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RESULTS OF THE USE OF INTEGRATED PROGRAM OF PHYSICAL REHABILITATION OF SPORTSMEN AFTER DAMAGES OF ANKLE JOINT

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Abstracts

The aim of work was an improvement of results of physical rehabilitation of sportsmen of playing types of sport (on the example of football) with the intra-articular damages of ankle joint on the ambulatory stage by optimization and increase of efficiency of the differentiated application of rehabilitation measures, computer-integrated in a training process. In basis of this work was the fixed results of watching 36 sportsmen of 18–24, which engage in football, which got the inwardly-arthral damages of ankle joint, and are on the ambulatory stage of treatment. Researches were conducted in the clinic of the Medical center of «Mir Majid Erslan» of Beirut (Lebanon) on the base of cabinet of physical therapy. The trauma sportsmen of control group got the complex of rehabilitation measures on the traditional program of physical rehabilitation, accepted in this clinic. Injured basic group there was the offered complex of rehabilitation measures according to worked out by us programs, which included for itself the use of integrated in a training process medical gymnastics by the use of procedures of the modified ethnic Arabic bath-house by the successive use of procedures with the elements of the ethnic Arabic massage. For the estimation of efficiency of measures of physical rehabilitation of sportsmen we used the 100-levels scale of estimation of results of treatment of NEER (Neer - Grantham - Shelton (1967) in modification of D. Cherkes-Zade, M. Monesi, A. Causero, M. Marcolini (2003)). For the study of dynamics of change of quality of life of sportsmen and level of professional rehabilitation we used medic and sociological methodologies, namely: visual analog scale (Visual Analog Scale, VAS) and questionnaire of EuroQol-5D. The analysis of results of the conducted physical rehabilitation showed that at the positive dynamics of changes of the functional state of injured both clinical groups more expressed and for certain the best results were got in a victim basic group, which conducted a physical rehabilitation in obedience to the program offered byus.

Key words: ankle joint, physical rehabilitation, east massage, east bath-house, ambulatory stage.

Юсеф Шарбель. Результати використання інтегрованої програми фізичної реабілітації спортсменів після ушкоджень гомілково-ступневого суглоба. ***Мета*** роботи – покращення результатів фізичної реабілітації спортсменів-футболістів із внутрішньо-суглобовими пошкодженнями гомілково-ступневого суглоба на амбулаторному етапі за допомогою оптимізації та підвищення ефективності комплексного застосування реабілітаційних заходів, які інтегровано в тренувальний процес. ***Результати роботи.*** В основу роботи покладено результати спостереження за 36 спортсменами 18–24 років, котрі займаються футболом й отримали внутрішньосуглобові пошкодження гомілково-ступневого суглоба та перебувають на амбулаторному етапі лікування. Дослідження проводили в клініці Медичного центру «MirMajidErslan» м. Бейрут (Ліван) на базі кабінету фізичної терапії. Травмовані спортсмени контрольної групи отримали комплекс реабілітаційних заходів за традиційною програмою фізичної реабілітації, прийнятою в цій клініці. Постраждалим основної групи запропоновано комплекс реабілітаційних заходів згідно з розробленою нами програмою, що включав використання інтегрованої в тренувальний процес лікувальної гімнастики й процедур модифікованої етнічної арабської лазні та послідовне застосування процедур з елементами етнічного арабського масажу. ***Методи дослідження.*** Для оцінки ефективності заходів фізичної реабілітації травмованих спортсменів використано 100-бальную шкалу оцінки результатів лікування NEER (Neer-Grantham-Shelton (1967) у модифікації D. Cherkes-Zade, M. Monesi, A. Causero, M. Marcolini (2003)). Для вивчення динаміки зміни якості життя травмованих спортсменів та рівня професійної реабілітації застосовано медико-соціологічні методики, а саме: візуальну аналогову шкалу (Visual Analog Scale, VAS) й анкету EuroQol-5D. ***Висновки.*** Аналіз результатів проведеної фізичної реабілітації засвідчив, що за позитивної динаміки змін функціонального стану постраждалих обох клінічних груп більш виражені та достовірно кращі результати отримано в постраждалих основної групи, яким проведено фізичну реабілітацію згідно із запропонованою нами програмою.

Ключові слова: гомілково-ступневий суглоб, фізична реабілітація, східний масаж, східна лазня, амбулаторний етап.

Юсеф Шарбель. Результаты использования интегрированной программы физической реабилитации спортсменов после повреждений голеностопного сустава. ***Цель работы*** – улучшение результатов

физической реабилитации спортсменов-футболистов с внутрисуставными повреждениями голеностопного сустава на амбулаторном этапе путем оптимизации и повышения эффективности комплексного применения реабилитационных мероприятий, которые интегрированы в тренировочный процесс. ***Результаты работы.*** Основой данной работы были результаты наблюдения за 36 спортсменами, занимающимися футболом в клинике Медицинского центра «MirMajidErslan» г. Бейрут (Ливан) на базе кабинета физической терапии. Пострадавшие контрольной группы получили комплекс реабилитационных мероприятий по традиционной программе физической реабилитации, принятой в данной клинике. ***Методы исследования.*** Пострадавшим основной группы предложен комплекс реабилитационных мероприятий разработанной нами программы, который включал использование интегрированной в тренировочный процесс лечебной гимнастики, а также процедур модифицированной этнической арабской бани и этнического арабского массажа. ***Выводы.*** При позитивной динамике изменений функционального состояния пострадавших обеих клинических групп более выраженные и достоверно лучшие результаты получены у пострадавших основной группы, которым проводилась физическая реабилитация по предложенной нами программе.

Ключевые слова: голеностопный сустав, физическая реабилитация, восточный массаж, восточная баня, амбулаторный этап.

Introduction. The ankle joint injuries account for up to 15% of all joint injuries. The main contingent of people with this pathology is people of the most working age, namely athletes [4; 14].

The talocrural joint is a complex joint that carries considerable load, especially in sports, and is therefore often prones to traumatic injuries. The complexity of the anatomical structure and feeble protection of the soft tissues at systematic high loads and frequent traumatic actions leads to the fact that the mechanical strength of its elements is insufficient [3; 5; 12].

From 30 to 50% of all talocrural joint injuries and up to 12% among all pathologies of the musculoskeletal system are dislocations and fractures. Damage of the ligamentous-capsule apparatus of the talocrural joint is at the second place after pathology of the meniscus and makes up to 15% among all injuries of the joints. Intra-joint fractures of the talocrural joint are 1.5-4.0% among all skeletal bone fractures and 5-7% of all intra-joint fractures. Most victims with such injuries require prolonged treatment [7; 9; 11].

A large percentage of getting disability at open injuries of the talocrural joint is from 9.3% to 17.4%, which indicates the presence of unresolved issues in the treatment of such injuries [12].

At present, it is advisable to further improve, search and introduction into the process of rehabilitation after intra-joint injuries of the talocrural joints of the most advanced and scientifically educated technologies. Their use should be complex and provide a differentiated approach to the choice of forms and means, depending on the nature of damage to both the bone and cartilage structures of the joint and the soft tissues that surround it [2; 8; 12].

The necessity to return skilled athletes to active training and competitive activities require high demands not only on their health care, but also on the further restoration of their health. It is necessary to take into account the possible material costs and aim at reducing them, including by improving the range of rehabilitation measures at all stages and, in particular, the outpatient one [10].

The main purpose of physical rehabilitation, as an integral part of the medical rehabilitation process, is a comprehensive process of restoring the health, physical condition and employability of the victims with the use of physical exercises and natural factors for therapeutic and prophylactic purposes [1; 13].

The purpose of the research is to substantiate the structure and content of the program of physical rehabilitation of athletes of playing sports (for example football) with internal joint injuries of the talocrural joint at the outpatient stage.

The research methods. In the performance of comprehensive medical examinations with the participation of athletes, the World Medical Association Declaration of Helsinki on Ethical Principles of Medical Research with human participation as the object of the research was followed. The content of maximum test loads and procedures for measuring physiological parameters was being in accordance with International Rules and Requirements for Biomedical Research with human participation. Tested people were acquainted with the content of the tests, measurement procedures and agreed with its conduction 36 victim athletes (male players), who received intra-joint injuries of the talocrural joint, took part in the pedagogical experiment presented in this research.

Injured athletes who participated in the study ranged in age from 18 to 24 years. The mean age was (22.8 ± 1.3) years in the main group and (21.7 ± 2.1) years in the control group.

The study was conducted at the MirMajidErslan Medical Center, Beirut (Lebanon), at a physical rehabilitation office. The vast majority of the victims were residents of Beirut. The study involved traumatized athletes with closed talocrural joint injuries A1, A2, C1 and C2 types according to the AO / ASIF classification [4].

All traumatized athletes were divided into two equal clinical groups – the main and the control group (18 victims each). Trauma limitation ranged from 5 weeks to 2 months, moreover traumatized athletes of both clinical groups had undergone rehabilitation treatment for the first time.

All the traumatized athletes of both groups had undergone a primary and re-examination immediately before rehabilitation treatment and at its completion in 30 days after its initiation, which allowed assessing the dynamics of changes in the organism's indices.

To evaluate the effectiveness of physical rehabilitation measures for traumatized athletes, we used a 100-point Neer-Grantham-Shelton treatment score in D. Cherkes-Zade [6; 12].

We used medical and sociological methods, namely: VisualAnalogScale (VAS) and questionnaire EuroQol - 5D for study the dynamics of changes in the quality of life of traumatized athletes and the level of vocational rehabilitation [8].

The digital material obtained in research was processed using the Statisticafor Windows 6.0 general software package. The significance of the differences between the groups (comparing the mean values for each group) was determined using the Student's t test (t). The probability level was assumed to be 95%.

The results of the research. Injured athletes of the 1st (control) group have received a set of rehabilitation measures according to the traditional program of physical rehabilitation, adopted at the clinic of the MirMajidErslan Medical Center in Beirut. The injured group I athletes were assigned 3 sessions of magneto therapy with a magnetic field induction up to 30mT per week. Laser therapy in this phase was used by patients 3 times, taking into account the type of radiation monochrome on the talocrural joint and reflex zones, but usually in a constant mode with a power of up to 25 mW for 15 - 30 seconds each. The total time of the procedure was 3 minutes. Magneto therapy was assigned to all injured athletes of group I – 3 sessions (with previous characteristics), laser therapy – 3 sessions with identical capacity.

For the victims of group II the complex of rehabilitation measures was prescribed according to our program of complex application of the means of physical rehabilitation of the injured athletes, which included the use of therapeutic gymnastics, which was integrated into the training process, and massage with elements of ethnic Arab massage using the procedures of modified Arabic bath.

A set of physical rehabilitation measures, which consisted of the combined use of the traditional Arabic bath procedure and the massage procedure in combination with oriental massage techniques, integrated into the training process, has been developed by us. Choosing the oriental bath as a mean of physiotherapy for the victim athletes with consequences of intra-joint injuries of the talocrural joint, we took into consideration the following reasons:

1. The traditional popularity of visiting the oriental bath in Lebanon and its use as a preventive and therapeutic agent.

2. The authenticity of the bath used and the historical ethnic and cultural traditions of the Lebanon nation.

3. Injured athletes who participated in the research, had domestic experience of using the oriental bath and had the basics of the steaming method.

We supplemented the method of steaming in the oriental bath, which had some differences from the traditional, in particular:

1. Limiting the procedure time 100-120 minutes;

2. The number of procedures per week – three (Monday, Wednesday and Friday);

3. Control of the patient's condition and degree of action of each procedure, which was expressed in the monitoring by the doctor of blood pressure and heart rate before and after the procedure, as well as self-examination of physical condition by the patient;

4. Application at the end of the warm shower and air cooling procedure;

5. Absence of traditional peeling Kese (bath glove) and foam massage. We modified the procedure of oriental massage with the emphasis on the injured limb.

6. The control of the condition of the injured athletes was carried out on the survey of deterioration of health at appearance of uncomfortable subjective sensations, by external signs of changes of a state, measurement of blood pressure and heart rate during the procedure.

For each part of the program of oriental massage and ethnic bath procedure, the purpose and tasks of physical rehabilitation were determined, as well as the methodical sequence of their implementation.

The features of the rehabilitation period, as well as quantitative and qualitative clinical parameters (questioning, somatoscopy, anthropometry, goniometry, pulsometry, arterial tonometry, etc.) were taken into account.

The procedures we have developed for the athletes-footballers with intra-joint injuries of the talocrural joint of the program of complex application of the means of physical rehabilitation, integrated into the training process, were assigned differently in each individual case and were applied individually.

That is, the program of complex application of the means of physical rehabilitation is based on the quantitative indicators of the functional capabilities of the musculoskeletal system of the injured athlete as a whole, the correct selection of recovery modes taking into account the individual features, the degree of clinical and functional disorders.

The results of using the traditional NEER program of physical rehabilitation of the I (control) group after treatment slightly improved, namely, the number of unsatisfactory results decreased by 5.6%, the proportion of satisfactory results decreased by 22.2%, due to a two-fold increase in the proportion of good results – up to 55.6% (see table 1).

Table 1

Results of physical rehabilitation of injured athletes of the I (control) group according to the NEER methods

The results of treatment	Observation period			
	before treatment		after treatment	
	abs.	%	abs.	%
Good	5	27,8	10	55,6
Satisfied	9	50	5	27,8
Unsatisfied	4	22,2	3	16,6
Total	18	100	18	100

After a course of comprehensive use of physical rehabilitation tools under our proposed program, the results of the II (main) group improved significantly, namely – the number of good results increased by 50% due to a significant decrease in the number of satisfactory results by 27.8%, and the lack of unsatisfactory results after conducted rehabilitation treatment (see table. 2).

Table 2

Results of physical rehabilitation of injured athletes of the II (control) group according to the NEER methods

The results of treatment	Observation period			
	before treatment		after treatment	
	abs.	%	abs.	%
Good	4	22,2	13	72,2
Satisfied	10	55,6	5	27,8
Unsatisfied	4	22,2	-	-
Total	18	100	18	100

According to the EuroQol – 5D questionnaire, at the beginning of rehabilitation activities under the traditional program in the I (control) group, the number of good results increased unessentially – by 5.6%, obviously due to the same decrease in the number of unsatisfactory results as the number of satisfactory results remained unchanged – 33 , 3% (see table 3).

The use of the program of comprehensive application of physical rehabilitation according our proposed program significantly improved the results of the control group, namely – the number of good results doubled

to 88.9%, satisfactory – decreased 3.5 times and amounted to 11.1%, and unsatisfactory results not found at all (see table 4).

Table 3

Results of physical rehabilitation of injured athletes of the I (control) group according to the EuroQol - 5D questionnaire

The results of treatment	Observation period			
	before treatment		after treatment	
	abs.	%	abs.	%
Good	9	50	10	55,6
Satisfied	6	33,3	6	33,3
Unsatisfied	3	16,7	2	11,1
Total	18	100	18	100

Table 4

Results of physical rehabilitation of injured athletes of the II (control) group according to the EuroQol - 5D questionnaire

The results of treatment	Observation period			
	before treatment		after treatment	
	abs.	%	abs.	%
Good	8	44,4	16	88,9
Satisfied	7	38,9	2	11,1
Unsatisfied	3	16,7	-	-
Total	18	100	18	100

In the Ist (control) group, VAS indicator has being improved for the first week after the beginning of rehabilitation and was 6.2 ± 0.41. In the second and third weeks it was further improved (5.3 ± 0.37 and 4, 4 ± 0.28, respectively), and the maximum subjective improvement occurred within 4 weeks (2.9 ± 0.22), in particular at the end of treatment ($p < 0.05$).

In the II (main) group victims, VAS indicator has improved since the 1 week of rehabilitation (5.7 ± 0.38). It was observing a clear reduction of pain within 2 and 3 weeks, which corresponds to 4.3 ± 0.23 and 2.8 ± 0.24 points, respectively, and reaches its best value of 1.3 ± 0.18 in 4 weeks from the beginning of rehabilitation ($p < 0,05$), (see table 5).

Table 5

VAS indicators of both clinical groups depending on the observation terms

Observation period	VAS	
	I (control) group	II (control) group
Initial level	8,4±0,36	8,4±0,21
1 week	6,2±0,41	5,7±0,38
2 week	5,3±0,37	4,3±0,23
3 week	4,4±0,28	2,8±0,24
4 week	2,9±0,22	1,3±0,18

*–$p<0,05$

The sequence of implementation of measures of the rehabilitation process, involves the selection of adequate methods of examination of traumatized athletes for identifing the existing limitations of their functional capacities. The tasks and selected means of physical rehabilitation were determined.

The proposed rehabilitation of program provides an individual approach to prescribing recovering treatment techniques, which depends on the degree of functional impairments and the general condition of the victim. In addition, it allows assessment and timely necessary correction of rehabilitation measures.

The developed program of physical rehabilitation also allows to influence certain links of pathological process of the injured joint. Optimization of the muscular tone of the affected limb, improvement of its macro- and microcirculation processes, general stimulation of regenerative processes contribute to the restoration of the functional capacity of the talocrural joint, improve the quality of life of the affected athletes and speed up their return to sports activities.

Injured athletes clearly track the improvement of clinical and functional indicators of the effectiveness of the rehabilitation treatment, which indicates the presence of the effect and a pronounced positive dynamics after the program of complex application of the proposed combination of physical rehabilitation. This is the reason to recommend it for use in the practical work of the medical-prophylactic and sports-physical establishments of the respective profile.

Prospects for further study are presented in the development of physical rehabilitation programs that can be integrated into the training process, using ethnic physiological means of influencing the damaged segment and the body as a whole.

Conclusions and prospects for further researches. Analytical processing of the obtained results of the study indicates the positive dynamics of changes in the functional status of victims of both clinical groups more. But more precise and significantly better results were obtained in the victims of the II (main) group, who was rehabbed by physical rehabilitation according to our proposed program using an integral program the process of therapeutic gymnastics, procedures of modified ethnic Arabian bath and the consistent use of procedures with elements of ethnic Arabian massage.

The use of techniques for assessing the effectiveness of physical rehabilitation measures for traumatized athletes NEER (Neer-Grantham-Shelton), the VAS (visual analogue scale), and the EuroQol – 5D questionnaire to study the dynamics of changes in athletes' quality of life and vocational rehabilitation allowed objectively determine the reduction in the number of a satisfactory and an unsatisfactory results, and the increase in the number of good results in the control group. The athletes of the main group have been allowed determining significantly more good and satisfactory results, in the absence of unsatisfactory results proving superiority of the proposed program of physical rehabilitation.

The injured athletes of the second (main) group demonstrated significantly better than the control group indicators of the applied methods and scales of evaluation of results in the same terms of observation, which indicates the presence of the obtained effect and the precise positive dynamics in the condition of the affected athletes after the physical rehabilitation program.

The proposed program of physical rehabilitation of traumatized athletes after intra-joint injuries of the talocrural joint at the outpatient stage, which is integrated into the training process, is effective and can be recommended for general professional use.

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