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Research Article

INCREASE IN HbA1C LEVEL; PROGNOSTIC INDICATOR OF INCREASED 30-DAY MORTALITY IN PATIENTS WITH ST SEGMENT ELEVATION IN MYOCARDIAL INFARCTION

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Abstract:

Aim: To determine the relationship between glycan hemoglobin and short-term mortality after myocardial infarction.

Study design: Prospective case-control type of study

Place and duration: In the Medicine Unit I and Cardiology department of Nishter Hospital Multan for one year duration from January 2019 to January 2020.

Patients and methods: Initially, 955 patients with myocardial infarction (MI) were included in the study. Approximately 201 patients withdrew from the study due to premature deaths ($n = 17$) falling under impaired glucose tolerance during the next oral glucose tolerance test (OGTT) ($n = 67$), with dyslipidemia during the studies ($n = 20$) or due to other comorbidities such as chronic renal failure ($n = 34$), stroke ($n = 42$) or previous history of MI ($n = 21$). The remaining 754 patients were divided into two groups: diabetic and non-diabetics, depending on the results of the oral glucose tolerance test. HbA1c glycosylated hemoglobin was measured in all patients. After 30 days, these patients were followed and the number of deaths estimated. Data were analyzed using SPSS version 17.0.

Results: In non-diabetic patients, an increase in HbA1c ($> 5.5\%$) resulted in a significant increase in deaths, while HbA1c in the diabetic group was fatal within a month of acute myocardial infarction.

Conclusion: High levels of HbA1c in diabetic and non-diabetic patients increase the risk of short-term mortality after acute myocardial infarction.

Key words: glycan hemoglobin, oral glucose tolerance test.

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INTRODUCTION:

Diabetes is a chronic condition of various etiologies and pathogenesis; it affects around 220 million people worldwide¹⁻². It carries significant morbidity and mortality due to long-term complications. Glycan hemoglobin has been the main measure of glycemic control over the past two decades in diabetic patients³⁻⁴. Glycan hemoglobin is formed as a result of non-enzymatic glycosylation of the N-terminus of the hemoglobin beta chain⁵. Glycated Hb levels are more associated with the risk of chronic complications than single or episodic random glucose levels. A1C glycosylated hemoglobin (HbA1C) reflects average blood sugar over 2 months and is minimally affected by acute hyperglycemia, which is often seen in myocardial infarction (MI)⁶⁻⁷. In 2009, the International Committee of Experts recommended the use of HbA1C for diabetes > 6.5% for threshold diabetes⁸. The American Diabetes Association (ADA) suggested this recommendation as the "Standard for Diabetes Medical Care 2010". Prospective studies indicate that a high normal HbA1C level of 5.5% to 6.5% poses very high risk for subsequent development of diabetes, and the risk increases substantially as the values increase⁸⁻⁹. Glycosylated hemoglobin (HbA1C) level on admission is also a prognostic factor for mortality in patients with and without diabetes after myocardial infarction

METHODOLOGY:

This prospective case-control study held at the Medicine Unit I and Cardiology department of Nishter Hospital Multan for one year duration from January 2019 to January 2020. Initially, 955 patients with myocardial infarction (MI) were included in the study. Diagnosis of myocardial infarction was based on the definition of the American College of

Cardiology and the European Society of Cardiology, which perceived myocardial infarction as a typical increase in troponin T or I or CK-MB concentration above the 99th percentile norm with at least one of the following; ischemic symptoms, development of pathological ECG Q waves, ischemic ECG changes (ST segment collapse or elevation) or coronary artery intervention, for example PCI. All patients with one or more major risk factors for coronary artery disease (hypertension, smoking, dyslipidemia, BMI > 30 kg / m²), except diabetes, were excluded from the study. Patients were divided into diabetes or non-diabetic subjects according to WHO criteria for the diagnosis of diabetes. About 201 patients withdrew from the study due to premature deaths (n = 17), fell into the impaired glucose tolerance range in the next oral glucose tolerance test (OGTT) (n = 67) and in studies (n = 20) or chronic renal failure (n = 34) due to other comorbidities such as (n = 42) or history of myocardial infarction (n = 21). The remaining 754 patients were divided into two groups with and without diabetes based on the results of the oral glucose tolerance test. HbA1C glycosylated hemoglobin was measured in all patients. After 30 days, these patients were followed and the number of deaths estimated. Data were analyzed using the Social Sciences Statistical Package (SPSS) version 18.0. Mortality rates and association with HbA1C levels were compared in two groups.

RESULTS:

Of the 754 patients ultimately included in the study, 46.7% (n = 352) were diabetic. Baseline patient characteristics are shown in Table 1. During follow-up (thirty days after acute myocardial infarction), 20% of deaths occurred in the diabetic group compared to 11.2% in the non-diabetic population (p value <0.001, odds ratio = 2, 04).

Table 1: Baseline characteristics of the patients Mean age

Variable	=n
Male	51±09
Female	54±07
Male	512
Female	242
Diabetics	
HbA1C 6.5-8	172
HbA1C > 8	180
Non diabetics	
HbA1C < 5.5	198
HbA1C 5.5-6.5	204
Blood pressure (mmHg)	
Systolic	117±13
Diastolic	80±12
Mean BMI	26.4±3.2
MI	
Anterior	264
Lateral	136
Inferior	317
Combination	37

In non-diabetic patients, an increase in HbA1C (> 5.5%) resulted in a significantly higher number of deaths (33 versus 12, p value = 0.001, odds ratio = 2.99) in the diabetic group, although higher HbA1C levels were associated with increased deaths (odds ratio = 1.66) within one month after acute myocardial infarction, but statistically this difference was not significant (Table 2).

Table 2: Mortality statistics at 30 days follow up

	Non-diabetics			Diabetics		
	HbA1C < 5.5	HbA1C 5.5-6.5	p Value	HbA1C 6.5-8	HbA1C > 8	p Value
Dead	12	33	0.001	28	44	> 0.05
Alive	186	171	-	144	136	-
Total	198	204	-	172	180	-

DISCUSSION:

Many previous studies have shown that high intake of fasting or fasting glucose increases the risk of death and hospital complications in patients with acute coronary syndrome (ACS) and coronary artery bypass grafting¹⁰⁻¹¹. However, studies determining the relationship between HbA1C levels and coronary artery disease complications have shown conflicting results, including later mortality. Diabetic patients are 11% more likely to die than ischemic heart disease (UKPDS 23)¹². People with HbA1C > 8% are at an increased risk of 150% death from heart disease. As mentioned above, HbA1C levels (<6.5%) below the diagnosis threshold for diabetes are associated with a very high risk of coronary artery disease: such patients should clearly receive effective preventive treatment¹³⁻¹⁴. In the study of E. Selvin et al. It suggests that after 15 years of observation of over 11,000 participants, HbA1C values in the normal range without diabetes can identify people at high risk for CAD, stroke and death. Our study showed that non-diabetic HbA1C levels in the 5.5-6.5% range were associated with a significant increase in deaths after acute myocardial infarction. However, in patients who had previous

diabetes, higher HbA1C levels were increased in risk of death (probability coefficient = 1.66), but not statistically significant (p-value > 0.05)¹⁵.

CONCLUSION:

High levels of HbA1C in diabetic and non-diabetic patients increase the risk of short-term mortality after acute myocardial infarction.

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