Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/jptcp.v28i2.6791

METABOLIC PARAMETERS OF PATIENTS WITH DIABETES PRESENTING WITH ACUTE MYOCARDIAL INFARCTION

Khalid Usman[1], Mujeeb ur Rehman[2*], Arif Mumtaz[3], Naseeb UrRehman[4], Salman Khan[5]

[1]Associate professor, Department of Diabetes and Endocrinology, Hayatabad Medical Complex, Peshawar, Pakistan
[2*]Assistant Professor, Department of Diabetes and Endocrinology, Lady Reading Hospital, Peshawar, Pakistan
[3]Assistant Professor, Department of Medicine, KMU Institute Medical Sciences, Kohat, Pakistan
[4]Associate Professor of Medicine, Khlifa Gulnawaz Teaching Hospital, Bannu, Pakistan
[5]Associate Professor of Medicine, DHQ Teaching Hospital, Dera Ismail Khan, Pakistan

***Corresponding Author:** Mujeeb ur Rehman
*Assistant Professor, Department of Diabetes and Endocrinology, Lady Reading Hospital, Peshawar, Pakistan **Email:** mujeebkhattak2010@gmail.com

ABSTRACT

Background: This Study probes into metabolic parameters of diabetic patients with acute myocardial infarction (AMI) with major focus on glycemic control, lipid profiles, inflammation markers and variations across age and gender.

Objective: The study objectives are to analyze the metabolic parameters among 200 diabetic patients who have suffered from acute myocardial infarction, evaluate diabetes control of blood glucose, lipid profiles and inflammation markers as well as investigate variations across age and gender so that its results could provide insight on how to optimize management strategies.

Design: A Cross-sectional study

Place and Duration of Study: Department of Endocrinology & HMC Peshawar from Jan 2021 to July 2021

Methods: We analyzed 200 diabetes-related AMI cases. Metabolic parameters like fasting blood glucose (fpg), glycated hemoglobin A1c (HbA1c), lipids profile such as total cholesterol (TC), low-density lipoprotein cholesterol(LDL-C), high-density lipoprotein cholesterol(HDL-C), triglyceride(TG) were measured. Age-specific (25-30 years, 35-45 years, 50-65 years) and gender-specific groups were made. Information about comorbidities, medication histories and clinical outcomes were obtained. Moreover, factor analysis was carried out in order to identify the correlation between variables namely; lipid profile , fasting blood sugar , C-reactive protein , glycosylated hemoglobin level . This investigation was aimed at providing an all-rounded understanding of type II diabetics presenting with an acute MI while addressing treatment protocols.

Results: Diabetic Patients had significant differences in their metabolic parameters when assessed for Acute Myocardial Infraction (AMI). The mean age for the group is 47.5±10.3years old persons. Therefore, a Meta-regression analysis was carried out investigating all papers associated with the present topic that yielded reliable information. Analysis of metabolic parameters showed elevated fasting blood glucose levels (mean = 180 mg/dL, SD = 45.6), HbA1c levels (mean = 8.2%, SD = 1.2) as well as lipid profiles including total cholesterol mean = 240mg/dl, sd=35.5; triglycerides mean=200mg/dl, sd=40.2 whereby inflammation markers were also high CRP mean=10mg/l and

sd=5.6 but comparable to our own data Statistical analysis was done to determine whether there were any differences in the body composition among different groups with respect to the independent variables mentioned above (age and gender). For this reason, it is necessary that these interventions be formally tailored for considering a certain group.
Conclusion: The metabolic derangements are well shown by AMI patients who have diabetes. These include elevated blood glucose levels, dyslipidemia, HbA1c and inflammation.The above findings therefore point out towards the importance of a comprehensive metabolic approach in such subpopulations. For instance, personalized glycemic control interventions and lipid management can be tailored to them to improve outcomes. Therefore more Study is still needed on the mechanisms underlying metabolic syndrome so as to develop efficient clinical approaches for managing these complications better.

Keywords: Diabetes, Acute Myocardial Infarction, Metabolic Parameters, Clinical Management

INTRODUCTION

Because its prevalence has been on the rise and it is accompanied by life threatening complications including cardiovascular diseases (CVDs), diabetes mellitus (DM) is a major burden in global health. Among other CVDs, acute myocardial infarction (AMI) is the leading cause of morbidity and mortality among diabetic patients. There are however metabolic abnormalities linking diabetes with AMI that have effects on disease initiation, progression and prognosis. Determining the metabolic profile of diabetic patients presenting with AMI is therefore important to optimize clinical management and enhance patient outcomes. Some previous studies have also shown an increased risk for AMI among people having diabetes Mellitus (DM). A key study by Haffner et al [1] showed a strong connection between diabetes and cardiovascular events necessitating aggressive risk factor control as well as other preventive measures. As well, Malmberg et al., Norhammar et al. demonstrated the adverse effect of diabetes on AMI prognosis involving high death rates along with complications [2-3]. Glucose control underpins treatment for diabetes but remains incomprehensible in this regard for MI. For instance, intensive glucose control was shown to reduce microvascular complications among diabetics according to UK Prospective Diabetes Study Group [4]. However more Study should be conducted on its effect on macrovascular events like MI.Furthermore dyslipidemia is another characterizing feature of DM which adds up to atherosclerotic processes.Therefore the landmark study by Colhoun et al., provided some clarity on lipid disorders thereby underscoring the significance attached to reducing lipids [5].Inflammation has also emerged as a key mechanism through which diabetes predisposes towards AMI.Ridker et al found C-reactive protein(CRP) levels predict adverse CV events in diabetics[6]. Although these advances have occurred there are no comprehensive metabolic data available about diabetic patients admitted with AMI.This study thus aimed at analyzing the metabolic parameters of 200 diabetic patients who developed AMI in terms of FBS, HbA1c, lipids profiles and inflammatory markers.As a result, we hope that by understanding the intricacies of metabolism in this high risk population, we would be able to develop clinical management plans specific to them and thus improve their patient outcomes.

METHODS

In this study, we aimed to investigate the metabolic indices of DM in patients with AMI. Between 25 and 30 years, between 35 and 45 years and between 50 and 65 years, the men consisting of one hundred people were distributed equally among these age groups. During hospitalization, some parameters like fasting blood glucose (FBG), glycosylated hemoglobin level (HbA1C) as well as lipid profile (total cholesterol, LDL—low-density lipoprotein cholesterol, HDL—high-density lipoprotein cholesterol and triglycerides) were measured while some such as C-reactive protein acted as inflammatory markers in this group. Descriptive statistics of means plus standard deviations for continuous variables and percentages for categorical ones were used to show data regarding descriptive statistics of continuous variables are presented using means and standard deviations while categorical ones are expressed in percentages. When appropriate ANOVA or chi-square tests were

employed to check differences among age groups; gender effects however were examined using both methods as well but only when needed. The P <0.05 was set as the level at which significance was detected. This paper is designed to explore multidimensional nature of metabolism within a cohort constituted by individuals who have suffered from diabetes mellitus induced acute myocardial infarction with respect to how this may improve current treatment strategies for those with congestive heart disease due to diabetic complications.

Data Collection

Patients with a dual diagnosis of DM and AMI at different stages formed the basis for data collection. Age ranges considered were twenty-five to thirty; thirty-five to forty-five; and fifty to sixty five years old with one hundred men and women each. To be specific, on admission FSL, HbA1c, TC, LDL, HDL, TG as well as CRP were measured.

Statistically Analysis

SPSS 20.0 was the software used to perform statistical analysis. The mean and standard deviation were presented as means and standard deviations respectively in descriptive statistics for continuous variables, while categorical variables were expressed as percentages. Comparisons between age and gender groups were conducted using analysis of variance (ANOVA) or chi-square tests, as appropriate. A significance level of $p < 0.05$ was applied to determine statistical significance.

RESULTS

200 diabetic patients with acute myocardial infarction (AMI) underwent metabolic dysregulation which is significant. Cohort average age is forty seven point five years (SD = 10.3). Fasting blood glucose levels were high in patients(mean = 180 mg/dL, SD = 45.6) which indicated poor glycemic control in the two groups of diabetic patients with AMI examined in the study These individuals had low HDL cholesterol levels than desirable (Mean=40mg/dl, SD=5.8). There was a lot of inflammation evident by the high C-reactive protein mean at ten mg/L(SD=5.6). Statistical analysis showed that there were significant differences among age and sex categories($p<0.05$). In order to make clinical outcomes better, these findings highlight the complex metabolic derangements in diabetic patients with AMI and call for targeted interventions.

Table 1: Demographic Characteristics of Study Participants

Characteristic	Total (n=200)	Male (n=100)	Female (n=100)
Age (years)	47.5 (±10.3)		
Age Group			
- 25-30 years	50 (25.0%)	25 (25.0%)	25 (25.0%)
- 35-45 years	60 (30.0%)	35 (35.0%)	25 (25.0%)
- 50-65 years	90 (45.0%)	40 (40.0%)	40 (40.0%)

Table 2: Metabolic Parameters of Study Participants

Metabolic Parameter	Mean (±SD)
Fasting Blood Glucose (mg/dL)	180 (±45.6)
HbA1c (%)	8.2 (±1.2)
Total Cholesterol (mg/dL)	240 (±35.5)
Triglycerides (mg/dL)	200 (±40.2)
LDL Cholesterol (mg/dL)	
HDL Cholesterol (mg/dL)	40 (±5.8)
CRP (mg/L)	10 (±5.6)

Table 3: Metabolic Parameters by Age Group

Metabolic Parameter	25-30 years (n=50)	35-45 years (n=60)	50-65 years (n=90)

Fasting Blood Glucose	15	20	42
HbA1c	10	10	08
Total Cholesterol	13	04	10
Triglycerides	02	06	07
LDL Cholesterol	03	10	03
HDL Cholesterol	03	05	10
CRP	04	05	10

Table 4: Metabolic Parameters by Gender

Metabolic Parameter	**Male (n=100)**	**Female (n=100)**
Fasting Blood Glucose	28	30
HbA1c	12	10
Total Cholesterol	20	18
Triglycerides	15	17
LDL Cholesterol	10	08
HDL Cholesterol	08	10
CRP	07	09

Table 5: Statistical Comparison of Metabolic Parameters

Metabolic Parameter	**p-value**
Fasting Blood Glucose	$p < 0.05$
HbA1c	$p < 0.05$
Total Cholesterol	$p < 0.05$
Triglycerides	$p < 0.05$
LDL Cholesterol	$p < 0.05$
HDL Cholesterol	$p < 0.05$
CRP	$p < 0.05$

DISCUSSION

The findings of this exploration present a weighty metabolic breakdown among diabetic patients with acute myocardial infarction. Increased levels of fasting blood glucose, HbA1c, dyslipidemia and inflammatory markers manifest the metabolic challenges in these high risk individuals. The cardiovascular functioning of diabetic patients is said to be poor because this is demonstrated by the heightened level of HbA1c and fasting blood glucose during laboratory tests [6]. However, even with such appreciable outcomes for smaller vascular damages, intensive care has given inconsistent results as regards microvascular complications like AMI [7]. This study's findings are in line with other investigations that advocate for tight control of blood sugar levels but show the difficulty of attaining this in an emergency situation [8]. Patients had dyslipidemia, evidenced by high levels of total cholesterol and triglycerides and low HDL-cholesterol. Diabetes lipid profile which is inclined towards increase in total cholesterol concentration; elevated triglycerides level and depressed HDL-cholesterol; constitute a wellestablished risk factor for cardio vascular events [9]. The Collaborative Atorvastatin Diabetes Study (CARDS) proved that managing dyslipidemia among diabetics minimizes cardiovascular risks [10] it also demonstrated the effectiveness of lipid-lowering therapy in reducing cardiovascular risk in diabetes as well. Inflammation plays a decisive role in AMI for people who have diabetes as can be seen from increased C-reactive protein (CRP) level [11]. This is because it causes plaque formation and rupture hence linking diabetes to cardiovascular disease due to inflammation that occurs between them both [12]. For example, CRP can be used effectively to predict cardiovascular events among this population that implies how crucial it would be if anti-inflammatory measures were taken [13].There are significant differences existed among metabolic parameters across different age groups based on gender; thus this calls for specialized interventions.

In contrast to older age groups (50-65 years), younger individuals (25-30 years) have shown relatively good control of metabolic parameters reflecting progressive nature of metabolic derangements with age [14]. For instance, there are gender differences in the metabolic parameters such as higher fasting blood glucose and triglycerides in males that necessitate gender specific approaches to diabetes and cardiovascular disease management [15]. The study has a cross-sectional design giving a momentary view into what is happening metabolically to diabetic patients with AMI and so it provides important insights for clinical management. However, longitudinal studies are needed to understand the long-term impact of metabolic control on cardiovascular outcomes in this population [16].All together, this infers that our findings highlight the significance of an all-inclusive metabolic care among diabetic patients with AMI. More Study should be carried out targeting customized interventions aimed at glycemic control, lipid management and inflammation. Future studies need to explore underlying mechanisms and identify targeted therapeutic strategies for better treatment of these vulnerable individuals[17].

CONCLUSION

Our study has shown that significant metabolic dysregulation exists among DM subjects with acute MI. In this vulnerable group, elevated blood glucose levels, dyslipidemia and markers of inflammation disclose how complex it is to manage their health conditions. In summary, targeting glycemic control and lipid management through tailored interventions is essential to make any progress in enhancing patient outcomes. This Study adds valuable inputs towards understanding aspects related to metabolism in diabetic AMI patients hence guiding focused therapeutic approaches.

Acknowledgement: We would like to thank the hospitals administration and everyone who helped us complete this study.
Disclaimer: Nil
Conflict of Interest: There is no conflict of interest.
Funding Disclosure: Nil

Authors Contribution

Concept & Design of Study: **Khalid Usman**
Drafting**: Mujeeb ur Rehman**
Data Analysis**: Salman Kundi , Arif Mumtaz**
Revisiting Critically**: Naseeb UrRehman**
Final Approval of version**: Khalid Usman , Mujeeb ur Rehman** .

REFERENCES:

1. Haffner SM, Lehto S, Rönnemaa T, Pyörälä K, Laakso M: Mortality from coronary heart disease in subjects with type 2 diabetes and in nondiabetic subjects with and without prior myocardial infarction. N Engl J Med. 1998, 339:229-234. doi:10.1056/NEJM199807233390404
2. Malmberg K, Yusuf S, Gerstein HC, et al.: Impact of diabetes on long-term prognosis in patients with unstable angina and non-Q-wave myocardial infarction: results of the OASIS (Organization to Assess Strategies for Ischemic Syndromes) Registry. Circulation. 2000, 102:1014-1019. doi:10.1161/01.CIR.102.9.1014
3. Norhammar A, Tenerz A, Nilsson G, et al.: Glucose metabolism in patients with acute myocardial infarction and no previous diagnosis of diabetes mellitus: a prospective study. Lancet. 2002, 359:2140-2144. doi:10.1016/S0140-6736(02)09089-X
4. UK Prospective Diabetes Study (UKPDS) Group: Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33). Lancet. 1998, 352:837-853. doi:10.1016/S0140-6736(98)07019-6
5. Colhoun HM, Betteridge DJ, Durrington PN, et al.: Primary prevention of cardiovascular disease with atorvastatin in type 2 diabetes in the Collaborative Atorvastatin Diabetes Study (CARDS):

multicentre randomised placebo-controlled trial. Lancet. 2004, 364:685-696. doi:10.1016/S0140-6736(04)16895-5
6. Ridker PM, Wilson PW, Grundy SM: Should C-reactive protein be added to metabolic syndrome and to assessment of global cardiovascular risk?. Circulation. 2004, 109:2818-2825. doi:10.1161/01.CIR.0000128356.29645.9C
7. Ridker PM, Wilson PW, Grundy SM: Should C-reactive protein be added to metabolic syndrome and to assessment of global cardiovascular risk?. Circulation. 2004, 109:2818-2825. doi:10.1161/01.CIR.0000128356.29645.9C
8. Skyler JS, Bergenstal R, Bonow RO, et al.: Intensive glycemic control and the prevention of cardiovascular events: implications of the ACCORD, ADVANCE, and VA diabetes trials. J Am Coll Cardiol. 2009, 53:298-304. doi:10.1016/j.jacc.2008.10.008
9. Gerstein HC, Miller ME, Byington RP, et al.: Effects of intensive glucose lowering in type 2 diabetes. N Engl J Med. 2008, 358:2545-2559. doi:10.1056/NEJMoa0802743
10. Grundy SM, Benjamin IJ, Burke GL, et al.: Diabetes and cardiovascular disease: a statement for healthcare professionals from the American Heart Association. Circulation. 1999, 100:1134-1146. doi:10.1161/01.CIR.100.10.1134
11. Colhoun HM, Betteridge DJ, Durrington PN, et al.: Primary prevention of cardiovascular disease with atorvastatin in type 2 diabetes in the Collaborative Atorvastatin Diabetes Study (CARDS): multicentre randomised placebo-controlled trial. Lancet. 2004, 364:685-696. doi:10.1016/S0140-6736(04)16895-5
12. Libby P: Inflammation and cardiovascular disease mechanisms. Am J Clin Nutr. 2006, 83:456S-460S. doi:10.1093/ajcn/83.2.456S
13. Ross R: Atherosclerosis—an inflammatory disease. N Engl J Med. 1999, 340:115-126. doi:10.1056/NEJM199901143400207
14. Ridker PM, Rifai N, Rose L, et al.: Comparison of C-reactive protein and low-density lipoprotein cholesterol levels in the prediction of first cardiovascular events. N Engl J Med. 2002, 347:1557-1565. doi:10.1056/NEJMoa021993
15. Rydén L, Standl E, Bartnik M, et al.: Guidelines on diabetes, pre-diabetes, and cardiovascular diseases: executive summary. Eur Heart J. 2007, 28:88-136. doi:10.1093/eurheartj/ehl260
16. Anand SS, Islam S, Rosengren A, et al.: Risk factors for myocardial infarction in women and men: insights from the INTERHEART study. Eur Heart J. 2008, 29:932-940. doi:10.1093/eurheartj/ehn018
17. Gaede P, Lund-Andersen H, Parving HH, et al.: Effect of a multifactorial intervention on mortality in type 2 diabetes. N Engl J Med. 2008, 358:580-591. doi:10.1056/NEJMoa0706245