FORMATION AND CLINICAL COURSE OF METABOLIC SYNDROME IN MILITARY PERSONNEL

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ABSTRACT

To identify the manifestations of metabolic syndrome in military personnel, it is important to assess this disease by checking abdominal obesity, blood pressure, glucose metabolism and lipid profile, as well as examining key laboratory values such as blood glucose, insulin, HOMA IR, triglycerides, HDL/LDL and total cholesterol.

Metabolic syndrome is one of the most pressing issues in modern healthcare, associated with a combination of metabolic disorders. The main manifestations of MS are typically considered to be obesity, high blood pressure, and changes in cholesterol and blood sugar levels. Therefore, early detection of metabolic syndrome and timely interventions to correct it can significantly reduce the risk of severe cardiovascular disease and type 2 diabetes [1, 3, 5].

Research into metabolic syndrome and its impact on military health is developing as a broad area of research, even within the field of general medicine. Authoritative organizations such as the World Health Organization, the European Society of Cardiology, and the American Diabetes Association have extensively studied the diagnostic criteria for metabolic syndrome, risk factors, and prevention methods, and regularly update their guidelines. These guidelines also serve as an important methodological basis for research in military medicine [2, 5, 8].

Key features and criteria of metabolic syndrome. According to the World Health Organization (WHO) and other leading medical organizations, there are several criteria that may indicate metabolic syndrome:

Abdominal obesity. This refers to an increased concentration of fat tissue in the waist area. For men, a waist circumference greater than 94 cm, and for women, greater than 80 cm, is generally considered a warning sign of abdominal obesity [4,6].

Insulin resistance. Impaired tissue sensitivity to insulin, the hormone that regulates blood glucose levels. With insulin resistance, even normal or elevated insulin levels cannot effectively lower blood sugar, which subsequently leads to hyperglycemia and type 2 diabetes [1,5,12].

High blood pressure. Blood pressure above 130/85 mmHg is often considered borderline, while higher values indicate a predisposition to hypertension, one of the components of metabolic syndrome.

Dyslipidemia. Changes in cholesterol and triglyceride levels: decreased levels of "good" cholesterol (high-density lipoprotein, HDL) and elevated levels of "bad" cholesterol (low-density lipoprotein, LDL) and triglycerides. If a person has two or more of these factors, there's every reason to check their metabolic parameters and pay close attention to their health [1, 5, 7].

The main driving force in the development of MS is considered to be an imbalance in the body's energy balance. Simply put, if we consume more calories than we expend, we inevitably gain excess weight. Fat tissue, especially in the abdominal area, affects hormonal levels and metabolic processes, becoming a kind of "active organ."

Key causes and risk factors include:

1. Heredity. A genetic predisposition to obesity and type 2 diabetes increases the likelihood of developing MS.

2. Poor diet. Excessive consumption of high-calorie foods rich in simple carbohydrates (sweets, baked goods, sugary soft drinks) and saturated fats leads to the accumulation of fatty tissue.

3. Low physical activity. A sedentary lifestyle, office work, and lack of regular exercise contribute to excess weight and decreased tissue sensitivity to insulin.

4. Stress. Chronic stress triggers the release of hormones (cortisol, adrenaline), which affect metabolic processes. Changes in eating behavior due to stressful situations (overeating "on nerves") also play a negative role.

5. Hormonal imbalances. Thyroid disease, hormonal imbalances in women during menopause, and endocrine disorders can become a catalyst for the development of MS.

To confirm or rule out a diagnosis of metabolic syndrome, doctors typically prescribe a number of tests: Laboratory tests: complete blood count, biochemical parameters (fasting glucose, glycated hemoglobin level, triglycerides, total cholesterol and its fractions) [3,7].

Waist circumference measurement: an indicator of abdominal obesity. Blood pressure monitoring: regular measurements over several days or weeks. Additional methods: abdominal ultrasound, thyroid function assessment, glucose tolerance tests, etc. If there are deviations from the norm for several parameters, metabolic syndrome is diagnosed and a comprehensive treatment strategy is developed [2,7].

Without proper treatment and lifestyle modification, metabolic syndrome can lead to a number of serious complications:

1. Type 2 Diabetes. With long-term insulin resistance, the pancreas becomes exhausted, and blood glucose levels remain persistently elevated. This accelerates the development of type 2 diabetes, which is characterized by chronically elevated blood sugar levels and the risk of vascular and target organ damage.

2. Cardiovascular disease. Elevated levels of "bad" cholesterol and high blood pressure contribute to atherosclerosis, coronary heart disease, strokes, and heart attacks.

3. Fatty liver disease. Excess fat deposition in the liver (non-alcoholic fatty liver disease) negatively impacts liver function and increases the likelihood of progression to cirrhosis.

4. Polycystic ovary syndrome (PCOS). In women, metabolic syndrome can exacerbate hormonal imbalances, leading to menstrual irregularities and reproductive problems.

5. General deterioration in quality of life. Excess weight and chronic illnesses are accompanied by rapid fatigue, shortness of breath with minimal exertion, decreased performance, and an increased risk of depression.

In most cases, managing metabolic syndrome requires a comprehensive approach: dietary changes, increased physical activity, hormonal adjustments (if necessary), and regular medical monitoring [3,7].

Let's consider the main approaches to treating and preventing metabolic syndrome.

1. Changing eating habits. A balanced diet. The foundation of a healthy diet is vegetables, fruits, lean meats, poultry, fish, cereals, and whole grains. With metabolic syndrome, it is important to control the total calorie intake and the proportion of fast carbohydrates. For example, replace regular baked goods and sweets with fruits or nuts, and saturated fats (confectionery shortening, butter in large quantities) with vegetable oils (olive, flaxseed).

Eliminating "empty" calories. "Empty" calories are foods that contain almost no beneficial nutrients: sugary sodas, candy, chips, and other fast foods. Their consumption should be limited as much as possible [1, 7, 10].

Regular meals. To maintain stable blood sugar levels, it is recommended to eat 4-5 small meals a day, avoiding overeating at night.

2. Increase physical activity. Regular exercise. Moderate physical activity (brisk walking, yoga, swimming, cycling) for at least 150 minutes per week helps improve insulin sensitivity and strengthen the cardiovascular system.

Strength training. Exercise in the gym or with weights (including home workouts with dumbbells) promotes muscle growth and speeds up metabolism. An active lifestyle. Try to move more in your daily life: take the stairs instead of the elevator, go for a walk during your lunch break, do some stretches during office work[3,5,14].

3. Medication therapy. Medications that improve insulin sensitivity. In some cases, doctors prescribe metformin or other hypoglycemic drugs that lower blood glucose levels and increase insulin effectiveness. Medications to control blood pressure

For hypertension, a doctor may prescribe ACE inhibitors, calcium channel blockers, or other classes of medications that lower blood pressure.

Medications to correct lipid profile

For severe dyslipidemia, statins or fibrates, which regulate cholesterol and triglyceride levels, may be required. Medications should be prescribed exclusively by a doctor, taking into account the individual characteristics of the patient, comorbidities, and possible contraindications [3].

4. Stress and sleep management. Stress management. Relaxation techniques, breathing exercises, meditation, and regular rest help normalize cortisol levels, which contribute to weight gain. Quality sleep. Lack of sleep (less than 7–8 hours per night) negatively affects the

feeling of satiety and increases appetite, which in the long term can worsen metabolic disorders[4,8,10].

Regular checkups. Get a medical examination or preventative checkup at least once a year, monitor your blood pressure, blood sugar, and cholesterol levels. Maintain a healthy weight. Body mass index (BMI) and waist circumference are important risk indicators. Monitor them to spot negative trends early [3, 7].

Healthy eating. Minimize fatty, sweet, and highly salty foods, and include more vegetables, fruits, protein, and complex carbohydrates. Maintain an active lifestyle. You don't necessarily need to be a professional athlete—30-40 minutes of walking or vigorous exercise per day is sufficient. Stress management. If possible, avoid situations that cause chronic stress, or learn appropriate responses to them: meditation, hobbies, walks in the fresh air, etc. [3, 5, 7].

Metabolic syndrome is a serious set of metabolic disorders that significantly increases the risk of developing type 2 diabetes and cardiovascular disease. Abdominal obesity and associated insulin resistance are considered the main predisposing factors. However, timely diagnosis and comprehensive lifestyle changes can change the course of events.

A healthy diet with a balance of proteins, fats, and carbohydrates, as well as avoiding sweets and unhealthy foods, will help you lose weight and normalize your blood sugar levels. Moderate physical activity improves cardiovascular function and increases tissue sensitivity to insulin. Regular medical monitoring (testing lipids, blood pressure, and glucose levels) and, if necessary, medication support help keep all key indicators under control [3,7].

Healthy sleep and stress management are important for maintaining hormonal balance, which directly affects appetite regulation and metabolism. The key message is that metabolic syndrome is not a death sentence. By combining proper prevention, adjusting eating habits, and regular consultations with specialists, most people can avoid serious consequences and lead a full, active life. If you notice excess weight, blood pressure fluctuations, or other signs of possible metabolic syndrome, consult a doctor and undergo the necessary examination. Early treatment significantly increases the chances of a successful outcome and long-term health [13,15].

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