

## TINCTURAE MORUS AN EFFECTIVE REMEDY FOR THE TREATMENT OF CARDIOVASCULAR DISEASES

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**Resume:** The development of potassium and magnesium deficiency is accompanied by various cardiovascular diseases, which is especially common in the elderly with cardiovascular disease, as well as in patients taking antiarrhythmic, diuretic drugs. Recommendation of tincturae morus is a replacement therapy aimed at restoring the physiological processes that occur in the presence of these electrolytes. An herbal preparation- tincturae morus containing large amounts of essential micronutrients is an effective tool in the treatment of cardiovascular disease in the elderly.

**Key words:** hypomagniaemia, hypopotassemia, tincturae morus, treatment, effective means.

## НАСТОЙКА ШЕЛКОВИЦЫ ЭФФЕКТИВНОЕ СРЕДСТВО ДЛЯ ЛЕЧЕНИЯ СЕРДЕЧНО-СОСУДИСТЫХ ЗАБОЛЕВАНИЙ

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**Резюме.** Развитие дефицита калия и магния сопровождается различными сердечно-сосудистыми заболеваниями, что особенно характерно для пожилых людей с сердечно-сосудистыми заболеваниями, а также у пациентов, принимающих антиаритмические, диуретические препараты. Рекомендация настойки шелковицы - это заместительная терапия, направленная на восстановление физиологических процессов, происходящих в присутствии этих электролитов. Растительный препарат - настойка шелковицы, содержащий большое количество необходимых микроэлементов, является эффективным средством лечения сердечно-сосудистых заболеваний у пожилых людей.

**Ключевые слова:** гипомагниемия, гипокалиемия, настойка шелковицы, лечение, эффективные средства.

Minerals are necessary to ensure the normal functioning of the body. They maintain a constant internal environment, acid-base balance, water-salt metabolism. Almost all chemical elements of the periodic table Mendeleev participate in the physiological and pathological processes of man. The human body is 60% water, 34% organic matter and 6% inorganic matter. Scientists have long drawn attention to the fact that many diseases are associated with a lack of a chemical element in the body (hypoelementosis). Hypoelementosis can cause not only temporary disorders in the body, but also contribute to the development of serious diseases. In recent years, there has been growing interest in studying the biological role of macro and micronutrients. Particular attention is not accidentally given to potassium and magnesium as one of the most common in the human body. Potassium and magnesium in ionized form are positive ions - cations, respectively, with one ( $K^+$ ) and double positive charges ( $Mg^{2+}$ ). These are some of the most common elements on Earth. Especially a lot of potassium and magnesium in the water of the oceans, the electrolyte composition of which is close to the electrolyte composition of blood serum [1,2,12]. Potassium is the main intracellular cation of tissues of various organs, approximately 98% of it is concentrated inside the cells. Under normal conditions, it contains 150–160 mmol / L in the cell, and 3.7–5.5 mmol / L in the blood serum. Most of the potassium in the body is intracellular, therefore, a significant loss of intracellular potassium is possible without large changes in its content in serum. Potassium plays a significant role in the implementation of the bioelectric activity of cells and the maintenance of neuromuscular excitability and conduction. Under normal conditions, potassium comes from food and is absorbed through the gastrointestinal tract (GIT), followed by excretion of the excess through the kidneys. Hypokalemia - a persistent decrease in serum potassium concentration (less than 3.5 mmol / l). Adult body weight of 70 kg contains 136.85 g or 3500 mmol of potassium.

Causes of hypokalemia: 1. Insufficient (less than 10 meq / day) intake of potassium in the body with food (with starvation or restriction of intake of products containing potassium, decreased intestinal absorption). 2. Excessive excretion of potassium from the body as a result of: - chronic profuse diarrhea (intestinal secrets contain a large amount of potassium);

- repeated vomiting (the potassium content in the gastric juice is low, but the development of hypovolemia causes secondary hyperaldosteronism and increased excretion of K<sup>+</sup> ions by the kidneys); - increased excretion of potassium by the kidneys with improper use of diuretics, primary and secondary hyperaldosteronism, renal tubule defects, tubular tubular syndrome (Bartz syndrome acidosis), damage to the kidney tissue with nephrotoxic substances, including drugs (penicillins, gentamicin, amphotericin B), hypomagnesemia (with not only contributes to the release of potassium from the cells, but also increases its excretion in the urine). 3. Redistribution of potassium ions from the blood and / or intercellular fluid into cells under the following conditions: - an increase in the level of insulin in the blood; - hypercatecholaminemia (as a result of the use of adrenaline, norepinephrine, dopamine, with pheochromocytoma, acute stress);

- an overdose of folic acid or vitamin B12 (these substances stimulate the proliferation of cells and their consumption of potassium ions). The symptomatology of potassium homeostasis disorders depends on its content in the body (in this case, the concentration indicators of plasma potassium do not accurately reflect the state of potassium balance, although they have a rather narrow range of fluctuations). The main manifestations of hypokalemia are associated with a violation of the electrical properties of the membranes of excitable tissues. Complaints and symptoms accompanying a decrease in potassium levels in the body are varied and unspecific. Specific, which allows us to talk not about the clinical picture, but about the numerous clinical masks of hypokalemia. The most common ones are neuromyopathic and psychoemotional disorders, cardiac syndrome, polyuria and polydipsia syndrome. An imbalance of potassium leads to a violation of the polarization and depolarization of cell membranes, a violation of the function of folin esterase. The main result of these changes is a disorder in the process of transferring excitation from nerve to muscle, which is clinically expressed by fatigue, muscle weakness, leg muscle spasms, paresthesias in the limbs, and extinction of tendon reflexes in old age [3,5,11]. Non-specific symptoms of hypokalemia - loss of appetite, loss of concentration, apathy. Hypokalemia is also manifested by disorders of cardiovascular activity, characterized by inhibition of the contractile function of the myocardium, the occurrence of systolic murmur at the apex of the heart and the expansion of its cavities, and a decrease in blood pressure [4,6]. The cardiopulmonary effect of the deficiency of potassium ions in the body early affects the ECG, and therefore it can be used as an indicator of latent

hypokalemia. Permanent, albeit non-specific ECG signs — frequent ventricular extrasystoles, prolongation of QRS, ST segment decline, depression or inversion of T wave, pronounced U wave. Patients taking cardiac glycosides are especially sensitive to hypokalemia [8,10]. In relation to gastroenterology and urology, this means that damage to smooth muscles leads to intestinal paresis, weakening of intestinal sounds, vomiting, flatulence, constipation, urinary bladder [7,9]. Chronic hypokalemia is accompanied by functional and structural damage to the central and peripheral nervous system. CNS dysfunction is realized by psychoemotional disorders in the form of superficial asthenic, anxiety-depressive or hypochondriacal syndromes. Polymorphic sensory disturbances are represented by mild paresthesia of the face and limbs, or loss of pain and tactile sensitivity, or, conversely, severe hyperesthesia. Neuromotor symptoms usually correlate with the depth and duration of hypokalemia, ranging from limb muscle weakness and low tendon reflexes to general paralysis, including respiratory muscles [5]. Magnesium is a cofactor of many enzymes involved in intracellular biochemical reactions. In addition, magnesium, a natural physiological calcium antagonist, a universal regulator of biochemical and physiological processes in the body, provides ATP hydrolysis, reducing the dissociation of oxidation and phosphorylation, regulates glycolysis, and reduces the accumulation of lactate. Magnesium contributes to the fixation of potassium in cells, providing polarization of cell membranes, controls the spontaneous electrical activity of the nervous tissue and the cardiac conduction system, and controls the normal functioning of cardiomyocytes at all levels of subcellular structures [3]. Clinical manifestations of magnesium deficiency - increased heart rate, increased diastolic blood pressure, sleep disturbance, increased irritability, chronic fatigue syndrome. A low concentration of magnesium in red blood cells is combined with increased blood pressure at rest and under stress, as well as spasm of the coronary arteries. On an ECG, magnesium deficiency manifests itself as a slowdown in atrioventricular conduction, broadening of the QRS complex, lengthening of the QT interval, nonspecific decrease in the ST interval, flattening of the T wave and the formation of a pronounced U wave. Potential magnesium deficiency in clinical practice is quite often a rhythm disturbance cardiac activity [2]. One of them is atrial fibrillation (AF), characterized by uncoordinated electrical foci of excitation of the atrial myocardium with a deterioration in their contractile function. AF tends to increase with age, can be accompanied by severe hemodynamic disorders, and in the vast majority of cases is a result of disturbances in the intracellular potassium-magnesium balance in cardiomyocytes [4]. AF is observed in approximately 1% of patients under 60 years of age and more than 6% is older than 80 years, and adjusted for age, the prevalence of AF is higher in men. Paroxysms of AF as a reason for hospitalization of CVD patients account for more than 1/3 of all hospitalizations for cardiac arrhythmias. AF is most often associated with coronary heart disease (CHD),

chronic heart failure (CHF), arterial hypertension (AH). In the restoration of sinus rhythm in AF, the state of potassium-magnesium balance is important sintering membrane stabilizing effect. Another variety of supraventricular and ventricular arrhythmias due to a lack of potassium and magnesium is extrasystole [5]. The appearance of extrasystoles is influenced by the state of the nervous system: they are often observed with neurosis and emotional stress (joy, anger, fear, fear, etc.), accompanied by an intense loss of potassium and magnesium. Magnesium deficiency can be decisive in the occurrence of foci of ectopia, especially in patients taking cardiac glycosides [1]. Chronic magnesium deficiency adversely affects the course of coronary heart disease. This is due to impaired endothelial function, activation of peroxidation processes, accelerated progression of atherosclerosis, increased ectopic myocardial activity [6]. In coronary heart disease, many different factors are involved in the mechanisms of the protective effect of ischemic preconditioning. To maintain a normal intracellular energy-phosphate balance, the leading role is played by mitochondrial  $Ca^{2+}$ -activated  $K^{+}$  channels and their effect on oxidative phosphorylation in mitochondria [3]. The pharmacological discovery of ATP-dependent  $K^{+}$  channels using membrane-stabilizing potassium-magnesium preparations reproduces the protective effect of ischemic preconditioning - the protection of cardiomyocytes from ischemic damage [5]. In addition, chronic magnesium deficiency increases the basal tone of the coronary vessels and their tendency to vasospasm [4]. Based on the described role of magnesium and potassium in CVD, the timely replenishment of their reserves in the body is an urgent task. Given the anti-atherogenic effects of magnesium preparations, correction of its deficiency can help slow the progression of coronary heart disease [7]. In a study by The Atherosclerosis Risk in Communities (ARIC) after 4–7 years of follow-up, 13,922 patients were recorded risk factors showed that hypomagnesemia is associated with the development of ischemic heart disease [10]. The most pronounced magnesium deficiency is in individuals with a high content of atherogenic lipids [9]. Recent studies of the role of magnesium and potassium in CVD can open up new possibilities for their preparations. However, far from always with the modern rhythm of life, we manage to pay due attention to our diet and daily include foods rich in potassium and magnesium. Thus, the optimal ratio of potassium and magnesium is the basis for the normal functioning of the body. As part of a large-scale strategic campaign in the field of health care, which is carried out by specialists to preserve the health of the population and the progression of chronic CVD, much attention is paid to lifestyle modification, as well as the use of herbal preparations.

The fruits of the mulberry tree contain a huge number of elements, are a rich source of natural antioxidant. The great scientist Abu Ali ibn Sino described in his treatises the useful and healing properties of the mulberry. The fruits of the mulberry tree contain many vitamins and minerals necessary for the body, such as Calcium - 39



mg, Iron - 1.85 mg, Magnesium - 18 mg, Phosphorus - 38 mg, Potassium - 194 mg, Sodium - 10 mg, Zinc - 0.12 mg Mulberry tincture (Tincturae Morus) are an alcohol-water extract from plant materials of mulberry fruits. It is used for hypokalemia, hypomagnesemia and their correction in the elderly. Application Tincturae Morus is possible as a preventive measure in patients with vegetovascular dystonia, arterial hypertension, diabetes mellitus, chronic heart failure, as well as for the correction of endothelial dysfunction and atherosclerosis [8]. The content of Tincturae Morus tincture of the natural antioxidant resviratol has a positive metabolic effect on myocardial metabolism, and potassium and magnesium reduce the toxicity of glycosidic drugs in the treatment of heart failure, without adversely affecting their positive inotropic effect. Indications for the use of Tincturae Morus are mineral deficiency states, as part of complex therapy in the treatment of heart failure, myocardial infarction, metabolic syndrome (obesity, hypertension, impaired glucose tolerance, type 2 diabetes mellitus).

**Conclusion.** The development of potassium and magnesium deficiency is accompanied by a variety of cardiovascular disorders, especially in patients who already have heart and vascular diseases, taking antiarrhythmic, diuretic drugs in old age. The appointment of the plant tincture Tincturae Morus is a kind of replacement therapy and aims to restore the physiological processes that occur with the participation of these electrolytes. Herbal preparation containing a huge amount important trace elements, it is considered effective in the combination therapy of cardiovascular disease in the elderly.

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