



ASSESSMENT OF THE CORRELATION BETWEEN ACUTE MYOCARDIAL INFARCTION AND MICROALBUMINURIA IN NON-DIABETIC, NON-HYPERTENSIVE PATIENTS AT A TERTIARY CARE CENTRE OF AHMEDABAD

Cardiology

Dr. Advait Akash Resident, Department of Cardiology, SMT. NHL Municipal Medical College.

Dr. Bhupesh R Shah Professor and HOD, Department of Cardiology, SMT NHL Municipal Medical College.

Dr. Somya Goyal Resident, Department of Cardiology, Smt NHL Municipal Medical College.

ABSTRACT

In the examination of acute myocardial infarction patients' long-term morbidity, mortality, and in-hospital coronary events, microalbuminuria (MA) is a newly identified risk factor. The main objective of this study is to determine the prognostic significance and predictive value of MA for complications in patients with non-diabetic, non-hypertensive acute myocardial infarction. Materials and Procedures The current prospective observational study was conducted for a year in Ahmedabad, Gujarat at a tertiary care hospital on 100 patients older than 20. A number of blood and urine parameters like MA, postprandial blood sugar (PPBS), renal function test, were assessed in the subjects. All patients had comprehensive transthoracic echocardiography (ECHO), Doppler analysis, and 12-lead ECGs. The ejection fraction was used in our investigation. The ejection fraction (EF) of less than 50% was regarded as abnormal in our study. The majority of patients, or 55%, were reported to be between the ages of 41 and 50. 78% of the population was male and 22% was female. In all cases, 86% of people were obese and 47% were smokers. There were 22% of patients with aberrant cholesterol levels, 34% with abnormal triglycerides, 18% with abnormal HDL, and 28% with increased LDL. 76% of patients had the MA present. The majority of patients (50%) had an ejection fraction between 50 and 60. There was a 4% overall death rate among MA patients.

KEYWORDS

INTRODUCTION

Acute myocardial infarction (MI) is the most common cause of hospital admission in developed countries. Every year, the world experiences more than 2.5 million ST-elevation myocardial infarctions and 3.9 million non-ST-elevation myocardial infarctions, which account for 1 in 5 deaths from coronary artery disease.

Excretion of Less than 300 mg of albumin in the urine each day is known as microalbuminuria (MA).[1] Due to these limitations, standard urine tests are unable to detect this range of albumin in urine. The association between MA and diabetes mellitus (type I & II over time) is widely acknowledged. In this condition, MA is a precursor to renal impairment.

Despite improvements in treatment over the previous years, the outlook for myocardial infarction is still dismal. Numerous studies emphasize the function and prognostic importance of novel, unconventional elements connected to the therapeutic process and the outcome of myocardial infarction (for shorter or longer periods), such as the level of C reactive protein, BNP state of the metabolic control - before and during hospitalization, and MA, because they acknowledge the significance of the accuracy of the risk prediction in myocardial infarction patients.[1]

The study aimed to investigate the association between micro albuminuria (MA) and acute myocardial infarction (MI) in non-diabetic, non-hypertensive individuals, as well as its potential to predict in-hospital mortality.

MATERIAL & METHODS

The study was conducted at a tertiary care hospital in Ahmedabad from 2021 to 2022. A prospective observational design was employed

Inclusion criteria :

100 patients older than 20 years, diagnosed with acute MI but without diabetes or hypertension, were included after obtaining their consent. The inclusion criteria specified that patients should be non diabetic, non hypertensive and were admitted to the Intensive Coronary Care Unit (ICCU) of the hospital. Patients with documented ischemic heart disease, congenital heart disease, valvular heart disease, those under 20 years of age, and those with kidney disease, diabetes, hypertension, or who declined to participate were excluded.

Microalbuminuria was measured using the immune turbidimetric method, while serum glucose and serum creatinine were measured using the GOD-POD endpoint and Modified Jaffe's method, respectively. Random blood sugar (RBS) levels, MA, and creatinine were assessed in serum samples, while microalbumin levels were

determined in random mid-stream urine samples. In addition, 12-lead ECGs and detailed transthoracic echocardiography (ECHO) with Doppler evaluation were performed. Ejection fraction (EF) was calculated using the Modified Simpson's technique, and an EF of less than 50% was considered abnormal.

OBSERVATIONS & RESULTS-

The study group consisted of 100 non-diabetic, non-hypertensive patients with MI. The majority of patients (55%) fell within the age group of 41 to 50. Among the cases, 78% were males and 22% were females. In terms of lifestyle factors, 47% of patients were reported as smokers, and 86% were classified as obese, as per Table 1 of the study.

Table 1

	Particulars	Observations N (%)
Age Group (years)	<40	13 (13%)
	41-50	55 (55%)
	51-60	25 (25%)
	61-70	6 (6%)
	>71	1%
	Mean Age± SD	45.4±10.61
Gender	Male	78 (78%)
	Female	22 (22%)
BMI	Overweight	14 (14%)
	Obese 1	80 (80%)
	Obese 2	6 (6%)
Smoking	No	53 (53%)
	Yes	47 (47%)
HDL	Normal	82 (82%)
Total cholesterol	Normal	78 (78%)
	Abnormal	22 (22%)
Triglycerides	Normal	66 (66%)
	Abnormal	34 (34%)
	Abnormal	18 (18%)
LDL	Normal	72 (72%)
	Abnormal	28 (28%)
MA	<30	24 (24%)
	>30	76 (76%)
EF	<50	42 (42%)
	50-60	50 (50%)
	>60	8 (8%)

Within the study population, 22% of patients were found to have abnormal cholesterol levels, 34% had abnormal triglyceride levels, 18% had abnormal HDL levels, and 28% had abnormal LDL levels.

Among the cases, 76% were diagnosed with microalbuminuria, while 24% had normoalbuminuria. The ejection fraction ranged from a maximum of 50% to between 50 and 60, as shown in Table 1.

Table 2

		Microalbuminuria		P-value
		<30	>30	
Diagnosis	AWMI	14 (21.2%)	52 (78.8%)	0.157
	ILWMI	0	1 (100%)	
	IPWMI	3 (75%)	1 (25%)	
	IWMI	7 (25%)	21 (75%)	
	PWMI	0	1 (100%)	
Mortality	No	24 (25%)	72 (75%)	0.251
	Yes	0	4 (100%)	

Table 2 provides the association between microalbuminuria and various types of myocardial infarction based on ECG findings. The highest percentage of patients (66%) were observed with anterior wall myocardial infarction (AWMI), followed by inferior wall myocardial infarction (IWMI) in 28% of cases.

In the present study of all patients, only in 4 MA patients mortality was reported, and no mortality in patient without MA [Table 2].

DISCUSSION

Previous research conducted by Al-Saffar et al. at Baghdad University in Iraq has shown that microalbuminuria (MA) can be used to predict the severity of coronary artery disease (CAD) and the likelihood of unfavorable outcomes in non-diabetic patients with unstable angina/non-ST elevation myocardial infarction [2].

Similarly, Abhijit Basu et al. discovered a strong correlation between MA and myocardial infarction in non-diabetic, non-hypertensive individuals, particularly in younger age groups [3].

Haffner et al. suggested that MA may serve as a predictor of coronary heart disease in individuals without diabetes [4].

In our study, the majority of MA patients were found in the age groups of 41-50 (55%) and 51-60 (25%), while the least number of cases occurred in the age group >61. This differs from the findings of Gamit et al., who reported the highest number of MA cases in the age group >60 [5].

The mean age of MA patients in our study was 45.4 years, whereas Mok et al. reported a higher mean age of 65 years in their study [6].

Male patients were predominant in our study, consistent with the male dominance observed in previous research by Mustafa et al. [7].

Smoking, high body mass index (BMI), and elevated cholesterol levels were identified as risk factors for MA in our study. We found that 47% of the patients were smokers, supporting the notion that smoking can aggravate MA rates in non-diabetic, non-hypertensive individuals.

The relationship between BMI, cholesterol levels, and MA has been established in several studies. Our analysis revealed that 14% of patients were overweight, while 80% and 6% fell into the obese 1 and 2 categories, respectively. Abnormal total cholesterol levels were observed in 22% of patients, while abnormal triglyceride, HDL, and LDL levels were present in 34%, 18%, and 24% of patients, respectively. However, the association between abnormal lipid levels and the prevalence of MA may be insignificant. Other studies, such as those by Mai et al. and Romundstad et al., have also reported insignificant associations between BMI, lipid levels, and MA [8]. In contrast, Jensen et al. found a positive correlation between these factors [9].

Our study revealed a high incidence of MA (76%) among the patients. Similar findings were reported by Lazzeri et al. and Taskiran et al., who reported MA incidences of 52.1% and 68%, respectively [10][11]

Regarding the association between MA and different types of myocardial infarction (MI), we found that anterior wall myocardial infarction (AWMI) was the most prevalent type, affecting 66% of the patients, followed by inferior wall myocardial infarction (IWMI) in 28% of cases. These findings align with previous study done by

Mohamed et al that also reported a higher incidence of MA in AWMI cases [12]. However, the association between the type of MI and MA was found to be statistically insignificant ($p=0.157$).

In-hospital mortality rates were low (4%) in our study and were not significantly different between patients with and without MA ($p=0.251$). However, studies by Naidoo et al have shown that MA is a strong predictor of in-hospital mortality and future cardiovascular events and death following a myocardial infarction.[13]

CONCLUSION-

The connection between MA and myocardial infarction demonstrates that MA has additional importance as a prognostic factor in the absence of risk variables like diabetes and hypertension. It indicates the presence of widespread vascular injury and is associated with renal failure, cardiovascular disease, and future mortality

REFERENCES:

1. Yuyun M F, Adler A I, Wareham N J. What is the evidence that microalbuminuria is a predictor of cardiovascular disease events? *Curr Opin Nephrol Hypertens*. 2005; 14:271-6.
2. Al-Saffar HB, Nassir H, Mitchell A, Philipp S. Microalbuminuria in non-diabetic patients with unstable angina/non-ST-segment elevation myocardial infarction. *BMC Res Notes* 2015; 8:371.
3. Basu A, Jhala JS. Association of microalbuminuria in non-diabetic and non-hypertensive patients with myocardial infarction. *Int J Adv Med* 2015; 2:196- 200.
4. Haffner SM, Stern MP, Gruber MK, Hazuda HP, Mitchell BD, Patterson JK. Microalbuminuria. Potential marker for increased cardiovascular risk factors in non-diabetic subjects? *Arteriosclerosis* 1990; 10:727-31.
5. Gamit D, Vanani B, Patel C, Mishra A, Patel A. Evaluation of microalbuminuria in non-diabetic and non-hypertensive patients with acute myocardial infarction. *Alcohol* 2017; 4:225-8.
6. Mok Y, Ballew SH, Sang Y, Grams ME, Coresh J, Evans M, et al. Albuminuria as a predictor of cardiovascular outcomes in patients with acute myocardial infarction. *Journal of the American Heart Association*. 2019; 8: e010546
7. Mustafa A. Study of Microalbuminuria in Non-Diabetic and NonHypertensive Patients with Acute Myocardial Infarction International Journal of Contemporary Medical Research. 2020; 7:C1-C3
8. Romundstad S, Holmen J, Hallan H, Kvenild K, Krüger Ø, Midthjell K. Microalbuminuria, cardiovascular disease and risk factors in a non-diabetic/non-hypertensive population. The Nord-Trøndelag Health Study (HUNT, 1995-97), Norway. *J. Intern. Med*. 2002; 252:164-72
9. Jensen JS, Borch-Johnsen K, Jensen G, Feldt-Rasmussen B. Atherosclerotic risk factors are increased in clinically healthy subjects with microalbuminuria. *Atherosclerosis*. 1995; 112:24552.
10. Lazzeri C, Valente S, Chiostri M, Piciarello C, Gensini GF. Microalbuminuria in hypertensive non-diabetic patients with STElevation myocardial infarction. *J Cardiovasc Med*. 2010; 11:74853.
11. Taskiran M, Iversen A, Klausen K, Jensen GB, Jensen JS. The association of microalbuminuria with mortality in patients with acute myocardial infarction. A ten-year follow-up study. *Heart international*. 2010; 5: 62
12. Mohamed P, Lorenz T, Gopal B. A study on the association of microalbuminuria in non-diabetic and non-hypertensive patients with acute myocardial infarction. *J. Evid. Based Med. Healthc*. 2019; 6:82-6.
13. Naidoo DP. The link between microalbuminuria, endothelial dysfunction and cardiovascular disease in diabetes. *Cardiovasc J South Afr* 2002; 13:194-19