Original Article

Nepalese Heart Journal 2019; Vol 16 (2), 63-67

Profile of Non-Diabetic patients with Microalbuminuria in Acute Coronary Syndrome: A hospital based study

Navaraj Paudel[1], Abhishek Maskey[1], Dipesh Karki[1], Sushant Katwal[1], Namrata Thapa[2],

[1]Department of Internal Medicine, Manipal Teaching Hospital, Pokhara
[2]Manipal School of Nursing, Manipal Teaching Hospital, Pokhara

Corresponding Author: Navaraj Paudel,
Department of Internal Medicine (Cardiology Unit), Manipal Teaching Hospital, Pokhara, Nepal.
Email: drnavarajdm@gmail.com
ORCID ID NO: 0000-0003-4551-0808

Cite this article as: Paudel N., Maskey A., Karki D., et al. Profile of Non-Diabetic patients with Microalbuminuria in Acute Coronary Syndrome: A hospital based study. Nepalese Heart Journal 2019; Vol 16 (2), 63-67

Submission date: 17th July 2019
Accepted date: 7th November 2019

Abstract

Background and Aims: Microalbuminuria (MA) (urinary albumin excretion of 30-299 mg/d in a 24 hours collection or 30-299 µg/mg creatinine in a spot collection) is well accepted marker of micro and macrovascular damage in patients with diabetes mellitus and is considered as a surrogate marker for endothelial dysfunction in diabetic and non-diabetic patients. This study has been undertaken to investigate the prevalence of microalbuminuria among non-diabetic Acute Coronary Syndrome (ACS) patients.

Methods: : A hospital based cross-sectional study of 100 consecutive non-diabetic ACS patients was done. Traditional risk factors (like smoking, hypertension, dyslipidemia, obesity) of coronary artery disease were studied for the association with microalbuminuria in study subjects. Investigations were carried out in all the cases as per proforma and entered in the SPSS software for analysis.

Results: The prevalence of microalbuminuria in non-diabetic ACS patients in the study was 73% which was statistically significant (p=0.04). A statistically significant higher prevalence of microalbuminuria was seen with different presentations of ACS; being highest (81.96%) in NSTEMI followed by STEMI (63.15%) and Unstable Angina (55%). It was found to be significant with the history of smoking (81.25%, p=0.013) and hypertension (82.25%, p=0.013). No significant association was found with age, body mass index (BMI) and dyslipidemia. A statistically significant higher prevalence of microalbuminuria was seen with increasing number of risk factors.

Conclusion: There is increased prevalence of microalbuminuria in ACS patents. MA was associated with statistically higher number of cases with history of smoking and hypertension and presence of increasing number of risk factors.

Keywords: Acute Coronary Syndrome, Microalbuminuria, Traditional risk factors.

DOI: https://doi.org/10.3126/njh.v16i2.26320

Introduction

Microalbuminuria (MA) is defined as increased urinary albumin excretion of 30-299 mg/d in a 24 hours collection or 30-299 µg/mg creatinine in a spot collection[1].

Evidence has shown an early increase of urinary albumin in acute myocardial infarction is a strong independent predictor of long-term adverse clinical outcome and Albumin Creatinine Ratio (ACR) improved clinical prediction over and above baseline traditional multivariable risk models[2]. The study on "Relationship between MA and the Presence and Extent of Coronary Atherosclerosis" found MA to be an independent predictor for the presence and severity of CAD. They concluded a strong relationship between MA and the severity of CAD[3]. Some studies show patients with higher proteinuria are at risk of developing higher degrees of ACS with adverse outcomes[3, 4].

There is a study regarding outcomes in ACS patients in Nepal taking in consideration of ACS patients only (including all the risk factors)[5]. We know that diabetes is an established cause of

endothelial dysfunction (ED) and its presence is considered as coronary artery disease equivalent. Hence to minimize confounding bias, we wanted to exclude diabetes (however other risk factors like hypertension and dyslipidemia are included). So, this study aims to find an association of MA in non-diabetic ACS patients admitted in Manipal Teaching Hospital which may represent patients of western region of Nepal being a referral center for ACS.

Methods

It was a cross-sectional observational study. One hundred (100) consecutive patients of Acute Coronary Syndrome admitted in Manipal Teaching Hospital were included in this study. Patient included in this study were: Acute Coronary Syndrome included patients with 1. ST Elevation Myocardial Infarction (STEMI) 2. Non ST Elevation Myocardial Infarction (NSTEMI). 3. Unstable Angina (UA).

The diagnostic criteria used for each were as under: 1) ST Elevation Myocardial Infarction (STEMI): Cases fulfilling two of the following three criteria- a) History of prolonged chest discomfort or angina equivalent (30 minutes). b) ST-elevation 1mm or more in two consecutive leads or new onset Left Bundle Branch Block (LBBB). c) Presence of elevated cardiac biomarkers. 2) Non ST Elevation Myocardial Infarction (NSTEMI): Severe chest discomfort having at least one of three features along with evidence of myocardial necrosis as reflected by abnormally elevated levels of biomarkers of cardiac necrosis. i) Occurring at rest (or with minimal exertion), lasting for > 10 minutes ii) Recent onset (i.e. within the prior 2 weeks) iii) Occurring with crescendo pattern (i.e. distinctly more severe, prolonged, or frequent than previous episodes. 3) Unstable Angina (UA): Angina pectoris or equivalent ischemic discomfort with at least one of three features: i) Occurring at rest (or with minimal exertion), lasting for > 10 minutes ii) Recent onset (i.e. within the prior 2 weeks) iii) Occurring with crescendo pattern (i.e. distinctly more severe, prolonged, or frequent than previous episodes. The following cases were excluded: 1. Known cases of diabetes mellitus. Cases showing random blood sugar ≥200mg/dl. 3. MA >300mg µg/mg creatinine. 4. Serum Creatinine >1.5mg/dl. 5. Patients showing pyuria with urine microscopy showing ≥8WBC/hpf. Patients with history of preexisting congestive cardiac failure.

Urine examination was carried out for all patients. a) Routine and microscopy b) MA by Nyocard kit test. The patients were explained about the procedure of urine specimen collection. Urine spot test was opted for assessment of MA for feasibility. Early morning midstream specimen was collected after washing the penile area in males, and perineal area in females. All urine specimens were obtained aseptically in well labeled screw capped universal containers and were promptly transported to laboratory for routine and microscopy examination and MA estimation.

The data was entered in excel sheet and analyzed using SPSS software version 16. Percentage, mean value were calculated and Pearson's correlation coefficient, chi square test, t-tests, odds ratio etc were calculated wherever required and p values were considered significant at a predetermined alpha level of 5%.

Results

Total 100 patients were studied in this study. Out of them 68 were males while 32 were females with male: female= 2.12. Majority of patients had NSTEMI: 61% (n=61), 20% (n=20) had UA and 19% (n=19) had STEMI. Overall prevalence of MA in our study was 73% (p=0.04); (Table 1).

Table 1: Overall prevalence of MA in ACS.

Urine	No of patients	p- value
Microalbuminuria	73	0.04
No microalbuminuria	27	

Out of 68 males and 32 females, MA was found positive in 47 (69.11%) males and 2 (81.25%) females respectively (p=0.202); (Table 2).

Table 2: Prevalence of MA among male and female patients.

Urine	Male (n=68)	Female (n=32)	Odds ratio	p-value
Microalbuminuria	47	26	1.97	0.202
No microalbuminuria	21	6		

The prevalence of MA was highest in NSTEMI group being 81.96%. The corresponding figures in STEMI and Unstable Angina were 63.15% and 55% respectively. The difference was statistically significant (p=0.035).

Table 3: Prevalence of MA in different presentation of ACS

Presentation of ACS	Total (n=100)	Microalbuminuria (n=73)	No Microalbuminuria (n=27)	p-value
STEMI	19	12	7	0.035
NSTEMI	61	50	11	
Unstable Angina	20	11	9	

Figure 4: Prevalence of microalbuminuria in different pressentation of ACS

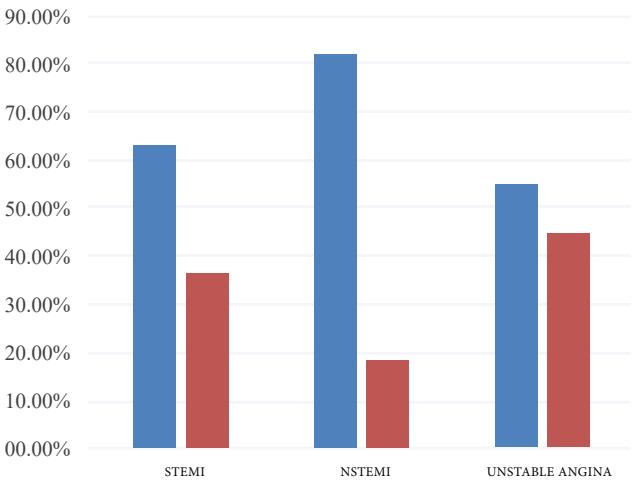

Table 4: Prevalence of MA with risk factors

Risk factorspatients (n)			Microalbuminuria	No microalbuminuria	p-value
Smoking	Yes	64	52	12	0.013
	No	32	21	11	
Hypertension	Yes	62	51	11	0.013
	No	38	22	16	
Obesity (BMI>25Kg/m2)	Yes	59	45	14	0.221
	No	41	28	13	
Dyslipidemia	Yes	61	47	14	0.254
	No	39	26	13	

98 out of 100 ACS patients were having one or more risk factors under studied. Prevalence of MA was in 50% of patients with no risk factor, 40% with one risk factor, 75% with two risk factors and 86% with three or more risk factors. The difference was statistically significant (p=0.001).

Table 5: Relative prevalence of MA in ACS according to number of risk factors.

Risk factors	Total (n=100)	Microalbuminuria (n=73)	No microalbuminuria (n=27)	p-value
None	2 (2%)	1 (50%)	1 (50%)	
One	20 (20%)	8 (40%)	12 (60%)	0.001
Two	28 (28%)	21 (75%)	7 (25%)	
Three or more	50 (50%)	43 (86%)	7 (14%)	

Discussion

The overall prevalence of micro-albuminuria in non-diabetic ACS in this study was 73% which was statistically significant (p=0.04). The studies done outside also show similar findings ranging from 58-92% [6-10]. In the study done by F Aziz et al found prevalence of MA to be 56.5% in angiographically proved severe CAD (luminal narrowing > 70%)[11], Similarly, in the study done by Silva et al on prevalence of MA in 39 patients with angiographically confirmed severe lesion (stenosis > 70%) in at least one coronary artery found to be 33% which was statistically significant[12]. The results of above studies cannot be matched with our study due to different inclusion criteria but nevertheless they confirm the fact that MA is present in statistically significant number of cases in coronary artery disease.

This study showed no difference in MA between different sexes (p = 0.202). Few studies[13,14] also show similar results but a case control study done by Basu et al found a statistically significant higher numbers of males (83.33%) as compared to females (40%)[6]. In the study done by Silva et al on determination of MA in hypertensive patients and in patients with coronary artery disease found prevalence of MA was 23% in the age group 56 years and above and 5% in age group 55 years and below which was statistically significant[12].

The prevalence of MA was highest in NSTEMI group being 81.96%. The corresponding figures in STEMI and Unstable Angina were 63.15%and 55% respectively. The difference was statistically significant (p= 0.035). Zeeshan A, Ahmad Z, Tahir GA, Yaqoob Y in their study on acute coronary syndrome titled MA as atherosclerotic risk factors and its association found MA in 20.4% cases of STEMI. The corresponding figures in NSTEMI and Unstable angina were 21.3% and 25.3% respectively[15]. In contrast, Abdul Ghaffar Memon and Mubashir Kolachi in their study on relationship of MA in non-diabetic and non-hypertensive patients with acute myocardial infarction done in Hyderabad, Pakistan found MA in 53.17% STEMI and15.8% NSTEMI[8].

Out of 64 patients with the history smoking in our series, MA was present in 52 (81.25%) while out of 36 nonsmokers, MA was found in 21 (58.33%) patients. The difference was statistically significant (p = 0.013). Basu A et al in their study of 50 non diabetic and non-hypertensive patients of ACS with similar inclusion criteria as our study found MA was present in 92% (23 out of 25) of patients with smoking while out of 25 nonsmokers, MA was found in 10 (40%) of patients .The difference was statistically significant (p < 0.001)[6]. However Bhalabhi Vaishali and Ghanekar Gayatri in their study of correlation of MA and multiple risk factors in acute coronary syndrome found MA in 50% (6 out of 12) of patients with smoking which was not statistically significant (p > 0.05). However cases of diabetes mellitus were also included in their study[7]. Since association of smoking and MA has long been known, further large scale studies are required to determine its association in patients with acute coronary syndrome.

In our study, out of 62 hypertensive patients in our series, MA was present in 51 (82.25%) of the cases while corresponding figures in 38 normotensive patients was 22 (57.89%). The difference was statistically significant (p = 0.013). Bhalabhi Vaishali and Ghanekar Gayatri in their study of correlation of microalbuminuria and multiple risk factors in acute coronary syndrome found microalbuminuria to be present in 8.82% among hypertensive cases which was not statistically significant (p > 0.05). Cases of diabetes mellitus were also included in their study[7]. However,

Al–Saffar et al in their study of microalbuminuria in non-diabetic patients with Unstable angina/non ST elevation myocardial infarction found microalbuminuria to be present in 8 (22%) of the 37 cases with hypertension while corresponding figures in 33 normotensive patients was 13 (39%). The results were not statistically significant (p = 0.1). ST segment elevation MI cases were not included in their study[14]. Association of microalbuminuria with dyslipidemia and obesity was not significant in our study; however few studies have shown significant association[6, 15-18]. 98 out of 100 ACS patients in our study were having one or more risk factors. Prevalence of microalbuminuria was in 50% of patients with no risk factor, 40% with one risk factor, 75% with two risk factors and 86% with three or more risk factors. The difference was statistically significant (p = 0.001). In the study done by Bhalavi Vaishali and Ghanekar Gayatri on correlation of microalbuminuria and multiple risk factors in ACS found microalbuminuria in 86.66% with multiple risk factors compared to 44.44% with no risk factors and the difference was statistically significant[7]. Massimo Cirillo et al in their of Microalbuminuria in non-diabetic adults showing relation of blood pressure, BMI, plasma cholesterol levels and smoking showed that blood pressure, BMI and smoking relate positively to rate of urinary albumin excretion and prevalence of microalbuminuria independently of each other in non-diabetic middle aged patients[19]. The results of these studies are in agreement with our study.

Conclusion

Overall prevalence of microalbuminuria in non-diabetic ACS patients in our study was 73%.There is no difference in prevalence of microalbuminuria between males and females. Highest prevalence of microalbuminuria was seen in NSTEMI patients. Microalbuminuria was associated with statistically higher number of cases with history of smoking and hypertension and with increasing number of risk factors present.

Limitations and recommendations

Our study consisted of 100 patients only and the results of our study need to be substantiated with the results of prospective larger clinical studies with matching clinical criteria.

Sources of funding: None

Conflict of Interest: None

References

1. Powers AC. Diabetes Mellitus Complication. In: Dennis LK, Anthony SF, Longo DL, Loscalzo J, Stephen LH, Jamenson JL, editors. Harrison's Principles of Internal Medicine.19th edn: New York: McGraw-Hill; 2015. p. 2422- 35. doi:10.1001/jama.308.17.1813-b.

2. Berton G, Cordiano R, Palmeri R, et al. Microalbuminuria during acute myocardial infarction; a strong predictor for 1 year mortality. Eur Heart J. 2001; 22(16):1466-75. doi: http://dx.doi.org/10.18203/2349-3933.ijam20170523.

3. Deveci OS, Kabakci G, Tulumen E, et al. The relationship between microalbuminuria and the presence and extent of coronary atherosclerosis. Angiology 2010;61(2):184-91. doi: 10.14740/jocmr2785w.

4. Schrader J, Luders S, Kulschewski A, et al. Microalbuminuria and tubular proteinuria as risk predictors of cardiovascular morbidity and mortality in essential hypertension: final results of a prospective long-term study (MARPLE Study). J Hypertens. 2006;24(3):541-8. doi: 10.1097/01.hjh.0000209991.48928.c4.

5. P. Karki, K.K. Agrawaal, M. Lamsal, and N.R. Shrestha. Predicting outcomes in acute coronary syndrome using biochemical markers. Indian Heart J. 2015 Nov-Dec; 67(6): 529–537. doi: 10.1016/j.ihj.2015.06.029.

6. Basu A, Jhala JS. Association of microalbuminuria in non-diabetic and non-hypertensive patients with myocardial infarction. Int J Adv Med. 2015;2(3):196-200. doi: http://dx.doi.org/10.18203/2349-3933.ijam20150003.

7. Bhalavi V, Ghanekar G. Correlation of Microalbuminuria and Multiple Risk Factors in Acute Coronary Syndrome. Int J Sci Res. 2016;5(3):187-91. doi: 10.4103/0971-4065.43690.

8. Memon AG, Kolachi M. Relationship of Microalbuminuria in Non-Diabetic and Non-Hypertensive Patients with Acute Myocardial Infarction. J Clin Exp Cardiolog. 2015;6(9):403. doi:10.4172/2155-9880.1000403.

9. Kumar Jha P, Ete T, Malviya A, et al. Microalbuminuria: Correlation With Prevalence and Severity of Coronary Artery Disease in Non-Diabetics. J Clin Med Res. 2017 Oct;9(10):838-843. doi: 10.14740/jocmr2785w.

10. Patel SR, Acharya H, Saiyad M. A study of predictive value of microalbuminuria in early outcome of non-diabetic patients of acute myocardial infarction. Int J Adv Med. 2017;4(2):334-8. doi: http://dx.doi.org/10.18203/2349-3933.ijam20170523.

11. Srinivasan MP, Kamath PK, Manjrekar PA, et al. Correlation of severity of coronary artery disease with insulin resistance. N Am J Med Sci. 2013;5(10):611–614. doi:10.4103/1947-2714.120799.

12. Silva RP, Cisne K, de Oliveria JM, et al. Determination of Microalbuminuria in Hypertensive Patients and in Patients with Coronary Artery Disease. Arq Bras Cardiol. 2008;90(2):99-103. doi: http://dx.doi.org/10.1590/S0066-782X2008000200006.

13. Bhalavi V, Ghanekar G. Correlation of Microalbuminuria and Multiple Risk Factors in Acute Coronary Syndrome. Int J Sci Res. 2016;5(3):187-91. Paper ID: NOV161805.

14. Al –Saffar HB, Nassir H, Mitchell A, et al. Microalbuminuria in non-diabetic patients with unstable angina/non ST-segment elevation myocardial infarction. BMC Res Notes. 8:371 (2015). doi: 10.1186/s13104-015-1347-x.

15. Zeehan A, Ahmad Z, Tahir GA, Yaqoob Y. Acute coronary syndrome; microalbuminuria as atherosclerotic risk factor and its association. Professional Med J. 2017;24(1):26-30. doi: 10.1186/s13104-0 15-1347-x

16. Kim YS, Kim HS, Oh HY, et al. Prevalence of microalbuminuria and associated risk factors among adult Korean hypertensive patients in a primary care setting. Hypertens Res. 2013;36(9):807-23. doi: 10.1038/hr.2013.44.

17. Liu X, Liu Y, Chen Y, et al. Body mass index (BMI) is associated with microalbuminuria in Chinese hypertensive patients. Int J Environ Res Public Health. 2015;12(2):1998-2008. doi: 10.3390/ijerph120201998.

18. Aziz KMA. Association of Microalbuminuria with Ischemic Heart Disease, Dyslipidemia and Obesity among Diabetic Patients: Experience from 5 Year Follow up Study of 1415 Patients. Biogenetics. 2014;3(2):118. doi:10.4172/2167-7662.1000118.

19. Cirillo M, Senigalliesi L, Laurenzi M, et al. Microalbuminuria in nondiabetic adults: relation of blood pressure, body mass index, plasma cholesterol levels, and smoking: The Gubbio Population Study. Arch Intern Med. 1998;158(17):1933-9. doi: 10.1001/archinte.158.17.1933.