

# Correlation of Microalbuminuria and Multiple Risk Factors in Acute Coronary Syndrome

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**Abstract:** Background: The current study was undertaken at tertiary care center, Bhopal, MP, Central India. with the objective is to study the occurrence of microalbuminuria in acute coronary syndrome and to find their association with multiple cardiovascular risk factors. Materials and Methods: The present study was carried out during period jun2009 to 2010 on patients presenting to the cardiology department Hamidia hospital, Bhopal, MP. It was an observational comparison study in which comparison of two groups according to the presence and absence of microalbuminuria in patient diagnosed to have acute coronary syndrome after proper history, thorough clinical examination and investigations and find their correlation with multiple risk factors for acute coronary syndrome. Results and Conclusions: This observation implies that microalbuminuria is significantly more commonly seen in patients with acute coronary syndrome as compared to healthy adults of same biological characteristics. The difference between occurrence of microalbuminuria was significant in cases with multiple risk factors than any isolated single risk factors.

**Keywords:** Microalbuminuria, Multiple risk factors, Acute coronary syndrome

## 1. Introduction

Microalbuminuria (MAU) is a common phenomenon in patients with cardiovascular disease worldwide. Although mortality from coronary heart disease (CHD) has declined since the late 1960s and 1970s in most industrialized countries, CHD is still the leading cause of death.<sup>1</sup> The geographic and temporal patterns of CHD event rates correspond to trends in the prevalence of classical cardiovascular disease risk factors, with the residual variance in CHD attributable in part to unknown factors<sup>2</sup>. This indicates that non established CHD risk factors might be operational in CHD incidence and mortality and lends support to the continuous search for novel cardiovascular disease risk factors or risk markers that might predict CHD independently of the classical risk factors. Microalbuminuria is one of these possible predictive factors.

Microalbuminuria is associated with an increased risk of cardiovascular and renal disease in patients with diabetes mellitus<sup>3,4</sup> and hypertension.<sup>5,6</sup> Although the role microalbuminuria plays in the general population is less well known, studies have shown that it is independently associated with prevalent cardiovascular disease in the general population<sup>7,8</sup> and that it predicts all-cause and cardiovascular disease mortality in the general population and in nondiabetic persons.<sup>9,10,11,12</sup> Although the significance of albuminuria as a possible predictor of CHD in persons without diabetes has been suggested,<sup>13,14,15</sup> there has not been a report from a large population-based cohort study of albuminuria and incident CHD. The prognostic significance of albuminuria in persons with baseline CHD in the general population is also unknown. Therefore, we undertook this study to examine the correlation of microalbuminuria with multiple risk factors in patient with acute coronary syndrome in hamidia hospital Bhopal, MP, Central India.

## 2. Materials and Methods

The present study was carried out during the period of june2009 to september2010 on patients presenting to the cardiology department in Hamidia hospital Bhopal, M.P. It was an observational comparison study, in which intra

group comparison was the main focus of analysis. This comparison was done between two groups formed in the study cases by dividing them in two groups according to the presence or absence of microalbuminuria.

Firstly the study population cohort was compared with age and sex matched control population from the same demographic and socioeconomic background for confirming the observation that microalbuminuria was frequent in the study population compared to general population.

All the patients who presented with the history, physical examinations and investigations (ECG, cardiac enzymes) satisfying the criteria for diagnosis of an acute coronary syndrome –including unstable –angina and myocardial infarction were included in the study.

After proper history and thorough clinical examinations data were recorded and other data regarding history of hypertension, diabetes, tobacco use, smoking, past and family history of CAD were noted.

Every patients first morning urine sample on his or her second post admission day was collected and analysed using immunoturbidometric analysis. Microalbuminuria was defined as presence of 30-300mg/liter of albumin in spot urine sample. Patient received appropriate treatment according to standard protocol and after stabilization patient were subjected to 2-Dechocardiography on day 5. Presence of regional wall motion abnormality, ejection fraction and any other abnormality like pericarditis, apical aneurysm, valvular regurgitation and relevant findings were recorded. Subsequently, the patient were followed for the development of any arrhythmias, any conduction defect, left ventricular dysfunction or any other complications or death during their period of hospitalization (average: 5 days).

The entire data was analysed and statistical tests were applied as and when appropriate.

### Inclusion Criteria

All the patients with history of chest pain and diagnosis consisting of ACS were included in the study regardless of other parameters.

### Exclusion Criteria

- 1) Those with presence of preexisting renal failure were excluded.
- 2) Those with stable ischaemic heart diseases were not included.
- 3) Those with suspected ACS but investigations suggesting alternating diagnosis were excluded.

## 3. Results

Present study included comparison between microalbuminuria positive and negative cases with acute coronary syndrome. There were 55 cases satisfying the criteria for diagnosis of ACS as mentioned earlier and 27 healthy age and sex matched controls. The age group of cases was from 23-90yrs and that of controls was 28-84yrs. Microalbuminuria in cases population was found to be in total 34 patients out of 55(61.81%); whereas in control population, 3 patients comprising of 14.81%.

On comparison of these two populations, the difference between occurrence of microalbuminuria was found to be statically significant( $\chi^2=11.7$  and  $p<0.05$ ). (Table:1)

This observation implies that microalbuminuria is significantly more commonly seen in patients with ACS as compared to normal healthy population of same biological characteristics.

The mean age of cases was  $52.78 \pm 12.96$  yrs and  $53 \pm 10.61$  yrs for controls. The mean age of MA+ve cases was 53.09yrs and MA-ve cases was 51.94 yrs. Maximum number of cases were in 40-49yrs (n=17 or 30.90%). Maximum number of controls were in 50-59yrs agegroup (n=10 or 37.03%).

**Table 1:** Shows the characteristics of cases and control in the study.

	Cases	Controls	Comments
Total Number	55	27	
Males	47(85.47%)	23(85.18%)	$p>0.05$
Females	8(14.54%)	4(14.81%)	$p>0.05$
Sex Ratio	5.875	5.75	
Mean Age	$52.78 \pm 12.96$ yrs	$53 \pm 10.61$ yrs	$p>0.05$
Total MA+ve(Patients)	34(61.81%)	4(14.81%)	$P<0.05$
Total MA+ve(Males)	28(59.57%)	4(100%)	$P<0.05$
Total MA-ve(Females)	6(75%)	0	

There were 47(85.45%) males and 8(14.54%) females in cases and the sex ratio was 5.875:1. In MA+ve cases, there were 28(82.35%) males and 6(17.64%) females and the sex ratio was 4.66:1. In MA-ve cases, there were 19(90.47%) males and 2(9.52%) females with the sex ratio of 9.5:1. There were 23(85.18%) males and 4(14.81%) females in the control group and the sex ratio was 5.75:1. Table:2 shows variables in genders in the present study.

**Table 2:** Shows variables in males and females in the present study.

	Males	Females	Comments
TOTAL CASES	47	8	
MA+VE CASES	28	6	$p>0.05$
MA-VE CASES	19	2	$p>0.05$
MEAN AGE	$50.55 \pm 11.6$ yrs	$65 \pm 13.88$ yrs	$p>0.05$ but $<0.1$
RISK FACTORS	33(70.21%)	4(50%)	$p>0.05$

Mean age of males with acute coronary syndrome was  $50.55 \pm 11.6$  yrs and that of females with ACS was  $65 \pm 13.88$  yrs. This observation suggests that females with ACS were older than males. Table:3 shows age distribution of cases of microalbuminuria in the study. Table:4 and figure 1 shows distribution of the multiple risk factors in cases in the present study.

**Table 3:** Shows age distribution of cases of microalbuminuria in acute coronary syndrome in the study

Age group	Total cases(n=55)	MA+ve(n=34)	MA-ve(n=21)
<50yrs	24(43.63%)	16(47.05%)	8(38.09%)
>50yrs	31(56.36%)	18(52.92%)	13(61.90%)

**Table 4:** Shows the distribution of risk factors in cases in the present study

Risk Factors	MA+ve(n=34)	MA-ve (n=21)	Total cases (n=55)	P Value	Significance
Diabetes mellitus	4(11.76%)	2(9.52%)	6(10.96%)	$p>0.05$	Not significant
Hypertension	3(8.82%)	1(4.76%)	4(7.27%)	$p>0.05$	Not significant
Smoking	6(17.46%)	6(28.57%)	12(21.81%)	$p>0.05$	Not significant
Multiple risk factors	13(38.23%) HTN+Smoking=5 DM+Smoking=4 HTN+DM=3 HTN+DM+Smoking=1	2(9.52%)	15(27.27%)	$P<0.05$	<b>Significant</b>
NO Risk factors	8(23.52%)	10(47.61%)	18(32.72%)	$p>0.05$	Not significant

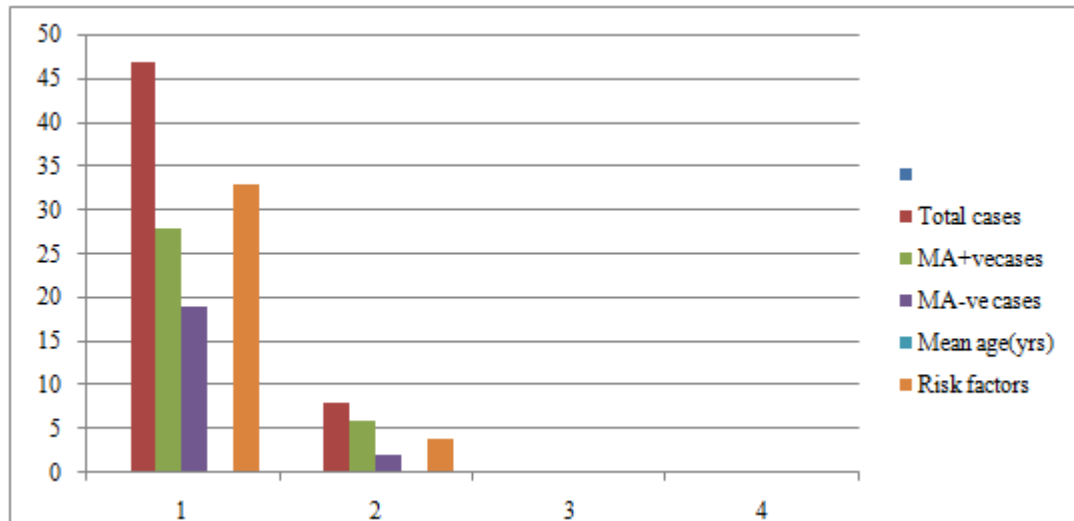


Figure 1: Shows the distribution of risk factors in the present study.

In MA+ve cases ,there were 4 cases with DM,3 cases of hypertension ,6 smokers and 13 with multiple risk factors. In MA-ve cases there were 2 cases of DM ,1 case with hypertension and 6 smokers and only 2 with multiple risk factors. The difference between occurrence of microalbuminuria was significant in cases with multiple risk factors than any isolated risk factors.

#### 4. Discussion

In our study, mean age of males with acute coronary syndrome was  $50.55 \pm 11.6$  yrs and that of females with ACS was  $65 \text{ yrs} \pm 13.88$  yrs similar to the INTERHEART study<sup>16</sup> where age distribution was mean age of  $59 \pm 12$  for males and women were older than males by 5.4 yrs .Various studies from all over world ,including Asia and India, suggest the maximum no of patients with MI or CAD are from the age group of 50-60 yrs. Case series study from Iran in 2001, average age of patients was  $59.1 \pm 12.2$  yrs and in 1991 this figure was  $59.18 \pm 10.8$  yrs ( $p=0.94$ )

In our study females with acute coronary syndrome were older than males similar to INTERHEART study.

Microalbuminuria in females(75%) was more in our study than males(59.57%) but this difference was not statically significant ( $p>0.05$ ) .This difference may be present due to the fact that females were overall older as compared to males and hence prone to endothelial dysfunction. In PREVEND<sup>17</sup> study prevalence of microalbuminuria remains fairly constant for females, despite of their age group, but in males prevalence increases after the age of 50 yrs. In our study prevalence of microalbuminuria was higher in younger males as compared to older males(66.66% in males <50 yrs and 52.13 in males >50 yrs of age).

In the present study the difference in occurrence of microalbuminuria were significant ( $p<0.05$ ) in acute coronary syndrome with multiple risk factors than isolated factor which is similar to DIABHYCAR<sup>18</sup> and HOPE<sup>19</sup> study. In the review article by Dobre D, Nimade S<sup>20</sup> from neither land mentioned that several large prospective studies say that urinary albumin excretion rate has been shown to

predict cardiovascular disease in patient with diabetes, hypertension and seemingly healthy individual.

In our study, prevalence of microalbuminuria was 75% but the MAGIC<sup>21</sup> study from Italy conducted to evaluate the prevalence and clinical correlates microalbuminuria in essential hypertension reported a considerably less prevalence of MA in untreated hypertensives and the authors state that “the present study reports a 6.7% prevalence of microalbuminuria in untreated patients with mild to moderate essential hypertension.

This figure differs from those of several previously published reports indicate a variable but considerably higher prevalence of microalbuminuria. These discrepancies are most likely due to different criteria in patient selection (severity of hypertension, age, race, coexistence of renal diseases and technique used for the detection of microalbuminuria).

Smoking is a recognized cardiovascular risk factor, and it may be also related to MAU

Association of smoking and microalbuminuria has been long known. We found a 50% prevalence of MA in smokers regardless of the duration of amount. In other studies by H B.Saffar et. al<sup>22</sup> and Jaun-Manuel Guizer<sup>23</sup>, MAU was more common in smokers than in non-smokers while study by Charles et al. could not confirm this finding<sup>24</sup>.

We carried out this study on patients who had an acute coronary events, whereas the other researchers have included otherwise healthy population apart from presence of hypertension or diabetes and smoking. Our observation on patients with ACS infact represent the small cohorts of hypertensives and diabetics who actually went on to develop a macrovascular complication like MI and this microalbuminuria was probably one of the culprit of high cardiovascular risk indicators.

#### 5. Conclusions

The present study concluded the occurrence of microalbuminuria is significantly more in patients with ACS as compared to the general population. Patients with

multiple cardiovascular risk factors are more likely to have microalbuminuria rather than patients with isolated risk factors like diabetes, hypertension and smoking.

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