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# RESULTS OF DIRECTIONAL CONTACT DIATHERMY FOR INJURIES OF THE KNEE JOINT OF JUDO ATHLETES

Biykuzieva A. A.
Axmedova D. Sh.
Sharipov U. A.
Tashkent Medical Academy, Assistants of the Department of Rehabilitation, Folk Medicine, and Physical Culture
e-mail: ulugbeksharipovdoc@gmail.com

**Summary**
The article presents the results of a study of complex rehabilitation using directed contact diathermy for sprains of the knee ligaments in judo athletes.
A comparative analysis showed that the introduction of directed contact diathermy into the complex rehabilitation of judo wrestlers with knee joint problems leads to a quick and effective recovery, which can be seen from the dynamics of indicators of the knee joint injury outcome scale - KOOS.

**Keywords:** directed contact diathermy, knee sprains, sports injuries, judoists, rehabilitation in sports.

Sport has always been accompanied by a critical level of physical activity. In the world, many people participate in some form of organized sport, and every year more than 25% of athletes suffer injuries that force them to give up the sport for a while.
Sport injuries in martial arts, according to the literature, account for 4–7% of the total injuries [2,4]. In a comparative study by Finnish scientists in 2015, it was shown that the injury rate in judo (117 injuries per 1000 fights per year) significantly exceeds that in hockey (94), football (89), and volleyball (60), but below the level in karate (142). Mc Pherson and Pickett (2010) report on the level of injuries in martial arts recorded in the emergency departments of hospitals in two states of Canada - judo in the comparative table took 3rd place (99 injuries) after karate (299 injuries) and taekwondo (129 injuries). Yard et al. (2011) came to similar conclusions - 79.5% of all martial arts injuries were in karate, 6.4% in taekwondo, and 4.8% in judo. Analysis of injuries at the 2008 Olympic Games in Beijing showed that among martial arts the level of injuries was as follows: taekwondo - 270 injuries per 1000 athletes, boxing - 149, judo - 112, wrestling - 94 [2,4,7].
Today, the most common injuries are sprains and dislocations. In wrestling (classical and Greco-Roman) 69.27% of injuries are acute injuries of the musculoskeletal

system, most often the knee (menisci, cruciate and lateral ligaments), as well as combined injuries of the capsular-ligamentous apparatus. Approximately 13% of injuries are fractures and dislocations, 4.3% are severe bruises, and another 5.6% are muscle and tendon injuries (muscle tears of the shoulder girdle, pectorals major muscle, biceps tendons, and Achilles tendon).

About 17% of athletes during the season receive one or another knee injury. Injuries of the knee joint are mainly injuries of the anterior cruciate ligament (ACL) (47%) and damage to the medial collateral ligament (28%) [3]. The posterior cruciate or collateral ligaments are much less frequently injured. The search for new methods of physiotherapy in the treatment and rehabilitation of athletes after injuries remains an urgent issue.

**The purpose of the study** was to evaluate the effectiveness of the method of directed contact diathermy in knee sprains in athletes. To achieve this goal, the following tasks were set: to determine the impact of complex rehabilitation using contact diathermy on pain and the functional state of the knee joints; to evaluate the complex rehabilitation with contact diathermy on professional activity and quality of life of athletes.

**Materials and Research Methods**:

The study involved 22 athletes involved in judo with different sports qualifications, who showed signs of sprains of the knee joint of 1 and 2 degrees. The diagnosis was confirmed instrumentally on MRI and ultrasound studies of the knee joint. The median age of the athletes was 23.8±6.7 years. The experience of going in for sports was 10.23±3.35 years. Athletes were divided into 2 groups of 11 patients, depending on the rehabilitation treatment program.

For both groups, the rehabilitation program included physiotherapy (electrophoresis with analgesic and anti-inflammatory drugs, laser therapy, magnetotherapy) and exercise therapy.

The main group included 11 athletes, including 6 women (55 %) and 5 men (45 %), with a mean age of 25.2±7.5. For athletes of this group, contact diathermy procedures (TR-Therapy ELITE) on the BTL 6000 were added to the comprehensive rehabilitation program. The control group consisted of 11 athletes, 7 women (64%) and 4 men (36%), with an average age of 23.5 ± 5.2, similar in demographic parameters and the degree of structural changes in injured knee joints, whose rehabilitation program was carried out without inclusion contact diathermy.

The duration of rehabilitation in each group was 18 - 20 days. The procedure was carried out in the first half of the day, with a frequency range of 480–520 kHz, and current power up to 320 W, the first three sessions were carried out only in capacitive mode, every other day. The patient was lying on his back. The neutral electrode was placed on the back of the left or right thigh.

TR-therapy parameters (from 1 to 3 treatments)

| | |
|---|---|
| Therapy mode | capacitive |
| Procedure time | 15-20 minutes |
| Continuous / Pulse | Continuous |
| Schliefeck intensity (intensity set on the machine) | I (3–5%) |

All other 7 procedures were combined with the use of capacitive and resistive modes every other day. The patient was lying on his back with a neutral electrode placed on the back of the left or right thigh.

TR-therapy parameters (from 4 to 10 treatments)

| | | |
|---|---|---|
| Therapy mode | capacitive | resistive |
| Procedure time | 15 minutes | 10 minutes |
| Continuous / Pulse | Continuous | Pulse |
| Scale intensity Sanding (intensity, set on the machine) | I–II (15–20%) | I-II (5-15%) |

To study the subjective assessment of the functional state of the damaged knee joint, we used the KOOS (Knee injury and osteoarthritis outcome score) developed by E. Roos (Department of Orthopedics _ _ University Hospital, Sweden) [7,8].

“Statistica” software package version 7.0 (Stat Soft Inc., USA), and "Microsoft Excel 2007".

The knee Injury Outcome Scale (Knee Injury and Osteoarthritis Outcome Score, or KOOS) was developed as a tool for assessing the patient's opinions about their knee joint and related problems. The scale is intended for use in knee injuries (anterior cruciate ligament injuries, menisci, cartilage) and consists of 5 subscales (pain; other complaints - symptoms; leg function during sports and recreation; quality of life associated with the knee joint). When answering questions, the assessment of the patient's condition over the past week is taken into account. For each question, 4

answers are offered, which are evaluated on a scale of 0 to 4 (no - 0, slightly - 1, moderate - 2, strong - 3, excessively - 4). A score is calculated for each subscale. Then the scores are recalculated using special formulas, which allow for each subscale to get a score from 100 points to 0. At the same time, 100 points correspond to the absence of symptoms, and 0 points indicate that the symptoms are pronounced. [8,9]. Based on the results of the survey, a so-called outcome profile is built. During the study, athletes filled out a questionnaire before the start of treatment and after the end of the rehabilitation course.

**Results and Discussion**

When calculating the indicators of the KOOS subscales upon admission to rehabilitation treatment, the minimum score was noted for the "symptoms" indicators of 48.7 ± 6.2 in the main group and 51.8 ± 12.9 in the control group (Table 1), which was caused due to severe pain syndrome on the area of the injured knee joint in the examined athletes. Also, due to the pain syndrome, there was a low score on the subscales "quality of life" 61.9±13.1 and "sports activity" 63.2±18.7. However, despite the pain and other symptoms, the athletes were the least affected by daily activity, which indicates a small increase in this indicator (Table 1).

**Table 1.** Comparative assessment of KOOS scale parameters in the study groups before and after treatment

| Index | Main group (n=10) ( M ± m ) | | Control group (n=10) ( M ± m ) | |
|---|---|---|---|---|
| | before | After | before | after |
| Pain | 75.5±11.7 | 86.5 ± 11.1 * | 75.0±10.2 | 7 9 .8 ± 4 .8 ** |
| Symptoms | 48.7±6.2 | 5 8.7±10.1 * | 51.8 ± 12.9 | 55.9 ± 4.1 ** |
| Daily activity | 78.1±12.4 | 80.8±9.7 | 79.4±15.3 | 80.9±9.2 |
| Sports activity | 63.2±18.7 | 7 4.1 ± 10.9 * | 53.2±12.7 | 60.3± 7.1** |
| The quality of life | 6 1.9±13.1 | 72.6 ± 10.8 * | 60.8 ± 17.2 | 67.7 ± 6.9 ** |
| Final index | 71.4±15.8 | 80.8±9.3 * | 71.5±14.3 | 7 6.8 ± 5.2 ** |

**Note:** *- intragroup significant difference (before and after) p≤0.05.
**-significant difference between groups 1 and 2 p≤0.05.

TR Therapy (or Directed Contact Diathermy) is similar to Tecar Therapy but has more recently emerged as a safer and more effective form of physical therapy. It is based on the mechanism of action on the human body by high-frequency electromagnetic energy, which causes deep heating of tissues, and a greater supply of nutrients, oxygen, and blood flow to the affected area. As a result, muscle relaxation occurs, pain reduction and the onset of other therapeutic effects occur immediately after the start of treatment. During the session, which lasts about half an hour (depending on the initial diagnosis), the patient does not experience discomfort. In the affected area, you feel warmth, muscle relaxation, and an almost instantaneous reduction in pain.

To mobilize the joints, a frequency range of 400–520 kHz is selected, with a variable mode. The selection of such a range leads to an increase in joint mobility, achieved through warming up and manual impact on the muscles surrounding the joint [9].

**Findings:**

The use of directed contact diathermy in the complex rehabilitation treatment of athletes with knee sprains reduces pain and improves the functional state of the knee joints, which is confirmed by significant differences in the parameters of the subscales "Pain" and "Symptoms", and also contributes to an increase in sports activity and an improvement in the quality of life according to the data KOOS questionnaire.

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