

**RESULTS OF THE APPLICATION OF THE PHYSICAL THERAPY
PROGRAM USING ETHNIC MASSAGE TECHNIQUES FOR INJURIES OF
THE ANKLE JOINT**

Youssef Charbel

Tetiana Podkopaï

Denis Podkopaï

*Kharkiv State Academy of Physical Culture,
Kharkiv, Ukraine*

Purpose: to evaluate the results of physical therapy of sportsmen football players with intra-articular injuries of the ankle joint at the outpatient stage when using measures of the physical therapy program using the techniques of ethnic oriental massage.

Material and methods: the study analyzes the results of a study conducted in Beirut (Lebanon), the clinic of the Mir Majid Erslan Medical Center. The effectiveness of physical therapy of 36 football players with intra-articular injuries of the ankle joint at the outpatient stage was assessed according to the method of A.V. Kalashnikov and LEFS scale.

Results: it was found that with positive changes in the functional state of the injured athletes of both clinical groups, reliably better results were revealed among the football players of the main group, who were offered physical therapy according to the program we developed.

Conclusions: the analysis of the research results showed that in the injured athletes of the main group, with the same periods and volumes of observation, the

results of the research methods were significantly higher and objectively more pronounced than in the control group.

Keywords: intra-articular injuries of the ankle joint, physical therapy, oriental massage, oriental bath, outpatient stage.

Introduction

In a study that lasted over 16 years, J. M. Hootman et al [15] observed athletes in 15 different sports in the United States and concluded that lower limb injuries account for more than 50% of all sports injuries, with the knee and bones being predominantly involved. Most of the injuries were contact injuries, with a significantly higher number of injuries observed during the competition compared to training. With 15 sports, football had the highest injury rate, followed by competitive wrestling.

The most common type of fracture in the AJ in all age groups is the lateral ankle fracture, the frequency of which reaches 55% of all ankle fractures. Bones are one of the most common sites of injury in 24 out of 70 sports. The causes of injuries in 61% of cases are falls, in 22% - sports [14]. Despite the fact that in most cases there is a complete recovery of the AJ function after this type of injury, about half of patients, despite complete recovery, report constant problems with physical and psychological health [16].

Massage is widely used in the treatment of patients with fractures of various localization. The therapeutic effect of the massage consists in a mechanical effect on the skin, muscles, tendons, the capsule-ligamentous apparatus of the joints, and lymphatic vessels. In addition, under the influence of massage, complex processes develop in the cerebral cortex, causing corresponding reactive responses in body systems and organs [2].

The effect of massage on the body occurs through mechanical irritation of tissues using special techniques: stroking, rubbing, kneading, shock techniques, vibration. Massage acts on the body in a complex way, since any irritation caused by

massage techniques acts not only in the place of direct impact, but also indirectly affects the state of the body as a whole [1].

The therapeutic effect of massage on the circulatory system, ligamentous-muscular and articular apparatus of the human body occurs through reflex connections. The therapeutic effect of massage is manifested in the improvement of blood supply and tissue trophism, and prevents the development of muscle wasting. It is known that massage improves the contractility of muscles and increases their elasticity, affects muscle tone [8].

The massage accelerates the regeneration of bone tissue, as its techniques increase the blood supply to the injured area. This explains the requirement for the earliest possible use of massage in the recovery period after injuries [10].

The therapeutic effect of therapeutic massage during therapy after injuries of the foot and AJ leads to clinically significant improvements in the function of the joint, an increase in its mobility and range of motion. [7].

E. E. Painter et al. [17] observed an improvement in the movements of the AJ, a decrease in joint pain in injured athletes after immobilization with stable fractures of the AJ after an average of 6 massage sessions, while the majority of injured athletes noted an improvement after 4 weeks.

M. S. Crowell et al. [13] drew attention to the need for an individual approach to the injured athlete, based not on the treatment protocol, but on the decision making, which is based on the assessment of the response of the injured athlete to each massage technique, increasing the degree or duration of the techniques that had the desired effect.

The use of ethnic directions of oriental massage in the literature is described somewhat fragmentarily, more often for restorative and recreational purposes, but the physiological effect of oriental massage techniques is considered to be quite pronounced and directed. The use of oriental massage techniques for reparative effects on the structures of the joints, fascial and periarticular tissues with the correct technical and methodological application, according to Mercato M. (2002), and Lambert J. (2005), is an effective influence on the process of returning and

increasing the passive flexibility of the majority joints of the human body, especially large joints of the spine and lower extremities. The implementation of the oriental massage procedure, according to the authors, has certain age restrictions and medical contraindications (for persons over 60 years old, the presence of acute or chronic diseases of the joints, etc.), which should be taken into account by changing the amplitude and intensity of the massage techniques, the selection of massage techniques and the duration of the procedure [5].

Separately, experts note the advisability of combining massage, especially oriental massage procedures with thermal procedures (bath procedures) in the treatment of traumatic and inflammatory diseases of the ligamentous and muscular apparatus in the subacute period, as well as in chronic processes, joint stiffness, muscle contractures, vascular disorders, the possibility of spasms. In case of functional disorders of the musculoskeletal system, which include: joint stiffness, articular adhesions, delayed callus formation, muscle atrophy, paresis, neuritis, neuralgia, in rehabilitation practice it is recommended to first apply heat, and then a massage procedure using massage techniques with amplitude movements in the joints, it is clearly used in the technique of oriental (Thai) massage [6].

The foregoing indicates a significant attention to this problem and the possibility of creating effective programs for physical therapy of athletes with intra-articular injuries of the ankle joint at the outpatient stage with the involvement of ethnic massage techniques.

The purpose of the study is to evaluate the results of physical therapy of sportsmen football players with intra-articular injuries of the ankle joint at the outpatient stage when using measures of a physical therapy program using ethnic massage techniques.

Material and Methods of research

The study was carried out at the Mir Majid Erslan Medical Center in Beirut, Lebanon in a physical therapy room from 2016 to 2018. The study involved 36 athletes, football players. All affected athletes were males between the ages of 18 and 24. The injured athletes were divided into the main group and the control group (18

people each). The main and control groups were the same in terms of manifestations of functional disorders, localization of injuries, age and level of sports qualifications.

The duration of the injury of the athletes participating in the study was 4-6 months. The injured athletes of the main clinical group underwent a course of physical therapy simultaneously with the resumption of the training process.

The study involved injured athletes with closed injuries of the ankle joint of types A1, A2, C1 and C2 according to the AO / ASIF classification [18].

Injured athletes from both groups underwent initial and repeated examination - immediately before physical therapy and at its completion, namely, 30 days after its start, which made it possible to objectively assess the dynamics of changes in the indicators of research methods.

We assessed the effectiveness of physical therapy using the LEFS scale (The Lower Extremity Functional Scale) [12], which contains a differentiated characteristic of social and domestic functions, the degree of physical activity and normalization of the gait of injured athletes.

Anatomical and functional results of treatment of injured athletes with intra-articular injuries of the ankle joint were assessed using the standards for assessing the quality of treatment of injuries and diseases of the organs of movement and support set forth in the Order of the Ministry of Health of Ukraine No. 41 dated 03.30.94 "On the regulation of orthopedic and traumatological care in Ukraine" to the changes proposed by A.V. Kalashnikov (2006) [3].

The volume of digital material obtained in the course of the study was processed using the general-purpose data processing software Statistica for Windows version 6.0. [9].

Results of the research

Patients of the main group, instead of a complex of physiotherapeutic procedures and classical massage in the control group, were prescribed a complex consisting of a combined application of a bath procedure of a conventional Arab bath and a procedure of oriental massage of the lower extremities.

The bath procedure was used as a preparatory tool for further use, as the main tool, of oriental massage techniques. The previous deep heating of the soft tissues and the osteoarticular apparatus of the injured limbs activated internal arterial hyperemia, increased the elastic qualities of fibrous tissue, somewhat reduced the pain sensitivity threshold when performing high-amplitude movements. In turn, the techniques of oriental massage, used against the background of the action of the hyperthermic bath procedure, were used to increase the amplitude of passive movements in the injured ankle joint, which led to a decrease in both the structural and functional contracture of the injured joint.

For the muscles and joints of the affected limb, oriental massage was also intended with an emphasis on activating blood and lymph flow. Physiotherapy procedures were replaced by mixed Arab bath procedures - an oriental bath with a fixed technological and methodological sequence.

The therapeutic massage technique, which was used during the modified Arab bath procedure, was carried out in the bath room on a massage bench and included a combination of oriental and Thai techniques for the limbs [5].

The massage procedure was performed for 30 minutes. Each technique was performed three times, with fixing the initial position in the extreme positions of the limb links for 3-5 s in the first phase of therapy, up to 6-8 s in the second phase, up to 8-10 s in the third and fourth phases of therapy.

The degree of intensity (strength, applied) when performing techniques for stretching the ligamentous apparatus of the joints gradually increased from the initial to the fourth phase of therapy and depended on the pain threshold of the injured athlete and his general condition.

The massage technique was methodically divided into three parts according to topographic and physiological principles. First, a healthy limb was massaged, and then the muscles and joints of the damaged.

The technique of oriental massage for injured athletes of the main group was performed in the following methodological sequence: the massage procedure was started by treating the muscles and joints, first of a healthy, and then of an injured

limb in the initial position lying on the stomach. In this position, the techniques of pressing and kneading the limb muscles, dosed flexion, extension and abduction of the hip joints with stable and soft dynamic stretching of the capsular-ligamentous apparatus of these joints were performed.

Massage of the muscles of the lower extremity consisted of techniques of oriental massage of the thigh and lower leg in the form of a pressing (surging) massage with a number of pressure on the muscle, and classical massage techniques such as squeezing, exciting and squeezing kneading, deep classic fascinating and pressing kneading of muscles and rubbing of joints.

Next, flexion and extension of the knee and extension of the capsular-ligamentous apparatus of the ankle joints into flexion-extension and abduction-adduction with increased amplitude, with stable and soft dynamic stretching of the capsular-ligamentous apparatus of these joints were performed.

In the future, the procedure of massage of joints and muscles was continued, first of a healthy, and then of an injured limb in the initial position lying on the back.

In this position, the techniques of stable pressure on the muscles and joints of the limb, dosed stable and soft dynamic stretching, flexion and extension of the hip, knee and ankle joints were performed..

The techniques were performed in flexion-extension and abduction-adduction with increased amplitude and constant control of the level of pain in the injured athlete.

Flexion-extension and adduction-abduction of the foot in the ankle joint were performed both in isolation and with simultaneous extension of the entire limb and movements in adjacent joints with their simultaneous extraction. This allows you to stabilize blood circulation and synchronize the muscle tone of the limb. Local pain sensations with these techniques are significantly reduced.

Flexion-extension and adduction-abduction of the foot in the ankle joint was carried out both in isolation and in simultaneous extension of the entire limb and movement in adjacent joints and its simultaneous abduction, adduction and rotation. Flexion-extension and adduction-abduction of the foot in the ankle joint was also

carried out in isolation with additional load in special four techniques, which were used only in the 4th phase of the complex of physical therapy.

At the end of the oriental massage procedure, in the absence of individual intolerance (excessive tickling or significant pain), Thai foot massage techniques were performed for all injured athletes - extension and pressure in the area of the joint space of the toes, the metatarsal surface of the foot and pressure on the active points of the toes and the sole of the foot (the so-called "plantar massage"), which were carried out according to the method of Thai massage Lambert (2005) [4].

The results of physical rehabilitation, obtained according to the LEFS scale, showed that after a course of physical rehabilitation according to the generally accepted program in the control group, the number of unsatisfactory results decreased by 11,1%, the number of satisfactory results did not change, and the number of good results slightly increased – by 11,1%. The results of evaluating the data of the main group convincingly indicate a significant increase in the number of good results, namely, 6.5 times, and a significant decrease in the number of satisfactory results - almost 2.3 times, and, especially, a decrease in the number of unsatisfactory results (almost 7 times), which shows the effectiveness of our proposed program of physical rehabilitation (Table 1, Figure 1).

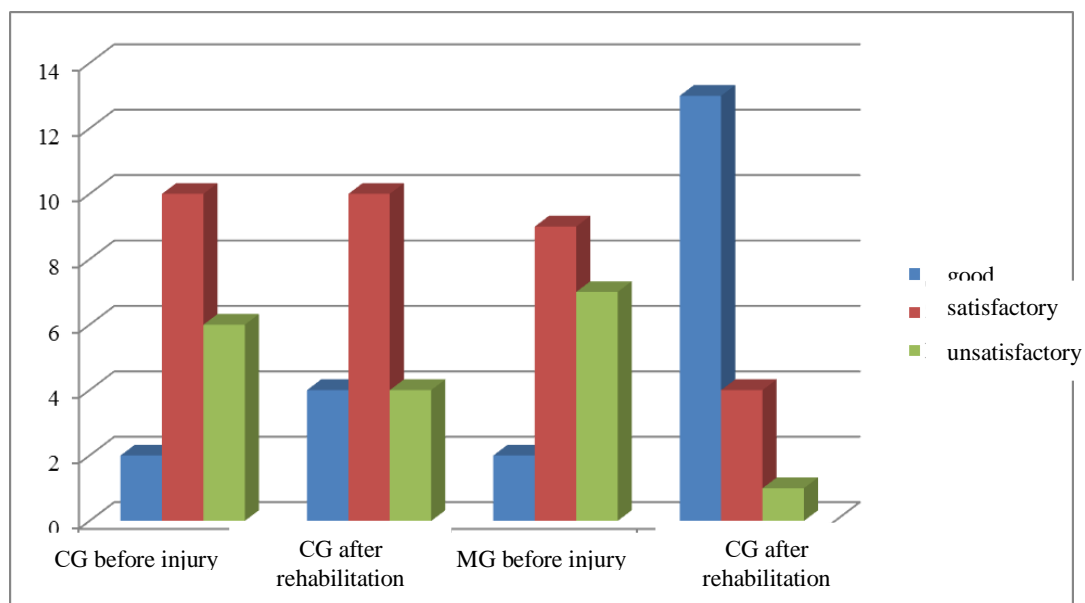


Fig. 1. Comparative results of rehabilitation measures for injured athletes of both clinical groups on the LEFS scale

Table 1

Results of physical rehabilitation of injured athletes, obtained according to the LEFS scale

Results	Control group				Main group			
	before rehabilitation		after rehabilitation		before rehabilitation		after rehabilitation	
	abs.	%	abs.	%	abs.	%	abs.	%
Good	2	11,1	2	22,2	2	11,1	13	72,2
Satisfactory	10	55,6	9	55,6	9	50	4	22,2
Unsatisfactory	6	33,3	7	22,2	7	38,9	1	5,6
Total	18	100	18	100	18	100	18	100

From the analysis of the assessment of the results of physical rehabilitation performed according to the method of A.V. Kalashnikov, it can be seen that after a course of physical rehabilitation according to the generally accepted program, the number of unsatisfactory results decreased by half, the number of satisfactory results decreased by 22.2%, and the number of good results doubled (up to 66,7%) (Table 2, Figure 2).

In the main group, there was a significant increase in the share of good results, namely, 2,1 times to 83,3%, due to which the number of satisfactory results decreased by half to 16,7%, in the absence of unsatisfactory results..

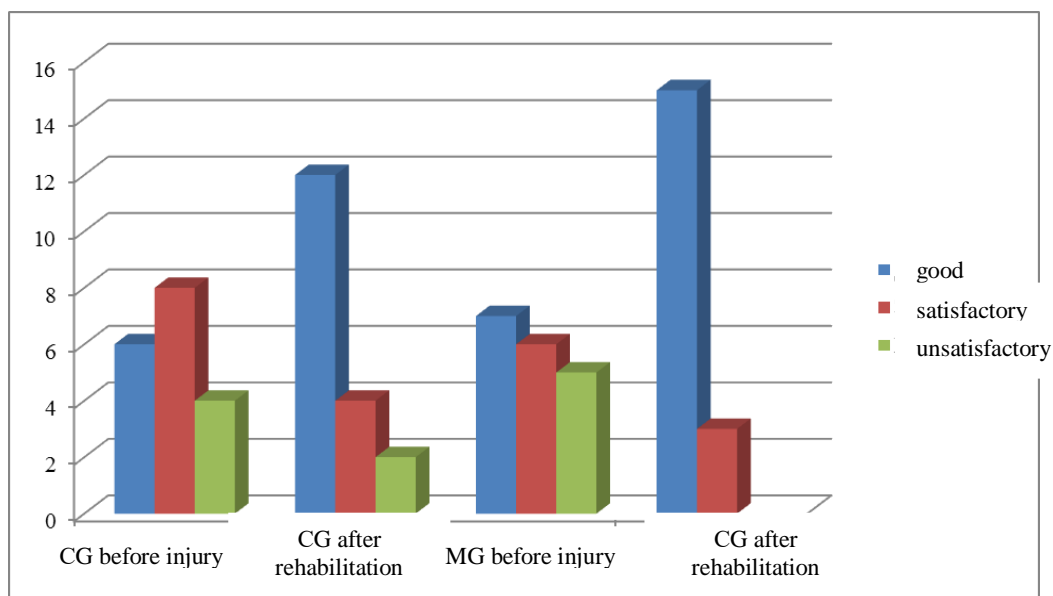


Fig. 2. Comparative results of assessing the orthopedic status of injured athletes of both clinical groups according to the method of A.V. Kalashnikov

Table 2

Results of physical rehabilitation of injured athletes, obtained by the method of A.V. Kalashnikov

Result	Control group				Main group			
	before rehabilitation		after rehabilitation		before rehabilitation		after rehabilitation	
	abs.	%	abs.	%	abs.	%	abs.	%
Good	6	33,3	12	66,7	7	38,9	15	83,3
Satisfactory	8	44,4	4	22,2	6	33,3	3	16,7
Unsatisfactory	4	22,2	2	11,1	5	27,8	-	-
Total	18	100	18	100	18	100	18	100

The analysis of the results of the performed physical therapy indicates that more pronounced positive results were obtained in the injured athletes of the main group who received physical therapy according to the program we proposed, with a positive dynamics of changes in the functional state of the injured athletes of both clinical groups.

In addition, in the victims of the main group, at the same time of observation, there were significantly better indicators than the control group, the indicators of the above methods and the scale of assessing the results, which indicates a pronounced positive dynamics of the condition of the injured athletes after the physical therapy program.

Conclusions / Discussion

It is generally accepted that the most important problem of modern physical therapy for injured athletes is the rapid and complete return of sports performance.

It is also known from many scientific sources that injuries of the ligamentous-capsular apparatus of the ankle joint in terms of prevalence rank second among all joint injuries and injured athletes need long-term treatment.

In this case, it is advisable to argue only about the choice of the tactics of physical therapy, depending on the nature of damage to the osteochondral structures of the joint. An effective return to active professional activity of injured athletes occurs provided that new treatment technologies are added to existing traditional approaches and methods of physical therapy to accelerate recovery processes. The authors of the study developed and tested a program of physical therapy, which

contained the methods of oriental massage in combination with the procedures of the oriental bath specifically for solving the problem of the fastest restoration of the proper functional state of qualified sportsmen football players and their return to productive professional activity.

The activities of the traditional program of physical therapy for injured athletes with the consequences of intra-articular injuries of the ankle joint, which included the use of classical massage techniques, according to the LEFS scale, reduced the number of unsatisfactory results by 11.1% in the control group, and the number of good results doubled to 22,2%.

The activities of the physical therapy program, which included the oriental massage technique in combination with the oriental bath for the athletes of the main group, increased the number of good results by 61,1%, which reduced the number of satisfactory results by 27,8%, and by 33,3% unsatisfactory results, which indicates on the objective effectiveness of the proposed physical therapy program.

The therapy program according to the traditional program allowed in the control group to reduce the number of unsatisfactory and satisfactory anatomical and functional results according to the method of A.V. Kalashnikov by 11,1% and 22,2%, respectively, and increase the number of good ones to 66,7%.

The athletes of the main group, according to A.V. Kalashnikov, the number of good results increased by 44,4%, due to which the number of satisfactory results decreased by 16,6%, and the absence of unsatisfactory results was recorded, convincingly demonstrates the advantages of the proposed physical therapy program.

To solve the problem of returning qualified athletes to active training and competitive activity, we have developed and objectively successfully implemented a program of rehabilitation measures using oriental massage techniques in combination with an oriental bath, can be recommended for general use.

Prospects for further research. Implementation of the proposed program of physical therapy for athletes with intra-articular injuries of the ankle joint using the procedures of a modified oriental bath and the sequential use of procedures with

elements of oriental massage in specialized healthcare institutions of Ukraine and Lebanon.

Conflict of interests. The authors declare that no conflict of interest.

Financing sources. This article didn't get the financial support from the state, public or commercial organization.

References

1. Belaya, N. A. (2001), *Lechebnaya fizkul'tura i massazh*. Moskva, 272 p. (in Russ.)
2. Vasichkin, V. (2016), *Vse pro massazh*. Moskva, 304 p. (in Russ.)
3. Gajko, G. V., Kalashnikov, A. V., Vdovichenko, K. V. (2010), "Vibir metodu likuvannya hvorih iz diafizarnimi perelomami velikogomilkovoï kistki", *Ukraïns'kij medichnij al'manah*, 13(1), pp. 40-43. (in Ukr.)
4. Lamber, Dzh. (2005), *Tajskij massazh*. Rostov na Donu, 346 p. (in Russ.)
5. Merkti, M. (2002), *Tajskij massazh: SHag za shagom po puti k isceleniyu*. Moskva, 176 p. (in Russ.)
6. Pidkopaj, D. O. (2019), *Klasichnij masazh*. Harkiv, 452 p. (in Ukr.)
7. Pogosyan, M. M. (2002), *Lechebnyj massazh: uchebnyk*. Moskva, 528 p. (in Russ.)
8. Rudenko, R. (2013), *Masazh*. L'viv, 302 p. (in Ukr.)
9. Sergienko, V. I., Bondareva, I. B. (2000), *Matematicheskaya statistika v klinicheskikh issledovaniyah*. Moskva, 256 p. (in Russ.)
10. *Travmatologiya ta ortopediya: pidruchnik / za red. Golki, G. G., Bur'yanova, O. A., Klimovic'kogo, V. G. 2-ge vid*. Vinnicya, 432 p. (in Ukr.)
11. Hassan, Dandash, Pidkopaj, D. O. (2016), "Metodicheskie osobennosti fizicheskoy rehabilitacii postradavshih s posledstviyami minno-vzryvnoj travmy", *Slobozhans'kij naukovo-sportivnij visnik*, № 2, pp. 127-131. (in Russ.)
12. Binkley, J. M., Stratford, P. W., Lott, S. A., Riddle, D. L. (1999), "The Lower Extremity Functional Scale (LEFS): scale development, measurement properties, and clinical application", *Physical Therapy*, Vol. 79(4), pp. 371-383. (in Eng.)

13. Crowell, M. S., Deyle, G. D., Owens, J., Gill, N. W. (2016), "Manual physical therapy combined with high-intensity functional rehabilitation for severe lower extremity musculoskeletal injuries: a case series", *Journal of Manual & Manipulative Therapy*, Vol. 24(1), pp. 34-44. (in Eng.)
14. Elsoe, R., Ostgaard, S. E., Larsen, P. (2018), "Population-based epidemiology of 9767 ankle fractures", *Foot and ankle surgery*, Vol. 24(1), pp. 34-39. (in Eng.)
15. Hootman, J. M., Dick, R., Agel, J. (2007), "Epidemiology of collegiate injuries for 15 sports: Summary and recommendations for injury prevention initiatives", *Journal of athletic training*, Vol. 42, pp. 311-319. (in Eng.)
16. McPhail, S. M., Williams, C. M., Schuetz, M., Baxter, B., Tonks, P., Haines, T. P. (2014), "Development and Validation of the Ankle Fracture Outcome of Rehabilitation Measure (A-FORM)", *Journal of Orthopaedic & Sports Physical Therapy*, Vol. 44(7), pp. 488-492. (in Eng.)
17. Painter, E. E., Deyle, G. D., Allen, C., Petersen, E. J., Croy, T., Rivera, K. P. (2015), "Manual Physical Therapy Following Immobilization for Stable Ankle Fracture: A Case Series", *Journal of Orthopaedic & Sports Physical Therapy*, Vol. 45(9), pp. 665-674. (in Eng.)
18. *Traumatology and orthopedics: textbook* (2018) / edited by Golka, G. G., Burianov, O. A., Klimovitsky, V. G., Nova Knyha, 400 p. (in Eng.)

Received: 24.03.2021.

Published: 26.04.2021.

Information about the Authors

Youssef Charbel: Kharkiv State Academy of Physical Culture: Klochkivska str. 99, Kharkiv, 61058, Ukraine.

ORCID: <https://orcid.org/0000-0002-4442-9509>

E-mail: twintracker@gmail.com

Tetiana Podkopi: Kharkiv State Academy of Physical Culture: Klochkivska str. 99, Kharkiv, 61058, Ukraine.

ORCID: <https://orcid.org/0000-0002-7890-0215>

E-mail: alicepodkopay@gmail.com

Denis Podkopi: PhD (Physical Education and Sport), Kharkiv State Academy of Physical Culture: Klochkivska str. 99, Kharkiv, 61058, Ukraine.

ORCID: <https://orcid.org/0000-0001-9845-7639>

E-mail: frir@ukr.net