

A study of the cardiovascular risk factor profile in patients with acute coronary syndrome

Azhar Ali Syed¹, Mohammed Hidayatullah², Wajhia Sultana³, Amina Shareef^{4*}

¹Assistant Professor, Department of General Medicine: Deccan College of Medical Sciences, Kanchanbagh, Santhosh Nagar, Hyderabad, India

²Assistant Professor, Department of Cardiology : Deccan College of Medical Sciences, Kanchanbagh, Santhosh Nagar, Hyderabad, India

³HITAM Telangana State Health and Family Welfare, India

^{4*}Duty Medical officer: Maxwell Hospital, India

Received: 10-12-2020 / Revised: 10-01-2021 / Accepted: 24-01-2021

Abstract

Introduction: Acute coronary syndrome (ACS) remains a leading cause of death in the United States. Numerous studies have shown that the risk factors are major if not the most important determinant of long-term outcome in ACS. **Aims:** This study is taken up to study the cardiovascular risk factor profile in patients with acute coronary syndrome. **Materials and methods:** 120 patients with acute coronary syndrome, admitted to the ICCU, Department of Cardiology, who had been diagnosed with acute coronary syndrome were enrolled for the study. **Results :** In this study 60% of patients had metabolic syndrome and 40% did not satisfy the criteria for MS. In the MS+ group 59 (82%) are males and 13(18%) are females Mean age of the patients of the study is 51.3 years. Mean age of the patients with and without metabolic syndrome is 52.3 and 48.9 years respectively. 22%, 45.8%, 29%, 20.8% and 16.7% of patients with metabolic syndrome had history of smoking, hypertension, diabetes, obesity and coronary artery disease respectively, of which history of hypertension has statistical significance. Among males, 34 satisfied 3 criteria of metabolic syndrome, 17 satisfied 4 criteria and 2 satisfied all 5 criteria of MS. Among females, 3 satisfied 3 criteria of metabolic syndrome, 7 satisfied 4 criteria and 4 satisfied all 5 criteria. **Conclusion:** The most commonly affected were elderly. Among the risk factors, smoking was the most common risk factor found in the present study.

Keywords: Acute coronary syndrome, Metabolic syndrome, Diabetes.

This is an Open Access article that uses a fund-ing model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Asian Indians have one of the highest rates of coronary artery disease (CAD) in the world. Over the past 30 years, the prevalence of CAD has increased 300% from 2% to 6% in rural India and from 4% to 12% in urban India. CAD among Indians is usually more advanced at the time of presentation compared with whites or other Indians. The overall social and economic impact of the disease is much greater because the CAD in Asian Indians affects a younger and working population. Both established and novel risk factors and a possible genetic predisposition (in part due to lipoprotein (a) excess and higher prevalence of diabetes and metabolic syndrome appear to significantly contribute to this problem[1,2]. Most experts agree that metabolic syndrome identifies individuals who are generally at low short term (10 year) risk for CVD but at very high lifetime risk of CVD and diabetes (type 2), but more importantly, respond well to intensive lifestyle modification. The World Health Organization has recognized obesity, diabetes mellitus(DM), hypertension(HTN), chronic kidney disease (CKD), hypercholesterolemia, and smoking among the top ten traditional risk factors for premature death and morbidity [3]. The ultimate importance of knowing those risk factors is to determine and identify the individual risk[4]. This study is taken

up to study the cardiovascular risk factor profile in patients with acute coronary syndrome.

Materials and methods

120 patients with acute coronary syndrome, admitted to the ICCU, Department Of Cardiology, who had been diagnosed with ST and non-ST segment elevation ACS and who had clinical, electrocardiographic and biochemical diagnosis within the first 24 h of clinical onset. ST-segment elevation, were enrolled for the study after meeting the inclusion and exclusion criteria.

Inclusion criteria: Patients with ACS diagnosis, established according to criteria established by the American College of Cardiology and American Heart Association through evaluation of myocardial necrosis markers in serial determinations [MB fraction of creatine phosphokinase (CPK) $\geq 10\%$ of total CPK and/or troponin-I (TNI) ≥ 1 ng/ml] plus one of the following criteria:

- Precordial ischemic pain >30 min with or without dyspnea,
- Diaphoresis, nausea and/or vomiting,
- ST-segment elevation in electrocardiogram >1 mm in two or more contiguous leads,
- Pathologic q wave or
- Left bundle branch block, new or presumed new.

Non-ST segment elevation ACS was diagnosed when angina onset ≤ 20 min associated with electrocardiographic (ECG) changes of negative ST-segment deviation >1 mm in two or more contiguous leads.

*Correspondence

Dr. Amina Shareef

Duty medical officer, Maxwell hospital, Telangana, India.

E-mail: aminashareef@gmail.com

1. Patients with unstable angina.
2. Patients more than 18 years of age.
3. Patients with hypertension, diabetes and obesity on drug therapy are also included in the study.

Exclusion criteria:

1. Patients found to have other than acute coronary syndrome on evaluation are excluded from the study.
2. Seriously ill patients, patients with acute infection, neoplastic disease, cardiomyopathies, cardiogenic shock at admission were excluded from the study.
3. Patients with other major organ (liver, kidney, brain) chronic illness or degenerative disease with life expectancy <2 years are excluded from the study.
4. Patients on drugs, unrelated to lipid lowering therapy & known to alter serum lipid profile (long term steroids, diuretics, other proprietary medications etc) were excluded from the study.

All patients signed an informed consent form before being admitted into the study. All the patients were subjected to detailed history and complete physical examination and the data collected was recorded in a predesigned proforma.

- Diagnosis of ACS as per ACC/AHA criteria
- Waist circumference as per national health and nutrition survey study.
- Blood and urine routine investigations
- Fasting blood sugar
- 12 hr fasting lipid profile

- 12 lead ECG
- 2 D echo
- Coronary Angiography
- Evaluation of Metabolic Syndrome using South Asian Modified NCEP-ATP III criteria.

After meeting the inclusion and exclusion criteria 120 patients of ACS admitted to ICU were enrolled for the study. Their cardiovascular risk factor profile is studied with particular reference to metabolic syndrome and the results are statistically analysed. The impact of clustering of the risk factors is assessed between 2 groups: those with metabolic syndrome (MS+) and those without (MS-). [Evaluation of Metabolic Syndrome using South Asian Modified NCEP-ATP III criteria.][5] Results were described according to data distribution using average and standard deviation or median and ranges. Demographic characteristics of groups were expressed through frequencies and percentages. Qualitative independent variables were compared using Student t-test. Dichotomous variables were tested using χ^2 test or Fisher's exact test according to expected frequencies. A p value of <0.05 was considered statistically significant.

Results

In this study 60% of patients had metabolic syndrome and 40% did not satisfy the criteria for MS. In the MS+ group 59 (82%) are males and 13 (18%) are females. This distribution of MS between males and females is not statistically significant.

Table 1: Demographic distribution in present study

Age group	MS+ (n=72)	MS- (n= 48)	TOTAL (n= 120)
<30	0 (0%)	3 (6.2%)	3(2.5%)
30-39	7 (9.7%)	7 (14.5%)	14(11.6%)
40-49	14 (19.4%)	13 (27%)	27(22.5%)
50-59	33 (45.8 %)	17 (35.4%)	50(41.6%)
60-69	15 (20.8%)	8 (16.6%)	23(19%)
≥ 70	3 (4%)	0 (0%)	3(2.5%)
Gender			
Males	59 (82%)	46 (95.8%)	105(87.5%)
Females	13 (18%)	2 (4.2%)	15(12.5%)

Mean age of the patients of the study is 51.3 years. Mean age of the patients with and without metabolic syndrome is 52.3 and 48.9 years respectively. Age distribution is similar in both groups with maximum number of patients belonged to age group 50-59 (41.6%) followed by age group 40-49 (22.5%). There was no statistical significance between the group of patients with MS and that without MS. In this study 87.5% are males and 12.5% are females. However this prevalence is statistically significant. In the MS+ group 82% (59/72) are males and 18% (13/72) are females.

Table 2: Risk factors associated with metabolic syndrome in patients

Risk factor	MS+	MS-	p value
H/o Smoking	16(22%)	16(33%)	NS
H/o HTN	33 (45.8%)	13(27%)	S
H/o Diabetes	21(29%)	8(16.6%)	NS
H/o Obesity	15(20.8%)	7(14.5%)	NS
H/o CAD	12(16.7%)	6(12.5%)	NS

Cardiovascular risk factors like family history of hypertension, diabetes, obesity and coronary artery disease are more common in MS+ group than in MS- group, except history of smoking, which is more common in MS- group. Only history of hypertension between MS+ and MS- groups has statistical significance.

Table 3: Risk factors associated with metabolic syndrome in genders 00

MS+	Males	Females	p value
H/o Smoking	15 (25.4%)	0(0%)	S
H/o HTN	24 (40.6%)	9(69 %)	NS
H/o Diabetes	17(28.8%)	5(38.5%)	NS
H/o Obesity	11 (18.6%)	6 (46%)	NS
H/o CAD	9(15.2%)	3(23)	NS

In MS+ group, cardiovascular risk factors like family history of hypertension, diabetes, obesity and coronary artery disease are more common in females than in males except for history of smoking which exclusively prevalent among men statistically significant.

Table 4: Prevalence of Components of Metabolic Syndrome

Risk factor	MS+	MS-	p value
WC	59(82%)	21(43.7%)	HS
HTN	51(71%)	6(12.5%)	HS
FBS	54(75%)	20(41.6%)	S
TG	51(71%)	23(48%)	S
HDL-C	25(34.7%)	9(18.7%)	S

In the MS+ group, all the components of metabolic syndrome are more common in females, (HDL being the most prevalent one), except waist circumference, which is most prevalent in males. The prevalence of HDL and TG, being more common in females than in males, is statistically significant.

Table 5: Components of Metabolic Syndrome Vs Sex Distribution

MS+	Males	Females	p value
WC	51(86.4%)	7(53.8%)	NS
HTN	40(67.8%)	9(69%)	NS
FBS	43(72.8%)	11(84.6%)	NS
TG	44(74.5%)	11(84.6%)	S
HDL-C	12(20.3%)	13(100%)	HS

Among males, 34 satisfied 3 criteria of metabolic syndrome, 17 satisfied 4 criteria and 2 satisfied all 5 criteria of MS. Among females, 3 satisfied 3 criteria of metabolic syndrome, 7 satisfied 4 criteria and 4 satisfied all 5 criteria.

Discussion

120 patients with acute coronary syndrome, admitted to the ICCU, Department Of Cardiology, who had been diagnosed with acute coronary syndrome were enrolled for the study after meeting the inclusion and exclusion criteria. The observations made are discussed here.

Table 6: Prevalence of Metabolic Syndrome in the patients of ACS

Study	Incidence
Zeller M et al[6]	46%
Schwartz G et al[7]	38%
Madrid Miller A et al[8]	43.4%
This Study	60%

The prevalence of metabolic syndrome as defined by the NCEP ATP III modified South Asian guidelines, in patients with acute coronary syndrome in this study is 60% which is higher than above mentioned studies. The other studies were conducted in non Indian population. Asian Indians are in double jeopardy from nature and nurture—*nature*, being the genetically-determined excess of insulin resistance and diabetes, Lp(a) excess, and *nurture*, being an ever-increasing unhealthy lifestyle associated with rising affluence, urbanization, and mechanization[9]. Furthermore, patients with ACS represent a cohort with accumulation of multiple risk factors that have culminated in a adverse coronary event.

Table 7: Age and Sex distribution in comparison with other studies

Study	Mean Age	Males	Females
Levantesi G et al[10]	68.2	85%	15%
Milani R V et al[11]	65.7 ± 10.3	64%	36%
Madrid Miller A et al[8]	62.2 ± 11.05	66.7%	33.3%
This Study	51.3	82%	18%

In this study maximum number of patients belonged to the age group 50 – 59 years (45.8% in MS+ group and 35.4% in MS- group). There is no statistical significance in mean age of presentation between two age groups (52.3 and 48.9 years) (NS). Metabolic syndrome in ACS patients is seen earlier in this study compared to other studies. In this study males predominate in MS+ group (82%) than females 18% comparable to other studies.

Table 8: Risk factors in comparison with other studies

Study	H/o Smoking	H/o HTN	H/o DM	H/o Obesity	H/o CAD
Zeller Met al[6]	23%	79%	48%	25%	32%
Madrid Miller A et al[8]	62.2%	87.6%	70.3%	56.6%	35.5%
This study	23.3%	50%	31.7%	23.3%	16.7%

In this study the prevalence of above risk factors is lower than other studies reflecting the poor awareness and control of CVD risk factors among Indians. However, except for history of hypertension, there is no significant difference in the prevalence of history of the cardiovascular risk factors. [$p > 0.05\%$].

Table 9: Components of metabolic syndrome comparison with other studies

Study	WC	HTN	FBS	TG	HDL-C
Schwartz G et al[7]	76%	90%	86%	-	88%
Ninomiya et al[12]	51%	48.2%	-	43.2%	45%
This study	83.3%	70%	76.7%	78.3%	36.7%

All components of metabolic syndrome are more prevalent in MS+ group than in MS- group and the distribution is of statistical significance [$p < 0.05$; S] High Waist circumference is the most prevalent followed by High Triglycerides and High Fasting Blood Sugar. When compared to other studies, High Waist Circumference and High Triglycerides are higher in this study reflecting higher prevalence of atherogenic dyslipidemia among Indians. In this study mean values of all the components of MS are higher in MS+ group than in MS- group. The mean values of HDL, TG and WC are comparable to findings of Madrid Miller et al and hypertension to that of Milani et al [11].

Conclusion

The metabolic syndrome is a highly prevalent condition among the patients with acute coronary syndrome and is associated with severe CAD. The most commonly affected were elderly. Among the risk factors, smoking was the most common risk factor found in the present study. Identification of those risk predictors upon patient evaluation could be helpful to identify high risk-patients, in need of particular care, aggressive therapy and close follow-up to improve their poor outcome. Hence it is of paramount importance to aim for stricter goals and lower cut offs for intervention at all levels of prevention – primordial, primary and secondary.

References

1. Robert H. Eckel. The metabolic syndrome, Harrison's Principles of Internal Medicine. 17th edition. New York, McGraw- Hill 2008 ; 1509-1513.
2. Robert F. Kushner. Evaluation and Management of Obesity. Harrison's Principles of Internal Medicine. 17th edition. New York, McGraw- Hill 2008 ; 468-473.
3. Daniel J. Radar , Hellen H. Hobbs Disorders of Lipoprotein metabolism. Harrison's Principles of Internal Medicine. 17th edition. New York, McGraw-Hill 2008 ; 2416-2429.
4. Haffner SM. The metabolic syndrome: Inflammation, Diabetes mellitus, and Cardiovascular disease. Am J Cardiol 2006; 97(suppl): 3A-11 A.
5. Third report of the National Cholesterol Education Program (NCEP) Expert panel on Detection, Evaluation, and Treatment of high blood cholesterol in adults (Adult Treatment Panel III) Final report. Circulation 2002; 106: 3146-3421.
6. Zeller M, Gabriel P, Ravisy J, Laurent Y, Mahifitant LJ, Huillier et al. Prevalence and impact of metabolic syndrome on hospital outcomes in acute myocardial infarction. Arch Intern Med 2005; 165: 1192-8.
7. Schwartz, Szarek M. Olsson A, Sasiela WJ, Gregory G, Andess G. Relation of characteristics of metabolic syndrome to short-term prognosis and effects of intensive statin therapy after acute coronary syndrome. Diabetes Care 2005;28:2508-1.
8. Madrid Miller A et al. Metabolic Syndrome: Clinical and angiographic impact with acute coronary syndrome. Cir Cir 2010;78:113-120.
9. Enas EA, Singh V, Munjal YP, Bhandari S, Yadave D, Manchanda S. Reducing the Burden of Coronary Artery Disease in India: Challenges and opportunities. Indian Heart J 2008;60:161-175.
10. Levantesi G, Macchia A, Marfisi RM, Franzosi MG, Maggioni AP, Nicolosi G et al. Metabolic syndrome and risk of cardiovascular events after myocardial infarction. J Am Coll Cardiol 2005; 46(2): 277-83.
11. Milani RV, Lavie CJ. Prevalence and profile of metabolic syndrome in patients following acute coronary events and effects of therapeutic life style change with cardiac rehabilitation. Am J Cardiol 2003; 92(1): 50-54.
12. Ninomiya JK, L'italien G, Criqui MH, Whyte JL, Gamst A, Chen RS. Association of the metabolic syndrome with history of myocardial infarction and stroke in the third national health and nutrition examination survey. Circulation 2004; 109: 42-46.

Conflict of Interest: Nil

Source of support: Nil