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CLINICAL AND LABORATORY PARAMETERS AND THEIR RELATIONSHIP WITH THE LEVEL OF MAGNESIUM IN OSTEOARTHRITIS AGAINST THE BACKGROUND OF UNDIFFERENTIATED CONNECTIVE TISSUE DYSPLASIA

Akhmedzhanova Diyora Marufovna
Assistant of the Department of Physiology, Pathophysiology, Pharmacology, Hygiene, Chemistry University of Zarmed Samarkand, Uzbekistan

Abstract
The purpose of this work is to conduct a comparative analysis of the parameters of antibodies to type I collagen and their relationship with Mg2+ ions in patients with osteoarthritis against the background of undifferentiated connective tissue dysplasia (UCTD). The study involved 88 individuals aged 25 to 55 (35.2±1.89) years with phenotypic signs of UCTD and osteoarthritis. In patients with osteoarthritis against the background of UCTD, there was a decrease in the level of Mg2+ ions and an increase in titers of autoantibodies to type I collagen. The dynamics of changes in the level of autoantibodies, as well as magnesium, depending on the severity of the clinical course of osteoarthritis against the background of UCTD, can serve as a method for assessing the progression of the pathological process and prognosis of the disease.

Keywords: Osteoarthritis, undifferentiated connective tissue dysplasia, magnesium ions (Mg2+), autoantibodies to type I collagen.

Introduction

In recent years, the problem of osteoarthritis against the background of undifferentiated connective tissue dysplasia (UCTD) has attracted particular interest, which is due to the increase in the number of patients with this pathology

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[1,2]. One of the important tasks of modern medicine is the desire for early detection of diseases in order to take preventive measures and prevent the development of complications.

The development of osteoarthrosis against the background of UCTD leads to a more severe course of this disease, in turn, this has№t only a high medical and social significance, but also shows the lack of awareness of practicing doctors about the pathological significance of UCTD as a background condition in osteoarthrosis. The frequency of UCTD detections ranges from 26 to 80%, in school-age children it reaches 85%.

Structural and functional “breakdowns” of connective tissue (CT) can lead to persistent disorders in vital organs, which in clinical practice is embodied in multiple organ diseases in one individual.

In the last decade, special attention of researchers has been paid to the importance of regulation of fibrillar proteins of the extracellular matrix (ECM) - magnesium ions (Mg2+) and autoantibodies to type I collagen [11,12,13]. A decrease in magnesium Mg2+ - leads to damage to the endothelium, disruption of the spatial organization of collagen, in particular type I, as well as elastin, responsible for the formation of ECM components, as well as enzymes involved in the process of fibrillogenesis [9,14]. Low concentrations of Mg2+ affect the activity of the musculoskeletal system, the cardiovascular system, and dysplastic disorders of the valvular apparatus of the heart.

The high information value of autoantibodies to collagen lies in the possibility of assessing its metabolism, in determining the severity of autoimmune processes to extracellular matrix proteins. The detection of elevated levels of autoantibodies to collagen along with active antibody formation to the tissues of internal organs in patients with osteoarthrosis against the background of UCTD confirms a close relationship with the concentration of magnesium in connective tissue dysplasia. Since collagen is the main protein in the tissues of the skin, nails, hair, tendons and joints, magnesium is an important mineral for the synthesis of proteins, i.e. collagen in the body, in the neuromuscular system and bone tissue.

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In connection with the above, the aim of this study was to conduct a comparative analysis of the levels of autoantibodies to type I collagen and their relationship with Mg2+ ions in patients with osteoarthritis against the background of UCTD.

Materials and Methods

The population survey included 88 individuals, including 36 (40.9%) males and 52 (59.1%) females aged 25 to 55 (35.2±1.89) years with phenotypic signs of UCTD. The survey group (gr) included 40 (45.4%) patients with skeletal changes (chest deformity, flat feet, knee osteoarthritis), 15 men and 25 women – 1 gr and 48 (54.5%) patients, including 26 men and 22 women with coxarthrosis – 2 gr. The control group consisted of 20 conditionally healthy individuals of comparable age 30.5±2.56 years, without signs of joint changes, who gave voluntary oral consent for the survey.

Blood was taken from the cubital vein of all subjects on an empty stomach in the morning to isolate blood serum and determine: Mg2+ ions in mol/l (on an atomic absorption spectrofluorimeter of the AF 610 – A brand, LTD China); titers of autoantibodies to collagen type I in blood plasma were determined by the enzyme immunoassay method using the Imtek kits (Russia) in accordance with the attached instructions. The obtained results were processed statistically, using the databases of the Microsoft Office Excel 2007 computer program, the Biostat software package. Differences were considered reliable at $p \leq 0.05$.

Results and Discussion

As the conducted studies have shown, in the blood of patients with osteoarthrosis against the background of UCTD, a decrease in magnesium ions and an increase in the titers of autoantibodies to collagen type I wereNoted. With an increase in the progression of the disease, the expression of magnesium ions and antibody titers is inversely proportional, compared with the data in the control (table).

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Table 1. Level of autoantibodies to collagen type 1 in the blood plasma of patients with UCTD and osteoarthritis taking into account bone-skeletal external factors

Subject groups	Level Mg+2, mol/l	Level of autoantibodies to type I collagen, μg/ml
With pectus excavatum (PE) and osteoarthritis of the knee joint (n = 10)	0.53±0.026	5.6±0.7*
With flat feet and coxarthrosis (n = 11)	0.41±0.026	6.2±0.6*
Without PVD, flat feet, with osteoarthritis of the knee joint (n = 3)	0.32±0.026	7.3±0.8
Control (n = 20)	0.92±0.026	3.2±0.3

Note:* – p < 0.05 compared to control.

Table 2. Content of Mg2+ ions, titers of antibodies to collagen type I in the blood serum of patients with UCTD and osteoarthritis in comparison of 2 groups and the control group

Group	Mg+2, mol/l	Autoantibodies to collagen type I, μm/l
1st group (n=40)	0.83±0.026	5.2±0.6*
2nd group (n=48)	*^0.76±0.021	6.5±0.4*
Control group (n=20)	0.91±0.051	3.2±0.3

* - p <0.05 compared to control
^ - p <0.05 compared to group 1

At the same time, in patients with deformity of the hip joint and flat feet, a decrease in Mg2+ ions in the blood is№ted, which in patients of the 1st group was lower than the data in the control group - by 8% (p> 0.05), in the 2nd group, that is, with coxarthrosis - by 16.5% (p <0.05).
Consequently, patients with osteoarthrosis have a decrease in the level of Mg2+ ions and an increase in autoantibodies, which simultaneously manifests itself in

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a violation of the collagen formation processes that enter the bloodstream. A decrease in the magnesium level and an increase in autoantibodies in the blood cause a violation of homeostatic mechanisms. Connective tissue dysplasia is known to be often associated with homeostasis disorders at the tissue and organ levels. In this aspect, a decrease in magnesium and an increase in the levels of autoantibodies to type I collagen in UCTD№t only characterize interstitial collagens as predominantly involved in the process of forming dysplastic changes in the musculoskeletal system and heart, but also indicates the "tension" of autoimmunity - a process bordering on№rmal self-recognition and autoimmune pathology.

Conclusion

Thus, it can be assumed that the cause of progression in patients with osteoarthritis with UCTD is a decrease in magnesium ions and activation of autoantibodies to type I collagen, which in turn leads to deterioration in health and a decrease in the working capacity of the population.

The dynamics of changes in magnesium expression, an increase in antibody titers to collagen in patients with osteoarthritis can serve as a method for assessing the progression of the pathological process and predicting bone and joint complications.

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