The diagnosis and treatment of metabolic syndrome (A Review)

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ABSTRACT

The diagnosis of metabolic syndrome calls for having the criteria of this syndrome, and this is fulfilled by conducting different tests and examining the patient. The patient’s medical history includes the assessment of OSA symptoms in all patients and PCOS in premenopausal women. Family record is helpful for determining CVD and DM risk. Measuring blood pressure and waist circumference provide the information required for diagnosing metabolic syndrome. Searches were conducted by two independent researchers in international (PubMed, Web of science, Scopus and Google scholar) and national (SID, Magiran) databases for related studies from the inception of the databases to September 2017 (without time limitation) in English and Persian languages. To ensure literature saturation, the reference lists of included studies or relevant reviews identified through the search were scanned. When metabolic syndrome is diagnosed, fasting lipid and glucose values need to be determined. The necessity of measuring other biological markers associated with insulin resistance is different for each individual. This measurements need to include ApoB, high-sensitivity CRP, fibrinogen, uric acid, microalbuminuria, and liver function tests. When there are symptoms of obstructive sleep apnea (OSA), a sleep study must need to be taken from the patient. If PCOS is suspected, the values of testosterone, luteinizing hormone (LH), and follicle-stimulating hormone (FSH) need to be measured according to clinical manifestations and anovulation.

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Introduction:

The diagnosis of metabolic syndrome calls for having the criteria of this syndrome, and this is fulfilled by conducting different tests and examining the patient (1). The patient’s medical history includes the assessment of OSA symptoms in all patients and PCOS in premenopausal women. Family record is helpful for determining CVD and DM risk. Measuring blood pressure and waist circumference provide the information required for diagnosing metabolic syndrome (2).

Methods:

1.1. Search strategy

Searches were conducted by two independent researchers in international (PubMed, Web of science, Scopus and Google scholar) and national (SID, Magiran) databases for related studies from the inception of the databases to September 2017 (without time limitation) in English and Persian languages. To ensure literature saturation, the reference lists of included studies or relevant reviews identified through the search were scanned. The specific search strategies were created by a Health Sciences Librarian with expertise in systematic review search using the MESH terms and free terms according to the PRESS standard.
After the MEDLINE strategy was finalized, it was adapted to search in other databases. Accordingly, PROSPERO was searched for ongoing or recently related completed systematic reviews. The key words used in the search strategy were “diagnosis, treatment, Metabolic syndrome” which were combined with Boolean operators including AND, OR, and NOT.

1.2 Study selection

Results of the Literature review were exported to Endnote. Prior to the formal screening process, a calibration exercise was undertaken to pilot and refine the screening. Formal screening process of titles and abstracts were conducted by two researchers according to the eligibility criteria, and consensus method was used for solving controversies among the two researchers. The full text was obtained for all titles that met the inclusion criteria. Additional information was retrieved from the study authors in order to resolve queries regarding the eligibility criteria. The reasons for the exclusion criteria were recorded. Neither of the review authors was blinded to the journal titles, the study authors or institutions.

Laboratory tests

When metabolic syndrome is diagnosed, fasting lipid and glucose values need to be determined. The necessity of measuring other biological markers associated with insulin resistance is different for each individual. This measurements need to include ApoB, high-sensitivity CRP, fibrinogen, uric acid, microalbuminuria, and liver function tests. When there are symptoms of obstructive sleep apnea (OSA), a sleep study must test need to be taken from the patient. If PCOS is suspected, the values of testosterone, luteinizing hormone (LH), and follicle-stimulating hormone (FSH) need to be measured according to clinical manifestations and anovulation (3).

The treatment of metabolic syndrome

1. Lifestyle

Obesity is the main cause of metabolic syndrome. Thus losing weight is the first step to be taken by these patients. For losing weight, the following measures need to be taken: adopting calorie restriction; doing sports; and modifying behavior pattern. Calorie restriction is the most important factor of losing weight, and increased physical activity (doing sports) is the most important factor of maintaining weight loss (4).

2. Diet

These patients need to be justified that weight loss process is a time-consuming one. The restriction of 500Kcal of energy intake will result in weight loss for one pound a week. The weight loss pattern will not change after one year. Thus, keeping a diet is more important than the diet itself. Low-carb diets result in quicker initial weight loss. These patients are recommended to adopt a diet containing fruit, vegetables, legumes, cereal, chicken, low-fat poultry, and fish (5).

3. Physical activity

Doing sports results in little weight loss. However, the patients need to be recommended to do sports for 60-90 minutes a day. If someone fails to do sports for 60-90 minutes a day, he is required to do physical activities for at least 30 minutes a day. Before recommending sports, one needs to make sure that doing sports has no risk for the patient (6). The patients need to undergo a cardiovascular examination. Physical activities need to be increased gradually. Some activities including gardening, walking, and doing housework require an average level of calorie. Thus, by physical activities, we do not merely mean sports such as running, swimming, and tennis (7).

4. Obesity treatment

In addition to changing lifestyle, some patients suffering from metabolic syndrome are required to take some other medical measures for losing weight. Two groups of drugs used for weight loss include appetite suppressants such as phentermine and sibutramine as well as reuptake inhibitors such as orlistat. Bariatric surgery is one of the treatment options in patients suffering from metabolic syndrome whose BMI is more than 40 or more than 30 with a simultaneous disease. Gastric bypass results in severe weight loss and improved symptoms of metabolic syndrome. However, its effect on the patient’s longevity is not clear yet (8).

5. Increased LDL cholesterol treatment

Decreased LDL results in reduced coronary artery diseases. In patients suffering from
metabolic syndrome and diabetes, LDL needs to be less than 100 mg/dl. In patients with a history of coronary artery disease, the LDL needs to be even less than 100 mg/dl. In patients suffering from metabolic syndrome lacking diabetes, the target is the LDL of less than 130mg/dl. For reducing LDL, the following measures need to be conducted: a diet restricted with saturated fats (less than 7% of the total calorie); the least trans fat; and the cholesterol of less than 200 mg/dl a day. If the LDL is higher than the abovementioned values despite adopting a diet, the medicinal treatment (including statins, fibrates, nicotinic acid, and cholestyramine) needs to be initiated (9).

6. Increased triglyceride treatment
In patients suffering from metabolic syndrome, the fasting triglyceride value needs to be less than 150 mg/dl. Reducing fasting triglyceride is dependent upon weight loss. The weight loss of 10% is essential for reducing fasting triglyceride. The drugs that are used for reducing triglyceride include fibrates (being the most important), statins, nicotinic acid, and the high dose of omega-3 fatty acids (10).

7. Decreased HDL cholesterol treatment
In metabolic syndrome, it must be attempted to increase HDL as well. For this purpose, the following measures are taken: weight loss; and using drugs such as nicotinic acid. Increased HDL reduces the likely risk of coronary artery disease in patients suffering from metabolic syndrome (11).

8. Blood pressure treatment
The blood pressure of higher than 140/90 increases the mortality. The control measures of blood pressure include a diet with limited salt and rich in fruits and vegetables. In patients with metabolic syndrome without diabetes, the selective treatment includes ACE inhibitors or Angiotensin II receptor blockers; both drugs reduce the incidence rate of type 2 diabetes (12).

9. Impaired fasting glucose treatment
In patients suffering from metabolic syndrome and type 2 diabetes, the severe control of glucose will result in modified triglyceride or HDL. In patients suffering from IFG, changing lifestyle (including weight loss, fat limit intake, and increased physical activities) will decrease the incidence rate of type 2 diabetes (13).

10. Insulin resistance treatment
Biguanides and thiazolidinediones (TZDs) remove insulin sensitivity. If insulin resistance is the main mechanism of forming metabolic syndrome, using these drugs will result in decreased metabolic syndrome. Both metformin (a kind of biguanides) and TZDs increase the liver insulin activity and control glucose. Thiazolidinediones (rather than metformin) improves the absorption of insulin-dependent glucose in muscle and adipose tissue. Both groups of drugs bring about useful effects for both NAFLD (non-alcoholic fatty liver disease) and polycystic ovary syndrome (PCOs) (14).

References:

8. Sadr-nia , Chehrei A. Determining the effect of Body Mass Index and labartry
factors on left ventricular hypertrophy in patient with systemic hypertension. Journal of Arak University of Medical Sciences 2008 spring; 11 (2):56-62


