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Research Article

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Evaluation of Metabolic Syndrome in Primary Health Care

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ABSTRACT

Background: *Metabolic syndrome includes atherogenic dyslipidemia, obesity, hypertension, hyperglycemia, and insulin resistance. This complex of metabolic abnormalities is a risk factor for DM2, stroke, adverse cardiac events, and hepatic necrosis. In the last few years, studies showed a significant high prevalence of this syndrome among Saudi males. Central visceral adiposity is thought to be the primary trigger of most pathogenic events involved in the advent of the syndrome.* ***Objectives:*** *In this paper, our aim is to discuss metabolic syndrome, its definitions, pathophysiology, diagnosis, screening, and the management done for such patients in general with special focus to primary healthcare.* ***Methodology:*** *PubMed database was used for articles selection.* ***Conclusion:*** *The syndrome is linked with significant impacts on the patient health; as a result, the health care providers shall be alarmed on how to screen, diagnose and manage such disease. Prevention of childhood obesity is critical through screening and early diagnosis to save major burden and prevent future complications. Thus, nowadays, the new trend is towards incorporating screening of this syndrome in primary health care centers.*

Key words: *Metabolic Syndrome, screening, diagnosis, family physician, primary health care.*

INTRODUCTION

Metabolic syndrome is basically a syndrome that strikes when a cluster of cardiovascular diseases risk factors' co-occurrence exists at the same time. Those include atherogenic dyslipidemia, obesity, hypertension, hyperglycemia, and insulin resistance [1]. This complex of metabolic abnormalities increments the risk for developing diabetes mellitus type 2, stroke, several cardiac diseases, and hepatic necrosis [2, 3]. Metabolic syndrome could be explicitly defined as a combination of insulin resistance, organ adiposity, atherogenic dyslipidemia, and endothelial dysfunction [1]. Within the last decade, studies were conducted in Saudi Arabia, and showed a significant high prevalence among Saudi males. These results shall alert the ministry of health to implement preventive interventions including lifestyle changes, smoke cessation programs, and weight control programs [4]. In this paper, we will review literature regarding metabolic syndrome pathophysiology, definition, diagnoses, screening, and complications.

METHODOLOGY

PubMed database was used for articles selection using the keywords metabolic syndrome, and its diagnosis. With regard to the inclusion criteria, the articles were selected based on the following topics; metabolic syndrome, and its screening and diagnosis. Exclusion criteria were all other articles which did not have one of these topics as their primary endpoint.

DISCUSSION

Pathogenesis of metabolic syndrome remains unclear whether the aforementioned individual parameters of the syndrome represent distinct pathologies or they are all manifestations of a primary trigger such as obesity. In general, central visceral adiposity is thought to be the primary trigger of the pathogenic mechanisms in this syndrome. This adiposity is hypothesized to be an inflammatory tissue that secretes mediators creating a chronic inflammatory status in the affected body leading to insulin resentence, diabetes, dyslipidemia and/or hypertension [5].

Variety of worldwide health organizations have been trying to establish a criterion of diagnosis for metabolic syndrome. An early definition of metabolic syndrome was created by the World Health organization (WHO) in 1998. Later in 1999, it was modified by European Group for Study of Insulin Resistance (EGSIR). American Association of Clinical Endocrinologists introduced their new definition in 2003. The main consideration of these organizations' definitions was insulin resistance, which was assessed by glucose tolerance test or the euglycemic hyperinsulinemic clamp. These definitions had some limitations like obesity cut-off values in different groups of ethnicities. As a result, only three definitions for specific populations were identified that were not applicable to other ethnicities. International Diabetes Federation (IDF) provided a new definition in 2005. This definition comprised the old three definitions provided by WHO, with addition of waist circumference measurement. The cut-off for ethnic groups was provided in IDF criteria which also included blood pressure, fasting glucose, triglycerides, high-density lipoproteins (HDL), and cholesterol evaluations [3, 6].

Risk factors

An important risk factor for metabolic syndrome is obesity, and should be considered in the holistic management of metabolic syndrome. An interesting approach to this would be the fecal microbiota transplantation. It is performed primarily in ill patients and those with Inflammatory Bowel Disease [7]. While it is interesting to examine this treatment further, more research is still needed for it to be applicable in the general therapy for metabolic syndrome patients [7]. Dietary intervention is a potential modality for metabolic syndrome management and had displayed beneficial effects in elderly patients with proven protective effects [8]. Rochlani Y et al. [5] reviewed the literature on natural compounds that could be of benefit in metabolic syndrome. They identified low intake of fat, cholesterol, and sodium along with simple sugars as a way to help with dyslipidemia, hyperglycemia and hypertension. Thus, they recommended nutraceuticals (dietary supplements) in the treatment of metabolic syndrome. The latter included cinnamon, garlic, turmeric powder, and cumin among others [5].

Definition

As previously described, there are several definitions or diagnostic criteria have been formulated for the so called metabolic syndrome in literature. The most widely used is the National Cholesterol Education Program (NCEP), and Adult Treatment Panel III (ATP III) [9]. Based on this definition, metabolic syndrome is diagnosed if 3 or more parameters out of five are present. These are high glucose level, low high density lipoprotein (HDL) level, high triglyceride level, obesity and hypertension (Table 1).

Table 1: The diagnostic criteria of metabolic syndrome according to NCEP ATP III
(Metabolic syndrome is diagnosed when ≥3 of the following 5 parameters are fulfilled.)

Parameter	Definition
Glucose level	Equal to or more than 100 mg/dL **or** drug treatment for elevated blood glucose
HDL cholesterol	Less than 40 mg/dL (men) / Less than 50 mg/dL (women) **or** drug treatment for low HDL
Triglyceride	Equal to or more than 150 mg/dL **or** drug treatment for elevated triglycerides
Obesity	Waist equal to or more than 102 cm for men or equal to or more than 88 cm for women
Hypertension	Equal to or more 130/85 mmHg or drug treatment for hypertension

Other diagnostic criteria use the same parameters; however, they define the specific numbers differently. Also, unlike the NCEP ATP III, they include a "requirement" which means that one particular parameter has to be present or metabolic syndrome cannot be diagnosed. For example, in the International Diabetes Federation (IDF) criteria, a patient has to have a waist circumference of 94 cm or more (or ≥80 cm for women), plus two or more out of the four remaining criteria. These four include blood glucose level, HDL, triglyceride and hypertension. Nevertheless, NCEP ATP III is the most widely used and accepted set of criteria [10].

Diagnosis and Screening

Metabolic syndrome is not diagnosed only by laboratory analysis. Proper medical history and physical examination are the first crucial step for the disease recognition, prevention and treatment. Screening for such syndrome starts with vital signs, with findings like high blood pressure, and the general appearance of the patient, such as, obesity can all be used by healthcare center physician to screen possible patients. Lifestyle and social history (such as sedentary lifestyle, smoking and eating fast food) can also give the clinician an indicator for possible development of metabolic syndrome. Furthermore, careful examination is an ever essential part for screening and diagnosis. The clinician should assess waistline circumference as it plays a major part in such cases. Further signs that can be noted by the physician indicating insulin resistance include peripheral neuropathy, retinopathy, and acanthosis nigricans. Listening to arterial bruits that could be due to atherosclerotic disease is also important in the evaluation of patients. Finally, dyslipidemia features like xanthomas can also be noted, and shall alarm the clinician to further needed investigations. Screening for such syndrome shall be carried out as early as possible, even in children, and obese children shall be managed accordingly, in order to avoid potential complications of this syndrome. Screening is vital and is implemented more and more by health ministries, thus understanding this syndrome by the clinicians is very important.

Diagnosis of this disease starts from the physical examination, history, and lifestyle of the patient according to the definitions mentioned earlier. However, laboratory studies can be done initially in patients suspected of having metabolic syndrome and should include standard chemistries. These are used to assess for hyperglycemia, renal dysfunction and hypertriglyceridemia or low HDL levels (via lipid profile studies). Family and personal history of coronary disease, with or without atherosclerotic disease, are indications for investigating further. Advanced test that can be indicated include high and low-density lipoprotein cholesterol, lipoprotein, apolipoprotein-B100, and C-reactive protein. Additional helpful blood tests may include thyroid study, liver studies, hemoglobin-A1C levels, and uric acid. Increased thyroid stimulating hormone (TSH) has been linked to an increased disease prevalence of metabolic syndrome [4]. Hyperuricemia is noticed more in patients with metabolic syndrome; and this could be explained by the inflammation occuring in metabolic syndrome [11].

Furthermore, sleep-related disorders, and obstructive sleep apnea in particular, are a probable risk for metabolic syndrome development [12]. Obesity is a confounding factor in both diseases and therefore differentiating causation might be difficult to prove [13]. Moreover, in people with sleep deficiencies, and daytime drowsiness could potentially benefit from further investigation such as polysomnography.

Clinical Assessment

New guidelines on cardiovascular risk assessment by the American Heart Association/American College of Cardiology (AHA/ACC) advised the use of a revised calculation for the risk of acquiring atherosclerotic cardiovascular disease (ASCVD) incident. This included a new non-deadly myocardial infarction, fatal coronary heart disease, and/or stroke in the patient. Guidelines suggested assessing the clinical risk factors in a five-year interval for patients in early twenties to late seventies years of age with no existing clinical ASCVD. Moreover, patients with a low ten-year risk (< 7.5%) and between age of twenty and late fifties, physicians were advised to assess the thirty-year or lifetime risk. However, patients with a high 10 year risk shall be advised about their risk factors, blood cholesterol, and obesity in accordance to the guidelines. Regardless of the patient's age, clinicians should convey risk data to the patient and refer to the lifestyle guidelines (by AHA/ACC) covering diet and physical activity [14].

The role of imaging modalities is limited to the diagnosis of metabolic syndrome, and not routinely requested. Nevertheless, specific imaging studies can be indicated when the clinician notices any signs or symptoms of the complications associated with this syndrome. The family physician shall not take slightly any complaints like chest pain, dyspnea, claudication, and/or any other sudden issues. The previous complaints may require additional tests like electrocardiography (rest or stress), x-ray, and ultrasound. Other more sophisticated modalities include

stress single-photon emission computed tomography or cardiac positron emission tomography; are usually carried out in the tertiary hospital rather than the primary health care unit.

Because metabolic syndrome is a cluster of different medical conditions, further investigations are needed to rule out differential diagnosis. As an example, hypertension secondary to other causes should be rule out by extensive workup, like imagining (e.g. renal ultrasonography) to rule out renovascular disease. Other differential diagnosis that must be excluded include cushing disease, sleep obstructive apnea, and hereditary dyslipidemia [1, 15].

CONCLUSION

Metabolic syndrome prevalence showed a great increase, especially among the younger generation. With many complications associated with this disease and with how fatal they are, the health care workers shall be alarmed on how to screen, prevent, and diagnose such syndrome. Prevention of childhood obesity is critical through screening, and early diagnosis can negate major burden and prevent future complications. Thus, nowadays, the recent trend in health care policies is incorporating screening of this syndrome in primary health care centers. Intervening with this syndrome with targeted lifestyle recommendations, along with repeated follow-up proves to be vital in these cases; however further research is needed to establish the full effect of these methods.

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