Original Research Article

A study of prevalence of metabolic syndrome in patients with acute myocardial infarction

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Abstract

Background: Metabolic syndrome is not a disease in itself. Instead, it's a group of risk factors high blood pressure, high blood sugar, unhealthy cholesterol levels, and abdominal fat. Specifically, metabolic syndrome can lead to a buildup of plaque in the arteries, known as atherosclerosis. This is when fats, cholesterol, and other substances stick to the sides of the arteries. The arteries then become clogged and brittle. Blood clots form when the artery walls are damaged. A clot can cause a heart attack or stroke. These risk factors double your risk of the blood vessel and heart disease, which can lead to heart attacks and strokes. They increase your risk of diabetes by five times.

Aim of this study: To Find the prevalence of metabolic syndrome in young patients with acute myocardial infarction and to find the prevalence of individual components of metabolic syndrome in the study population.

Materials and methods: The study consisted of 30 patients diagnosed with mitral valve prolapse who were attending General medicine, OPD at Rajah Muthiah Medical College & Hospital, Annamalai University, Chidambaram, Cuddalore District at the year 2018 (August to December over 5 months) were included in the study. Acute myocardial infarction is defined as atleast two of the following: prolonged chest discomfort, typical electrocardiographic changes, or elevated cardiac troponin levels, as outlined by the Joint European Society of Cardiology/ American College of Cardiology Committee. Patients with rheumatic heart disease, congenital heart disease, severe anemia/ chronic kidney and liver disease, cocaine abuse, lack of definitive MI criteria, and age > 45 years are excluded from the study. Detailed demographic data and clinical examination are done. Blood pressure, fasting blood sugar, and fasting lipid profile was done in all patients. Patients were

classified as having metabolic syndrome according to the international diabetes federation (IDF) criteria.

Results: A total of about sixty-two patients were studied, of which 35 (56%) of the patients fulfilled the criteria for metabolic syndrome. Remaining patients with age <45 years and Acute myocardial infarction without metabolic syndrome constituted 44% (n= 27). Increased waist circumference >80 for females and > 90 for males was the mandatory criteria to diagnose metabolic syndrome according to IDF criteria. In our study, 42 patients had increased waist circumference of which 35 patients satisfied the remaining criteria for metabolic syndrome. Of the 27 patients without MS, 7 patients (26%) had increased waist circumference. Elevated blood pressure was present in about71% (n=25) of the patients with metabolic syndrome and 40% (n=11) of patients without metabolic syndrome. Elevated fasting blood sugar >100 mg/dl was present in about 88% of patients with metabolic syndrome and 28% of patients without metabolic syndrome. Increased levels of fasting triglyceride were seen in about 77% (n=27) of patients with metabolic syndrome and 70% (n=19) of the patients without metabolic syndrome. Decreased HDL was seen in about 66% (n=23) of patients with metabolic syndrome and 55% (n=15) of the patients without metabolic syndrome.

Conclusion: Metabolic syndrome is highly prevalent in young patients with acute myocardial infarction. Each component of metabolic syndrome is an independent risk factor for cardiovascular and cerebrovascular disease. The increasing prevalence of myocardial infarction in young individuals is mainly due to an increase in the prevalence of metabolic syndrome.

Key words

Metabolic syndrome, Dyslipidemia, Coronary artery disease, Waist circumference.

Introduction

Coronary artery disease (CAD) is one of the commonest causes of death in the developing and developed world. Metabolic syndrome has become a major public health problem. Globally the prevalence of the metabolic syndrome is increasing [1]. A metabolic syndrome is a group of risk factors for cardiovascular disease and diabetes mellitus. It includes abdominal obesity, dyslipidemia, raised blood pressure, insulin resistance, and an inflammatory state. Metabolic syndrome is present in nearly one-quarter of all adults and in 40% of adults over 60 years of age. It is now recognized as a secondary target for intervention in the National Cholesterol Education Program (NCEP) Adult Treatment Panel (ATP) III recommendation. Most studies show that 4–10% of patients with acute myocardial infarction (AMI) are below 45 years of age [2]. There are limited data on the risks associated with metabolic syndrome in the increasingly large group of young patients who have sustained an AMI. The mechanisms of the complex pathways of metabolic syndrome are under investigation. The pathophysiology is very complex and has been only partially elucidated. Most people affected by the condition are older, obese, sedentary, and have a degree of insulin resistance. Stress can also be a contributing factor [3]. The most important risk factors are diet (particularly sugar-sweetened beverage consumption), genetics, aging, sedentary behavior or low physical activity, disrupted chronobiology/ sleep mood disorders/ psychotropic medication use, and excessive alcohol use. The pathogenic role played in the syndrome by the excessive expansion of adipose tissue occurring under sustained overeating, and its resulting lipotoxicity was reviewed by Vidal-Puig [4]. There is debate regarding whether obesity or insulin resistance is the cause of the metabolic syndrome or if they are consequences of a more far-reaching metabolic derangement. Markers of systemic inflammation, including C-reactive protein, are often increased, as are fibrinogen, interleukin 6, tumor necrosis factor-alpha (TNF-α), and others. Some have pointed to a variety of causes, including

increased uric acid levels caused by dietary fructose. Research shows that Western diet habits are a factor in the development of metabolic syndrome, with high consumption of food that is not biochemically suited to humans [5]. Weight gain is associated with metabolic syndrome. Rather than total adiposity, the core clinical component of the syndrome is visceral and/or ectopic fat (i.e., fat in organs not designed for fat storage) whereas the principal metabolic abnormality is insulin resistance. The continuous provision of energy via dietary carbohydrate, lipid, and protein fuels, unmatched by physical activity/ energy demand, creates a backlog of the products of mitochondrial oxidation, a process associated with progressive mitochondrial dysfunction and insulin resistance [6].

Materials and methods

The study consisted of 30 patients diagnosed with mitral valve prolapse who were attending General Medicine, OPD at Rajah Muthiah Medical College & Hospital, Annamalai University, Chidambaram, Cuddalore District at the year 2018 (July-October over 4 months) were included in the study. Acute myocardial infarction is defined as atleast two of the following: prolonged chest discomfort, typical electrocardiographic changes, or elevated cardiac troponin levels, as outlined by the Joint European Society of Cardiology/ American College of Cardiology Committee. Patients with rheumatic heart disease, congenital heart disease, severe anemia/ chronic kidney and liver disease, cocaine abuse, lack of definitive MI criteria, and age > 45 years are excluded from the study.

Inclusion criteria: Age <45 years, Acute myocardial infarction is defined as at least two of the following: prolonged chest discomfort, typical electrocardiographic changes, or elevated cardiac troponin levels, as outlined by the Joint European Society of Cardiology/ American College of Cardiology Committee.

Exclusion criteria: Rheumatic heart disease, Congenital heart disease. Severe anemia/ chronic kidney and liver disease, Cocaine abuse, Lack of definitive MI criteria, Age >45 years.

A previously designed proforma was used to collect the demographic and clinical details of the patients. A complete clinical examination was done. Demographic data obtained from all patients include age, gender, weight, height, waist circumference, and information on risk factors such as diabetes, hypertension, smoking status, and a family history of vascular disease. Smoking status was documented. The presence of previously diagnosed diabetes was noted, as well as the mode of therapy (diet alone, oral hypoglycemic agents, or insulin). Blood pressure was measured twice in the supine position from the right hand, using a mercury sphygmomanometer. Waist circumference (WC) was measured at the widest diameter between the xiphoid process of the sternum and the iliac crest. Serum lipids and blood sugar were measured by taking a sample of 5 mL blood from the right brachial vein after 12 h overnight fasting. Additional clinical data on complications encountered from hospital admission until discharge were collected, and included events such as sustained ventricular arrhythmias (ventricular tachycardia/ ventricular fibrillation) requiring intervention, complete heart block, cardiac failure, cardiogenic shock, recurrence of angina or MI, and death, as well as information on angiographic results and revascularization procedures such as angioplasty.

Results

Results were depiced in **Table – 1**, **Graph – 1 to 5**.

Discussion

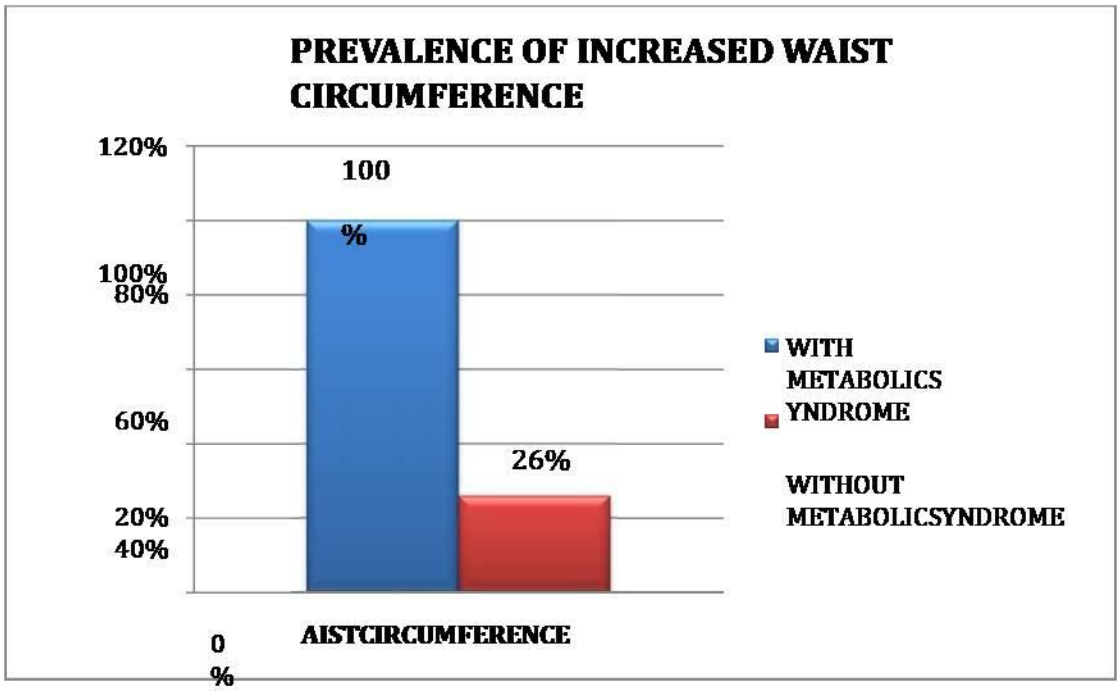
A total of about sixty-two patients were studied, of which 35(56%) of the patients fulfilled the criteria for metabolic syndrome. Remaining patients with age <45 years and Acute myocardial infarction without metabolic syndrome constituted 44% (n=27). The mean age for patients with metabolic syndrome is 38.6 with a standard deviation of ±5.45. The mean age

for patients without metabolic syndrome is 41.51, with a standard deviation of ±3.13. There were no patients below 20 years of age [7]. Between 21 and 30 years, there were 3 patients all of whom were males. Between 31 and 40 years there were 26 patients, of whom 25 were males and one female. More than 41 years, there were 33 patients, of who 26 were males and 7 females. All the 3 patients between 21 and 30 years had metabolic syndrome [8]. Between 31 and 40 years (n=26), 16 patients (61/%) of them satisfied the criteria for metabolic syndrome. In the age group of >41 years (n=33), 16 patients (48%) had metabolic syndrome. The overall prevalence of metabolic syndrome (n=62), was 56% (n=35). Younger age groups had a higher prevalence of metabolic syndrome than older age groups [9].

Table - 1: Comparison of age distribution of the study population, in patients with and without metabolic syndrome.

Age group (Years)	Total (n = 62)	Patients with metabolic syndrome (n =35)	Patients without metabolic syndrome (n =27)	Prevalence of metabolic syndrome
<20	0	0	0	0
20-30	3	3	0	100%
31-40	26	16	10	61%
>41	33	16	17	48%
TOTAL	62	35	27	56%

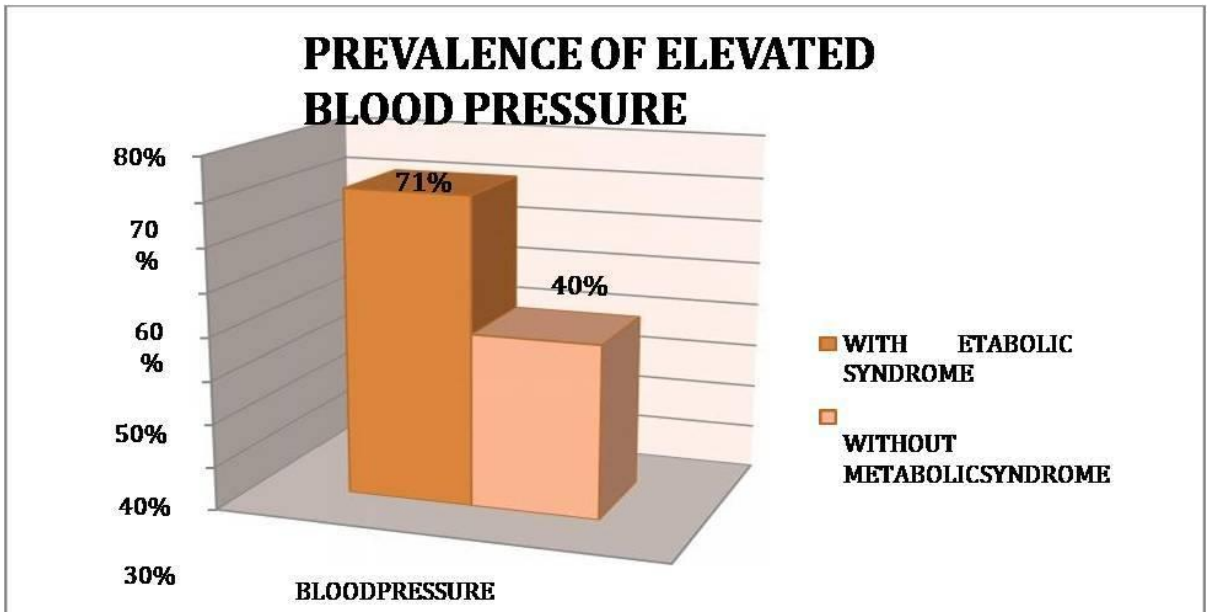
Graph - 1: Comparison of waist circumference among patients without metabolic syndrome.



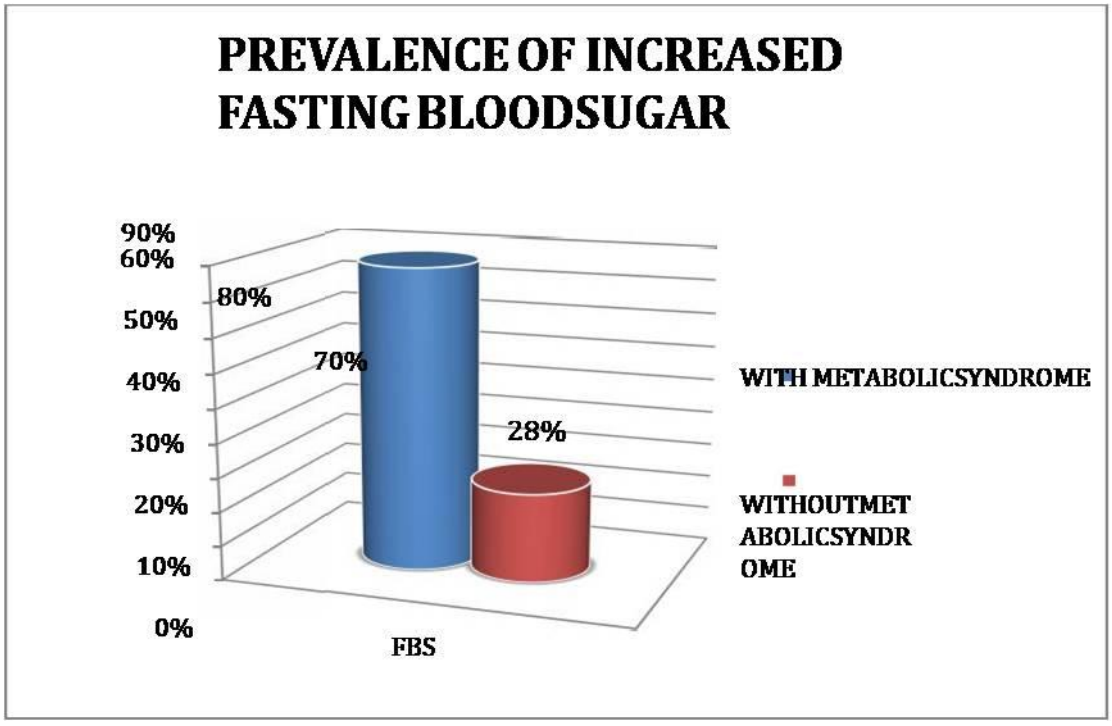
Data from graph 1 reveals that out of 62 patients, 87% (n=54) of patients were males, and 13% (n=8) were females. Increased waist circumference >80 for females and> 90 for males is the mandatory criteria to diagnose metabolic syndrome according to IDF criteria. In our study, 42 patients had increased waist circumference of which 35 patients satisfied the remaining criteria for metabolic syndrome. Of the 27 patients without MS, 7 patients (26%) had increased waist circumference [10]. Elevated blood pressure >130/80 is an important criterion for diagnosing metabolic syndrome. It is present in about 71% (n=25) of the patients with metabolic

syndrome and 40% (n=11) of patients without metabolic syndrome [11]. Elevated fasting blood sugar >100 mg/dl is present in about 88% of patients with metabolic syndrome and 28% of patients without metabolic syndrome. Increased levels of fasting triglyceride are seen in about 77% (n=27) of patients with metabolic syndrome and 70% (n=19) of the patients without metabolic syndrome [12].

Graph - 2: Comparison of elevated blood pressure among patients with and without metabolic syndrome.



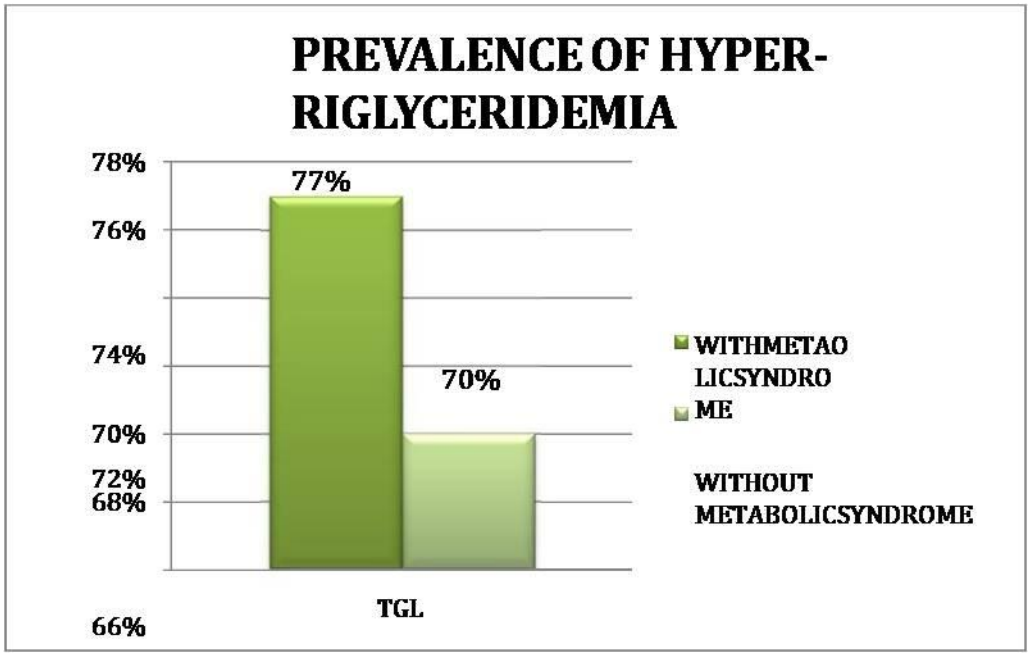
Graph - 3: Comparison of fasting blood glucose level.



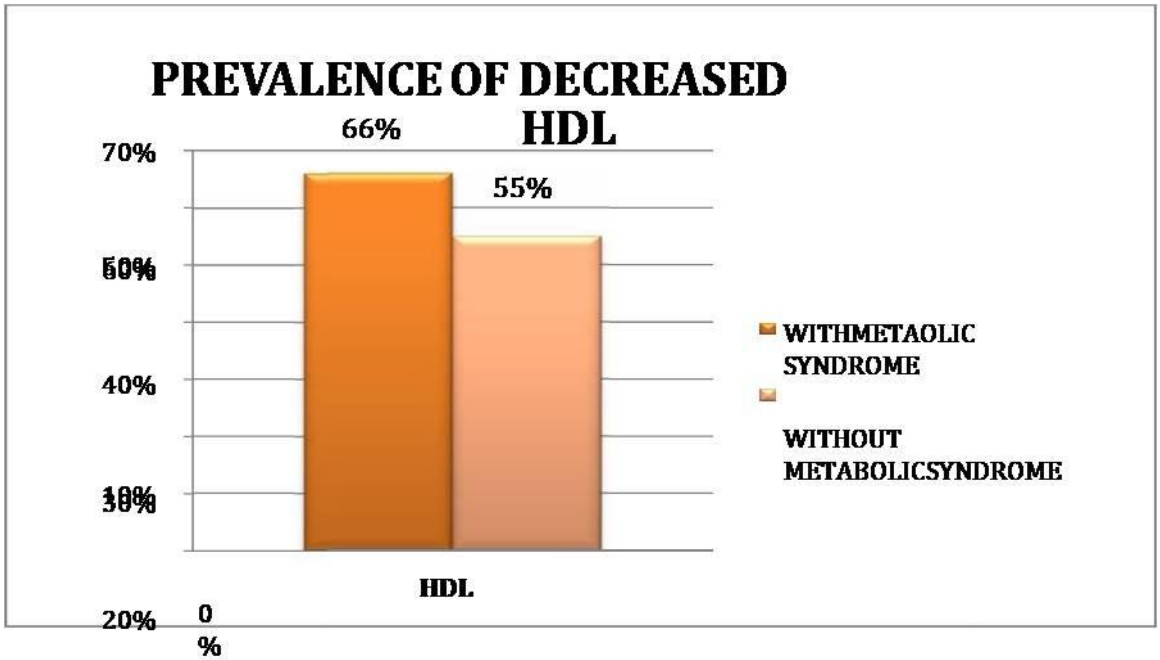
Decreased HDL is seen in about 66% (n=23) of patients with metabolic syndrome and 55% (n=15) of the patients without metabolic syndrome [13]. Our study shows a strong

relationship of metabolic syndrome with myocardial infarction in young patients <45 years. Of the individual components of metabolic syndrome, elevated fasting blood sugar has the highest positive predictive value of 88% followed by increased triglyceride levels in 77%, elevated blood pressure in 71%, and decreased HDL in 66% of the patients [14, 15].

Graph - 4: Comparison of hypertriglyceridemia among patients without metabolic syndrome.



Graph - 5: Comparison of decreased HDL among patients with and without metabolic syndrome.



Conclusion

Metabolic syndrome is highly prevalent in young patients with acute myocardial infarction. Hence all measures must be undertaken to prevent cardiovascular events in these patients. Obesity, sedentary lifestyle, smoking, and insulin resistance are important risk factors for metabolic syndrome. Metabolic syndrome is diagnosed by various criteria like ATP III

criteria, WHO criteria, and IDF criteria. Indians have a higher risk for CAD at comparatively lower waist circumference than western people. Indians have a lower cutoff for waist circumference for diagnosing metabolic syndrome (>80 cm for females and >90 cm for males) Increasing prevalence of myocardial infarction in young individuals is mainly due to an increase in the prevalence of metabolic syndrome.

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