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ORIGINAL ARTICLE

Undiagnosed Diabetes Mellitus in Acute Coronary Syndrome (ACS) Patients

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ABSTRACT

Introduction: Diabetes mellitus is a significant precursor of CAD. Patients hospitalised for suspected myocardial infarction had type 2 diabetes at higher rates than the general population, increasing the likelihood of cardiovascular complications. Hospitalized individuals with CAD have a worse prognosis if they also have diabetes mellitus.

Objective: With this study, we want to quantify the prevalence of unrecognised diabetes mellitus among Acute Coronary Syndrome patients at a tertiary care hospital in Lahore.

Study design: Cross sectional study

Setting: Department of Cardiology, Bahria Town Hospital, Lahore

Duration: Six months (09-2018 to 03-2019)

Data collection procedure: One hundred forty patients who fulfilled the study's inclusion and exclusion criteria were included. Using a standardised questionnaire, we were able to collect information such as age, gender, and type of ACS (STEMI, Non-STEMI, or unstable angina). Diabetes was diagnosed by measuring fasting blood sugar and haemoglobin A1c in a serum sample of 3 cc. It was noted that untreated diabetes mellitus was present.

Results: There were 110(78.6%) males and 30(21.4%) females in our study. The mean age of patients was 57.08±12.72 years. The mean height was 171.95±14.37 cm, mean weight was 80.70±11.23 kg and mean BMI was 26.89±3.64. There were 63(45%) patients with family history of diabetes. There were 60(42.9%) patients with Non-STEMI, 52(37.1%) with STEMI and 28(20%) with unstable angina. The mean HbA1c of the patients was 6.11±0.86. There were 10(7.1%) patients with undiagnosed Diabetes mellitus.

Conclusion: 7 percent of ACS patients have diabetes mellitus that has not been diagnosed.

Keywords: Undiagnosed Diabetes Mellitus, Acute Coronary Syndrome, type 2 diabetes, family history, STEMI,

INTRODUCTION

Diabetes mellitus is a significant precursor of CAD. Numerous studies have shown that type 2 diabetes is a major contributor to cardiovascular morbidity and death, responsible for 20% of all patients treated for suspected myocardial infarction [1]. Patients hospitalised due to CAD [2] have a poorer prognosis if they also have diabetes mellitus. A rising mortality rate over time has been linked to deadly re-infarctions and congestive heart failure[1]. When a diabetic patient has a history of myocardial infarction, their risk is equivalent to that of a non-diabetic patient with the same history[3].

Pakistan is one of the countries whose citizens are helping to fuel the worldwide diabetes pandemic [4]. In 2014, 422 million persons worldwide were diagnosed with diabetes, according to the World Health Organization [5]. Over 7 million Pakistanis were diagnosed with diabetes in 2015, according to data from the country's National Diabetes Action Plan[6]. Acute coronary syndrome (ACS) encompasses a wide variety of cardiac conditions, including ST-segment elevation myocardial infarction (STEMI), non-ST-segment elevation myocardial infarction (NSTEMI), and unstable angina. [7]

Myocardial ischemia is often brought on by the development of atherosclerotic plaques[7]. As of now, we know that diabetes is a major contributor to atherosclerosis [8]. It is therefore hypothesised that decreasing diabetes rates through early identification and management will reduce the prevalence of ACS. Numerous individuals presenting with ACS have their diabetes identified for the first time at this point. Previous investigations have determined the prevalence of undiagnosed diabetic mellitus in ACS patients [9, 10], and the results have been contradictory. Since diabetes is a major risk factor for ACS and there is a lack of local data on the prevalence of undiagnosed diabetes in patients with ACS, I decided to conduct this study to learn more about the incidence of undiagnosed diabetes mellitus in patients presenting with ACS at Baharia Town Hospital in Lahore. Diagnosing and treating diabetes in patients experiencing a STEMI, NSTEMI, or unstable angina as soon as possible has been shown to minimise mortality, shorten hospital stays, and lower healthcare costs.

MATERIALS AND METHODS

Over the course of nine months (September 2018–March 2019), researchers from Bahria Hospital Lahore gathered a total of 140 samples for this cross-sectional investigation. 140 patients were chosen as the study's sample size after determining its needs based on the projected prevalence of undiagnosed diabetes mellitus (10.1% at 95% confidence level, 5% margin of error). Patients with acute coronary syndrome at a tertiary care hospital in Lahore were analysed to ascertain the prevalence of undiagnosed diabetes mellitus.

Any patient not previous known to have diabetes (type II) BSR > 200 mg/dl before their presentation of ACS diagnosed with Glycosylated hemoglobin (HbA1C) > 6.5 % at presentation was labeled as having Undiagnosed Diabetes Mellitus. As per operational definition, patients of both genders of age 25 to 80 years old admitted with ACS in Bahria Hospital either through emergency or OPD were included in the study. Exclusion criteria for this study was:

1. Type 2 diabetics whose diabetes is related to another condition. Steroid/medication-induced, Hemochromatosis, Chronic Pancreatitis, Polycystic Ovary Syndrome (PCOS), and Cushing's syndrome are all examples.
2. Patients with uncontrolled diabetes already on medications or diet control.
3. ACS does not include patients with secondary causes raised troponin, including renal failure (cr 1.3 mg/dl), pulmonary embolism, severe pulmonary hypertension, and sepsis (TLC > 11000/ mm2 and < 40000/mm2).

After approval of ethical review committee, a total of 140 patients meeting the inclusion and exclusion criteria were included in the study and an informed consent was taken as per Declaration of Helsinki. With detailed relevant history, relevant data according to the predesigned questionnaire including age, gender, ACS

category (STEMI, Non-STEMI or unstable angina) was recorded. For diagnosis of diabetes, 3 cc serum blood sample was taken for fasting blood sugar and HbA1c. Undiagnosed diabetes mellitus was recorded (as per operational definition). Data was analyzed in SPSS 20.0. We calculated frequency of undiagnosed diabetes mellitus in patients with ACS. Mean and Standard Deviation was calculated for numerical variables like age, HbA1C while qualitative variables like gender, presence of ACS according to its sub-types was presented as percentage and frequency. Effect modifiers like age, gender, weight, BMI and family history of diabetes mellitus, type of CAD was stratified and post-stratification chi-square test was applied. P-value < 0.05 was considered significant.

RESULTS

There were 110 males (78.6%) and 30 females (21.4%) in our sample. The ages of the patients ranged from 25 to 80, with a mean age of 57 12.7%. In this sample, patients ranged in height from 76 to 195 centimetres on average, with a mean height of 171.9514.37 centimetres. The patients' weight ranged from 58 to 125 kilogrammes, with an average of 80.7011.23 kg. Patients' body mass indexes ranged from 19 to 43, with a mean of 26.89 3.64. Patients with a family history of diabetes numbered 63 (45%), whereas those without such a history numbered 77 (55%). We found that 42.9% of our patients were suffering from unstable angina, 37.1% from STEMI, and 42.9% with non-ST elevation MI.

The patients' HbA1c ranged from 5 to 13.9, with a mean value of 6.110.86. Only 10 people (7.4%) had diabetes that hadn't been properly diagnosed, while the other 130 (92.9%) were in the clear. Undiagnosed diabetes mellitus was not associated with either age (p=0.53), gender (p=0.49), or CAD (p=0.59) in a statistically significant way. Undiagnosed diabetes mellitus was associated with a higher risk of having a family history of diabetes (p=0.003) and a higher body mass index (p=0.045).

Table 1: showing the details of the CAD patients diagnosed with diabetes (n=140)

Variable	Groups	Undiagnosed DM		Significance
		Yes	No	
Age	25-44	1(4.3%)	22(95.7%)	Chi-square= 1.27, p-value= 0.53
	45-64	7(9.5%)	67(90.5%)	
	65-84	2(4.7%)	41(95.3%)	
Gender	Male	7(6.4%)	103(93.6%)	Chi-square= 0.47 p-value= 0.49
	Female	3(10.0%)	27(90.0%)	
BMI	19-27	6(6.8%)	82(93.2%)	Chi-square= 5.65 p-value= 0.045
	28-36	3(6.0%)	47(94.0%)	
	37-45	1(50.0%)	1(50.0%)	
Family History of Diabetes	Yes	9(14.3%)	54(85.7%)	Chi-square= 8.81 p-value= 0.003
	No	1(1.3%)	76(98.7%)	
Types of Coronary Artery Disease	Non-STEMI	4(6.7%)	56(93.3%)	Chi-square= 1.03 p-value= 0.59
	STEMI	5(9.6%)	47(90.4%)	
	Unstable Angina	1(3.6%)	27(96.4%)	

DISCUSSION

Diabetes is considered a vascular illness since it affects the blood vessels throughout the body, both the little ones and the larger ones[12]. Macrovascular complications of diabetes develop years before the disease becomes clinically apparent. There is independent evidence that hyperglycemia raises the risk of cardiovascular disease in people. [13] More than 7% HbA1c is connected with a large increase in the risk of cardiac events and mortality. Surprisingly, the association between HbA1c levels and cardiovascular morbidity is already present before the diagnosis of clinical diabetes. [14] Individuals with diabetes have an increased risk of developing CAD and have more advanced atherosclerosis. [15] Recent studies have shown what has been known for some time: that those with diabetes are at increased risk for developing CAD. [16]

Previous studies have shown that persons with coronary artery disease who also have diabetes mellitus are more likely to suffer from cardiovascular events in the future. [17] Although preventing diabetes mellitus with dietary changes, medication, and bariatric surgery has been demonstrated, it is yet unknown if early detection and aggressive treatment of glucometabolic state improves cardiovascular outcomes. [18]

Recent studies have shown that strict glycemic control produces either no benefits or worsens poor cardiovascular outcomes in diverse diabetic groups. [19] Undiagnosed diabetes mellitus was much more common in the high-risk population studied by Balakrishnan et al. [10] (2015) than in the general population. Their results showed a 4.5-fold greater incidence of previously undiscovered diabetes mellitus (8.3 percent vs. 1.8 percent) in comparison to unselected NHANES survey groups, and our results are quite similar to their results; the prevalence of undiagnosed diabetes mellitus in our research was 7.1%. [21]

Rare research has examined the frequency in people who have never had diabetes but are having elective percutaneous heart intervention. Oral glucose tolerance testing was utilised in two small European studies; the results revealed that about 20% of the subjects had undiagnosed diabetes mellitus. Although we used HbA1c rather than the oral glucose tolerance test to diagnose diabetes, this prevalence is significantly higher than in our study. [22] Our findings of a 7.1% prevalence of undetected diabetes mellitus are quite similar to those of a research that evaluated A1c values in patients without known diabetes mellitus having elective percutaneous coronary intervention and found that one-third of patients had levels more than or equal to 6%. [24]

These patients had considerably increased incidence of severe adverse cardiac events, target vessel revascularization, and cardiovascular death after a year of follow-up.[24] According to Ashraf et al 2016[25], a total of 693 ACS patients were involved in their research, with 102 (14.7 percent) having undiagnosed (first time found) diabetes. However, these findings are greater than the findings of our study, which found a prevalence of undiagnosed diabetes of 7.1 percent. While 40.5% of patients in Balakrishnan et al's research had an A1c of 6% or above, we found an average of 6.1[10]. 86 (range: 5.0-13.9.10) In our study, 9.6 percent of patients with diabetes mellitus had a STEMI, which is very close to the 8.5 percent reported by Roger et al. [26] However, a study by Giraldez et al. showed that only 3.6 percent of patients with undiagnosed diabetes had a non-ST-elevation myocardial infarction, which is significantly lower than our findings. [27] In spite of the need for more study, it stands to reason that if an aberrant glucometabolic condition is diagnosed, the patient's lifestyle will be modified, and maybe medication will be prescribed, in an effort to reduce the patient's risk of developing cardiovascular disease.

CONCLUSION

In this study, 7.1% of the participants with ACS also had undetected diabetes mellitus. Due to the high prevalence of people who have both ACS and diabetes mellitus but have not yet been identified, routine screening is essential. Micro- and macro-vascular problems from diabetes have been demonstrated to be lessened with therapy if diagnosed early.

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