

ASSOCIATION OF SHORT TERM OUTCOMES OF ACUTE CORONARY SYNDROME WITH PREDIABETESS Begum¹, J Chowdhury², N Sultana³, S Ahmed⁴, N Sultana¹

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ABSTRACT

The global incidence and prevalence of prediabetes are rapidly increasing with a parallel increase in the proportion of patients suffering from acute coronary ischemic events with prediabetes. Impaired glucose metabolism (IGM), comprising impaired glucose tolerance and impaired fasting glycemia (IFG), is also associated with an increase risk of Acute coronary syndrome (ACS). This study was aimed to assess the adverse outcomes of Acute Coronary Syndrome (ACS) with and without prediabetes. This prospective observational study was conducted with 132 patients admitted in coronary care unit and cardiology departments of Dhaka medical college and NICVD, Dhaka from January 2010 to December 2010. The patients were grouped into prediabetic ACS group (Group A) and non-diabetic ACS group (Group B) by estimating fasting blood glucose and 2 hours postprandial blood glucose. Mean (\pm SD) age of prediabetic ACS group (56.73 ± 8.19 years) was higher than non-diabetic ACS group (53.16 ± 8.92 years) and it was statistically significant. In this study 85 (64.4%) patients were male and 47 (35.6%) patients were female. The presence of risk factors, such as smoking (65.9% vs 48.9%), dyslipidemia (86.4% vs 68.2%), family history of IHD (20.5% vs 14.8%) and hypertension (65.9% vs 43.2%) was higher in group A study subjects in comparison to group B. Overall final outcome results of study subjects during hospital stay in group A and group B respectively were heart failure 14 (31.8%) and 10 (11.4%) ($P < 0.01$), cardiogenic shock 9 (20.5%) and 4 (4.5%) ($P < 0.01$), arrhythmia 4 (9.1%) and 5 (5.7%) ($P = 0.480$), recurrent angina 2 (4.5%) and 0 (0%) ($P = 0.109$), need for urgent revascularization 1 (2.3%) and 0 (0%) ($P = 0.333$), and death 2 (4.5%) and 3 (3.4%) ($P = 1.000$). Significantly higher number of study subjects of group A suffered cardiogenic shock ($P < 0.01$) and heart failure ($P < 0.01$) than those in group B. The study shows that acute coronary syndrome patients with prediabetes have more risk to develop adverse effects like cardiogenic shock and heart failure than non-diabetic ACS patients.

Key Words: Acute Coronary Syndrome, Dyslipidemia, Prediabetes

Introduction

Acute Coronary Syndrome (ACS) refers to a constellation of symptoms that are compatible with acute myocardial ischemia and the syndrome includes ST-segment elevation myocardial infarction (STEMI), non ST-segment elevation myocardial infarction (NSTEMI) and unstable angina.

It is well known that Diabetes Mellitus (DM) is a

major risk factor of developing cardiovascular disease. Coronary artery disease (CAD) accounts for over 60% of deaths in people with diabetes, which is at least twice than that of non-diabetic population¹. But people are unaware of another condition that is prediabetes which is a relatively new clinical term, first introduced in 2002 by the

Department of US Health and Human Services and American Diabetic Association (ADA), to replace Impaired Fasting Glucose (IFG) and Impaired Glucose Tolerance (IGT)². Prediabetes is often an incidental finding in people who are undergoing biochemical testing for diabetes³. The American Diabetes Association (ADA) and the United States Department of Health Services defined prediabetes as the condition in which blood glucose levels are elevated above normal range but do not satisfy the criteria for the diagnosis of Diabetes Mellitus.

Prediabetes, refers to the presence of Impaired Fasting Glucose (IFG) and/or Impaired Glucose Tolerance (IGT). Biochemical ranges used for IFG are Fasting blood glucose ≥ 6.1 mmol/L- <7.0 mmol/L. In IGT the ranges of blood glucose are >7.8 mmol/L- <11.1 mmol/L⁴.

Results of several large cohort studies indicate that people with prediabetic conditions have a raised risk of cardiovascular disease⁵.

So, there is much evidence that prediabetes is a risk factor for ACS and adverse outcome following ACS. In Bangladesh, no study has yet been done to see the association of Acute Coronary Syndrome (ACS) with prediabetes. So, the present study was designed to explore the association of ACS with prediabetes and without prediabetes.

Materials and Methods

This prospective observational study was carried out in the Department of Biochemistry, Dhaka Medical College, Dhaka. Samples were collected from the Department of Cardiology of Dhaka Medical College Hospital (DMCH) and National Institute of Cardiovascular Diseases (NICVD), Dhaka, Bangladesh. The study was carried out during the period from January 2010 to December 2010. The patients were grouped into prediabetic ACS group (group-A) and non-diabetic ACS group (group-B) by estimating fasting blood glucose and 2 hours postprandial

blood glucose. Patients were followed up during hospital stay. After meticulous checking and rechecking, data was compiled and statistical analysis was done using computer based software, Statistical Package for Social Science (SPSS), using student's 't' test or chi-square test. P value <0.05 was taken as level of significance.

Results

Table-I shows that, in group A, most of the study subjects belonged to age group 51-60 years (52.3%), followed by ≤ 50 years (22.7%); in group B, however, most of the study subjects belonged to age group 50 and 51-60 years (40.9% each). Mean(\pm SD) age in group A was 56.73 ± 8.19 years and in group B was 53.16 ± 8.92 years but the difference was not statistically significant ($p > 0.05$).

Table-II shows that males and females were almost evenly distributed between group A and group B.

Table-III shows that presence of risk factors, such as smoking (65.9% vs 43.2%), dyslipidemia (86.4% vs 68.2%), family history of IHD (20.5% vs 14.8%) and hypertension (65.9% vs 48.9%) were higher among group A study subjects in comparison to that of group B.

Table IV shows overall final outcome results of group A and group B study subjects during hospital stay. In group A and group B, respectively, heart failure occurred in 14 (31.8%) and 10 (11.4%) ($P < 0.01$), cardiogenic shock occurred in 9 (20.5%) and 4 (4.5%) ($P < 0.01$), arrhythmias was seen in 4 (9.1%) and 5 (5.7%) ($P = 0.480$), recurrent angina was seen in 2 (4.5%) and 0 (0%) ($P = 0.109$), need for urgent revascularization was in 1 (2.3%) and 0 (0%) ($P = 0.333$), and death occurred in 2 (4.5%) and 3 (3.4%) ($P = 1.000$). Significantly higher number of study subjects of group A suffered cardiogenic shock ($P < 0.01$) and heart failure ($P < 0.01$) than that of group B.

Table-I: Age distribution of the study subjects.

Age (years)	Group A (n=44)	Group B (n=88)	p value
≤ 50	10 (22.7)	36 (40.9)	0.849
51-60	23 (52.3)	36 (40.9)	
61-70	8 (18.2)	13 (14.8)	
>70	3 (6.8)	3 (3.4)	
Mean±SD	56.73±8.19	53.16±8.92	

Figures in parentheses indicate percentage of total number of subjects (n). Chi-square test was done to see the level of significance. *= significant ($p < 0.05$)

Table-II: Sex distribution of the study subjects

Sex	Group A (n=44)	Group B (n=88)	p value
Male	29 (65.9)	56 (63.6)	0.849
Female	15 (34.1)	32 (36.4)	

Figures in parentheses indicate percentage of total number of subjects (n). Chi-square test was done to see the level of significance. *= significant ($p < 0.05$)

Table-III: Traditional risk factors of acute coronary syndrome patients.

Risk factors	Group A n= 44	Group B n= 88	P value
Smoking	29(65.9)	49(43.2)	0.017*
Dyslipidemia	38(86.4)	60(68.2)	0.034*
Family history of IHD	9(20.5)	13(14.8)	0.461
Hypertension	29(65.9)	43(48.9)	0.068

Figures in parentheses indicate percentage of total number of subjects (n). Chi-square test was done to see the level of significance. *= significant ($p < 0.05$)

Table-IV: Outcome of the study subjects during hospital stay.

Outcome	Group A n=44	Group B n=88	P value
Heart failure	14 (31.8)	10 (11.4)	0.007*
Cardiogenic shock	9 (20.5)	4 (4.5)	0.010*
Arrhythmias	4 (9.1)	5 (5.7)	0.480
Recurrent angina	2 (4.5)	0	0.109
Need for urgent revascularization	1 (2.3)	0	0.333
Death	2 (4.5)	3(3.4)	1.000

Figures in parentheses indicate percentage of total number of subjects (n). Fisher's Exact test was done to see the level of significance *=significant ($P < 0.01$).

Discussion

Acute coronary syndrome (ACS) is the most common form of heart disease and the single most important cause of premature death in most part of the world. It is estimated that by 2020, ACS will become the major cause of death in all regions of the world⁶. Prediabetes is the condition in which blood glucose levels are elevated above normal range but do not satisfy the criteria for the diagnosis of diabetes mellitus⁴. Results of several large cohort studies indicate that people with prediabetic conditions, have a raised risk of cardiovascular disease⁵. So the present study was aimed to assess the risk of cardiovascular diseases in ACS patients with prediabetes and without prediabetes. With this view 132 ACS patients, both male and female were selected as the study subjects. Study subjects were divided into prediabetic ACS group and non-diabetic ACS group.

This study shows that mean(\pm SD) age of prediabetic ACS group (56.73 \pm 8.19 years) was higher than non-diabetic ACS group (53.16 \pm 8.92 years). Otten *et al.* and Zeller *et al.* also found that prediabetic patient with ACS were older than non-diabetic patients which is close to the present study^{7,8}. Elizabeth *et al.* also reported that mean(\pm SD) age of prediabetic ACS group was more than non-diabetic ACS group which is consistent with the present study⁹. The observation of the present study is consistent with Lenzen *et al.* which showed mean (\pm SD) age in prediabetic group was more than non-diabetic group¹⁰.

In this study 85 (64.4%) patients were male and 47 (35.6%) patients were female. Female patients comprised a small part of the present study. Female patients also formed a small proportion in other studies. Otten *et al.*⁷ found 29%, Bartnik *et al.*¹¹ found 33% and Tamita *et al.*¹² found 21% female ACS to have prediabetes in their study. This study also showed that male ACS patients have got more prediabetes than female ACS patients.

Traditional risk factors like smoking, dyslipidemia, hypertension and family history of IHD were more in prediabetic ACS group than that of non-diabetic ACS group. Tamita *et al.* also found majorities of the prediabetic patients were smoker and had dyslipidemia as well as family history of IHD in comparison to non-diabetic patients¹². Otten *et al.* also found hypertension and dyslipidemia to be more in prediabetic group than that of the non-diabetic group⁷. So the findings of the current study are consistent with previous studies.

The complications of ACS were observed in both of the study groups. Prediabetic ACS patients were found to have more in-hospital complications than that of non-diabetic group, though all the parameters for complications did not show the same statistical significance. Heart failure and cardiogenic shock were significantly higher in prediabetic ACS group compared to those in non-diabetic ACS group.

In the present study, significantly higher number of patients developed heart failure in prediabetic group (31.8%) compared to non-diabetic group (11.4%). This finding is nearly consistent with Verges *et al.*¹³ who in their study showed that heart failure was more in prediabetic group (34%) than that of the non-diabetic group (20%). Kanaya *et al.*¹⁴ also found that heart failure in prediabetic group was more (76%) than that of non-diabetic group. This is consistent with the present study. Thus the present study shows that prediabetic ACS patients are more prone to develop heart failure than that of non-diabetic group.

The incidence of cardiogenic shock was observed in the present study. It was found to be significantly higher (20.5%) in prediabetic group than that of non-diabetic group (4.5%). Zeller *et al.* in their study showed that incidence of cardiogenic shock (21%) in prediabetic group was more than that of non-diabetic group (6%)⁸. Otten *et al.* also found that cardiogenic shock in

prediabetic group was significantly higher than that of non-diabetic group⁷. These are consistent with the findings of the present study.

In this study arrhythmias were higher in prediabetic group (9.1%) compared to those in non-diabetic group (5.7%). Bartnik *et al.* reported arrhythmias to be more in prediabetic group than that of non-diabetic group which is consistent with the present study¹¹. Otten *et al.* also found arrhythmias to be higher in prediabetic group than that of non-diabetic group⁷. This finding is also close to the present study.

In the present study recurrent angina occurred only in 4.5% of prediabetic patients. Why recurrent angina occurred only in prediabetic group was unknown. Porter *et al.*¹⁵ found recurrent angina in prediabetic group to be 5.4% which is nearly consistent with the present study.

In conclusion, the results of the present study showed that ACS patients with prediabetes has more adverse outcome than that of non-diabetic ACS patients. Heart failure and cardiogenic shock were found to be significantly higher in prediabetic ACS group than that of non-diabetic ACS group. Thus every ACS patients after admission should be screened for prediabetes, so that they might be provided better care and follow up to prevent adverse outcomes. Multicentred broad based study with large sample size and follow up for longer duration of time is recommended to support the findings of the present study.

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