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Research article

PHYSICAL TREATMENT OF SPORTS KNEE INJURIES

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Abstract. *The development of sports medicine and rehabilitation with the great involvement of techniques and modern technology have increased the needs and possibilities for quick diagnosis and more adequate treatment. Sport injuries of various parts of the body are regular companions of sports activities, depending on the type and conditions in which the sport activity is performed. In this paper, we analyzed knee injuries because they are the most dominant. The knee, which is the largest, the most complex and the most stressed joint, is most exposed to injuries. We analyzed 124 respondents who were treated in Ribarska Banja by physical and balneological treatment, from 2005 to 2006. Anamnestic data, as the most common cause of injury, include insufficient training, insufficient physical preparedness, rough start of an opponent or uneven terrain. The knee joint is the most commonly injured region in athletes, and because of the complexity of the joint itself, these injuries are very complicated. Balneal treatment showed positive effects on healing and accelerated return to the field. Balneo Climatic Treatment is always accompanied with certain methods of physical therapy and rehabilitation, and all of them together can accelerate healing. The successful return to the field depends on the applied therapeutic methods and on the early beginning of therapeutic treatment.*

Key words: *knee, injuries, treatment, athletes*

INTRODUCTION

Injuries are an inevitable part of competitive sports, as well as recreational activities. Research shows that one of the most common musculoskeletal complaints that accounts for approximately 48 out of 1,000 patients are knee related injuries. As noted, approximately nine percent of these knee complaints are related to anterior cruciate ligament (ACL) injuries. The ACL is commonly injured in contact sports via a non-contact action such as

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planting, cutting, landing on a hyperextended knee, or pivoting and sudden deceleration. Typically, athletes report feeling immediate pain, hearing a pop which results in progressive knee swelling; as well as difficulty ambulating. The ACL is one of the major ligaments that provides stability to the knee joint by preventing anterior translation of the femur in the closed kinetic chain (Rodriguez, Marroquin, & Cosby, 2018).

Today, nearly every person participates in almost a hundred sports disciplines, starting from children's games through amateur, semi-professional or professional sports activities to even sailing and walking. Some kind of physical activity is practiced by most of mankind (Apostolski et al., 1993). Regular companions of sports activities are sport injuries of various parts of the body, depending on the type and conditions in which sport activity is performed. Sports injuries are injuries during exercises, trainings and competitions, and they are gained by amateurs, semi-professionals and professionals. In England, the number of sports injuries exceeds 1.5 million annually. Most of the injuries occur at the age of 20-30 (Maffulli, Longo, Gougoulias, Caine, & Denaro, 2010). Most injuries in youth are due to the collision elements of the game, mainly the tackle (Pollock & Kirkwood, n.d.). According to differences in etiopathogenesis and evolution, all sports injuries can be divided into acute and chronic. Acute symptoms appear immediately after injuries and can be opened and closed. A large percentage of acute changes, about 75% are light, 22% are moderately severe and only 3% are difficult (Curry, Goehring, Bell, & Jette, 2018; Banović, 1989; Medved & Barbir, 1987; Mrvaljević, 2006; Nedvidek, 1988). About 75% of all knee injuries in sports refer to football and ski injuries. The highest number of sports injuries, about 50%, appear due to excessive load, that is, to disproportion between the athlete's ability and what is required from him, and in percentages, the knee injuries are most common. The mechanism of higher leg injuries in the presence of KAB deployment in real-world crashes can be interpreted by the increased effective body mass, axial compression along the shafts of long bones, and altered pre-impact posture due to muscle contraction (Nie, Sathyanaran, Ye, Crandall, & Panzer, 2018). Since sports injuries are more and more frequent, there are some suggestions for their prevention. This is a very complex problem, which includes the professional selection of future athletes, improvement of the proper technique, good physical preparedness, adequate battle fields, quality equipment, quality trial, etc. (Guyton, 1996; Jajić, 1994). Depending on the degree of injury, the type of therapy is determined. Sometimes cooling with a slight immobilization of the minor injury is enough, and in a small percentage of injuries, the definitive therapy must include surgical intervention, after which a balneo-physical treatment is required (Conić, 1986; Conić & Obradović, 1961). The use of natural healing waters for therapeutic purposes is one of the oldest methods of treatment, which changed over time and developed with the development of science and medicine. In addition to healing thermal waters, peloids and medicinal gases are used for therapeutic purposes (Barrett, Barman, Boitano, & Brooks, 2009; Curry et al., 2018; Guyton, 1996; Jakonić, 1995). Their action changes the reactivity of cells, tissues, organs and functional systems. The specific composition of natural medicinal products, thermal waters, enables them to act on all receptors of the human body, so they can be considered the most physiological suitable for the body (Conić, 1986; Guyton, 1996; Jakonić, 1995). The effects of bathing in mineral waters are mechanical, thermal and chemical, and in the case of radioactive waters, they are also ionizing. The range of physical agents used in knee injury treatments is large. In the acute phase, the goal is to reduce pain and remove the swellings, and therefore cryoterias, electrophoresis, diadynamic currents

and ultrasound are used. In this phase the effects of lasers and magnets, are used - analgesic, antiedematous and anti-inflammatory (Jakonić, 1995; Jevtić & Vesović-Potić, 1997). In the later stage of recovery, heat therapy, paraffin and peloid are used.

The aim of the research was to determine the influence of balneo-physiatric treatment on the course and the degree of establishment of functional abilities of the injured knee in case of injuries of the ligament knee apparatus, and after operative orthopedic treatment.

MATERIAL AND METHODS

The total number of respondents was 124, they were both males and females, of an average age of 24.5±0.7 years. They were all involved in sports as amateurs, semi-professionals or professionals, whereas football (85), basketball (22) and handball (12) were the dominant sports activities, although there were a few volleyball players (3) and athletes (2). All of the respondents had undergone surgery before their arrival for the spa treatments, and in the patient history and accompanying documentation the injuries of knee ligaments (interruption, distortion and distension) prevailed, where most the most common injuries were the ones of the front crossed ligaments, and less frequent were injuries of the meniscus and patella.

The therapy was conducted according to the already established protocol, in Ribarska Banja from 2005 to 2006. In addition to the available medical documentation, we also analyzed the questionnaires that were filled out by the patients on arrival at the therapy. From these questionnaires we received some demographic data as well as data concerning the cause of the injuries.

The Knee Injury and Osteoarthritis Outcome Score (KOOS) is self-administered and assesses five outcomes: pain, symptoms, activities of daily living, sport and recreation function, and knee-related quality of life. In clinical study of Roos, Roos, Lohmander, Ekdahl, & Beynnon (1998), the KOOS proved reliable, responsive to surgery and physical therapy, and valid for patients undergoing anterior cruciate ligament reconstruction. The KOOS meets the basic criteria of outcome measures and can be used to evaluate the course of knee injury and treatment outcome.

The results were statistically processed, and tabulated.

RESULTS

In the period from 2005 to 2006, due to sports knee injuries, 124 patients underwent physiatric-balneological treatment at the Special Hospital Ribarska Banja.

In the structure of the respondents, the males were strongly dominant in gender (79.8% vs. 20.2%), and the difference was statistically highly significant (X^2=28.530; p<0.001) (Table 1).

Table 1 The structure of respondents with sports knee injuries according to gender

Gender	Number	%
M	99	79.8
F	25	20.2
Total	124	100.0
X^2=29620; DF=1; p<0.001		

Table 2 The structure of respondents by type of sport

Type of sport	Number	%
Football	85	68.6
Basketball	22	17.7
Handball	12	9.7
Volleyball	3	2.4
Other sports	2	1.6
Total	124	100.0

The highest incidence of injuries occurs in footballers with 68.6%, followed by basketball and handball players. Only 3 respondents played volleyball, so we can say that the athletes in contact sports are more vulnerable to knee injuries (Table 2).

Table 3 Age of respondents with knee injuries

Age groups	Number	%
Up to 19 years	20	16.1
20-29	66	53.2
30 and more	38	30.7
Total	124	100.0
$\overline{X}$	27.9	
SD	9.3	
Median	26.0	

As can be seen from Table 3, the highest percentage of respondents with sports injuries are categorized in the age group of 20-29 (53.2%), which was also expected because the largest number of people in this age group are engaged in physical activity.

According to anamnestic data, the greatest number of injuries was due to contact with an opponent (75 and 60.5% respectively), 30 respondents stated that the cause of the injury was poor warming up, and 15 of them as the cause of the injuries stated inadequate terrain (Table 4).

Table 4 The most common causes of injuries

Causes of injuries	Number	%
Contact with an opponent	75	60.5
Bad weather	30	24.1
Terrain conditions	15	12.1
Other reasons	4	3.3
Total	124	100.0

The elapsed time from injury to surgery in respondents with sports injuries is shown in Table 5. Nearly 50% of the respondents asked for an intervention within 12 months, within 13-24 months interventions were done on 28.2% patients, within 25-36 months interventions were done on 24.2%, while only 3.1 % of respondents waited for an intervention over 37 months. With a more pronounced dispersion, the average time between injury and surgery for all the respondents was 27.0 ± 9.8 months.

Table 5 Time elapsed from injury to surgery in respondents with sports injuries of the knee

Age groups	Number	%
Up to 12 months	55	44.5
13-24	35	28.2
25-36	30	24.2
37 and more	4	3.1
Total	124	100.0
$\bar{x}$	27.0	
SD	9.8	
Median	18	

The time spent from surgery to arrival for balneological and physiatric treatment of patients with sports injuries of the knees were very different, on average 86.0±57.2 days. The median is 54 days. The largest number of respondents, 58.1% of them, received treatment within 60 days after surgery (Table 6).

Table 6 Time elapsed from surgery to arrival at the balneological and physiatric treatment of respondents with sports knee injuries.

Elapsed time	Number	%
Up to 30 days	25	20.2
31-60	47	37.9
61-90	20	16.1
91-120	9	7.3
121-150	6	4.8
151 and more	17	13.7
Total	124	100.0
$\bar{x}$	86.0	
SD	57.2	
Median	53	

Table 7 shows the structure of treated sports injuries according to diagnosis, and the highest degree of injuries is "Distorsio et distensio ligamenti genus" with 60.5%.

Table 7 Structure of treated sports injuries according to diagnosis

Diagnosis	Number	%
1. Distorsio et distensio ligamenti genus	75	60.5
2. Fissura menisci traumatica recens	23	18.5
3. Morbi patellae et genus interna	5	4
4. Luxatio patellae	13	10.4
5. Morbus genus alii	8	6.6
Total	124	100

In all the respondents, kinesis and work therapy were applied, and practically in all of them, except in one, hydro therapy was also applied. Electrotherapy was performed in 81 or 65.3% of the respondents, 68 of them or 54.84% received magneto and cryo therapy, and in 8 or 6.5% sono and paraffin therapy (Table 8).

Table 8 Type of therapeutic treatment in respondents with sports knee injuries

Type of treatment	Number	%
1. Kinesis	124	100.0
2. Work	124	100.0
3. Hydro	123	95.2
4. Electro	81	65.3
5. Magneto	68	54.8
6. Cryo	68	54.8
7. Sono	8	6.5
8. Paraffin	8	6.5

The duration of balneological and physiatric treatment in respondents with sports knee injuries, lasted to 15 days in 16.1% of the respondents, then from 16-30 days in 65.4% of them, from 31-45 days at 10.6% and 8.6% of the respondents had over 46 days of treatment . The average duration of balneological and physiatric treatment for all the respondents was 26.9±13.7 days (Table 9).

Table 9 Duration of balneological and physiatric treatment in respondents with knee sports injuries

Elapsed time	Number	%
Up to 15 days	20	16.1
16-30	80	64.2
31-45	15	11.0
46 and more	9	9.2
Total	124	100.0
$\bar{X}$	26.9	
SD	13.7	
Median	22	

Based on the insight into the health status of the respondents and on clinical examinations, and the physiatric assessment of their condition after the performed balneo-physiotherapy treatment (Table 10), we noticed that in 75.8% of the respondents there was a significantly improved clinical picture compared to their initial condition.

Table 10 The results of the balneo- physiatric treatment in respondents with sports injury of the knee

Outcome	Number	%
Significant improvement	94	75.8
Slight improvement	30	24.2
Total number	124	100.0

DISCUSSION

The ultimate goal of physical therapy after a knee ligament injury is: pain relief, calming of the affected area, improvement of blood flow and lymphatic flow, improvement of the metabolism of damaged tissue, acceleration of swelling resorption and reduction of muscle tone (Conić & Obradović, 1961; Jakonić, 1995). After this phase, a stage of kinesitherapy treatment is performed, using various methods for improving the mobility of the knee, which can be passive, actively-assisted and active. The return to the training process and competition depends on individual abilities, but the rehabilitation team is obliged to include a trainer who follows the injured athlete, doses the level of load and helps in making the decision when the injured person can return to normal training.

A successful return is possible when: there is no pain in any kind of activity, when there is a complete function of the joint, when there is a preserved sport skill as before the injury, when the cardiovascular system is fully prepared, when an athlete is psychologically ready for training and competitions and when the coach is satisfied with the achieved possibilities (Jakonić, 1995; Jevtić & Vasović-Potić, 1997). The knee is a key clamp that ensures straightforward walking, provides support, enables stepping, running, jumping, kicking and any other leg movements. It is the most complex and the largest joint in humans, exposed to great load and traumatogenic effects, unprotected by massive musculature (Jevtić, 2001; Medved & Barbir, 1987). The compactness and stability of the knee joint provides a strong and numerous ligamentary device and an attachment of meniscuses, which are important knee joint stabilizers, which are considered to be vital elements of the biomechanical function of the knee (Banović, 1989; Jevtić, 2001; Kostić, 2002; Popović, 1986).

The knee is an anatomically and biomechanically complex joint. Few studies reported the type and frequency of knee injuries that may help to prevent, diagnose, and treat knee joint injuries. Majewski, Susanne, & Klaus (2006) documented 17397 patients with 19530 sport injuries over a 10-year period. 6434 patients (37%) had 7769 injuries (39.8%) related to the knee joint. 68.1% of those patients were men and 31.6% were women. Almost 50% of the patients were between the ages of 20–29 (43.1%) at the time of injury. The injuries documented were ACL lesion (20.3%), medial meniscus lesion (10.8%), lateral meniscus lesion (3.7%), MCL lesion (7.9%), LCL lesion (1.1%), and PCL lesion (0.65%). The activities leading to most injuries were soccer (35%) and skiing (26%). LCL injury was associated with tennis and gymnastics, MCL with judo and skiing, ACL with handball and volleyball, the posterior cruciate ligament (PCL) with handball, lateral meniscus with gymnastics and dancing, and medial meniscus with tennis and jogging.

Improved basic science data on the anatomy and biomechanics of the human PCL have provided the orthopaedic surgeon with new information on which to base treatment decisions. Injuries to the PCL are reported to comprise approximately 3% of all knee ligament injuries in the general population and as much as 37% in an emergency room setting. While the diagnosis of a PCL injury can often be made with a physical examination, ancillary studies such as radiographs and magnetic resonance images can be very helpful in detecting associated ligament and bony injuries. In general, most partial (grades I and II) PCL injuries can be treated non-operatively. However, surgical reconstruction is usually recommended for those PCL injuries that occur in combination with other structures. In this review, current surgical techniques of PCL reconstruction based on anatomic and biomechanical studies will be discussed (Harner & Höher, 1998).

During the sports tournaments in 2017, 87 injuries were recorded yielding an overall injury incidence of 286.1 per 1000 match hours. Time-loss due to injury was 49.3 per 1000 match hours. Senior players had a higher overall injury incidence with 395.3 injuries than u-17 players with 205.7 injuries per 1000 match hours ($p<0.01$). Comparison of the injury incidence between the two sexes showed 330.23 injuries per 1000 h handball exposure for male players and 234.9 injuries for female players (n.s.). The most frequent injury type were sprains (21 injuries, 24.1%) followed by contusions (19 injuries, 21.8%) and skin abrasions with (15 injuries, 17.2%). Central defenders and specialists had the highest injury incidence. Thighs, ankles, as well as foot and toes (altogether 12 injuries, 13.8%) were the three most frequently injured anatomic sites (Achenbach et al., 2018).

In October 2017, the International Olympic Committee hosted an international expert group of physical therapists and orthopaedic surgeons who specialize in treating and researching pediatric ACL injuries. The purpose of this meeting was to provide a comprehensive, evidence-informed summary to support the clinician and help children with ACL injury and their parents/guardians make the best possible decisions. Representatives from the American Orthopaedic Society for Sports Medicine, European Paediatric Orthopaedic Society; European Society for Sports Traumatology, Knee Surgery, and Arthroscopy, International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine, Pediatric Orthopaedic Society of North America, and Sociedad Latinoamericana de Artroscopia, Rodilla, y Deporte, attended. Physical therapists and orthopaedic surgeons with clinical and research experience in the field and an ethics expert with substantial experience in the area of sports injuries also participated. This consensus statement addresses 6 fundamental clinical questions regarding the prevention, diagnosis, and management of pediatric ACL injuries. Injury management is challenging in the current landscape of clinical uncertainty and limited scientific knowledge. Injury management decisions also occur against the backdrop of the complexity of shared decision-making and the potential long-term ramifications of the injury (Ardern et al., 2018).

CONCLUSION

On the basis of the obtained results, we concluded that gender structure is dominated by men of 79.8%, and, on average, they were 27.9 years old, which fits into earlier considerations that the people engaged in sport, amateurs, semi-professional and professional, are primarily aged 20-30 (in this case both males and females were 24.5±0.7 years of age). In most cases, the patients reported injuries of the crossed ligaments, 60.5%, of them, and the injuries were mainly due to severe contact with the opponent or poor warming up or preparedness for effort.

The outcome of the therapy was better for athletes who had previously come to therapy, and in 75.8% of them, a significant improvement was confirmed.

REFERENCES

Achenbach, L., Loose, O., Laver, L., Zeman, F., Nerlich, M., Angele, P., & Krutsch, W. (2018). Beach handball is safer than indoor team handball: injury rates during the 2017 European Beach Handball Championships. *Knee Surgery, Sports Traumatology, Arthroscopy*, 1-7.

Apostolski, S. A., Banović, D., Butković, I., Đorić, I., Filipović, M., Nikolić, G., Rakić, C., Slavković, S., Stanojković, M., Stefanović, P. & Stojimirović, D. (1993). *Povrede u sportu (Injuries in sport).* Medicinska knjiga, Belgrade. In Serbian

Ardern, C. L., Ekas, G., Grindem, H., Moksnes, H., Anderson, A., Chotel, F., Forssblad, M., Ganley, T. J., Feller, J. A. and Karlsson, J. (2018). 2018 International Olympic Committee consensus statement on prevention, diagnosis and management of paediatric anterior cruciate ligament (ACL) injuries. *Knee Surgery, Sports Traumatology, Arthroscopy*, 26(4), 989-1010.

Banović, D. (1989). *Traumatologija koštano-zglobnog sistema (Traumatology of the bone and joint system*). Dečije novine, Gornji Milanovac. In Serbian

Barrett, K.E., Barman, S. M., Boitano, S., & Brooks, H. (2009). *Ganong's review of medical physiology*. 23. NY: McGraw-Hill Medical.

Conić, Ž. (1986). *Osnovi fizikalne medicine i rehabilitacije (Basics of physical medicine and rehabilitation*). Naučna knjiga, Belgrade. In Serbian

Conić, Ž., & Obradović A. (1961). *Specifičnosti fizikalnog lečenja i rehabilitacije sportskih povreda (Specificity of physical treatment and rehabilitation of sports injuries*). Book of Proceedings of the The First Scientific-Professional Meeting of Sports Physicians of Yugoslavia, NIP Partizan, Belgrade. In Serbian

Curry, A. L., Goehring, M. T., Bell, J., & Jette, D. U. (2018). Effect of physical therapy interventions in the acute care setting on function, activity, and participation after total knee arthroplasty: A systematic review. *Journal of Acute Care Physical Therapy*. doi: 10.1097/JAT.0000000000000079

Guyton, A.C. (1996). *Medicinska fiziologija (Textbook of medical physiology*). Savremena administracija, Medicinska knjiga, Belgrade. In Serbian

Harner, C.D., & Höher, J. (1998). Evaluation and treatment of posterior cruciate ligament injuries. *The American Journal of Sports Medicine*, 26(3), 471-482.

Jajić, I. (1994). Specijalna fizikalna medicina (*Special physical medicine*). Školska knjiga, Zagreb. In Croatian

Jakonić, D. (1995). *Sportska medicina (Sports medicine*). Novi Sad. In Serbian

Jevtić, M. (2001). *Klinička kineziterapija (Clinical kinesitherapy*). Faculty of Medicine, University of Kragujevac. In Serbian

Jevtić, M. R, & Vesović-Potić, V. (1997). *Fizikalna medicina (Physical Medicine*). Faculty of Medicine, University of Kragujevac. In Serbian

Kostić, O. (2002). *Fizikalna medicina i rehabilitacija (Physical medicine and rehabilitation*). Faculty of Medicine, University of Niš. In Serbian

Maffulli, N., Longo, U.G., Gougoulias, N., Caine, D., & Denaro, V. (2010). Sport injuries: a review of outcomes. *British Medical Bulletin*, 97(1), 47-80.

Majewski, M., Susanne, H., & Klaus, S. (2006). Epidemiology of athletic knee injuries: A 10-year study. *The Knee*, 13(3), 184-188.

Medved, R., & Barbir, Ž. (1987). Sportska medicina *(Sports medicine*). JUMENA, Zagreb. In Croatian

Mrvaljević, D. (2006). *Anatomija donjeg ekstremiteta-membrum inferius (Anatomy of the lower extremity-membrum inferius)*. Savremena administracija d.d. Beograd. In Serbian

Nedvidek, B. (1988). *Osnovi fizikalne medicine i medicinske rehabilitacije (Basics of physical medicine and medical rehabilitation*). Faculty of Medicine, University of Novi Sad. In Serbian

Nie, B., Sathyanarayan, D., Ye, X., Crandall, J. R., & Panzer, M. B. (2018). Active muscle response contributes to increased injury risk of lower extremity in occupant-knee airbag interaction. *Traffic Injury Prevention*, 19(1), 76-82.

Pollock, A. M., & Kirkwood, G. (n.d.). Sport Collision Injury Collective Sport Collision Injury Collective. Retrived at the World Wide Web: https://www.sportcic.com/resources/response%20to%20Alan%20Carson%20by%20Pollock%20and%20Kirkwood%20Tackle%20and%20scrum%20should%20be%20banned%20in%20school%20rugby.pdf

Popović, N. (1986). *Sportske povrede u rukometu (Sports injuries in handball*). Sportska knjiga, Belgrade. In Serbian

Rodriguez, R. M., Marroquin, A., & Cosby, N. (2018). Reducing fear of reinjury and pain perception among athletes with first time anterior cruciate ligament reconstructions by implementing imagery training. *Journal of Sport Rehabilitation*, 1-15.

Roos, E. M., Roos, H. P., Lohmander, L. S., Ekdahl, C., & Beynnon, B. D. (1998). Knee Injury and Osteoarthritis Outcome Score (KOOS)-development of a self-administered outcome measure. *Journal of Orthopaedic & Sports Physical Therapy*, 28(2), 88-96.

FIZIKALNI TRETMAN SPORTSKIH POVREDA KOLENA

Razvojem sportske medicine i rehabilitacije uz veliko uključivanje tehnike i savremene tehnologije narasle su potrebe i mogućnosti za brzu dijagnostiku i adekvatnije lečenje sportskih povreda. Redovan pratilac sportskih aktivnosti su sportske povrede raznih delova tela u zavisnosti od vrste i uslova u kojima se obavlja sportska aktivnost. U ovom radu, analizirali smo povrede kolena jer su one najbrojnije. Koleno je najviše izloženo povredama, to je najveći, najsloženiji i najistureniji zglob. Analizirali smo 124 ispitanika koji su se lečili u Ribarskoj banji u periodu 2005-2006. godine fizikalnim i balneološkim tretmanom. Iz anamnestičkih podataka, kao najčešći uzrok povređivanja spominje se grub start protivnika, nedovoljna utreniranost, nedovoljna fizička pripremljenost ili neravan teren. Koleni zglob je najčešće povređivana regija kod sportista, i zbog složenosti same strukure zgloba ove povrede su vrlo komplikovane. Balneološki tretman pokazao je pozitivne efekte na izlečenje povreda kolena i ubrzani povratak na teren. Balneoklimatsko lečenje je uvek udruženo sa određenim metodama fizikalne terapije i rehabilitacije, a one sve udružene omogućuju ubrzano ozdravljenje. Uspešan povratak na teren zavisi od primenjenih terapijskih metoda i što ranijeg otpočinjanja terapijskog tretmana.

Ključne reči: *koleno, povrede, tretman, sportisti*