METABOLIC SYNDROME

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INTRODUCTION

Metabolic syndrome (MetS) is a collection of pathological conditions associated with metabolic, pro-inflammatory, and prothrombotic states. MetS plays an essential role in the atherosclerotic process with associated clustering of risk factors which can increase the risk of atherogenic damage. There is an association between MetS components and the progression of atherosclerosis, which is the leading cause of cardiovascular deaths. This review was undertaken to assess the potential role of metabolic syndrome components, including oxidative stress, hypertension, hyperglycaemia and insulin resistance, obesity, dyslipidemia, chronic inflammation, physical inactivity, and atherogenic diet in the progression of atherosclerosis based on existing research.

We defined metabolic syndrome using the criteria and definition published in the joint scientific statement on metabolic syndrome (18). These criteria defined metabolic syndrome as present when 3 of these 5 components are present:

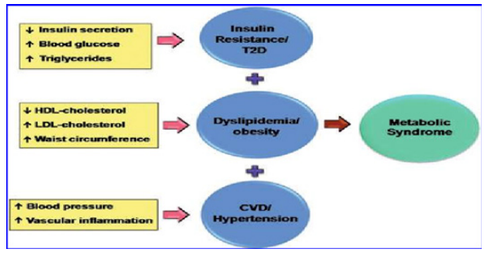
1. Elevated waist circumference (≥88 cm for women and ≥102 cm for men)
2. Elevated triglycerides (≥150 mg/dL) or drug treatment for elevated triglycerides
3. Low HDL cholesterol (<40 mg/dL for men and <50 mg/dL for women) or drug treatment for low HDL cholesterol.
4. Elevated blood pressure (systolic ≥130 mm Hg, or diastolic ≥85 mm Hg, or both) or antihypertensive drug treatment for a history of hypertension.

5. Elevated fasting glucose (≥100 mg/dL) or drug treatment for elevated glucose.

We defined metabolic components using the NHANES questionnaire responses and laboratory responses. NHANES did not collect laboratory values for HDL cholesterol for survey years 1999 through 2004. Therefore, we relied on self-report of drug treatment for low HDL cholesterol. In this analysis, we calculated the estimated proportion of adults who met each component criterion and who met the formal definition of metabolic syndrome across the study periods (individuals with missing or unknown data were included in a separate response category).

THE SYMPTOMS OF METABOLIC SYNDROME

A syndrome can have many characteristics associated with it, physicians had to agree on what symptoms are required for a MetS diagnosis, also known as Syndrome X, insulin resistance syndrome, and dysmetabolic syndrome, patients diagnosed with MetS must exhibit three of the following risk factors:



- **Elevated fasting blood triglycerides:** 150 mg/dL or higher or taking medication for high triglycerides.
- **Low HDL cholesterol level:** below 40 mg/dL for men or under 50 mg/dL for women. Or on medication for low HDL cholesterol.
- **Raised fasting glucose (blood sugar):** 100 mg/dL or more or taking medicine for high blood glucose.
- **Elevated blood pressure:** 130/85 mm Hg or higher or taking medicine for high blood pressure.
- **Central obesity:** waist circumference of more than 40 inches for men or greater than 35 inches for women.

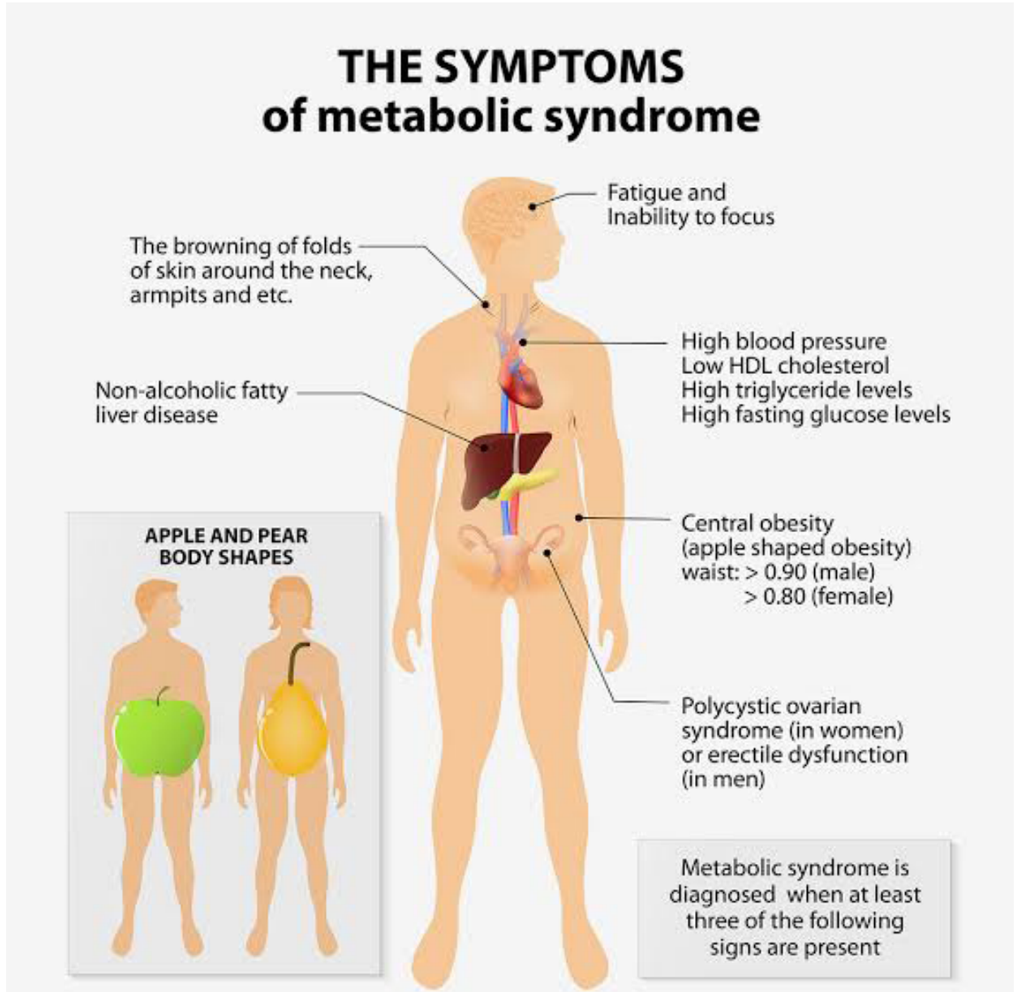
The American Heart Association describes the risk factors:

1. Cardiovascular disease. The arteries become hardened and narrow with plaque build up. Although this happens throughout the body, causing pain and leading to degenerative conditions, cardiovascular disease in the arteries leading to the brain, heart, kidneys, and legs is especially dangerous.

2. Coronary heart disease and heart attack. Narrowed arteries supplying the heart allow less blood and oxygen to reach that vital organ, resulting in chest pain (angina) or heart attack.

3. Stroke. When the blood supply to part of the brain is cut off by a blocked or burst artery, brain cells begin to die. Brain damage, other complications, or death are all possible outcomes.

4. Type 2 diabetes. When the body is either no longer able to use insulin properly or loses the ability to make insulin, diabetes occurs. Without insulin, sugars build up in the blood, increasing the risk for kidney failure and cardiovascular disease.



PREVENTION AND MANAGEMENT OF THE METABOLIC SYNDROME

Prevention of excess body weight/reduction of obesity—in obese patients, moderate energy restriction and low-fat diets, or cognitive/behavioural approaches may be effective in reducing body weight. Appetite-suppressing drugs or inhibitors of lipid digestion and absorption may assist in the loss of excess body weight. In more severe obesity, gastric reduction surgery or gastric by-pass may be an effective option.

Promotion of physical activity—physical fitness is positively associated with insulin sensitivity. An acute bout of exercise stimulates skeletal muscle glucose uptake. This effect is attained by non-insulin-dependent translocation of GLUT 4 transporters to the plasmaleurmal membrane as a result of AMP-dependent protein kinase activation during muscle contraction.