority of participants in both groups fell within the 41-60 age range. Group 1 had a mean age of 56.20 (SD=9.11), which was significantly higher than the mean age of 52.88 (SD=9.79) in Group 2 (p=0.014). The gender distribution showed a higher proportion of males in both groups, with 75% in Group 1 and 86% in Group 2. This difference was on the verge of statistical significance (p=0.050). Regarding occupation, the majority of participants in both groups were in service, with 69% in Group 1 and 72% in Group 2. The distribution of other occupations varied, with a higher proportion of housewives in Group 1 (24%) compared to Group 2 (11%). Conversely, there were more participants involved in business in Group 2 (11%) than in Group 1 (3%). The difference in occupation distribution between the two groups was statistically significant (p=0.038). Finally, the family history of ischemic heart disease was significantly different between the two groups (p=0.003). In Group 1, 52% of participants had a family history of ischemic heart disease, compared to only 31% in Group 2.

Table 2: Distribution of participants by clinical history (N=200)

Clinical History	Group 1 (n=100)	Group 2 (n=100)	P-Value
Smoking	59	74	**0.025**
Alcohol	17	23	0.289
Hypertension	81	71	0.098
Diabetes	100	0	**<0.001**
Obesity	37	22	**0.02**
Dyslipidemia	59	43	**0.024**
Previous History of CVD			
None	59	68	0.237
Sinoatrial node	23	22	
Unstable angina	17	8	
Myocardial Infarction	1	2	

In terms of smoking history, Group 2 had a significantly higher proportion of smokers (74%) compared to Group 1 (59%) (p=0.025). The consumption of alcohol was relatively similar in both groups, with 17% in Group 1 and 23% in Group 2, and the difference was not statistically significant (p=0.289). Hypertension was more prevalent in Group 1 (81%) compared to Group 2 (71%), but this difference was not statistically significant (p=0.098). As expected, all participants in Group 1 had diabetes, while none in Group 2 did, resulting in a highly significant difference (p<0.001). Obesity was significantly more prevalent in Group 1 (37%) compared to Group 2 (22%) (p=0.02). Dyslipidemia was also significantly more common in Group 1 (59%) than in Group 2 (43%) (p=0.024). In terms of previous history of cardiovascular disease (CVD), the majority of participants in both groups had no previous history of CVD, with 59% in Group 1 and 68% in Group 2. The distribution of other CVDs (Sinoatrial node, Unstable angina, Myocardial Infarction) was relatively similar in both groups, and the overall difference in previous history of CVD was not statistically significant (p=0.237).

Table 3: Distribution of participants by clinical presentations (N=200)

Clinical presentations	Group 1 (n=100)	Group 2 (n=100)	P-Value
Chest pain <5 Hours	69	74	0.682

Chest pain 5-12 Hours	25	22	
Chest pain >12 Hours	6	4	
Sweating	64	69	0.454
Breathlessness	22	18	0.48
Vomiting	7	8	0.788
Anxiousness	88	92	0.346
Anemia	28	12	**0.005**
Edema	5	1	0.097
Coldness of Extremities	47	50	0.671
Low pulse rate	11	7	0.26

In terms of chest pain duration, the majority of participants in both groups experienced chest pain for less than 5 hours, with 69% in Group 1 and 74% in Group 2. The difference in chest pain duration between the two groups was not statistically significant (p=0.682). The presence of sweating was similar in both groups, with 64% in Group 1 and 69% in Group 2 (p=0.454). Breathlessness was also similar, with 22% in Group 1 and 18% in Group 2 (p=0.480). Vomiting was relatively infrequent in both groups, with 7% in Group 1 and 8% in Group 2, and the difference was not statistically significant (p=0.788). Anxiety was highly prevalent in both groups, with 88% in Group 1 and 92% in Group 2 (p=0.346). Anemia was significantly more prevalent in Group 1 (28%) compared to Group 2 (12%) (p=0.005). Edema was relatively infrequent in both groups, with 5% in Group 1 and 1% in Group 2, and the difference was not statistically significant (p=0.097). The presence of coldness of extremities was similar in both groups, with 47% in Group 1 and 50% in Group 2 (p=0.671). A low pulse rate was relatively infrequent in both groups, with 11% in Group 1 and 7% in Group 2, and the difference was not statistically significant (p=0.26).

Table 4: Distribution of participants by investigative findings (N=200)

Investigative Findings	Group 1 (n=100)	Group 2 (n=100)	P-Value
(ECG) ST Segment Depression	25	17	0.165
(ECG) T-Inversion	87	91	0.366
Cardiomegaly on Chest X-ray	12	8	0.346
Mean ± SD Blood Glucose Level	168.90 ± 59.93	90.30 ± 14.36	**<0.001**
Mean ± SD Total Cholesterol	182.70 ± 45.10	184.13 ± 40.71	0.814
Mean ± SD Triglycerides	197.76 ± 83.102	184.39 ± 102.22	0.311
Mean ± SD HDL	41.07 ± 5.20	42.21 ± 5.21	0.123
Mean ± SD LDL	109.05 ± 41.16	109.41 ± 34.76	0.946
Mean ± SD serum creatinine	1.02 ± 0.22	0.93 ± 0.21	**0.003**

In terms of electrocardiogram (ECG) findings, ST segment depression was observed in 25% of Group 1 and 17% of Group 2, with no significant difference between the groups (p=0.165). T-inversion was more common, observed in 87% of Group 1 and 91% of Group 2, again with no significant difference (p=0.366). Cardiomegaly, as observed on chest X-ray, was present in 12% of Group 1 and 8% of Group 2, with no significant difference (p=0.346). In terms of laboratory findings, the mean blood glucose level was significantly higher in Group 1 (168.90 ± 59.93 mg/dl) compared to Group 2 (90.30 ± 14.36 mg/dl) (p<0.001). The mean total cholesterol was similar in both groups, with 182.70 ± 45.10 mg/dl in Group 1 and 184.13 ± 40.71 mg/dl in Group 2 (p=0.814). The mean triglyceride levels were also similar, with 197.76 ± 83.102 mg/dl in Group 1 and 184.39 ± 102.22 mg/dl in Group 2 (p=0.311). The mean HDL level was 41.07 ± 5.20 mg/dl in Group 1 and 42.21 ± 5.21 mg/dl in Group 2, with no significant difference (p=0.123). The mean LDL level was also similar in both groups, with 109.05 ± 41.16 mg/dl in Group 1 and 109.41 ± 34.76 mg/dl in Group 2 (p=0.946). The mean serum creatinine level was significantly higher in Group 1 (1.02 ± 0.22 mg/dl) compared to Group 2 (0.93 ± 0.21 mg/dl) (p=0.003).

Table 5: Distribution of participants by outcome (N=200)

Outcome	Group 1 (n=100)	Group 2 (n=100)	P-Value
Improved and discharged	53	72	**0.008**
Recurrent Chest pain	28	16	**0.041**
Myocardial Infarction	10	1	**0.005**

Heart Failure	5	1	0.097
Cardiogenic Shock	2	1	0.561
Sinus Bradycardia	5	4	0.733
Sinus Tachycardia	2	0	0.155
Atrial Fibrillation	1	1	1
Ventricular Fibrillation	2	0	0.155
Death	2	0	0.155

In terms of improvement and discharge, a significantly higher proportion of participants in Group 2 (72%) improved and were discharged compared to Group 1 (53%) (p=0.008). Recurrent chest pain was significantly more common in Group 1 (28%) compared to Group 2 (16%) (p=0.041). Myocardial infarction was also significantly more prevalent in Group 1 (10%) compared to Group 2 (1%) (p=0.005). Heart failure was observed in 5% of Group 1 and 1% of Group 2, but this difference was not statistically significant (p=0.097). Cardiogenic shock was relatively infrequent in both groups, with 2% in Group 1 and 1% in Group 2, and the difference was not statistically significant (p=0.561). In terms of arrhythmias, sinus bradycardia was observed in 5% of Group 1 and 4% of Group 2 (p=0.733). Sinus tachycardia, atrial fibrillation, and ventricular fibrillation were relatively infrequent in both groups, and the differences were not statistically significant (p=0.155 for both sinus tachycardia and ventricular fibrillation, p=1 for atrial fibrillation). Death occurred in 2% of Group 1, while there were no deaths in Group 2. However, this difference was not statistically significant (p=0.155).

IV.   DISCUSSION

The global burden of cardiovascular diseases (CVDs) is high, with unstable angina (UA) being a critical subset of CVDs that requires immediate attention.(5) The present study, conducted in Bangladesh, provides a comprehensive analysis of the sociodemographic characteristics, clinical history, clinical presentations, investigative findings, and outcomes of 200 participants with UA, further categorized into two groups based on their diabetes status. The study reveals that the mean age of participants in both groups was above 50, with a higher proportion of males than females. This aligns with the global trend where CVDs are more prevalent in older age groups and male.(9–11) The mean age of the group-1 participants was significantly higher compared to group-2. The occupation of the majority of participants was service-related, and a significant proportion of participants in both groups had a family history of ischemic heart disease. In terms of clinical history, smoking, hypertension, diabetes, obesity, and dyslipidemia were prevalent in both groups. However, the incidence of diabetes was significantly higher in Group 1 (P < 0.001), which is consistent with the present study design where group 1 members had diabetes and group 2 didn't by selection. The clinical presentations of the participants were varied, with chest pain, sweating, breathlessness, vomiting, anxiousness, anemia, edema, coldness of extremities, and low pulse rate being reported. Anemia was significantly higher in Group 1 (P = 0.005), which could be attributed to the complications associated with diabetes. The investigative findings revealed significant differences in the blood glucose level (P < 0.001) and serum creatinine (P = 0.003) between the two groups, with Group 1 showing higher levels. This is in line with the study by Patel et al. (2008), which reported elevated blood glucose levels in patients with diabetes.(12) The outcomes of the study were diverse, ranging from improvement and discharge to recurrent chest pain, myocardial infarction, heart failure, cardiogenic shock, sinus bradycardia, sinus tachycardia, atrial fibrillation, ventricular fibrillation, and death. The incidence of improved and discharged patients was significantly higher in Group 2 (p=0.008), while recurrent chest pain (p=0.041) and myocardial infarction (p=0.005) were significantly higher in Group 1. This suggests that diabetes may exacerbate the condition of UA, leading to poorer outcomes. This finding aligns with multiple studies, which reported that diabetes is a significant risk factor for myocardial infarction worldwide.(1,5,13,14) The higher incidence of recurrent chest pain and myocardial infarction in Group 1 could be attributed to the complications associated with diabetes, such as microvascular and macrovascular diseases, which can lead to a higher risk of cardiovascular events.(12) Furthermore, the higher rate of improvement and discharge in Group 2 indicates that patients without diabetes may have a better prognosis, which is consistent with the findings of the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure.(15) However, it is important to note that other outcomes such as heart failure, cardiogenic shock, sinus bradycardia, sinus tachycardia, atrial fibrillation, ventricular fibrillation, and death were not significantly different between the two groups. This suggests that while diabetes is a significant factor influencing the outcomes of UA, other factors may also play a role.

Limitations of The Study

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

V.   CONCLUSION

The present study provides a comprehensive understanding of the impact of diabetes on the outcomes of patients with unstable angina in Bangladesh. The findings underscore the significant role of diabetes in exacerbating the condition of unstable angina, leading to poorer outcomes such as recurrent chest pain and myocardial infarction. However, it is also evident that other factors may influence the outcomes of unstable angina, as indicated by the non-significant differences in outcomes such as heart failure, cardiogenic shock, and arrhythmias between the two groups. These findings highlight the importance of comprehensive management strategies for patients with unstable angina, particularly those with diabetes. Such strategies should focus on the control of diabetes and other comorbid conditions, in addition to the management of unstable angina, to improve the overall health outcomes of these patients.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

VI.   RECOMMENDATION

Further research is needed to explore the underlying mechanisms of the observed associations and to develop targeted interventions for this population. The findings of this study contribute to the growing body of evidence on the interplay between diabetes and cardiovascular diseases and underscore the need for a holistic approach to patient care in this context.

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