THE APPLICATION OF MAGNETIC RESONANCE IMAGING TO EVALUATE THE EFFICACY OF MEDICAL REHABILITATION FOR PATIENTS WITH KNEE OSTEOARTHRITIS: A REVIEW ARTICLE

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Annotation. In recent years, magnetic resonance imaging (MRI) has been increasingly used to diagnose early osteoarthritis (OA). Taking into account the fact that nowadays pharmacological agents are not effective enough and often lead to allergization of the body, there is a need to search for new non-drug methods of treatment of patients with knee joint OA that have proven effectiveness.

Keywords: Medical rehabilitation, osteoarthritis, knee osteoarthritis, physiotherapy, magnetic resonance imaging.

Osteoarthritis (OA), especially DOA of the knee joint, is the most common form of osteoarthritis, leading to significant disability of patients worldwide.

Until recently, radiography was mainly used to diagnose knee joint OA in the initial stages. However, this method does not allow reliable visualization of ligamentous apparatus, cartilaginous and soft tissues. In recent years, MRI has become more commonly used, which is a highly informative noninvasive method for diagnosing early OA of the knee joint [1]. MRI is included in the clinical guidelines for gonarthrosis (2021), according to which conservative and surgical methods are used for the treatment and rehabilitation of patients with knee OA [2]. Conservative methods include medications, as well as physical therapy, massage, physiotherapy, and diet. Taking into account the fact that today pharmacological agents are not effective enough and often lead to allergization, it becomes necessary in search of new non-drug treatment methods for patients with knee joint OA that have proven effectiveness [3].

A series of studies have been devoted to the study of the effectiveness of physical therapy in this category of patients [4]. So, in one of the analyzed publications, the author's team conducted a study aimed at determining the relationship between severity OA of the knee joint, according to MRI data, and the result of the use of physical therapy in patients with this pathology [5]. The study included 95 participants with knee joint OA participating in a 12-week program including physical therapy. All the subjects underwent an MRI scan of the knee joint on a device with a magnetic field strength of 3.0 T before and after treatment. Using MRI data, scientists systematically assessed the presence and severity of signs of OA (cartilage integrity, bone marrow changes, osteophytes, effusion/synovitis, and meniscus damage). To analyze the correlation between the severity of OA, according to MRI data, and changes in movement restriction after exercise therapy, a regression analysis was performed. The results demonstrated that physical therapy did not affect the severity of OA, according to MRI data.

The authors of another scientific paper studied the effect of strength training in water on the biochemical composition of cartilage tissue in the tibio-femoral joint in postmenopausal women with mild osteoarthritis of the knee joint [6]. The study included 87 postmenopausal female volunteers aged 60-68 years. All the subjects were randomly assigned to two groups: the first was the main group (n = 43) and the second was the control group. (n = 44). The women of the main group participated in 48 training sessions for 16 weeks under supervision. The subjects of the control group maintained a normal level of physical activity. The biochemical composition of cartilage tissue in the area of the medial and lateral condyles of the tibio-femoral joint was assessed using the transverse T2 relaxation time (technique T2 mapping) and on images of cartilage tissue with delayed contrast enhancement by drugs Gadolinium (dGEMRIC index). After 4 months of training in an aquatic environment, scientists noted a significant decrease in the T2 relaxation time of 1.2 ms (95% confidence interval (CI): from -2.3 to -0.1, P = 0.021), and the dGEMRIC index of 23 ms (from -43 to -3, p = 0.016) in the

posterior part (ROI) of cartilage tissue the entire thickness of the medial condyle of the femur in the main group, compared with the control group.

A study was published in which the effect of exercise therapy on the activity of the inflammatory process in synovitis and bone marrow damage was studied using MRI in patients with knee joint OA [7]. 60 patients with knee joint OA were randomly divided into two groups in a 1:1 ratio. Patients in the first group underwent physical therapy 3 times a week for 12 weeks, and in the second control group they did not undergo physical therapy.

Synovitis and bone marrow lesions were assessed using static MRI with and without contrast, as well as dynamic contrast enhancement (DST) MRI. The MRI data from DKU were quantified using a pixel-by-pixel methodology based on the analysis of signal intensity curves. After the course of therapy, the authors observed statistically significant group differences in the assessment of synovitis on MRI with DKU in the upper inversion of the synovial membrane in patients of the first group, compared with patients of the second. At the same time, no change was detected in both groups. inflammatory activity, as well as no group differences in bone marrow damage, compared with conventional MRI. The scientists noted that, despite the absence of changes in the activity of the inflammatory process in patients with knee OA who followed a 12-week course of physical therapy, there was a decrease in pain compared with the control group. The scientists concluded that, in general, physical exercise is not harmful for OA of the knee joint and further research is needed.

There is a study in which scientists used MRI to study the effect of glucosamine sulfate and exercise on joint structure [8]. The study included 39 women diagnosed with knee joint OA. The patients were randomized into two groups. Group I (n = 20) received an exercise program, while group II (n = 19) received glucosamine sulfate (1,500 mg/day) in addition to physical therapy. After the treatment, despite a significant improvement in all MRI parameters, including the volume and thickness of cartilage tissue knee joint along the medial and lateral

condyles in the two groups, there were no statistically significant differences between the groups after therapy. In conclusion, the authors noted that physical exercise alone was sufficient to prevent structural changes and cartilage loss in the knee joint, which was assessed using MRI.

Conclusion. The analysis of scientific data on the application MRI as an objective method for evaluating effectiveness medical rehabilitation of patients with knee joint OA has shown that there are not many scientific publications on this topic today. Despite the small number of studies, among the methods used with proven effects on ligamentous apparatus, cartilage and soft tissues, shock wave therapy, physical therapy and ultrasound therapy can be distinguished. However, it is necessary to conduct further studies using MRI as an objective method for evaluating the effectiveness of various methods of medical rehabilitation of patients with knee joint OA.

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