Original Article ISSN (O):2395-2822; ISSN (P):2395-2814

Study of Microalbuminuria in Non-Diabetic Patients with Acute Myocardial Infarction

Patnam Pravallika Reddy[1], Rajesh M Honnutagi[2]

[1]Junior Resident Department of Medicine, Shri B M Patil Medical College and Hospital, BLDE University, Vijayapura, India.
[2]Professor, Department of Medicine, BLDE University, Vijayapu, Karnataka, India.

Received: January 2021
Accepted: February 2021

ABSTRACT

Background: Microalbuminuria has been an established indicator for micro and macrovascular pathology in diabetics. But there is growing evidence that microalbuminuria may be an important indicator of future chance of developing coronary arterial disease. This study was conducted to establish a relationship between microalburminuria and Ischemic cardiac Disease in non-diabetics. Objective: This is an observational study designed to study of microalbuminuria in non-diabetic patients with acute myocardial infarction. **Methods:** 62 randomly selected non-diabetic patients with Ischemic Heart Disease who fulfilled the criteria for the study were evaluated for traditional risk factors and microalbuminuria in BLDE (DEEMED TO BE UNIVERSITY) Shri B.M Patil Medical college Hospital and Research center ,Vijayapura. Information was collected through prepared proforma from each patient. All patients were interviewed as per the prepared proforma and then complete clinical examination was done. **Results:** Mean age of patients was 59.5±12.8 years. There were 44 male patients and 18 female patients in the study group. The predominant type of MI is inferior wall MI followed by anterior wall MI and lateral wall MI. Microalbuminuria was present significantly in 39 (62.9%) patients. MAU is also seen independent of smoking status, BMI, total cholesterol in patients of myocardial infarction with significant p value. Also in our study more common presentation was anterolateral wall MI but there was no significant correlation. **Conclusion:** From the above findings, our patients with ischemic heart disease had a significantly positive association with microalbuminuria. Hence, microalbuminuria can be regarded as an additional risk factor for ischemic heart disease.

Keywords: Coronary heart disease; Myocardial infarction; Micro-albuminuria.

INTRODUCTION

Coronary heart disease (CHD) has been defined as impairment of heart functioning because of inadequate blood supply than its demand secondary to obstructive alteration in coronary flow. In 2000, CHD contributed to 15.3 million deaths, equivalent to 30% of the global mortality. Of these 9.77 million deaths were across developing nations. The 5.52 million deaths across developed nations amounted to 76% more deaths when compared to their population.[1]

The Indians and its diaspora across the world have one of the highest rates of CHD. Indian urban dwellers have as high as 10-12% prevalence of coronary artery disease (CAD).[2] Generally, they have more advanced presentation at first diagnosis, as compared to whites or other Asians. The affected Indians are mostly younger working population with a significant overall social and economic impact.[2,3] The decline in CAD related mortality and morbidity across western world, is not reciprocated in India.[3] The etiological factor for CAD, atherosclerosis, develops and progresses for decades prior to acute myocardial infarction (AMI).[4] Factors such as age, diabetes mellitus (DM), prior angina, heart failure, microalbuminuria (MAU),and depressed left ventricular function adversely affect prognosis of AMI.

Microalbuminuria (MAU) is defined as an urinary albumin excretion rate between 20–200 mg/l or 30–300 mg/day. It was first designated as a risk factor for chronic renal failure in diabetic patients.[5] It was also established as a responsible factor for vascular damage.[6] The MAU correlates with left ventricular wall thickness independent of blood pressure. It has been documented that there is increased prevalence of MAU in patients with AMI.[7] Among the manifestations of AMI, microalbuminuria (MAU) is associated with increased risk for in- hospital mortality.[7] The MAU predicts all- cause mortality in diabetics as well as general population.[5,8-10]

A better understanding of the mechanisms of MAU development may assist in designing novel therapies. Microalbuminuria is the result of an increased leakage of albumin through the complex glomerular sieve, which is called the glomerular filtration barrier. The leakage is secondary to alteration in the physio-chemical characteristics of the glomerular filtration barrier. However, the enhanced glomerular permeability in absence of explicit histological changes suggests subtler ultrastructure alteration as the pathological mechanism. The epidemiological data indicate a close association between systemic endothelial dysfunction and vascular disease in

Name & Address of Corresponding Author
Dr. Patnam Pravallika Reddy
Department of Medicine,
BLDE university, Vijayapur,
Karnataka, India.
Email: pravallikareddychennai@gmail.com

MAU, suggesting major role of glomerular endothelial dysfunction in MAU.[11]

MATERIALS AND METHODS

This is an observational study among the patients admitted with acute coronary syndrome in the dept. of medicine in Shri. B. M. Patil Hospital, Vijayapur. Ethical committee clearance was obtained prior to the study. This study consisted of 62 patients with AMI after obtaining their or their family members' consent. All patients underwent detailed clinical examination followed by routine and biochemical tests including CBC, blood sugar, blood urea, serum creatinine, serum electrolytes, urine routine/microscopic fasting lipid profile.. AMI diagnosis was made based on ECG finding and level of cardiac biomarkers. Blood pressure was measured using a standard mercury sphygmomanometer and appropriately sized cuff. Patients with a history of diabetes, hypertension, systemic infection, UTI, arthritis, nephropathy were excluded from the study. Patients with elevated urea and creatinine levels were also excluded from the study.Urine microalbumin estimation was performed on an early morning spot urine sample by immunoturbidimetric method.

Data were analyzed using SPSS software v.23.0. and Microsoft office 2007. If the p-value was < 0.05, then the results were considered to be statistically significant otherwise it was considered as not statistically significant.

RESULTS

In this study of 62 patients presenting with acute coronary syndrome between 40-80 years, age group of 41-60 years are affected more compared to other age groups.

Table 1: Distribution of Cases according to Age

Age(yrs)	N	Percent (%)
≤40	7	11.3
41-60	28	45.2
61-80	24	38.7
>80	3	4.8
Total	62	100

Table 2: Distribution of Cases according to Sex

Sex	N	Percent (%)
Male	44	71
Female	18	29
Total	62	100

Table 3: Distribution of Cases according to Microalbuminuria

Microalbuminuria	N	Percent(%)
Present	39	62.9
Absent	23	37.1
Total	62	100

Table 4: Distribution of Smoking between Study Groups

Smoking	Microalbuminuria		Normoalbuminuria		p value
	N	%	N	%	
Absent	14	35.9%	16	69.6%	0.010*
Present	25	64.1%	7	30.4%	
Total	39	100.0%	23	100.0%	

Note: * significant at 5% level of significance (p<0.05)

Table 5: Total Cholesterol between Study Groups

Total Cholesterol	Microalbuminuria		Normoalbuminuria		p value
	N	%	N	%	
<200	10	30.3%	9	69.2%	0.016*
≥200	23	69.7%	4	30.8%	
Total	33	100.0%	13	100.0%	

Note: * significant at 5% level of significance (p<0.05)

Table 3 shows that in our study, microlbuminuria was present in 62.9 percent of patients with acute myocardial infarction, 25 (64.1%) patients of the microalbuminuria group had history of smoking compared to the 7 (30.4%) patients in normoalbuminuria group which is statistically significant with p value of 0.010. [Table 4].

In our study, microalbuminuria was present in 69.7% of hypercholesterolemia compared to 30.8% in normoalbumnuria which is found to be statiscally significant with p value of 0.016. [Table 5]

DISCUSSION

This study is an observational study conducted over a period of one and half years from December 2018 to April 2020 to study microalbuminuria in non-diabetic patients with acute myocardial infarction. A total of 62 patients included in this study were analyzed to find out whether there is an association between IHD and MA in non-diabetic subjects.

Cardiovascular diseases, especially coronary heart disease, have assumed epidemic proportions worldwide. To target preventive strategies, risk stratification of the population should be effective. There are many reports emanating from the western literature about micro albuminuria where it is already considered in many countries as an independent risk determinant for development of ischemic heart disease.[12]

Microalbuminuria was considered as a marker of endothelial dysfunction in diabetes mellitus, but

many studies have shown micro albuminuria has become an effective indicator of generalised vascular dysfunction even in non-diabetic population.[13,14]

In this present study, all the cases had no renal dysfunction (creatinine less than 1.1mg/dl). Microalbuminuria in these patients was not associated with renal dysfunction. Our study agrees in this respect with Peter Gosling who considered it to be an sensitive indicator to non-renal disease.[22]

This study had 71% male patients compared to 29% female patients. This is in accordance with the knowledge that males are more prone for ischemic heart disease than females. Also the EPIC NORFLOK study had higher male incidence which is in concordance with our study.[15]

In our study the mean age of the study group was 59.5 ± 12.8 years. All the females were in the post-menopausal age group, which shows that sex hormones have a protective effect as far as cardiovascular risk is concerned. This is in concordance with the fact that Roeste and Banga et al have demonstrated that urinary albumin excretion in significantly higher in non-diabetic postmenopausal group when compared to pre-menopausal group.[16]

In our study of 62patients, 27 patients (69.2%) had presented with chest pain, 8patients(20.5%) had breathlessness in the microlbumnuria group and 18 (78.3%) in the normolbumnuria group presented with chief complaint of chest pain. The common presenting symptom was chest pain (45 patients). Similarly in a study done by Goel PK et al,[23] in 609 patients admitted with ACS for 1 year in 2008, they found that the most common symptom in patients with acute coronary syndrome was chest pain (84%), followed by breathlessness (8.7%).

In other study done by Conto J G et al,[24] in 434877 patients admitted with acute myocardial infarction, they found that chest pain was present in 67% of patients which is same as that observed in this study and they all find out that most common presenting symptom is chest pain in acute coronary syndrome.

In this study, the habit of smoking was there in 64.1% of the study subjects indicating that smoke abuse may be an important risk factor for IHD. Umesh N Khot et al.had found a prevalence of 41.6% in males and 29.5% in females in their study for smoking as a risk factor.[17]

The BMI was > 25kg/m2 in the majority of the study group. This prevalence was much higher than that obtained by Singh R.B. et al. (11.0% in rural and 27.2% in urban).[18]

In our study 45% of the patients in the microalbuminuria group had hypertriglyceridemia which was similar to that obtained by Voss and Cullen et al by the PROCAM study (39.6% of females and 34.1% of males had abnormal lipid parameters).[20,21]

The present study showed that 62.9% of the patients with ischemic heart disease had microalbuminuria which shows a positive association. The Prevend trial has demonstrated that that in a multivariate adjusted scenario while taking in comparison established risk determinants, the presence of microalbuminuria was by itself having an independent association with pattern of infarct, major type of ischemia and minor varieties of ischemia.[18]

The prevalence of Micro albuminuria was estimated in 15 % of a cohort of people in the HOPE (Heart outcomes and prevention and evaluation survey which was done in the years between 1998 and 2003.[13,16] This survey revealed that 20.6% of subjects with microalbuminuria were having a higher incidence of coronary artery disease, myocardial infarction and stroke when compared with 13.8% of those who did not have microalbuminuria.

The present trial design indicate that microalbuminuria may be used as a supplementary Cardiac risk determinant even among non-diabetics and in future may supplant existing markers currently used to quantify ischemic heart disease.

Limitations of Microalbuminuria

Several limitations of microalbuminuria evaluations require consideration. In case of acute infection or trauma there is non specific increase in inflammatory markers. In patients with known systemic inflammatory conditions microalbuminuria measurement should be avoided and at the time of infection or trauma as it may have limited clinical utility. Across different ethnic groups the utility of testing microalbuminria is also uncertain.

CONCLUSION

The present study aimed at studying microalbuminuria in non-diabetic acute myocardial infarction patients. A total of 62 cases of acute myocardial infarction were taken.

Mean age of patients was 59.5±12.8 years. There were 44 male patients and 18 female patients in the study group. The predominant type of MI is inferior wall MI followed by anterior wall MI and lateral wall MI. Microalbuminuria was present significantly in 39 (62.9%)patients.

The presence of MAU is an indicator of widespread vascular disease. It is associated with the presence of unfavourable risk profile and target organ damage. In the general population, MAU has also emerged as a significant risk factor for the development of CVD, and the all-cause mortality.

With the increasing prevalence of obesity, type 2 diabetes and metabolic syndrome, screening for MAU appears to be an important strategy to detect and prevent CVD. Recent articles suggest the role of microalbuminuria as a risk factor for cardiovascular diseases including myocardial infarction in non-diabetic as well.

MAU is strongly associated with smoking, high body mass index and high total cholesterol. MAU is also seen independent of smoking status, BMI, total cholesterol in patients of myocardial infarction.

The presence of microalbuminuria in the majority of patients with AMI suggests involvement of inflammation in the etiopathogenesis of MI and has prognostic utility in AMI.Microalbuminuria is associated with low-grade systemic inflammation and endothelial dysfunction.

In non-diabetics patients with MAU, an increase in vascular permeability is produced by changes in the extracellular matrix. This leads to endothelial dysfunction which is responsible for lipid influx into the vessel wall resulting in atherosclerotic lesions.

Thus, our data are consistent with the hypothesis that glomerular endothelial dysfunction, as indicated by low-grade albuminuria, is an important marker of future CVD events even in non-diabetic individuals.

In the absence of any renal insufficiency, microalbuminuria is nonspecific yet highly sensitive marker of myocardial infarction. Since microalbuminuria is simple investigation and is relatively inexpensive we propose the use of microlbuminuria as adjunct biochemical parameter in non-diabetic myocardial infarction patients.

However more studies are required with larger sample size to ascertain whether microalbumnuria can predict in-hospital mortality and its pathophysiology in a clinical setting.

REFERENCES

1. Basu A JJ. Association of microalbuminuria in non-diabetic and non-hypertensive patients with myocardial infarction. Int J Adv Med 2015;2:196-200.
2. Ardeshna DR, Bob-Manuel T, Nanda A, Sharma A, Skelton WPt, Skelton M, et al. Asian-Indians: a review of coronary artery disease in this understudied cohort in the United States. Ann Transl Med. 2018;6(1):12.
3. Sharma M, Ganguly NK. Premature coronary artery disease in Indians and its associated risk factors. Vasc Health Risk Manag. 2005;1(3):217-25.
4. Ambrose JA, Singh M. Pathophysiology of coronary artery disease leading to acute coronary syndromes. F1000Prime Rep. 2015;7:08.
5. Mogensen CE. Microalbuminuria predicts clinical proteinuria and early mortality in maturity-onset diabetes. N Engl J Med. 1984;310(6):356-60.
6. Feldt-Rasmussen B. Increased transcapillary escape rate of albumin in type 1 (insulin-dependent) diabetic patients with microalbuminuria. Diabetologia. 1986;29(5):282-6.
7. Taskiran M, Feldt-Rasmussen B, Jensen GB, Jensen JS. Urinary albumin excretion in hospitalized patients with acute myocardial infarction. Prevalence of microalbuminuria and correlation to left ventricle wall thickness. Scand Cardiovasc J. 1998;32(3):163-6.
8. Yudkin JS, Forrest RD, Jackson CA. Microalbuminuria as predictor of vascular disease in non-diabetic subjects. Islington Diabetes Survey. Lancet. 1988;2(8610):530-3.
9. Kuusisto J, Mykkänen L, Pyörälä K, Laakso M. Hyperinsulinemic microalbuminuria. A new risk indicator for coronary heart disease. Circulation. 1995;91(3):831-7.
10. Jensen JS, Feldt-Rasmussen B, Strandgaard S, Schroll M, Borch-Johnsen K. Arterial hypertension, microalbuminuria, and risk of ischemic heart disease. Hypertension. 2000;35(4):898-903.
11. Singh A, Satchell SC. Microalbuminuria: causes and implications. Pediatr Nephrol. 2011;26(11):1957-65.
12. .Stehouwer CDA, Henry RMA, ,: Microalbuminuria is associated with impaired brachial artery, flow-mediated vasodilation –the Hoorn study 178 59-78 2004 .
13. Deen WM: What determines glomerular permeability? J Clin Invest 114: 1412–1414, 20.
14. Pedrinelli R, DellOmo et al. Dissociation between microalbuminuria and common carotid thickness in essential hypertensive men. J Hum Hypertens 2000; 14: 831–36.
15. Fabsitz RR, Sidawy AN, Go O et al. Prevalence of peripheral arterial disease and associated risk factors in American Indians: the Strong Heart Study. Am J Epidemiol 1999; 149: 330–38.
16. Karalliedde J, Viberti G: Microalbuminuria and cardiovascular risk. Am J Hypertens 17: 986–993, 2004.
17. Khot UN, et al. Prevalence of conventional risk factors in patients with coronary heart disease. JAMA 2003;290:898-90
18. Verhave JC, Hillege HL, , de Jong PE: How to measure the prevalence of microalbuminuria Gansevoort RT, Verhave JC, Hillege HL, ; the PREVEND Study Group: screening based on spot morning urine samples to detect subjects with microalbuminuria . Kidney Int Suppl 94: S28–S35, 2005.
19. Gansevoort RT, Verhave JC,; the PREVEND Study Group: The validity of screening based on spot morning urine samples to detect subjects with microalbuminuria . Kidney Int Suppl 94: S28–S35, 2005.
20. Diercks GFH, von , deJong PE et al. Microalbuminuria is independently associated with ischemic electro-cardiographic abnormalities is a large non-diabetic population. The PREVEND study. Eur Heart J 2000;21: 1922-7.
21. Voss R, Cullen P, Prediction of risk of coronary events in middle-aged men (PROCAM. Int J Epidemiol 2002; 31: 1253–1262
22. Gosling P. Microalbuminuria : a sensitive indicator of non renal disease? Ann. Cl. Biochem. 1995 ; 32: 439-441.
23. Goel PK, Srivastava SK, Ashfaq F, Gupta PR, Saxena PC, Agarwal R, et al. A study of clinical presentation and delays in management of acute myocardial infarction in community. Indian Heart J. 2012;64(3):295–301.
24. Canto JG, Shlipak MG, Roger WJ, Et Al. Prevalence, clinical characteristics, and mortality among patients with myocardial infarction presenting without chest pain. JAMA. 2000;283(24):3223–9.

How to cite this article: Reddy PP, Honnutagi RM. Study of Microalbuminuria in Non-Diabetic Patients with Acute Myocardial Infarction. Ann. Int. Med. Den. Res. 2021; 7(2):ME01-ME04.

Source of Support: Nil, **Conflict of Interest:** None declared