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EXPLORING THE RISKS AND OUTCOMES OF AMI IN PATIENTS WITH AND WITHOUT DIABETES

General Medicine

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ABSTRACT

Aim: The aim of the present study was to compare complications and mortality in AMI patients with diabetes and without diabetes **Material & methods:** Comparative research was conducted at the Department of General Medicine over a period of 12 months. The study population consisted of adult patients who were hospitalised with Acute myocardial Infarction. The study examined 50 individuals with diabetes acute myocardial infarction (AMI) and 50 individuals with non-diabetic AMI to investigate post-AMI complications and death. **Results:** Group-1 has 50 cases (35 men, 15 females) while group-2 has 50 (40 males, 10 females). Most diabetics and nondiabetics were 45–54 years old. Men and women with diabetes had mean random blood sugar levels of 236.6±94.82 and 246.64±84.26, respectively. Most stable angina patients (64%) were non-diabetic, but unstable angina and MI were diabetic (26% and 18%). A substantial correlation exists between AMI types in diabetic and non-diabetic patients (P<0.001). Overall, 40 (80%) diabetics developed problems. Complications affected 30 (60%), non-diabetics. Pump failure and sinus tachycardia were the most prevalent diabetes complications. Non-diabetics had sinus tachycardia most often, followed by bradycardia. A substantial link exists between diabetes and complications (p<0.05). **Conclusion:** The current investigation found that individuals with diabetes have a considerably higher incidence of post myocardial infarction complications and mortality compared to those without diabetes.

KEYWORDS

Diabetes mellitus, complications, AMI

INTRODUCTION

Myocardial infarction (MI) is a significant global cause of mortality that is increasing due to the ageing population and the adoption of Western lifestyles. Several prospective cohort studies have investigated prognostic variables in patients after myocardial infarction (MI), and it has been seen that the mortality rate rises as time passes following the occurrence of MI. Research conducted in the United States examined the death rates of individuals aged 65 and above. The findings revealed that the mortality rate at the end of 5 years was 51%.[1] In separate research conducted in Taiwan, it was shown that the occurrence of major adverse cardiac events (MACE) rose by 5.9% and 13.8% at 1 and 3 years, respectively. Additionally, the mortality rate increased by 2.0% and 5.2% at 1 and 3 years, respectively.[2] MACE encompasses restenosis, stent thrombosis, recurrence of myocardial infarction (MI), readmission resulting from heart failure (HF), coronary artery bypass surgery, and cardiac mortality.Myocardial infarction (MI) is well recognised as a significant contributor to heart failure (HF) on a worldwide scale.Patients diagnosed with both type 4 and type 5 cardiovascular diseases, as well as those with heart failure, have been shown to have the greatest prevalence of a previous myocardial infarction, with a rate of (37.4%)[6], emphasising the necessity of recognising HF as a significant complication of MI.[7] Based on cohort studies, the rates of readmission linked to heart failure in patients who have had a myocardial infarction (MI) increased by 7.5% and 13.4% at 1 and 3 years, respectively.The Swedish study found that there was a 11.4% rise after 1 year and a 21.8% increase at 5 years.Another study revealed that out of the 1239 individuals who survived a non-fatal myocardial infarction (MI), 29.1% had the development of heart failure (HF) during an average period of 5.6 years of observation.Hydrofluoric acid (HF) has been identified as the most powerful factor that significantly enhances the occurrence and death rate in the later stages following the commencement of myocardial infarction (MI).[10] Diabetes mellitus impacts around 6% of the US population, however it is seen in up to 30% of people who are hospitalised with acute coronary syndromes. It has long been acknowledged that individuals with diabetes have a higher risk of death during the initial phase of a heart attack (myocardial infarction) and a larger likelihood of experiencing health problems in the period after the heart attack.[11,12] Prior to the emergence of contemporary coronary care, the death rate for diabetic individuals experiencing myocardial infarction (MI) was documented to reach up to 40%.The death rate in individuals with diabetes is at least twice as high as in people without diabetes.[13] The significant disparity in outcome was mostly attributed to the presence of more severe coronary artery disease, together with extra cardiovascular risk factors and other end-organ diseases. The current management of acute myocardial infarction, as informed by extensive clinical studies, has significantly enhanced the survival rates of both those without diabetes and those with diabetes. Nevertheless, even with these enhancements, diabetes continues to result in a twofold increase in the rate of death from the disease. The GUSTO-1 angiography substudy report[14] found that there was a twofold increase in the relative risk of 30-day death. This increase remained even after taking into account the characteristics mentioned before. What does the term "diabetic factor" refer to? It is crucial to assess fresh knowledge on this issue within this specific context. The GISSI-3 investigators examined the impact of administering lisinopril within 24 hours of admission on patients with and without diabetes mellitus who had experienced a myocardial infarction (MI).[15] Lisinopril significantly decreased the death rates at both 6 weeks and 6 months in diabetics compared to nondiabetics. The mortality rate at 6 weeks was 30% for diabetics and 5% for nondiabetics, while at 6 months it was 20% for diabetics and 0% for nondiabetics. Moreover, the occurrence of drug-induced negative effects was comparable across the two groups based on the blood pressure and renal function measures utilized in that particular investigation. The findings from this experience, as well as the subgroup analyses of SAVE[16] and TRACE[17], provide strong evidence for using an ACE inhibitor as a component of the treatment plan for diabetic patients who have had a myocardial infarction (MI).

A recent meta-analysis of ACE inhibitor trials in acute MI revealed a modest 6% relative reduction in mortality when the drugs were administered early, regardless of the presence or absence of diabetes mellitus.[18]

Therefore, the objective was to assess the incidence of complications and mortality in patients with acute myocardial infarction (AMI) who had diabetes compared to those who do not have diabetes.

MATERIAL & METHODS

A comparative study was carried out at Department of General Medicine for the duration of 12 months. Study population was adult patients admitted with Acute myocardial Infarction. 50 diabetic AMI and 50 non-diabetic AMI were studied in the study for post AMI

complication and mortality.

Inclusion criteria:
1. Patients with age more than 12 years.
2. Patients with diabetes as cases and non-diabetic patients as control group
3. Patients willing to participate in the study

Exclusion criteria:
1. Patients with age above 12 years
2. Patients having impaired Fasting Glucose [FPG < 126mg/dl. But > 110 mg/dl, PP-PG 140 –200mg/dl]

Methodology

A total of 200 patients with acute myocardial infarction (AMI) were examined, with 100 instances classified as diabetic AMI (Group 1) and the remaining 100 cases classified as nondiabetic AMI (Group 2). The sample is obtained using a simple random method. Individuals who had a previous diagnosis of diabetes or were recently diagnosed with diabetes based on the criteria established by the American Diabetes Association (ADA) in 2018, and who experienced acute myocardial infarction (AMI), were categorised as group 1. Group 2 consisted of individuals with myocardial infarction who had not been previously diagnosed with diabetes or did not fit the criteria established by the American Diabetes Association (ADA).

The data was collected using a pre-validated questionnaire. Participants were enrolled after the fulfilment of the prescribed inclusion and exclusion criteria. A detailed clinical history was documented. The medical history included the duration and treatment of diabetes, as well as the presence of risk factors such as smoking, hypertension, and a family history of ischaemic heart disease. Any past incidences of problems associated with hypertension or diabetes were documented. A thorough clinical assessment was performed. Vital signs, including pulse (to detect irregular rhythm) and blood pressure (to diagnose hypertension or hypotension), were documented. Conventional diagnostic procedures, including blood and urine analysis, were performed. Additionally, measures of fasting blood sugar (FBS), postprandial blood sugar (PPBS), and glycosylated haemoglobin (HbA1c) were taken. Tests were performed to evaluate the lipid profile, renal function, and fundus inspection. The patients were effectively stabilised under medical care.

The recorded consequences included of pump failure (left ventricular failure with or without cardiogenic shock), rhythm irregularities (ventricular or atrial), and co-morbid problems such as stroke. The complications and fatality rates were compared between the two groups in order to ascertain the result.

Statistical Analysis

Data was entered in excel sheet. Data was analysed with SPSS version 22.

RESULTS

Table 1: Distribution of diabetic and non-diabetic patients according to age and sex

Age group (years)	Diabetic		Non- Diabetic		Total
	Male	Female	Male	Female	
35 – 44	3	1	1	1	6
45 – 54	14	3	12	5	34
55 – 64	7	6	17	2	32
65 – 74	8	3	6	1	18
75 and above	3	2	4	1	10
Total	**35**	**15**	**40**	**10**	**100**

Group-1 consists of 50 cases (35 males and 15 females) and group- 2 consists of 50 cases (40 males and 10 females).

Most of the patients in both group diabetic and nondiabetic belonged to age group 45 – 54.

Table 2: Random blood sugar levels according to diabetic status and sex

Groups	Males	Females	Total
Diabetics	236.6±94.82	246.64±84.26	238.6±92.8
Non-diabetics	129.7±64.6	125±44.26	126.64±54.7

The mean random blood sugar in diabetes group in male and female were 236.6±94.82 and 246.64±84.26 respectively.

Table 3: Distribution of patients according to type of CAD

AMI	Diabetic		Non-diabetic	
	N	%	N	%
Stable angina	28	56	32	64
Unstable angina	13	26	11	22
Myocardial infarction	9	18	7	14
Total	50	100	50	100

Maximum number of cases of Stable angina belonged to non-diabetic group (64%) and unstable angina and MI belonged to Diabetic group (26% and 18%) respectively. There was a significant association between types of AMI among the diabetic and the non-diabetic groups (P<0.001).

Table 4: Post MI complications and death in diabetic and non-diabetic patients

Complications	Diabetic			Non-diabetic		
	Total	Recover	Death	Total	Recover	Death
Sinus tachycardia	12	12	0	15	15	0
Pump failure (pulmonary edema/ cardiogenic shock/both)	14	6	8	6	1	5
Bradycardia	8	7	1	3	3	0
Fatal ventricular arrhythmia	2	1	1	4	1	3
Acute VSD/MR	2	1	1	0	0	0
Other stroke	2	1	1	2	0	2
Total	40	28	12	30	20	10

Overall, 40 (80%) diabetics developed problems. Complications affected 30 (60%), non-diabetics. Pump failure and sinus tachycardia were the most prevalent diabetes complications. Non-diabetics had sinus tachycardia most often, followed by bradycardia. A substantial link exists between diabetes and complications (p<0.05).

DISCUSSION

In 2013, there were around 382 million individuals worldwide who had diabetes. It is projected that this number would increase to 592 million by the year 2035. The etiological categorisation of diabetes is now universally recognised. Type 1 and type 2 diabetes are the primary classifications, with type 2 diabetes being the majority (>85%) of the overall prevalence of diabetes. Both types of diabetes can result in many consequences affecting several systems, such as retinopathy, nephropathy, and neuropathy, as well as macrovascular problems such ischaemic heart disease, stroke, and peripheral vascular disease. Diabetes is a significant public health problem due to its early onset of illness, high death rate, shortened lifespan, and substantial economic burden. More than 95% of individuals with diabetes in India have Type-2 diabetes. Because the disease has a gradual and subtle beginning and does not have any noticeable symptoms, it often goes undetected for a long period of time. There is a strong correlation between type-2 diabetes mellitus and obesity, with about 90% of individuals with type-2 diabetes being obese. However, it is important to note that only a small percentage of obese individuals really have diabetes. Dyslipidaemia is present in nearly all people with type-2 diabetes mellitus, and diabetics with extremely high cholesterol levels have a 2-3 times greater risk of acute myocardial infarction (AMI) compared to persons without diabetes.[19] Group-1 has 50 cases, with 35 men and 15 females. Group-2 also comprises 50 cases, with 40 males and 10 females. The majority of patients in both the diabetes and nondiabetic groups were in the age range of 45-54. Malmberg et al[20] saw similar findings and highlighted the frequent involvement of females, a pattern also observed in our investigation. The average random blood sugar levels in the diabetes group for males and females were 236.6±94.82 and 246.64±84.26, respectively. The non-diabetic group had the highest proportion of instances of Stable angina (64%), whereas the Diabetic group had higher proportions of unstable angina (26%) and MI (18%). A strong correlation was seen between the kinds of acute myocardial infarction (AMI) in both the diabetes and non-diabetic groups (P<0.001). Hong et al[21] found that diabetes individuals had a higher prevalence of acute coronary syndrome, namely unstable angina and myocardial infarction, compared to non-diabetic individuals.

Out of the total diabetic patients, 40 individuals (80%) had problems. Complications were detected in 30 out of 50 non-diabetic individuals, with a prevalence of 60%. The most frequent complication observed in diabetic patients was pump failure, followed by sinus tachycardia.

Sinus tachycardia was the most often seen condition among the individuals without diabetes, followed by bradycardia. A strong correlation was seen between diabetes and complications ($p<0.05$). The FAST-MI registry, which focusses on acute ST elevation or non-ST-elevation myocardial infarction (AMI), revealed that 37.5% of AMI patients experienced heart failure (HF). These patients, when compared to AMI patients without HF, had a far higher likelihood of mortality during their initial hospital stay (12.2% vs. 3.0%).[22]

In the Multiple Risk Factor Intervention Trial (MRFIT), the absolute risk of cardiovascular death was three times higher in men with diabetes compared to non-diabetic men (160 vs 53 cardiovascular deaths per 10,000 person-years). This difference remained significant even after accounting for age, race, income, cholesterol levels, blood pressure, and smoking.[23] The 20-year follow-up of the Framingham Study revealed that individuals with diabetes not only had a greater risk of death during their initial event, but also experienced a higher occurrence of subsequent heart attacks and heart failure during the acute and post-heart attack periods.[24] The FINMONICA Study examined mortality rates among diabetes individuals, specifically focussing on deaths occurring outside of the hospital as well as fatalities during the first hospitalization. The study revealed that diabetic women experience greater mortality rates during their hospital stay and within one year, but diabetic males had a higher total mortality rate mostly owing to deaths occurring outside of the hospital.[25]

CONCLUSION

In the current investigation, the researchers came to the conclusion that diabetics had a considerably higher risk of post-myocardial infarction complications and mortality compared to non-diabetics.

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