ORIGINAL ARTICLE

Frequency of stress Hyperglycemia for in-hospital mortality in Acute Coronary Syndrome

MUHAMMAD AJMAL MALIK[1], SH. KHURRAM SALAM SEHGAL[2], MUNEER AHMAD SIDDIQUEI[3]

ABSTRACT

Aim: To find out the frequency of stress hyperglycemia in patients of acute coronary syndrome and its association with in-hospital mortality.

Methods: This study was conducted at Department of Cardiology Nishter Hospital Multan from March 2015 to August 2015. Total 100 patient of acute coronary syndrome either male or female with age from 40-70 years were selected. Serum glucose level at the time of admission and in-hospital mortality rate was recorded in pre-designed proforma.

Results: Mean age of the patients was 59±8 years. Total 39(39%) patients were found with stress hyperglycemia at the time of admission and in-hospital mortality rate was 12(12%). Statistically significant (P = 0.056) association of in-hospital mortality with stress hyperglycemia was found

Conclusion: Findings of this study revealed that marked number of patients of ACS found with stress hyperglycemia and in-hospital mortality was significantly associated with stress hyperglycemia.

Keywords: Stress hyperglycemia, acute coronary syndrome, Coronary heart disease

INTRODUCTION

Acute coronary syndrome (ACS) refers to acute myocardial ischaemia caused by atherosclerotic coronary disease and includes ST-elevation myocardial infarction (STEMI), non ST-elevation MI (NSTEMI), and unstable angina (UA)[1].

Globally, Coronary heart disease (CHD) is the most common cause of mortality[2]. In America, it is the most common cause of mortality among the both male and female[3]. In the year 2012, 7.4 million deaths was occurred due ischemic heart disease (IHD)[3]. ACS is one of the major causes of death and burden on health system[4,5]. CAD is the second most common cause of death in Pakistan and contributing to about 11% of all deaths[6]. Hyperglycemia at the time of admission in patients of ACS. In diabetics and non-diabetics, ACS is a very powerful predictor of survival of patients and increased risk of in-hospital complications[6,7].

In literature, many studies have established that hyperglycemia at the time of admission is very common in patients of ACS and is a risk factor for in-hospital complications and mortality[8,9]. In patients of ACS, the prevalence of hyperglycemia at the time of admission ranges from 25%-50%[10.]

A study is planned to find out the frequency of stress hyperglycemia in patient of acute coronary syndrome and its association with in-hospital mortality. Results of this study may guide us for the better management of cases of ACS and to reduce the rate of mortality and morbidity related to it.

----
[1]Associate Professor Cardiology, Nishter Hospital Multan
[2]Assistant Professor Biochemistry, Sheikh Zayed Medical College/Hospital, Rahim Yar Khan
[3]SMO Cardiology, B.V. Hospital, Bahawalpur
Correspondence to Dr. Muhammad Ajmal Malik, Email: drmajmalmalik@gmail.com

RESEARCH METHODOLOGY

This study was conducted at Department of Cardiology Nishter Hospital Multan. Before commencing the study, an approval was taken from the review committee of institution and written informed consent was also taken from every patient. Total 100 patient of acute coronary syndrome either male or female with age from 40-70 years were selected. Demographic profile of all the selected patients was noted on pre-designed proforma.

Patient having glucose level ≥ 140mg/dl at the time of admission was labelled as patient of stress hyperglycemia. At the time of admission of patients with ACS, blood sample was taken and send to laboratory for blood glucose levels. Findings of laboratory results were noted in term of stress hyperglycemia (Yes/No) and during the hospital stay, fate of the patients was also noted.

All the collected data was analyzed by using SPSS version 18. Mean and SD was calculated for age and frequencies were calculated for stress hyperglycemia (Yes/No), in-hospital mortality (Yes/No) and gender. Stratification was done in relation to in-hospital mortality. Chi-square test was used as test of association. P. value ≤5% was considered as statistically significant.

RESULTS

Total 100 patients ACS were selected for the study. Mean age of the patients was 59±8 years. Total 39(39%) patients were found with stress hyperglycemia at the time of admission (Fig. 1). Among the 100 patients of ACS, mortality rate as 12(12%) (Fig. 2). Stratification of the patients was done for in-hospital mortality. During the study period, 12(12%) patients were expired, of which 8(66.67%)

patients had stress hyperglycemia at the time of admission. Out of 88(88%) alive pts, stress hyperglycemia was found in 31(35.23%) patients. Statistically significant (P=0.056) association of in-hospital mortality with stress hyperglycemia was found (Table 1).
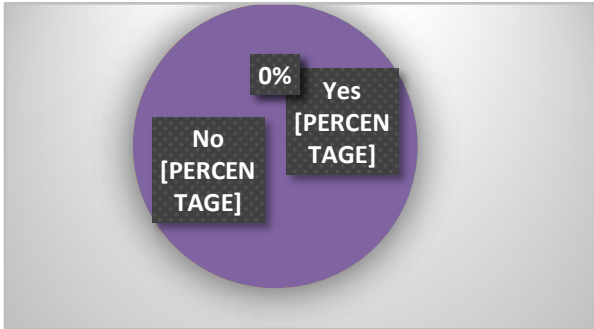
Fig. 1: Frequency of stress hyperglycemia (n = 100)

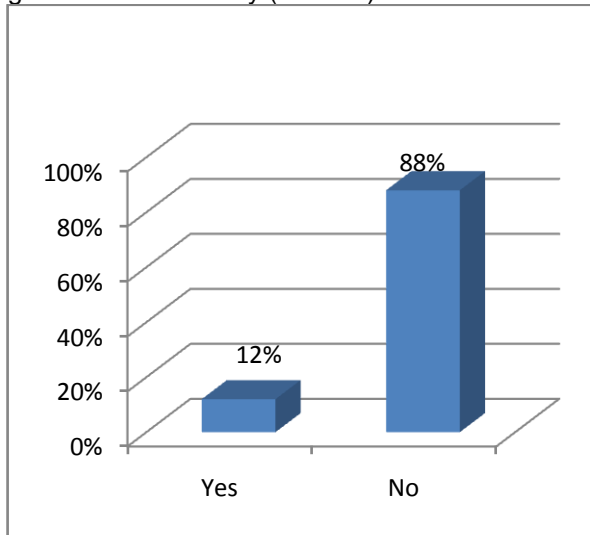Fig. 2: Rate of mortality (n = 100)

Table 1: Association of in-hospital mortality with stress hyperglycemia (n = 100)

In hospital mortality	Stress Hyperglycemia		Total
	Yes	No	
Yes	8(66.67%)	4(33.33%)	12(12%)
No	31(35.23%)	57(63.64%)	88(88%)

P value: 0.056

DISCUSSION

Several studies have shown that blood glucose levels predict the outcome of patients with ACS.[11] Most of these studies relied on the blood glucose level at first admission as a predictor of outcome, whereas others used fasting blood glucose or average glucose levels during the admission period. However, there is no well accepted definition of hyperglycemia as different studies used different glucose levels to define hyperglycemia in this setting[12].

Several studies have suggested that blood glucose levels between 110mg/dL and ≥200mg/dL are associated with adverse outcomes[13]. In the American Heart Association Scientific Statement on Hyperglycemia and Acute Coronary Syndrome, hyperglycemia was defined as a blood glucose level >140mg/dL at any time during hospitalization[14]. However, the relationship between glycemic status and the outcome may vary depending on the diabetic status of the patient. In non-diabetic patients, the mortality rate increases when blood glucose >120mg/dL, while in diabetic patients, a blood glucose>200mg/dL is associated with a poor outcome[14].

In present study, mean age of the patients ACS was 59±8 years. Bhalli et al[15] and Mansour et al[16] also reported comparable mean age to our study[16]. Numerous studies have indicated that stress hyperglycemia (SH) should be a common marker in patients with ACS and is an important risk factor for intrahospital complications[17]. Although the exact cutoff point for SH has not been defined to date, its prevalence in epidemiological studies varies from 25-50% in cases of ACS at the time of admission[18]. In our study stress hyperglycemia was found in 39% patients. In one study by Modenesi et al[19] stress hyperglycemia was noted in 26.4% patients which is lower than our findings. In a study by Marfella et al[20] stress hyperglycemia was observed in 29% patients. Nordin et al[21] in a retrospective analysis of patients admitted with ACS, observed 38% prevalence of SH.

Several studies demonstrate an association between hyperglycemia and death in populations with ACS.In the study by Mehta et al, patients with AMI with ST-segment elevation had a mortality rate of 6.6% within the first 30 days in the control group, whereas in the group with SH, the mortality rate was 14%[22]. In the study by Cheung et al, mortality was significantly higher in the group with average blood glucose levels greater than or equal to 144 mg/dL[23].

Suleiman et al reported correlation between higher rate of mortality and serum glucose level at the time of admission in patients with AMI.[24]Svensson et al., also reported that patients with serum glucose level >120mg/dl had 46% higher rate of death as compared to those patients who had serum glucose level from 56-119mg/dl[25].

The differential impact of SH on the outcome of patients with ACS has been assessed by several researchers. Specifically, SH appears to be a strong indicator of adverse effects. Although the pathophysiological mechanisms are not yet fully understood, there are several possible explanations. It is possible that a greater degree of stress is necessary to produce a similar degree of hyperglycemia in patients without DM than in those with DM[26].

The benefits of strict control of blood sugar levels in critical patients have been demonstrated and include reduced rates of organ dysfunction and mortality with the maintenance of blood glucose levels between 80 and 110mg/dL instead of the old target, which was between 180 and 200mg/dL. The benefits seem to be related not only to lower blood glucose levels but also to the anti-inflammatory effects of insulin, which reduce the production of substances related to oxidative stress and lower glucotoxicity[27].

CONCLUSION

Findings of this study revealed that marked number of patients of ACS found with stress hyperglycemia and in-hospital mortality was significantly associated with stress hyperglycemia.

REFERENCES

1. Kumar A, Cannon CP. Acute Coronary Syndromes: Diagnosis and Management, Part I. Mayo Clin Proc. 2009;84(10):917.
2. Gaziano TA, Bitton A, Abrahams-Gessel S. Growing Epidemic of Coronary Heart Disease in Low- and Middle-Income Countries. Curr Probl Cardiol. 2010 Feb;35(2):72.
3. Team E. Overview of acute coronary syndrome: http://bestpractice.bmj.com/best-practice/monograph/152. html.
4. Mehta SR, Granger CB, Boden WE, Steg PG, Bassand JP et al. Early versus delayed invasive intervention in acute coronary syndromes. *N Engl J Med* 2009; 360(21): 2165-75.
5. Hamm CW, Bassand JP, Agewall S, Bax J, Boersma E, Bueno H, et al. ESC Guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation: The Task Force for the management of acute coronary syndromes (ACS) in patients presenting without persistent ST-segment elevation of the European Society of Cardiology (ESC). *Eur Heart J* 2011; 1: 24-65.
6. Ashraf A, Ashraf S. Conventional cardiovascular risk factors associated with acute coronary syndrome in female patients admitted in cardiology department Khyber Teaching Hospital, Peshawar. Khyber Med Uinv J 2012; 4(2): 64-69.
7. Deedwania P, Kosiborod M, Barrett E, Ceriello A et al. Hyperglycemia and Acute Coronary Syndrome: A Scientific Statement from the American Heart Association Diabetes Committee of the Council on Nutrition, Physical Activity and Metabolism. Circulation. 2008 Mar 25; 117(12): 1610–9.
8. Meier JJ, Deifuss S, Klamann A, Launhardt V. Plasma glucose at hospital admission and previous metabolic control determine myocardial infarct size and survival in patients with and without type 2 diabetes: theLangendreer Myocardial Infarction and Blood Glucose in Diabetic Patients Assessment (LAMBDA). *Diabetes Care*. 2005;28:2551–2553.
9. Kadri Z, Danchin N, Vaur L, Cottin Y, Gueret P, Zeller M, Lablanche JM, Blanchard D, Hanania G, Genes N, Cambou JP; USIC 2000 Investigators. Major impact of admission glycaemia on 30 day and one year mortality in non-diabetic patients admitted for myocardial infarction: results from the nationwide French USIC 2000 study. *Heart*. 2006;92:91015.
10. Kosiborod M, Rathore SS, Inzucchi SE, Masoudi FA, Wang Y, Havranek EP, Krumholz HM. Admission glucose and mortality in elderly patients hospitalized with acute myocardial infarction: implications for patients with and without recognized diabetes. *Circulation*. 2005;111:3078 –3086.
11. Foo K, Cooper J, Deaner A, Knight C, Suliman A, Ranjadayalan K, et al. A single serum glucose measurement predicts adverse outcomes across the whole range of acute coronary syndromes. Heart 2003 May;89(5):512-516.
12. Benamer S, Eljazwi I, Mohamed R, Masoud H. Association of Hyperglycemia with In-Hospital Mortality and Morbidity in Libyan Patients with Diabetes and Acute Coronary Syndromes. Oman Medical Journal. 2015 Sep 15;30(5):326.
13. Kosiborod M, Rathore SS, Inzucchi SE, Masoudi FA, Wang Y, Havranek EP, et al. Admission glucose and mortality in elderly patients hospitalized with acute myocardial infarction: implications for patients with and without recognized diabetes. Circulation 2005 Jun;111(23):3078- 3086.
14. Deedwania P, Kosiborod M, Barrett E, Ceriello A, Isley W, Mazzone T et al; American Heart Association Diabetes Committee of the Council on Nutrition, Physical Activity, and Metabolism. Hyperglycemia and acute coronary syndrome: a scientific statement from the American Heart Association Diabetes Committee of the Council on Nutrition, Physical Activity, and Metabolism. Circulation 2008 Mar;117(12):1610.
15. Bhalli MA, Kayani AM, Samore NA. Frequency of risk factors in male patients with acute coronary syndrome. J Coll Physicians Surg Pak. 2011;21(5):271–5.
16. Mansour AA, Wanoose HL. Acute phase hyperglycemia among patients hospitalized with acute coronary syndrome: prevalence and prognostic significance. Oman medical journal. 2011;26(2):85.
17. Deedwania P, Kosiborod M, Barrett E, Ceriello A et al. Hyperglycemia and acute coronary syndrome: a scientific statement from the American Heart Association Diabetes Committee of the Council on Nutrition, Physical Activity, and Metabolism. Circulation. 2008 Mar 25;117(12):1610–9.
18. Kosiborod M, Rathore SS, Inzucchi SE, Masoudi FA, Wang Y, Havranek EP, et al. Admission glucose and mortality in elderly patients hospitalized with acute myocardial infarction: implications for patients with and without recognized diabetes. Circulation. 2005 Jun 14;111(23):3078–86.
19. Modenesi R de F, Pena FM, de Faria CAC, Carvalho RV et al. Influence on prognosis and prevalence of stress hyperglycemia in a cohort of patients with acute coronary syndrome. Rev Bras TerIntensiva. 2012;24(4):352–6.
20. Marfella R, Siniscalchi M, Esposito K, Sellitto A, et al. Effects of stress hyperglycemia on acute myocardial infarction: role of inflammatory immune process in functional cardiac outcome. Diabetes Care. 2003 Nov;26(11):3129–35.
21. Nordin C, Amiruddin R, Rucker L, Choi J,. Diabetes and stress hyperglycemia associated with myocardial infarctions at an urban municipal hospital: prevalence and effect on mortality. Cardiol Rev. 2005 Oct; 13(5): 223–30.
22. Mehta SR, Yusuf S, Díaz R, Zhu J, Pais P, Xavier D, et al. Effect of glucose-insulin-potassium infusion on mortality in patients with acute ST-segment elevation myocardial infarction: the CREATE-ECLA randomized controlled trial. JAMA. 2005 Jan 26;293(4):437–46.
23. Cheung NW, Wong VW, McLean M. The Hyperglycemia: Intensive Insulin Infusion in Infarction (HI-5) study: a randomized controlled trial of insulin infusion therapy for myocardial infarction. Diabetes Care. 2006 Apr;29(4):765–70.
24. Suleiman M, Hammerman H, Boulos M, Kapeliovich MR, Suleiman A, Agmon Y, et al. Fasting glucose is an important independent risk factor for 30-day mortality in patients with acute myocardial infarction: a prospective study. Circulation. 2005 Feb 15;111(6):754–60.
25. Svensson A-M, McGuire DK, Abrahamsson P, Dellborg M. Association between hyper- and hypoglycaemia and 2 year all-cause mortality risk in diabetic patients with acute coronary events. Eur Heart J. 2005 Jul;26(13):1255–61.
26. Svensson A-M, McGuire DK, Abrahamsson P, Dellborg M. Association between hyper- and hypoglycaemia and 2 year all-cause mortality risk in diabetic patients with acute coronary events. Eur Heart J. 2005 Jul;26(13):1255–61.
27. Pitrowsky M, Shinotsuka CR, Soares M, Salluh JIF. Glucose control in critically ill patients in 2009: no alarms and no surprises. Rev Bras TerIntensiva. 2009 Aug;21(3):310–4.

ORIGINAL ARTICLE