In the name of God

Shiraz E-Medical Journal
Vol. 12, No. 3, July 2011

http://semj.sums.ac.ir/vol12/jul2011/89060.htm

Screening and management of Metabolic Syndrome.

Nozari N.

Internist, Department of Internal medicine, Pastor hospital, Kerman University of Medical Sciences, Bam, Iran.

Correspondence: Correspondence: Dr. Neda Nozari, Pastor Hospital, Bam, Iran, Telephone: +1 (913)397-3577, Email: nozari_neda@yahoo.com

Received for Publication: March 17, 2011, Accepted for Publication: June 4, 2011.

Abstract:

Severe obesity leads to high mortality, morbidity and psychological problems; and has negative effects on quality of life. Beneficial effects of risk reduction through changing life style and pharmacological therapy have been documented. Environmental factors play a role in development of the metabolic syndrome and are recommended to be the subject of targeting screening for disease preventing in partners of people with the metabolic syndrome. An overweight child or adolescent may have several risk factors and should be carefully evaluated regarding each risk factor through screening. Clinical management of metabolic syndrome aims to reduce atherosclerosis risk at first and then to reduce development of diabetes mellitus risk; therefore, clinical management of metabolic syndrome starts with reducing major risk factors such as cessation of smoking, controlling LDL and triglycerides level, increasing HDL level, and controlling blood pressure and glucose levels. Treatment of lipid and non-lipid risk factors should be started after lifestyle changes. Body weight should be reduced 7-10% during first year of therapy. A major component of life style changes is reaching the energy balance. The goal for physical activity is to be at least 30 minutes of exercise per day; however, the level of activity needs to be adjusted regarding the individuals' age. Metabolic syndrome is accompanied by several complications and affects social health in childhood and adolescence; therefore, we recommend the establishment of a screening guideline for risk factor reduction in metabolic syndrome that includes a diet and physical activity program, and pharmacological treatment.

Key words: Metabolic syndrome, Screening, Social health.

Introduction:

Severe obesity leads to high mortality, morbidity and psychological problems; and has negative effects on quality of life during the life course.[1] Metabolic syndrome is characterized by three factors based on the National Cholesterol Education Program's Adult Treatment Panel III (ATP III) guidelines: 1- Abdominal obesity (waist circumference >102 cm for men and >88 cm for women) 2- Triglycerides (TG) ≥ 150 mg/dl, 3- High density lipoprotein (HDL) (Men<40mg/dl, Women <50mg/dl), 4- Blood pressure ≥ 130/85mmHg, 5- Fasting glucose ≥ 110mg/dl. [2] Correlation among these risk factors and cardiovascular diseases (CVD) [3, 4, 5, 6], and beneficial effects of risk reduction, life style modification [3, 4, 5] and pharmacological therapy have been documented.[3]

Why follow a screening guideline for metabolic syndrome group?

Ker et al. reported 31% prevalence of metabolic syndrome in the South African population [7] and almost 20% of people in United States suffer from metabolic syndrome. [6] Morrison et al. reported at least three components of metabolic syndrome in 3% of young adult women but this syndrome was very rare in prepuberty. These authors recommended that clinicians should assess early potential risk factors of metabolic syndrome in young people before the syndrome is completed in adolescence period. Central obesity is a major factor because if central adiposity does not exist in adolescence period it could not lead to metabolic syndrome.[8]

Environmental factors that potentially lead to metabolic syndrome include: high-fat diet, high-carbohydrate diet, consumption of high glycemic-index food or refined sugars and starches, low-protein diet, low intake of vegetables or fibers, micronutrient deficiencies (calcium, magnesium, chromium, vanadium), physical inactivity, and stress. [6] Temelkova-Kurktschiev et al. showed high prevalence of metabolic syndrome in acute myocardial infarction, hypertension, and diabetes in a Bulgarian group that was high risk for CVD. Also a high prevalence of metabolic syndrome was reported in low risk for CVD group. They have found a higher prevalence of metabolic syndrome in women. Authors recommended screening in the general population to improve social health.[9]

Kim et al. reported significant positive spousal correlations – with age adjustment- for every factor of the metabolic syndrome in Koreans people. This study showed spouses whose wives had metabolic syndrome were almost 1.3 times more at risk of having metabolic syndrome compared with spouses that their partner did not have the syndrome. This study documented that environmental factors can predispose the development of the metabolic syndrome and suggested the targeting screening of partners in people with the metabolic syndrome.[10]

Case et al. have found metabolic syndrome in two thirds of obese people that participated in a weight loss program with diet therapy (very low calorie diet: 600-800 kcal per day). Weight loss could improve all risk factors of metabolic syndrome in this study. The value of weight loss in the metabolic syndrome is reducing necessity of starting pharmacological therapy for controlling risk factors such

as hypertension, dyslipidaemia and/or hyperglycaemia.[11]

Consequently, physicians need to follow a screening guideline regarding obese and suspicious to metabolic syndrome subjects in order to reduce cardiovascular risk and other complications to eventually improve the social health.

Screening Guidelines in Metabolic Syndrome

A) Diagnostic assessments:

1- Taking precise medical history, measuring blood pressure, considering laboratory results including fasting lipid panel, and glucose, and evaluate anthropometric data [height, weight, and body mass index (BMI), and waist circumference).

2- Explaining adverse effects of metabolic syndrome for people, assess diet and physical activity.

3- Assaying comorbid conditions for more modifications in life style and needs to additional treatments.

4- Fasting plasma glucose (FPG) screening for diabetes should begin at age 45 with 3 years intervals (especially in overweight people with BMI≥25 kg/m2). Testing should be started at younger age in overweight individuals or subjects with other risk factor in metabolic syndrome. American Diabetes Association defines overweight as BMI>85th percentile for age and sex, or weight>120% of optimal (50th percentile) for height and recommends screening in overweight children with two of the risk factors (listed below). Testing should be performed every 2 years and should be started at age 10 years or at the time of early puberty (<10 years). Testing should be performed in other high risk patients with any of the below items:

- Positive family history of type 2 diabetes in first or second degree relatives;
- A special race/ethnic group (Native Americans, African-Americans, Hispanic Americans, and Asians/South Pacific Islanders);

Positive signs of insulin resistance or diseases that can accompany with insulin resistance such as acanthosis nigricans, hypertension, dyslipidemia, or polycystic ovary syndrome. [12]

5- Fasting lipid profile screening should be done in children and adolescents with a positive family history of dyslipidemia or early (≤55 years of age for men and ≤65 years of age for women) CVD or dyslipidemia. Children with unknown family history or with other CVD risk factors, such as overweightness (BMI≥85th percentile,<95th percentile), obesity (BMI≥95th percentile), hypertension (blood pressure≥95th percentile), cigarette smoking, or diabetes mellitus should also be screened with a fasting lipid profile. In children screening should be started after 2 years of age but not later than 10 years of age. There is no need to screening before age 2. The test should be repeated every 3 to 5 years.[13]

B) Clinical recommendations for management of the metabolic syndrome:

1- Smoking cessation

2- Educating regarding diet and physical activity persistently (diet's type and duration). Follow up patients for controlling lifestyle changes.

3- Follow up patients with measuring blood pressure, waist circumference, laboratory values (FBG, TG, HDL, LDL, and cholesterol), and need for starting medications.

4- Pharmacologic therapy should be started in patients ≥8 years with an LDL (low density lipoprotein concentration of ≥190 mg/dl (or ≥160 mg/dl in individuals with a positive family history of early heart disease or existence of ≥2 positive additional risk factors). The first aim of LDL concentration is keeping it <160 mg/dl but the optimal level of LDL is lower than 130 mg/dl and in a positive family history of CVD is 110 mg/dl particularly when family history of CVD is associated with other risk factors such as obesity, and metabolic syndrome. [13]

What are the therapeutic goals in Metabolic Syndrome group for long term prevention of cardiovascular disease and other complications?

The national Cholesterol Education Program's Adult Treatment Panel III (ATP III) guidelines suggest treatment of underlying causes such as overweightness, obesity and/or physical inactivity at initiation. The steps of clinical management of metabolic syndrome are to reduce atherosclerosis risk at first and then to reduce the risk of diabetes mellitus development.

Consequently clinical management of metabolic syndrome starts to reduce risk factors by cessation of smoking, controlling LDL and triglycerides level, increasing HDL level, and controlling blood pressure and glucose levels. Treatment of lipid and non lipid risk-factors should be started after lifestyle changes. Hence, administration of aspirin for coronary heart disease, treatment of hypertension, and treatment of elevated triglycerides and/or low HDL are the next steps.[2,3] The main long and short term goals are lifestyle changes and controlling risk factors for reducing metabolic syndrome complications.

Natural Therapy in Metabolic Syndrome:

Body weight should be reduced 7-10% during the first year of therapy, and should be continued until achieving to optimal body weight.[3] Being overweight is a result of positive energy imbalance (calorie intake more than calorie output).

A moderately high carbohydrate (50-60% of total daily calories)[2], low fat diet (25-35% of total daily calories)[2, 3], and enough protein (15% of total calories) are the best option for weight loss and prevention of weight gain.[2]

Physical activity and diet therapy are major key points to achieve long-term success in weight loss or prevention of weight gain. An exercise programme should include frequency, intensity, time of activity in one session, and type of exercise. Johnson et al. compared moderate-intensity exercise group (equivalent to walking nearly 19Km) over an average 170 minutes/week with inactive control group of metabolic syndrome and achieved significant improvement in metabolic syndrome in the absence of diet changes (improving insulin sensitivity and triglyceride response). This study indicated the proper intensity of exercise that is adequate for achieving metabolic health benefits. The major findings revealed the efficacy of low intensity exer-

cise in comparison to inactivity (control group) on metabolic syndrome; in contrast, there was not a better efficacy in more vigorous intensity exercise compared to the inactive group.[4]

Okoro et al. have found that gait speed impairment has an association with low HDL cholesterol and an inverse association with abdominal obesity among women over the age of 50 years. However, in this study no association was found between metabolic syndrome and impaired gait speed among either of genders.[14] Reasonable goal for physical activity is at least 30 minutes of exercise per day that function of muscle groups could increase the heart rate. [3,4] However, the level of activity needs to be adjusted for people at every age. Exercise programs for young subjects can be planned with more activity in comparison to older aged subjects with lower muscular functions. Regarding obesity, lack of physical activity is a more important factor than excess energy intake (imbalance of energy). Physical activity is not very effective in weight loss; however, regular physical activity with a healthy diet is more effective in maintaining optimal weight. The benefit of physical activity is only restricted to its effects on weight; in addition, physical activity can influence fat and carbohydrate metabolism even if weight loss is minimal or none. Accordingly it is recommended to be physically active and overweight, than to be physically inactive and normal weight. Majority of adverse effects of overweightness is due to lack of physical activity.[15]

Conclusion:

The metabolic syndrome can affect social health in childhood and adolescence, and a cut off point of risk factors should be established in order to avoid the complications. A number of risk factors such as blood pressure, height, weight, and BMI are different between males and females and can be variable by age. Children are continuously growing and are difficult to define overweight children with a protocol similar to adults. Height and weight of children change during time and puberty is a critical bridge for the metabolic syndrome progression. Early screening in high risk children is very important for prevention of development of chronic disease during adolescence period. An overweight child or adolescent may have several risk factors and should be carefully evaluated regarding each factor through screening.[5]

A healthy diet is recommended for children ≥ 2 years; particularly, it is advised to use low fat dairy products in children between 1 to 2 years of age if they are overweight, obese or with a positive family history of obesity, dyslipidemia, or CVD. Diet therapy (nutritionist consult) and lifestyle changes (increasing physical activity) are recommended in high risk children and adolescents with CVD and a high concentration of LDL. [13] Major component of life style change is reaching to energy balance (with diet therapy, physical activity, and behaviour modification) for reducing weight, and obesity epidemic. People with metabolic syndrome should perform moderate intensity aerobic physical activity at least 150 minutes per week.

Clinicians should expand their tunnel vision and change the system of health

care from on disease management to prevention of diseases with improving social health. Therefore we recommend the establishment of a screening guideline for risk factor reduction in metabolic syndrome that includes a diet and physical activity program, and pharmacological treatment.

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