ORIGINAL ARTICLE

STUDY OF METEBOLIC AND PHYSICAL RISK FACTORS IN CORONARY ARTERY DISEASE PATIENTS IN GGH GUNTUR

G. Chakradhar Rao¹, G. K. Rajeswari², N. Kalyani³, K. Vasudha⁴, J Siva Kalyani⁵

HOW TO CITE THIS ARTICLE:

G. Chakradhar Rao, G. K. Rajeswari, N. Kalyani, K. Vasudha, J Siva Kalyani "Study of Metebolic and Physical Risk Factors in Coronary Artery Disease Patients in GGH Guntur". Journal of Evolution of Medical and Dental Sciences 2015; Vol. 4, Issue 06, January 19; Page: 925-932, DOI: 10.14260/jemds/2015/132

ABSTRACT: BACKGROUND: Metabolic syndrome is a specific clustering of cardiovascular risk factors, which increases the mortality and morbidity. Hence, we aimed to know the incidence of METS in coronary artery disease proven by coronary angiogram and assess its various components and its impact on the in hospital prognosis of 1 week. **METHODS:** A total of 100 CAD cases admitted to CCU of Government General Hospital, Guntur were studied over a period of 1 year. Cases were categorized according to the NCEP ATP III METS criteria (presence of ≥ 3 of the following: hyperglycemia; triglycerides ≥ 150 mg/dl; HDL-C ≤ 40 mg/dl for males, ≤ 50 mg/dl for females; blood pressure $\geq 130/85$ mg/dl; waist Circumference >102 cm in men or >88 cm in women). **RESULTS:** Among the 100 cases, 44 (44%) fulfilled the criteria for METS and were more likely to be women. Low HDL-C (95%) was the most prevalent component followed by high TGs (95%), hyperglycemia (82%), HT (86%) and high WC (39%). In hospital complications (1week) were higher in METS patients compared to those without and associated with four fold (odds ratio 3.8, p value <0.001) increased risk of complications including heart failure (52%). **CONCLUSION:** The prevalence of METS was high in coronary artery disease, associated with worse in hospital prognosis of 1week and with four fold higher risk of development of complications including heart failure.

KEYWORDS: Metabolic syndrome, Myocardial infarction.

INTRODUCTION: Coronary Heart Disease (CHD) has reached enormous proportions striking more and more at younger subjects. It will result in coming years the greatest epidemic mankind has faced; unless we are able to reverse the trend by concentrating on research into its cause and prevention.¹ Coronary Heart disease and its major manifestations were a medical rarity prior to first world war.²

The prevalence of coronary heart disease is on the raise in our country, more so in South India cutting across all class and age distinctions, imposing severe burden on the health care system. Hence the present study aims to address the reasons for high prevalence of CAD and the risk factors involved, namely the Metabolic Syndrome.³ Metabolic syndrome refers to constellation of inter-related cardiac risk factors that appear to directly promote development of atherosclerotic cardiovascular disease.⁴ A recent review of insulin resistance syndrome revealed a rapid escalation of this syndrome among Indians and the prevalence of predominant component of METS varies from region to region.⁵

Studies have revealed the pathophysiology of this syndrome, with close to a six fold increase in cardiovascular mortality in those possessing this disorders.⁶ The increased risk of morbidity and mortality associated with the METS makes it essential that there be a clear understanding of the dimensions of this syndrome for the allocation of health care and research resources and for other purposes.⁷ Data regarding the prevalence of metabolic syndrome in coronary artery disease from this part of the country is scanty and conclusions are drawn based on the studies done in northern India.

ORIGINAL ARTICLE

Indian population is non-homogeneous and data specific to this region is a dire necessity which this study aims to address.

Only very few studies have reported on the prevalence of IRS as a whole in the native Indian population based on epidemiological studies. This is particularly relevant as India has the maximum number of diabetes patients in any given country in the world.⁸

This study was conducted in a large teaching hospital with a medical college fully equipped with a cardiology department with cath lab facility and located in the heart of Andhra Pradesh, thereby attracting representative population from all areas and especially the lower strata of society. Results of this study are therefore relevant to the general public in this part of the country. By examining the prevalence of metabolic syndrome in established CAD, this study aims to create awareness regarding the syndrome so that by early intervention, this menace could be tackled effectively.

OBJECTIVES:

1. To assess the prevalence of metabolic syndrome in angiogram proven coronary artery disease.
2. To assess the extent of coronary artery disease in patients with metabolic syndrome.

MATERIALS AND METHODS: This study is based on analysis of 100 patients admitted to the CCU of Government General hospital attached to the Medical College, Guntur during a period from March 2013 to March 2014.

CRITERIA: The proforma was used for the selection of patients with definitive evidence of myocardial infarction.

INCLUSION CRITERIA:

- Patients with evidence of coronary artery disease proven by coronary angiogram.
- Age > 30 years independent of sex.

EXCLUSION CRITERIA:

- Patients with evidence of coronary artery disease who has not undergone coronary angiogram.
- Patients having coexisting valvular heart disease.
- Age < 30 years.

All patients of CAD including both STEMI, and NSTEMI were included.

A final diagnosis of CAD was made in the presence of serial increases in serum biochemical markers of cardiac necrosis, has associated with typical electrocardiographic changes and by coronary angiography and/or typical symptoms as defined by the joint committee of the European society of cardiology and the American college of cardiology.

Patients with ST segment elevation or new or suspected new left bundle branch block on admission electrocardiogram were defined as having ST segment elevation MI (STEMI). The remaining patients were categorized as having non-STEMI.

ORIGINAL ARTICLE

CRITERIA OF DIAGNOSIS OF METS: The NCEP-ATP III22 definition was used for the diagnosis of METS includes any three of the following:

- **Central obesity:** waist circumference > 102 cm (male) or > 88 cm (female).
- **Hypertriglyceridemia:** triglycerides $\geq$ 150 mg/dl
- **HDL cholesterol:** <40 mg/dl (male) or <50 mg/dl (female)
- **Hypertension:** blood pressure $\geq$ 130 /85 mmHg or medication.
- Fasting plasma glucose $\geq$ 110mg/dl.

A detailed case history was taken including the symptoms, past history of diabetes mellitus, HT, smoking and alcohol consumption.

A careful physical examination was done with special reference to resting BP efore discharge, WC, Height and weight. The BMI was calculated using the formula BMI = Weight in kg/Height in m².

WC was recorded according to the national health and nutrition survey. "The subject stand and the examiner, positioned at the right of the subject, palpates the upper bone to locate the iliac crest. Just above the uppermost lateral border of right iliac crest, a horizontal mark is drawn, and then crossed with vertical mark on the midaxillary line.

RESULTS:

	No. of cases admitted
Total No. of coronary artery disease	100
METS with CAD	44 (44%)

TABLE 1: TOTAL ADMITTED CASES IN CCU OF ACUTE MI

A total of 100 cases of acute CAD admitted during the 1 year study period, out of which 44 cases had METS which showed an over-al percentage of 44% in the present study. These findings suggest the METS, as defined by the NCEP ATP III criteria, is very common among patients with CAD, because almost 1 in 2 patients had METS and that is associated with advanced coronary artery vascular damage.

This high incidence may be related to the vascular damage in METS by oxidative stress, endothelial dysfunction and pro-inflammatory state.⁹

	With METS (n = 44)		Without METS (n = 56)		Total	
Age (years)	No.	%	No.	%	No.	%
31-40	8	18	9	16	17	17
41-50	14	32	20	36	34	34
51-60	13	30	14	25	27	27
61-70	6	14	12	21	18	18
71-80	3	7	1	2	4	4
Total	44		56		100	

TABLE 2: AGE GROUPING

ORIGINAL ARTICLE

The age incidence was more between the age group 41-50 years followed by 51-60 years in both the groups. There was no statistical difference in Age between the 2 groups. (p value 0.48) NS. There is early incidence of METS in CAD patients in the present study compared to the other studies. About 25% CAD in India occurs under the age of 40 and 50% under 50¹⁰. In general MI develops 5-10 years earlier in Asian Indian than in other population.¹¹⁻¹²

Sex	CAD with METS		CAD without METS		Total	
	N = 44	%	N = 56	%	N = 100	%
Males	33	75	44	79	77	77
Females	11	25	12	21	33	33

Table 3: SEX DISTRIBUTION

Chi-square test. $X^2=1.33$, p value = 0.25 NS.

It was observed that 77 case among the 100 studied cases were male. The males predominated in both the groups. The METS was more in females with MI but it was not statistically significant. (p value 0.25)NS. Comparison between the two groups indicates that patients with METS were more likely to be a female, which was consistent with the other studies. In the present study, confounding factors like pre or post-menopausal status and presence or absence of anemia have not yielded statistically significant results. Higher waist circumference and BMI appeared to play a more significant role in female subjects than in males.

	With METS (n = 44)		Without METS (n = 56)		Total	
Symptoms	No.	%	No.	%	No.	%
Chest pain	42	95	56	100	98	98
Breathlessness	14	32	11	20	25	25
Cough/ sputum	8	18	10	18	18	18
Palpitation	7	16	8	14	15	15
Syncope	2	4.5	1	2	3	3
Sweating	25	56	20	36	45	45
Vomiting	2	4.5	5	9	7	7

TABLE 4: SYMPTOMATOLOGY AT PRESENTATION

The most common mode of presentation in both groups was chest pain followed by sweating. Breathlessness (32% vs. 20%) & sweating (56% vs. 36%) were more common in METS compared to those without METS.

	With METS (n = 44)		Without MET (n = 56)		Total		
Risk factors	No.	%	No.	%	No.	%	P* value, sig.
Diabetes Mellitus	25	57	16	29	41	41	0.004 S
Hypertension	24	56	16	29	35	35	0.01 S
Family History	12	27	12	21	24	24	0.49 NS

ORIGINAL ARTICLE

Current Smoker	13	29.5	14	25	27	27	0.61 NS
Alcohol Consumption	19	43	14	25	33	33	0.055 NS

TABLE 5: RISK FACTORS

Chi- square test. S=Significant, NS=Not Significant.

The past history of DM and HT were more common in the METS group compared to those without METS which were statistically significant. There was no significant difference in the current history of smoking, alcohol consumption and family history of CAD in both the groups.

Components of METS	With METS (n = 44)		Without MET (n = 56)		Total		P* value, sig.
	No.	%	No.	%	No.	%	
FBS = 110mg/dl	36	82	21	38	57	57	P < 0.001 HS
HTN or BP = 130/85 mm Hg	37	84	12	21	49	49	P < 0.001 HS
TGS = 150 mg/dl	42	95	18	32	60	60	P < 0.001 HS
HDL < 40 mg/dl(males) <50 mg/dl(females)	42	95	32	57	74	74	P < 0.001 HS
Waist circumference >102 cm(males) > 88 cm(females)	17	39	8	14	25	25	0.01 S

TABLE 6: COMPONENTS OF METS

	MI with METS	MI without METS	P value
FBS (mg/dl)	174.2 ± 66	133.3 ± 54.2	0.001 HS
TC (mg/dl)	186.5 ± 46.7	191.2 ± 49.8	0.63 NS
TGS (mg/dl)	246.1 ± 109.8	157.9 ± 46.3	< 0.001 HS
HDL-C (mg/dl)	35.8 ± 5.6	39.1 ± 3.9	< 0.001 HS
LDL-C (mg/dl)	137.3 ± 40.4	129.1 ± 41.2	0.31 NS
SBP mm of Hg	139.6 ± 29.4	128.8 ± 23.1	0.04 S
DBP mm of Hg	88.2 ± 19.6	81.6 ± 10.1	0.03 S

TABLE 7: MEAN VALUES OF PARAMETERS

Unpaired t test. HS= Highly significant, NS: Not significant, S=Significant.

It was observed that, the all the components were more common in the METS group than patients without METS and were highly significant. Low HDL-C was the major component in both the groups. High TGS is the next major component in METS group followed by the DM or FBS ≥110mg/dl,

ORIGINAL ARTICLE

HT or BP $\geq$ 130/85 and high WC. HT or BP $\geq$ 130/85 was the next major component in patients without METS followed by high TGS, DM or FBS $\geq$ 110mg/dl and high WC.

Other factors	CAD with METS		CAD without METS		Total		P value
	N = 44	%	N = 56	%	N = 100	%	
Obesity (BMI $\geq$ 30kg/m ²)	17	38.6	3	5.3	20	20	0.01 S
Serum cholesterol ($\geq$ 240mg/dl)	9	20.45	6	10.7	15	15	0.63 NS
LDL-C > 160mg/dl)	12	27.2	9	16.7	21	21	0.31 NS

TABLE 8: OTHER FACTORS

S= Significant, NS: Not significant.

The obesity with BMI > 30Kg/m² was present in 38.6 (Mean 27.2 $\pm$ 3.3) of patients with METS compared to 5.3% (25.7 $\pm$ 2.4) of those without METS, which was statically significant (p Value).

Angiogram	With METS (n = 44)		Without METS (n = 56)		Total		P* value, sig.
	No.	%	No.	%	No.	%	
LAD	28	64	40	71	68	68	0.4 NS
RCA	8	18	14	25	22	22	0.4 NS
LCX	8	18	10	18	18	18	0.9 NS

TABLE 9: ANGIOGRAM

It was observed that LAD was the most common vessel involved of the 100 studied cases 70 case 71 case were LAD and there was no much significance related to METS.

Prognosis in 1 week of hospital stay	CAD with METS		CAD without METS		Total		P value
	N = 44	%	N = 56	%	N = 100	%	
Heart failure	23	52	10	18	33	33	< 0.001 HS
Arrhythmias VT/VF	4	9	4	7	8	8	0.98 NS
Recurrent MI	3	7	1	2	4	4	0.74 NS

TABLE 10: IN HOSPITAL PROGNOSIS OF CAD IN 1 WEEK

HS= Highly Significant, NS: Not significant.

All the complication was more common in the METS group compared to those without METS group. Heart failure was present in 52% of METS patents compared to the 18% in those without METS which was statistically highly significant (P value <0.001). There was no significant difference in the development of other complications like arrhythmias (ventricular tachycardia/fibrillation), recurrent MI.

ORIGINAL ARTICLE

CONCLUSION: This is one of the prospective study carried out to describe the prevalence of metabolic syndrome in coronary artery disease and to assess its impact on hospital outcome.

The metabolic syndrome is a highly prevalent condition among the patients with coronary artery disease and has detrimental impact on short term outcome.

Metabolic syndrome is a clustering of risk factors of metabolic origin that are together associated with higher risk of cardiovascular disease and the need to develop strategies for controlling this syndrome and its component conditions.

In the industrialized countries there is a continuing decline of CAD during the last three decades. Between 1965-1990, CAD mortality had decreased by 60% in Japan and Finland and by 50% in USA, Canada, France, and Australia. This has been possible by focusing on public education programmes for modifying the known risk factors and by targeting high risk individuals. This achievement of the industrialized nations must become an inspiration for the physicians and the policy makers in India.

Considering that there is a strong genetic predisposition for onset of CAD in India, focus should be on cascade testing of families to identify mutations in LDL receptor gene, ApoB and ApoE gene responsible for premature onset of CAD. Innovative combination of genetic testing and cholesterol testing at an affordable price to the at-risk families with strong history of CAD is the need of the hour.

Early investigations diagnosis, treatment including lifestyle modification and prevention of the metabolic syndrome will reduce the development of cardiovascular diseases like myocardial infarction including its complications and it present a major challenge for health care professionals facing an epidemic of overweight and sedentary lifestyle.

To conclude, cardiovascular disease patients with METS must be identified and managed aggressively to reduce both morbidity and mortality since it is a preventable condition.

REFERENCES:

1. Feinlib M, Harlik RJ, and Thom TJ. The changing pattern of ischaemic heart disease. J Cardiovascular Med 1982; 7: 139.
2. Allison RB, Rodriguez FL, and Higgins EA. Clinicopathological correlation in coronary atherosclerosis. Four hundred thirty patient studies with postmortem coronary angiography. Circulation 1963; 27: 170.
3. Grundy JM, Cleemanji, Daniels SR, et al. American Heart Association. National Heart Lung, and Blood Institute. Diagnosis and management of metabolic syndrome: An American heart association / National Heart Lung and Blood Institute scientific statement. Circulation 2005; 112 (17): 2735-52.
4. Third report of the National Cholesterol Education Program (NCEP) Expert panel on Detection, Evaluation, and Treatment of high bloodcholesterol in adults (Adult Treatment Panel III) Final report. Circulation 2002; 106: 3146-3421.
5. Yajnik CS. The insulin resistance epidemic in India: fetal origins, later lifestyle or both? Nutr Rev 2001; 59: 1-9.
6. 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.

ORIGINAL ARTICLE

7. Ford EA, Giles WH. A comparison of the prevalence of the metabolic syndrome using Two Proposed Definitions. *Diabetes Care* 2003; 26: 575-581.
8. King H, Aubert RE, Herman WH. Global burden of diabetes, 1995- 2005, -prevalence, numerical estimates, and projections. *Diabetes Care* 1998; 21: 1414-31.
9. Deedwania PC, Fonesca VA. Diabetes, prediabetes, and cardiovascular risk: Shifting the paradigm. *Am J Med* 2005; 118: 939- 47.
10. Jha P, Enas EA, Yusuf S. Coronary artery disease in Asian Indians: Prevalence and risk factors. *Asian Am & Pac Islander J Health* 1993; 1: 161-175.
11. Bahulyan CG Hospital data on CHD from North Kerala. In: Vijaragahavan G, ed. *Cardiovascular disease prevention*. MC5459 (S).
12. Hughes LD, Raua U, Raftery E. Myocardial infarction in Asian and white men. *Br Med J* 1989; 298: 1345-1350.

AUTHORS:

1. G. Chakradhar Rao
2. G. K. Rajeswari
3. N. Kalyani,
4. K. Vasudha,
5. J. Siva Kalyani

PARTICULARS OF CONTRIBUTORS:

1. Associate Professor, Department of General Medicine, Guntur Medical College, Guntur.
2. Assistant Professor, Department of General Medicine, Guntur Medical College, Guntur.
3. Assistant Professor, Department of General Medicine, Guntur Medical College, Guntur.

4. Junior Resident, Department of General Medicine, Guntur Medical College, Guntur.
5. Junior Resident, Department of General Medicine, Guntur Medical College, Guntur

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. G. Chakradhar Rao,
Associate Professor,
Department of Medicine,
Guntur Medical College, Guntur.
E-mail: profguduri@gmail.com

Date of Submission: 07/01/2015.
Date of Peer Review: 08/01/2015.
Date of Acceptance: 09/01/2015.
Date of Publishing: 16/01/2015.