

Metabolic Syndrome is a Combination of Risk Factors

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Abstract:

Metabolic syndrome is a combination of five basic risk factors: the body's resistance to insulin, elevated blood insulin levels, elevated blood sugar levels, obesity, elevated blood fat levels, and elevated blood pressure. Obesity is characteristic of this syndrome and it is a characteristic, so-called central obesity, where fat tissue accumulates mainly around the waist. The body mass index is greater than 30. Men are more prone to the central type of obesity, and their waist circumference should not exceed 102 cm, while women should not have a waist circumference greater than 88 cm. The layers of fatty tissue on the abdomen cause a greater release of fatty acids into the hepatic circulation and an increase in the concentration of fats in the blood.

Key Words: Metabolic Syndrome, Pathophysiology, Risks, Lifestyle, Health

Introduction

Metabolic syndrome could be a group of stars of interrelated clinical syndromes of affront resistance, central weight, raised triglycerides, diminished HDL (High-density lipoprotein), and hypertension [1]. Generally, the prevalence of metabolic disorder is around 34% within the United States. The predominance is over 50% in Americans more seasoned than 60. The predominance of metabolic disorder has been generally higher in older adults, but it is presently expanding among more youthful patients due to increasing weight and diabetes rates. There are too noteworthy varieties within the predominance of metabolic syndrome among diverse ethnicities. Local Americans, African Americans, and Mexican Americans have higher rates of metabolic syndrome as compared to agematched non-Hispanic white Americans or Chinese Americans, likely due more to social components than genetic inclination. In expansion, there are geographic varieties within the rates of diabetes, weight, hypertension, and dyslipidemia. Those with metabolic disorder are five times more likely to create diabetes mellitus (DM), three times more likely to create ASCVD (Atherosclerotic cardiovascular disease), and two times more likely to create unremitting kidney malady; subsequently, it is basic to screen and treat patients within the essential care setting.

Pathophysiology

The pathophysiology of metabolic syndrome isn't well caught on, but it is likely multifactorial [1]. The foremost well-accepted speculation is that metabolic syndrome stems from resistance of fringe tissue to affront, which in turn causes the pancreas to discharge more affront

to preserve euglycemia. This hyperinsulinemia leads to expanded lipolysis and the discharge of more free fatty acids (FFAs). Expanded circulation of FFAs not as it were advance diminishes affront affectability of the fringe tissue but moreover leads to expanded generation of glucose and triglycerides, as well as modified cholesterol digestion system within the liver. In expansion, FFAs produce responsive oxygen species, which causes endothelial brokenness. Hyperinsulinemia can enact the thoughtful apprehensive framework. These instruments together can likely lead to the hypertension, hyperlipidemia, and hyperglycemia watched in patients with metabolic disorder.

Triglycerides are the lipids utilized for capacity of overabundance calories in fat cells for future utilize as an vitality source (not at all like cholesterol, which is utilized in cell membrane and hormone synthesis) [2]. Tall levels of triglycerides demonstrate abundance caloric admissions over vitality needs and are related with cardiovascular disease (conjointly weight, metabolic disorder, and type II diabetes). Triglyceride levels are best reduced by losing weight, cutting back on calories, and way of life adjustments

A few dietary lipids may move forward lipid profiles by expanding HDL ("good" cholesterol) and bringing down triglycerides. Monounsaturated fats (such as found in olive oil, avocados, almonds, and dull chocolate) don't raise LDL whereas raising HDL. Omega-6 polyunsaturated fatty acids (omega-6 PUFA found in seeds and nuts) and omega-3 polyunsaturated fatty acids (omega-3 PUFA found in angle oils) both have claimed benefits in terms of lipid digestion system (such as diminishing LDL cholesterol and triglycerides and

expanding HDL cholesterol). The omega 3 and 6 demonstrate the position of an unsaturated twofold bond within the long carbon chain. Such claims are complicated by the finding that omega-6 PUFA might promote the blend of certain mediators of irritation which omega-3 supplementation in high-risk people has not illustrated a decrease in cardiovascular infection. In spite of the fact that the American Heart Association right now recommends counting 6 to 10 percent of calories as omega-6 PUFA from nourishments as portion of a solid count calories, utilize of both omega-6 and omega-3 PUFA dietary supplements isn't suggested for healthy people

Risks

The metabolic syndrome could be a multiplex hazard calculate for atherosclerotic cardiovascular disease (ASCVD) [3]. Meta-analyses appear that the presence of metabolic syndrome basically pairs the chance for ASCVD. The condition could be a solid indicator of sort 2 diabetes; and people with diabetes are helpless for creating both ASCVD (macrovascular disease) and microvascular disease. The predominance of metabolic disorder all through the world is moderately tall – extending from 10% to 40%, depending on the populace. This tall predominance is generally due to the worldwide epidemic of weight and stationary life propensities.

Five cardiovascular chance components make up the metabolic syndrome: atherogenic dyslipidemia, hoisted blood weight, lifted plasma glucose, a pro-thrombotic state, and a pro-inflammatory state. Atherogenic dyslipidemia comprises of hoisted serum triglycerides (TG), hoisted apolipoprotein B (apo B), and decreased levels of high-density lipoprotein cholesterol (HDL-C). Hypertension can be borderline or clinically categorical. Dysglycemia comprises both prediabetes and diabetes. A pro-thrombotic state comprises of variations from the norm in coagulation components and/or blood platelets. A pro-inflammatory state is reflected by heights of provocative go betweens. When these hazard components total, they twofold the hazard for ASCVD.

All of the metabolic hazard variables show up to advance arterial disease. They act at one step or another in the pathogenesis of atherosclerosis or its complications. The overwhelming chance figure is atherogenic dyslipidemia, which comprises to a great extent of lifted apolipoprotein B-containing lipoproteins. These lipoproteins channel into the subendothelial space of supply routes and gotten to be captured in a work of glycosaminoglycans. Here they experience a few alterations that permit for their take-up by macrophages or smooth muscle cells. These cells gotten to be engorged with lipid and are called froth cells. In the long run, froth cells undergo apoptosis and discharge cholesterol into the subendothelial space. The coming about lipid-rich plaque can ended up unsteady and consequently inclined to plaque break. When burst happens, an occlusive thrombosis can supervene. This whole handle can continue through the activity of atherogenic lipoproteins alone; but it ordinarily is quickened by the other metabolic hazard variables. The details whereby these chance variables influence atherogenesis, actuate plaque instability, and cause obstructive thrombosis are not completely caught on. But there is small question that combined they can act together to upgrade the probability of intense cardiovascular occasions.

Symptoms

There are no particular clinical side effects related with metabolic syndrome [1]. A understanding may display to the essential care

clinic with side effects related with corpulence, affront resistance, hypertension, and dyslipidemia.

Patients regularly look for therapeutic care due to weight. In spite of the fact that flawed, BMI (Body mass index) could be a noninvasive and an reasonable screening device that has been connected with unfavorable cardiovascular occasions. As the BMI estimation does not account for body composition, sexual orientation, or age, BMI may not be exact in elderly patients (who tend to have more fat tissue compared to more youthful patients), women (who have higher add up to body fat for the comparable BMI), or strong people (who have lower body fat for the identical BMI). Later considers have illustrated that midriff circumference, waist-to-hip proportion, and neck circumference are extra surrogate markers that are related with expanded hazard of affront resistance, diabetes, and coronary course illness. In expansion, patients may show to the clinic for an assessment of menstrual cycle anomalies, hirsutism, daytime languor, or persistent weakness due to polycystic ovary disorder and obstructive rest apnea.

Patients with extreme affront resistance may have acanthosis nigricans. Those who have as of now created DM may have polyuria, polydipsia, polyphagia, blurry vision, peripheral neuropathy, or repetitive urinary tract contaminations. Uncontrolled hypertension may show as visual unsettling influences or verbose cerebral pains.

In expansion to hypertension and weight on the physical examination, the patient's blood work may uncover raised fasting serum glucose, Hb A1C, triglycerides, LDL (Low-density lipoprotein), or decreased HDL. Patients who have diabetes or hypertension may moreover have proteinuria on urinalysis.

Syndrome X, also known as metabolic disorder could be a cluster of side effects that incline to heart malady and is characterized by the National Cholesterol Instruction Program as the nearness of any three of the following [4]:

- Excess weight around the waist (waist estimation of more than 40 inches for men and more than 35 inches for women)
- High levels of triglycerides (150 mg/dL or higher)
- Low levels of high-density lipoprotein (HDL) cholesterol (underneath 40 mg/dL for men and underneath 50 mg/dL for women)
- High blood weight (130/85 mm Hg or higher)
- High fasting blood glucose levels (110 mg/dL or higher)

Adult-onset diabetes, moreover known as type 2 diabetes, is caused by the lacking reaction of the body to affront and lacking generation of affront by the pancreas.

Insulin Resistance

Affront resistance is caused by the disappointment of the cells to reply satisfactorily to boost from affront; this starts a horrendous cycle in which blood sugar levels rise, and in reaction, the pancreas quickens affront generation [4]. The cells inevitably react, and glucose within the blood enters the cells en masse, coming about in a comparing fast drop in blood sugar levels and a hypoglycemic state. As basic carbohydrates and high-glycemic-index nourishments are ingested, the cycle rehashes until in the long run the pancreas is overextended and is nolonger able to create adequate sums of affront,

coming about in diabetes. Affront resistance is checked by concurrent rises of blood sugars and blood affront. The liver reacts to the hoisted blood sugar levels by quickly changing over the overabundance sugars to fat. Glucose from sugars is changed over to energy in the cells; within the nonattendance of this basic source of vitality, weariness and nourishment longings result.

The overabundance fat cells result in expanded hormone stack as more estrogen is put away in fatty tissue and synthesized through the aromatase chemical. Aromatase protein synthesizes estrogen through the androstenedione pathway, which may eventually result in excess testosterone. Insulin resistance may be a prediabetic condition.

The marvel of fringe affront resistance could be a common result of weight and is unequivocally related with the advancement of T2DM () [5]. Inhibitory arbiters from adipose tissue (counting nonesterified greasy acids and cytokines such as TNF-) are specially expanded in visceral-abdominal (upper body) corpulence. These go between meddled with affront signaling by disturbing the engendering of protein-tyrosine phosphorylation. As a result, affront resistance and T2DM are more predominant in individuals with upper body-visceral weight. Adiponectin, which advances affront activity on its target tissues, is diminished in visceral adiposity. Hyperinsulinemia, caused by affront resistance, can downregulate the number of affront receptors on the plasma layer, which may advance contribute to cellular resistance to affront activity.

Resistance to the activity of affront in target tissues and compensatory hyperinsulinemia are closely tied to a differing set of cardiovascular hazard factors that are predominant in stout, stationary people and in patients with T2DM. These chance variables, together named the metabolic disorder, incorporate (1) abdominal adiposity with expanded abdomen circumference, (2) mild hypertension (maybe related to a disappointment of endothelium-dependent vascular unwinding) and (3) dyslipidemia, characterized by reduced high-density lipoprotein cholesterol, expanded circulating triglycerides and little, thick, LDL particles. These highlights ought to be assessed within the setting of other critical donors to cardiovascular hazard, such as plasma LDL levels, age, sex and smoking.

PCOS

Due to the fundamental affront resistance seen in PCOS (Polycystic Ovary Syndrome) patients, gestational diabetes is two and a half times more common in PCOS patients [6]. Ten percent of PCOS patients create Diabetes Mellitus Type II by age 40. DM sort II is 3–5 times more common in PCOS patients. Twenty five percent of PCOS patients have metabolic syndrome and this is often three times more common in PCOS patients. Rest apnea/disordered breathing is 30–40 times more common in PCOS patients. Interestingly rest apnea in PCOS patients isn't related to the patient's weight or androgen level but is related to the fundamental affront resistance. Nonalcoholic Fatty Liver Disease (NAFLD) and Nonalcoholic Steatohepatitis (NASH) are seen in 6.7% of PCOS patients. Estrogen overabundance of PCOS increments the chance of creating endometrial hyperplasia, atypia and cancer. One think about found that PCOS patients were three times more likely to create endometrial cancer. The chance of PCOS patients creating ovarian and breast cancer has not been substantiated. Depression is four times more common in PCOS patients. One think about found that the discouragement in PCOS patients was not related to corpulence or side effects of hyperandrogenemia.

The information on the coordinate impacts of PCOS on cardiovascular infection is clashing. Be that as it may, we do know that women with PCOS are more likely to have a better level of little thick low-density lipoprotein (LDL) particles when compared to ladies of comparative Body Mass Index (BMI) and affront resistance without PCOS. Small dense LDL particles are unequivocally related with an expanded hazard of coronary heart disease. There's higher frequency of coronary calcification, aortic calcification, and expanded carotid intima media thickness (CIMT) in PCOS ladies compared to controls. Women with PCOS may also have more broad coronary disease on angiography when compared to ordinary ladies. This was outlined in a report of women more youthful than 60 a long time of age, who were experiencing coronary angiography for appraisal of chest torment or valvular infection. Dyslipidemia is profoundly predominant in patients with PCOS. PCOS patients are moreover at higher hazard of creating hypertension at a more youthful age. PCOS patients who have been treated with tall dose of metformin for a long period of time have an expanded hazard of creating vitamin B12 insufficiency and thus ought to have their vitamin B12 level checked at slightest annually. A meta-analysis on pregnancy results in ladies with PCOS illustrated a significantly higher chance of creating gestational diabetes mellitus, pregnancy-induced hypertension, preeclampsia, and preterm birth in PCOS patients.

DM

There's overpowering prove of the connect between all shapes of diabetes mellitus (DM) and cardiovascular hazard, and DM is an autonomous chance calculate for a few shapes of CVD [7]. Besides, diabetics enduring with CVD have a worse prognosis than non-diabetics. Cardiovascular sequelae of DM incorporate CHD (Coronary Heart Disease), stroke, fringe arterial illness, nephropathy, retinopathy, neuropathy, and cardiomyopathy. Type 2 DM is the foremost predominant shape, emerging from a combination of affront resistance and the inadequate discharge of affront by pancreatic beta cells. Due to the maturing populace, expanding predominance of weight, and stationary way of life, which all incline to type 2 DM, the worldwide burden of diabetes mellitus is expanding at an disturbing rate. The metabolic disorder includes a cluster of metabolic chance variables related with expanded hazard for type 2 DM and CVD. Affront resistance, within the nonattendance of unmistakable DM, is progressively perceived as an autonomous hazard figure for CVD, as well as playing a vital part within the pathophysiology of the metabolic disorder.

Pharmacologic Therapies

In spite of the fact that the way of life adjustments are advertised as a first-line choice, they are regularly inadequately in tending to metabolic syndrome [1]. Patients ought to be advertised pharmacologic treatments for dyslipidemia, hypertension, and diabetes to anticipate the advancement of CVD (Cardiovascular disease), myocardial infarction, and cerebrovascular accidents. Utilizing the ASCVD hazard calculator, a patient's 10-year hazard of creating CVD ought to be surveyed. Those with borderline chance (5%-7.5%) and chronic kidney disease, metabolic syndrome, DM, HIV (Human immunodeficiency infection), rheumatoid joint pain, psoriasis, or South Asian ethnicity ought to be begun on moderate-intensity statins. Patients who have middle chance (7.5%-20%) ought to also be set on direct- or high-intensity statins. All high-risk patients (> 20%) ought to be endorsed high-intensity statin treatment.

Clinicians should consider starting metformin for patients who have impaired glucose tolerance (IGT). Metformin stifles hepatic glucose generation and upgrades peripheral tissue affront affectability. A huge cohort consider within the United Kingdom appeared that treatment of patients with IGT with metformin deferred advancement of metabolic syndrome and DM. Thiazolidinediones have too been appeared to move forward affront affectability and delay onset of DM in patients with prediabetes. More current specialists such as glucagon-like peptide-1 (GLP1) receptor agonists and sodium glucose transport-2 (SGLT2) inhibitors may possibly be valuable in treatment of metabolic disorder as they cause weight misfortune, make strides affront affectability, and decrease ASCVD; in any case, more ponders are required to evaluate their efficacies.

Essentially, pharmacologic treatments ought to be considered in patients with blood pressure > 140/90 mm Hg. An Ace inhibitor (ACEI) and angiotensin receptor blockers (ARBs) may be valuable especially in patients with metabolic syndrome or DM. Angiotensin II influences hypertension by expanding receptive oxygen species generation and disabling nitric oxide era. Besides, angiotensin II expands hepatic gluconeogenesis and affront resistance. A large-scale metanalysis has appeared that ACEi and ARBs not as it were move forward hypertension but too diminish advancement of new-onset DM.

Lifestyle

Lifestyle modification is the mainstay of treatment [1]. Smoking is one of the greatest modifiable chance variables for creating CVD. Patients' tobacco utilize ought to be evaluated at each visit, and smoking cessation intercessions ought to be given to all patients. The United States Preventive Services Task Force suggests the 5A approach for smoking cessation: Inquire around tobacco utilize, Exhort to stopped, Evaluate eagerness to stopped, Help to stopped, and Orchestrate for follow-up. Patients who are undecided approximately stopping may advantage from a brief motivational meet, which can offer assistance resolve a patient's irresoluteness approximately smoking cessation. A combination of counseling and pharmacologic treatment, counting nicotine substitution treatment, bupropion, or varenicline, is more viable than either counseling or solutions alone.

Different thinks about have appeared that moderate-intensity physical movement for at slightest 150 minutes per week is related with weight loss. Unassuming weight loss of 5% to 10% has been appeared to progress affront affectability, fasting blood glucose, HDL, and triglyceride levels as well as hypertension. In expansion to physical movement, diets wealthy in natural products, vegetables, fiber, unsaturated fats, and complex carbohydrates in which patients dodge immersed fats and sodium can anticipate advancement of CVD and DM.

Conclusion

The diagnostic procedure begins with a specialist examination, and includes laboratory tests, genetic testing and other diagnostic methods that are used according to indications and complications. The principle of treatment of metabolic syndrome is based on lifestyle changes, primarily dietary habits, increased physical activity and medication treatment. Regular physical activity is extremely important. Half an hour of exercise every day or an hour every other day reduces the risk of contracting a number of diseases. Fast walking, cycling and running are recommended activities. It is important to normalize body weight and keep BMI below 25. A healthy diet that includes a high proportion of fiber, lots of fruits and vegetables, blood pressure control and regular visits to the doctor reduce the risk.

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