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Original Article

Metabolic Syndrome in Patients with Atherosclerotic Vascular Disease

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Abstract

Background:To determine the frequency of metabolic syndrome (MetS) in patients having atherosclerotic vascular disease.

Methods: In this cross sectional study 100 patients with atherosclerotic vascular disease were included. Patients were enquired about the presence of diabetes, hypertension, ischemic heart disease, symptoms of peripheral vascular disease and any history of ischemic stroke. Blood pressure and waist circumference were measured. Fasting blood sugar and lipid profile (triglyceride and HDL) were estimated.

Results: The mean age of the patients was 53.97±9.95 years. Forty five percent were males. Seventy five percent presented with a history of ischemic heart disease, 19% presented with a history of ischemic stroke and 6% had peripheral vascular disease. Overall, 46% patients had metabolic syndrome. The mean age of the patients with MetS was significantly lower than the patients without MetS(p= 0.005). Among the 75 CAD patients 32 (42.7%) had MetS; among the 19 ischemic stroke patients 10 (52.6%) had MetS and among the 6 PVD patients 4 (66.7%) had MetS. This difference in the proportion of patients with MetS was not statistically significant(p=0.427).

Conclusion: Nearly half of the patients with atherosclerotic vascular disease have metabolic syndrome.

Key Words: Metabolic syndrome, Ischemic heart disease,Stroke,Peripheral vascular disease,Obesity, Diabetes, Mortality

Introduction

Metabolic syndrome is becoming increasingly common. In patients with manifest vascular disease presence of MetS is associated with advanced vascular damage. Among patients with atherosclerotic vascular disease, those with MetS are at increased risk of subsequent vascular events as compared with those without. Metabolic syndrome patients are at increased risk for developing cardiovascular morbidity and mortality. The increasing prevalence of the metabolic syndrome in various asymptomatic populations has been well documented.Metabolic syndrome (Syndrome X, Insulin resistance syndrome) is a combination of medical disorders that increase the risk of developing type 2 diabetes and atherosclerotic vascular disease (ischemic heart disease, ischemic stroke, and peripheral vascular disease). [1] The major features of metabolic syndrome include central obesity, hypertriglyceridaemia, low HDL, hyperglycemia and hypertension.[2] Increase in waist circumference predominates in women whereas higher fasting triglyceride levels are more likely in men. Central obesity is a key feature of the syndrome, reflecting the fact that the syndrome's prevalence is driven by the strong relationship between waist circumference and increasing adiposity.[3] Despite the importance of obesity patients who are normal weight may also be insulin resistant and have the syndrome.[4] Metabolic syndrome incidence increases with age. [5] MetS increases two-fold risk of mortality in patients with ischemic heart disease.[6,7] With appropriate cardiac rehabilitation and changes in lifestyle the prevalence of the syndrome can be reduced. Patient with MetS are also at increased risk for ischemic stroke and peripheral vascular disease.[8,9] Various strategies have been proposed to prevent the development of MetS. These include increase physical activity such as walking 30 minutes daily and a healthy, reduce calorie diet. However, drug treatment is frequently required to treat insulin resistance, hypertension and hyperlipidaemia.[10]

Patients and Methods

In this cross sectional study, performed in Department of Medicine Benazir Bhutto Hospital, Rawalpindi, 100 patients with atherosclerotic vascular disease were included .The study was carried out over 6 months from Oct 2012 to March 2013. Patients of all ages and both sexes having either ischemic heart disease or ischemic stroke or peripheral vascular disease were included. Patients with any cardiac or vascular

disease due to vasculitis syndromes and patients having haemorrhagic stroke as evident by hyperdense area on CT scan, were excluded.Patients were enquired about the presence of diabetes, hypertension, symptoms of ischemic heart disease, symptoms of peripheral vascular disease and any history of ischemic stroke. Fasting blood sugar levels and lipid profile were done.

The US national cholesterol education program adult treatment panel III (NCEP: ATP III criteria)was used to assess MetS. It requires at least three out of five (Table 1). BP Was measured in sitting position after 5 minute rest as an average of two readings taken 5 minute apart. Waist circumference was calculated as an average of two measurements taken after inspiration and expiration at midpoint of lowest rib and iliac crest. Diagnosis of ischemic heart disease was established when patient had history of angina (chest pain on exertion, relieved by rest and nitrates),acute coronary syndrome(chest pain at rest, worsening chest pain , not relieved by nitrates with raised cardiac enzymes),ETT positive for ischemia (patient suffers isoelectric line or 1mm elevation in limb leads or 2mm elevation in chest leads).

Table 1: NCEP: ATP III criteria of metabolic syndrome

Clinical measure	ATP III
Waist Circumference	≥102 cm in men, ≥88 cm in women
Triglycerides	≥150 mg/dL
HDL	<40 mg/dL in men, <50 mg/dL in women
Blood Pressure	≥130/85 mm Hg
Glucose	Fasting >110 mg/dL

from chest pain during ETT or there are ischemic changes on ECG) and typical ischemic changes on ECG(T wave inversion,ST segment depression from Peripheral vascular disease was established on the basis of palpable vessels,feeble or absent pulse (Doppler showing biphasic or monophasic waveform) and having symptoms like intermittent claudication (leg pain on walking after a relatively constant distance and relieved by rest).Patients having history of focal neurological deficit with or without recovery due to ischemic infarct (evident as hypodense area on CT scan) were diagnosed as a case of ischemic stroke .

Results

The age of the patients ranged from 35 to 79 years. The mean age was 53.97±9.95 years(Table 2). 45 were males and 55 were females. Majority (75%) presented with a history of ischemic heart disease, 19 (19%) presented with a history of ischemic stroke and 6(6%) had peripheral vascular disease. Overall, 46% patients had metabolic syndrome. The mean age of the patients with metabolic syndrome was 51±9.05 year whereas the mean age of the patients without metabolic syndrome was 56.5±10.06 year; hence patients with MetS were significantly younger(p= 0.005).Among the 45 males 17 (37.77%) had MetS, while among the 55 females 29 (52.72%) had MetS. Although greater proportion of female patients had MetS this was not statistically significant(p= 0.136). Among the 75 CAD patients 32 (42.7%) had MetS; among the 19 ischemic stroke patients 10 (52.6%) had MetS and among the 6 PVD patients 4 (66.7%) had MetS. This difference in the proportion of patients with MetS was not statistically significant(p=0.427).Fifty five percent patients had diabetes (Table 3). Twenty percent had one component, 34 (34%) had two component, 23 (23%) had three components, 14 (14%) had four components and 9 (9%) had all five components. Among 75 patients with CAD 18 (24%) had one component, 25 (33%) had two component, 15 (20%) had three components, 10 (13.3%) had four components and 7 (9.3%) had all five components. Among 6 patients with PVD 2 (33.3%) had two component, 2 (33.3%) had three components and 2 (33.3%) had all five components (Table 4).

Table 1– Age distribution of patients in study group

Age distribution	Count
30-39 yrs	8
40-49 yrs	32
50-59 yrs	38
60-69 yrs	17
70-89 yrs	6

Table 3 – Various components of metabolic syndrome.

Components	%age
Diabetes	55%
Hypertension	45%
Increased Waist circumference	58%
Abnormal HDL	48%
Abnormal TG	52%

Table 3- Components of metabolic syndrome among atherosclerotic vascular diseases

	1 (Diabetes)	2 (Hyper-tension)	3 (Increased waist circumfe-rence)	4 (Abnormal HDL)	5 (Abnormal triglycerides)
CAD	24.0	33.30	20.0	13.0	9.30
Stroke	10.50	36.80	31.60	21.10	0
PVD	0	33.30	33.30	0	33.3
Total	34.50	103.4	84.9	34.1	42.6

Discussion

Risk factors, comprising metabolic syndrome, cause or accelerate atherosclerosis. In patients with the MetS a two- to three-fold increased risk of coronary heart disease (CHD) and stroke and cardiovascular mortality has been reported.[11,12] Reported prevalence of the MetS in healthy subjects vary between 9 and 22%.[13] Drug-treated hypertensive patients revealed a prevalence varying from 0.8 to 35.3%. [14,15] Screening for MetS in an already high-risk population may help to identify patients with even higher risks for vascular complications and may direct therapy. Studies revealed hypertension and obesity as the main determinant.[16-18] Screening for metabolic syndrome in patients with high risk for new vascular incidents may identify patients with even higher vascular risk and may direct anti-atherosclerotic treatment in order to prevent new vascular incidents in the same or another vascular bed. In a study by Yasmin et al frequency of MetS was 32% in men and 28% in women. [19] Sandhu et al found the frequency of metabolic syndrome in 690 patients presenting with acute myocardial infarction (MI) to be 40% among males and 44% among females. [20] At Armed Forces Institute of Cardiology and National Institute of Heart Diseases, Rawalpindi Bhalli et al found that among 135 CAD patients metabolic syndrome (MS) was present in 55 (40.7%) patients. [21]

MetS is a combination of metabolic disorders including known risk factors like dyslipidemia, hyperglycaemia and hypertension, but also risk factors not routinely measured like hyperinsulinemia, decreased fibrinolysis, oxidative stress, small dense LDL-cholesterol and increased inflammation.[22] Instead of treating individual components of the metabolic syndrome, treating the underlying pathophysiological disturbance would ideally be the therapeutic option of first choice. [23,24] WHO and ATP III criteria gave similar prevalences of the metabolic syndrome in the Third National Health and Nutrition Examination Survey: 25.1% and 23.9%, respectively; 86.2% were classified the same under the two approaches. [20,25,26] In a study by Trevisan et al. in patients aged 50 or above, women had a higher prevalence than men. [27] A study in US adults showed that the prevalence of the MetS differed little among men and women in the general population (24% versus 23%), but after 70 years of age women had a higher prevalence. [27]

In the Botnia study, patients with the MetS and microalbuminuria were at markedly increased risk for cardiovascular death (relative risk 2.8) compared to patients with the MetS but without microalbuminuria. Microalbuminuria is thought to be a surrogate for endothelial dysfunction and is an early marker for increased cardiovascular risk. [28] This may indicate that patients with the MetS and vascular damage or vascular dysfunction are at increased risk compared to patients with the MetS but without vascular damage.

Wassink et al conducted a prospective study of 3196 patients with a history or recent diagnosis of clinically manifest vascular disease.

During a median follow-up of 3.2 years (interquartile range 1.4–5.4 years), 331 patients died and 373 patients experienced a first vascular event. [29] Jobien et al investigated whether the metabolic syndrome is related to the extent of vascular damage in patients with various manifestations of vascular disease. The study population of this cross-sectional survey consisted of 502 patients recently diagnosed with coronary heart disease, 236 with stroke, 218 with peripheral arterial disease and 89 with abdominal aortic aneurysm. [30] MetS was diagnosed according to Adult Treatment Panel III criteria. Carotid Intima Media Thickness , Ankle Brachial Pressure Index and albuminuria were used as non-invasive markers of vascular damage and adjusted for age and sex if appropriate. The prevalence of the metabolic syndrome in the study population was 45%. [30,31]

Conclusion

1. There is a high prevalence of the metabolic syndrome in patients with atherosclerotic vascular disease.
2. Screening for metabolic syndrome in patients with high-risk for new vascular incidents may identify patients with even higher vascular risk and may direct anti-atherosclerotic treatment .
3. The individual components that make up the syndrome should be treated coherently, with awareness of the underlying disorder.
4. Newly developed drugs such as the peroxisome proliferator-activated receptor (PPAR) agonists may help to reach targets, along with life style modifications

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