



STUDY OF THE EFFECTIVENESS OF PHYSICAL REHABILITATION OF ATHLETES AFTER KNEE INJURY

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Access this article online:		Abstract:
QR code: 		<p>The main goal of the study was to assess the range of movements and determine the effectiveness of the physical rehabilitation of athletes (wrestling Zorkhana and Pahlevani) after a knee joint injury.</p> <p>The proposed version of the program, developed for the physical rehabilitation of athletes with knee injuries, turned out to be very effective in helping them return to sports and continue professional activity. This result is due to the use of an integrated approach to recovery during the rehabilitation process with phased, permanent, and individual treatment. Compliance with these principles made it possible to eliminate the morphological and functional consequences of knee joint injury as completely as possible.</p>
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 © Azerbaijan Journal of Physiology		Keywords: athletes, physical rehabilitation; knee joint injury.

INTRODUCTION

Modern sports are characterized by an increase in the volume and intensity of training loads, which places high demands on the athlete's body and increases the risk of various injuries. One of the most frequent injuries and diseases of the musculoskeletal system in sports is the injury of the knee joint [2, 8]. The main treatment of knee injuries includes physical therapy, massage, and exercise [1, 4]. To smoothly enter the training process during the recovery phase of knee joint injury rehabilitation, athletes are selected for sports-specific physical exercises [3, 6, 8].

Most authors describe athlete rehabilitation schematically, without taking into consideration functional studies and mobility testing data,

which are very important in the process of restoring the physical performance of athletes and preparing them for sports training. So, it is important to continue to explore options for physical rehabilitation following an athlete's knee injury [1].

The study aimed to determine the effectiveness of physical rehabilitation for athletes (Zorkhana and Pahlevani wrestling) after joint injuries to the knee by assessing the range of their movements.

MATERIAL AND METHODS

To determine the impact of rehabilitation programs on the dynamics of restoration of functions of the damaged segment, physical performance, social life, and psychological

status, 30 athletes were included in our study. All athletes had combined injuries to the structures of the knee joint. The average age of the athletes was 24.6 ± 0.8 years. All athletes were divided into two groups: the first - main group included 10 athletes (8 athletes had the title of International Master of Sports (IMS), 2 athletes were Masters of Sports (MS)), and the second control group included 20 athletes (7 - MS, 8 - CMS, 5 - 1st sports class). The athletes' sports experience averaged 10 ± 4 years. The small number of subjects was explained by the high qualifications of the athletes, the complexity of the injury, and the duration of the rehabilitation process. Athletes in the control group underwent rehabilitation according to the program proposed by the rehabilitation center, and on average the rehabilitation period was 9-10 months. Athletes of the main group were engaged in a specially developed rehabilitation program taking into account the characteristics of the sport. We considered the main goal of recovery to be a reduction in rehabilitation time and an improvement in quality of life and psychological state.

Muscle volume diminishes due to less load on it during the period of being immobilized following the operation. The following measurement was used for the evaluation of the level of muscle healing: the length of the thigh circumference at the level of the lower and middle third of the thigh (measured at a distance of 10 and 20 cm from the knee joint) was measured while the athlete was in the beginning position lying on his back. Measurements of the 36 lower leg muscles were obtained in this position. In these tests, a healthy limb's circumference was regarded as a conditional individual norm (control). The index of the operated limb was subtracted from it, and the difference in centimeters was considered. Subsequently, the obtained result of the operated limb was evaluated compared to the healthy one with the degree of muscular weakness: no loss was observed, an average loss of 1-2 cm, and a more noticeable loss of above 2 cm.

Further, beginning from the prone position, the athlete first bent the lower leg of the knee

joint actively and then did the same using the help of the upper limbs. The degree of bending was measured and evaluated in degrees using a goniometer (protractor).

Statistical analysis was performed using the Wilcoxon-Mann-Whitney test for small samples using the Statistica 6.0 software. Differences at $P < 0.05$ were considered significant.

RESULTS AND DISCUSSION

Mobility is an important indicator to determine the functional usefulness of the joint after the operation. Changes in this indicator during the physical rehabilitation between athletes of the main and control groups are presented in Table 1. The development of the joint begins at the beginning of the second period, and within 3 months from the day of surgery, athletes did not bend the leg more than 90° . Athletes in the main group developed the leg for 2.5-3 weeks and achieved a 90° bending angle. One of the objective indicators characterizing the condition of the muscles of the injured limb is the size of the circumference of its thigh and calf muscles. This measure is associated with the values of a healthy limb. We conducted a study taking into account the period after the surgery (no later than one month from the day of surgery). After starting dynamic training, athletes in the main group showed a faster increase in muscle mass than athletes in the control group, which affected the growth of thigh and calf circumferences. Athletes in the main group had better thigh and calf circumferences than athletes in the control group during the early recovery period due to systematic training. After starting to perform dynamic exercises with additional weights (resistance), a faster increase in muscle mass subsequently begins, which is reflected in the increase in thigh circumference.

For athletes in the main group, the difference in the indicators of the healthy and injured leg was 1-1.5 cm ($p < 0.001$), and for athletes in the control group - 2-2.5 cm. Such a difference in the dynamics of the indicators reflecting the growth of the thigh muscle is a

natural consequence of the differences in the quality of rehabilitation in the mass-compared groups. A significant volume and intensity of strength training is required to rapidly increase muscle mass. Thus, the methodology aimed at

restoring the function of the operated knee joint contributes to a significant improvement of both active flexion and active extension of the knee joint, as well as a faster increase in muscle mass.

Table 1. The dynamics of knee joint flexion recovery in athletes of main and control groups.

Time from when the knee joint is allowed to flex (3 weeks after surgery)	Flexion indices of the operated knee joint (in degrees)				t	p
	Main group (n=10)		Control group (n=20)			
	M	SEM	M	SEM		
2-3 rd day	23,1	±2,2	18,1	±2,0	5,02	<0,001
6-7 th day	37,9	±2,4	32,1	±1,9	7,29	<0,001
10-12 th day	60,2	±1,7	52,9	±1,7	10,19	<0,001
14 th day	83,8	±4,8	72,1	±1,6	10,59	<0,001
20-21 st day	91,1	±1,6	83,2	±1,9	6,28	<0,001
28-30 rd day			90,1	±0,4	9,08	<0,001
After reaching 90° of flexion, the main goal was to strengthen the thigh muscles						

CONCLUSIONS

A variant of the program developed for the physical rehabilitation of athletes with knee injuries has proven to be very effective in helping them return to sports during their professional activities. This result is due to the application of an integrated approach to recovery during rehabilitation with gradual, permanent, and individual treatment. Compliance with these principles made it possible to eliminate the morphological and functional consequences of knee injury as completely as possible.

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ИССЛЕДОВАНИЕ ЭФФЕКТИВНОСТИ ФИЗИЧЕСКОЙ РЕАБИЛИТАЦИИ СПОРТСМЕНОВ ПОСЛЕ ТРАВМЫ КОЛЕННОГО СУСТАВА

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Цель исследования - оценить объем движений и определить эффективность физической реабилитации спортсменов (борьба Зорхана и Пахлевани) после травмы коленного сустава. Вариант программы, разработанный для физической реабилитации спортсменов с травмами колена, оказался весьма эффективным, помогая им вернуться в спорт во время профессиональной деятельности. Такой результат обусловлен применением комплексного подхода к восстановлению в процессе реабилитации с поэтапным, постоянным и индивидуальным лечением. Соблюдение этих принципов позволило максимально полно устранить морфологические и функциональные последствия травмы коленного сустава.

Açar sözlər: спортсмены; физическая реабилитация; травма коленного сустава.

DİZ OYNAĞININ ZƏDƏLƏNMƏSİNDƏN SONRA İDMANÇILARIN FİZİKİ REABILİTASIYASININ EFFEKTİVLİYİNİN TƏQDQIQI

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Tədqiqatın əsas məqsədi idmançıların (zorxana və pəhləvan güləşi) diz oynaqını zədələndikdən sonra hərəkət diapazonunu qiymətləndirmək və fiziki reabilitasiyasının effektivliyini müəyyən etmək idi. Diz zədələri olan idmançıların fiziki reabilitasiyası üçün hazırlanmış proqramın təklif olunan variantı onların peşəkar fəaliyyət zamanı idmana qayıtmalarına kömək etməkdə çox təsirli olduğu ortaya çıxdı. Bu nəticə mərhələli, daimi və fərdi müalicə ilə reabilitasiya prosesi zamanı bərpaya inteqrasiya olunmuş yanaşmanın tətbiqi ilə bağlıdır. Bu prinsiplərə uyğunluq diz oynaqının zədələnməsinin morfoloji və funksional nəticələrini mümkün qədər tamamilə aradan qaldırmağa imkan verdi.

Ключевые слова: idmançılar; fiziki reabilitasiya; diz oynaqının zədələnməsi.

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