

## Value of Admission HbA1c Level in Non-diabetic Patients With Unstable Angina

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### Abstract

**Introduction:** There have been incompatible evidences about the prognostic value of HbA1c on the adverse outcomes in acute coronary syndrome. Also, these data are so limited in nondiabetic patients with unstable angina.

**Methods:** In this cross-sectional study, HbA1c level of 231 nondiabetic patients admitted with unstable angina, was measured using high performance liquid affinity chromatography (HPLC) at admission. Then transthoracic echocardiography (TTE) was performed for evaluation of ejection fraction (EF) using Simpson method.

**Results:** Our data revealed that HbA1c was significantly higher in patients with  $EF \leq 50\%$  in comparison with  $EF > 50\%$  group ( $P$  value=0.01).

**Conclusions:** HbA1c may be a helpful prognostic marker in nondiabetic patients admitted in emergency department with diagnosis of unstable angina.

## INTRODUCTION

Higher level of Glycated hemoglobin A1c (HbA1c) as a marker of chronic glucose dysregulation and accelerated atherosclerosis has been shown to be a prognostic factor in cardiovascular disease and congestive heart failure. Moreover, HbA1c has been suggested as a marker of adverse outcomes in the setting of acute coronary syndromes [1-5]. Stress induced hyperglycemia even in non-diabetics, is related with enhanced activation of stress responsive kinases and initiation of apoptosis and cardiac cell necrosis, which sequentially results in systolic and diastolic dysfunction [6, 7].

Although an association between HbA1c level and adverse outcomes has been explained in diabetic patients with acute coronary syndromes, there are limited data in nondiabetic patients with unstable angina [8].

Therefore, the primary objective of this study was to determine the association of HbA1c levels at admission and ejection fraction (EF) in nondiabetic patients with unstable angina.

## METHODS

This was a cross-sectional study conducted from April 2013 to March 2014 on patients admitted in coronary chest pain unit of Modarres hospital. Those nondiabetic patients diagnosed with unstable angina were selected. The exclusion criteria were documented diabetes mellitus, ST elevation

MI (STEMI), None-ST elevation MI (NSTEMI), HbA1c  $\geq 6.5\%$  or Lab test indicative of diabetes mellitus, history of definite MI, history of congestive heart failure and history of chronic kidney disease.

For each patient with diagnosis of unstable angina [9], HbA1c level was determined using high performance liquid affinity chromatography (HPLC) at admission. Then transthoracic echocardiography (TTE) was performed to evaluate EF using the Simpson method. Finally, patients were divided into two groups including  $EF > 50\%$  and  $EF \leq 50\%$ . The Institutional Review Board approved the study protocol and patients provided informed written consent. Statistical analyses were performed by SPSS statistical software (version 16). Independent sample T-test was used for quantitative studies.  $P$  value  $< 0.05$  was considered statistically significant.

## RESULTS

In total, 231 patients including 122 males and 109 females, with diagnosis of unstable angina entered the study. Mean age of patients was  $57.1 \pm 4.5$  years. 130 patients had  $EF \leq 50\%$  and 101 patients  $EF > 50\%$ . The mean level of HbA1c was  $5.1\% \pm 0.43\%$  for all patients. Mean level of HbA1c was  $5.9\% \pm 0.51\%$  for  $EF \leq 50\%$  group and  $4.2\% \pm 0.37\%$  for  $EF > 50\%$  group. Data analysis revealed that HbA1c was significantly higher in patients with  $EF \leq 50\%$  in comparison with  $EF > 50\%$  group ( $P$  value = 0.01). Table 1 shows demographic and biochemical data of the two groups.

|  | EF ≤ 50% group, N = 122 | EF > 50% group, N = 109 |
|--|-------------------------|-------------------------|
| <b>Table 1.</b> Demographic and Biochemical Data of the Two Groups of Non-diabetic Patients With Unstable Angina Including EF ≤ 50% Group and EF > 50% Group. HbA1c Was Significantly Higher in Patients With EF ≤ 50% in Comparison With EF > 50% Group |                         |                         |
| <b>Age</b>   | 59.2 ± 3.3              | 55 ± 5.8                |
| <b>Gender</b>  |                         |                         |
| Male   | 63 (51.6%)              | 59 (54.1%)              |
| Female   | 59 (48.4%)              | 50 (45.9%)              |
| <b>HbA1c level, %</b>  | 5.9 ± 0.51              | 4.2 ± 0.37              |

Data in table are presented as Mean ± SD or No. (%)

## DISCUSSION

The key finding of the current study was that HbA1c level at admission is considerably related with reduced ejection fraction in diagnosed nondiabetic patients with unstable angina. Previous studies showed that enhanced HbA1c is related with higher cardiovascular risk in patients with and without diabetes [8, 10].

Another study on 50 patients with acute coronary syndrome including unstable angina, NSTEMI and STEMI determined that HbA1c at admission is a strong predictor of LV systolic dysfunction as a main adverse event of acute coronary syndrome in patients not known to be diabetics [11].

Measurement of glycated forms of hemoglobin presents a trustworthy reflection of the level of general glucometabolic status in the prior 8–12 weeks. It can be considered as an indicator for diabetic control. There have been inconsistent evidences about the prognostic value of HbA1c on adverse outcomes in acute coronary syndrome [3-5].

In a study performed in Asian Indians with normal glucose tolerance, a strong correlation of HbA1c and cardiovascular risk factors was established. Normal glucose tolerance patients with three or more metabolic abnormalities had the highest HbA1c levels and an HbA1c cut off point of ≥ 6.5% was found to be effective in predicting both metabolic syndrome and coronary artery disease [12, 13].

Our study focused only on patients with unstable angina and those with STEMI and NSTEMI were excluded. The study results emphasized on relation between HbA1c level as a marker of accelerated atherosclerosis and reduced EF on TTE in nondiabetic unstable angina patients. Moreover, another investigation showed HbA1c level as a predictor of fatal and nonfatal cardiovascular events in nondiabetic peritoneal dialysis patients [14].

On the other hand, one study suggested that HbA1c levels before admission are not related with short-term cardiovascular outcome in diabetic patients admitted with acute coronary syndrome [15]. This study can serve as a trigger for future investigations evaluating association of HbA1c and adverse outcomes in nondiabetic patients with unstable angina and developing new prognostic algorithm and cut off points for HbA1c in diabetic and nondiabetic patients with unstable angina.

Our study showed that HbA1c in unstable angina was considerably higher in nondiabetic patients with EF ≤ 50% in comparison with EF > 50% group. This finding emphasizes this point that HbA1c may be a helpful prognostic marker in nondiabetic patients admitted in emergency departments

with unstable angina. Nevertheless, detailed data about the prognostic role of HbA1c is to somehow controversial, and this study with such a relatively small size cannot clarify all the remaining doubts.

## ACKNOWLEDGMENTS

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## CONFLICT OF INTEREST

Authors declare that they have no conflict of interest.

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