



## PREVENTION TOOLS IN THE AREA OF THE KNEE COMPLEX - TREATMENT AND PROPHYLAXIS

Yani Shivachev, Stanislava Bogomilova

*Department of Physiotherapy, rehabilitation, thalassotherapy, occupational diseases, and University centre of East medicine - Medical University of Varna, Bulgaria..*

### SUMMARY

Injuries to the knee complex are one of the most common. In the world, physical therapeutic programs are being applied, adapted to the adequate recovery of patients, including athletes with such pathology. There are well-established physical therapeutic methodologies in accordance with the rehabilitation potential and the needs of the athletes, as in some of the cases of incorrect rehabilitation or their early return to sports activity, recurrences happen. This imposes the development of prevention strategies involving multidisciplinary teams between which there is a systematical exchange of information about the athlete's condition in order to prevent soft tissue damage or to reduce the risk of relapses. In this team, a key unit in the preparation of the preventive program for optimal fitness, performance and reduction of the risk of soft tissue injuries, is the physical therapist who is the main member of the multidisciplinary team.

The aim of this article is to present the most common physical therapeutic means for the prevention of injuries in the area of the knee complex.

**Keywords:** prevention, injuries, physical therapy

### INTRODUCTION

In the sphere of sports, the knee joint is often susceptible to various lesions of soft tissue structures. It occupies an intermediate position in the kinetic chain of the lower limb and is one of the joints that undergo large compression, torsion and scissor loads [1]. In sports such as football, basketball, handball, specific movements associated with a sharp internal or external rotation of the knee combined with hyperextension lead to an increase in the risk of traumatism of soft tissues and capsule-ligament structures [2]. In this connection, it is of particular importance to take a physical therapeutic anamnesis for the preparation of the rehabilitation program as it allows to define both the indications and the contraindications regarding the dosage and the duration of the load. Awareness of the patient from the physical therapist and back is of significant importance for the prevention of possi-

ble relapse risks as a result of a misapplied physical therapeutic program [3]. In order to reduce the micro- and macro-traumatism in the knee complex, different manually-muscular techniques can be used for the purpose of prevention and treatment. Among them, the most widely used are:

- Massage (classical, sport, manipulative);
- Muscle-energy techniques;
- Stretching;

For achieving good results in the application of various techniques in the recovery of patients with soft tissue injuries in the knee, it is necessary:

- The physical therapist should inform the patient about the recovery process in the short and long term;
- The physical therapist should create the conditions for enhancing patient participation in the rehabilitation phase of treatment;
- The physical therapist should participate fully in planning and conducting the recovery process [4].

In this long and continuous process of recovery, the physical therapist is the one who takes the lead role. His skills regarding the correctness of the applied sequence of different manual-muscular techniques in the overall plan are of particular importance [5].

### Massage – treatment and prophylaxis

Massage from the Greek “masso”, which means “hand clamp”, is one of the most ancient methods of health prophylaxis and treatment. Classical and sports massages are widely used in musculoskeletal and joint dysfunctions, strictly tailored to the regeneration stage of the tissues. In the acute and subacute phases, the massage is performed carefully and gently and aims to improve the trophic processes and help to break the adhesions [6, 7]. Typically, the classic massage precedes active physical therapy and is aimed at accelerating hemodynamics and musculature development to the upcoming physical load. For soft tissue injuries on the knee, an excellent means of influencing the pain symptom and relaxing periarticular soft tissue structures is **ischemic manual compression**. It is performed with a light, rhythmic and metered pres-

sure in the area where the trigger points are located, usually combined with a suitable stretching technique for the treated muscle [8]. In the moderate-protective and minimally protective period in soft-tissue dysfunctions of the knee, good results are achieved with the **manipulatory massage (Terrier massage)**. This method combines the effects of massage with the effect of passive movements and is mainly applied in the field of periarticular tissues with friction techniques on the principle of transversal massage. After the reconstruction of the anterior cruciate ligament, joint play in the tibio-femoral and patello-femoral joints and the soft tissue function was significantly impaired. Manipulating massage is a good way to reduce pain and improve physiological and transitive movements of the knee joint [9].

Classical and sports massage are also used for prophylactic purposes as part of overall recovery, especially for athletes. The effects of the massage are related to reducing physical and mental fatigue, increasing overall tone and condition, overcoming muscle imbalance and preventing injuries [10].

### **Muscle-energy techniques**

**Post-isometric relaxation (PIR)** is a therapeutic manual muscular-inhibitory technique developed by F. Mitchel et al. (1967) and modified by W. Janda and K. Lewit (1981). The technique consists of two components of influence: phase of isometry and relaxation phase, conformable to breathing and in combination with visual synergies. It is applied to musculoskeletal and joint dysfunctions in both the spine and the peripheral joints [11]. The **PIR** technique is extremely effective for:

- Improving the elasticity of shortened and hypertensive muscle groups;
- Reduction of pain and swelling;
- Increase the mobility of affected joint segments.

In isolated soft tissue injuries in the area of the knee complex (after reconstruction of the anterior cruciate ligament, medial collateral ligament) and combined traumas (rupture of the anterior cruciate ligament with medial meniscus) in the moderate-protective and minimally protective period PIR is applied to: m. Quadriceps femoris(rectus femoris), tensor fascia lata, hamstring and adductor group muscles, as they tend to shorten and increase muscle tone [8].

**Reciprocal inhibition, post-facilitation stretching, elements of proprioceptive neuromuscular facilitation** are part of the group of muscle-energy techniques that again obey the general principle of isometry-relaxation and, depending on the purpose, are used at various stages of restoring muscular dysfunctions of the knee joint [12].

**Pain-suppressor mobilization stretching** is a technique that impacts simultaneously on the muscle-tendon and joints units, i.e. on the overall arthrokinematics of the affected motor segment. The technique differs from other types of stretching in that it uses a short lever of action

and is sparing and is therefore recommended for application at the end of the acute and at the begging of sub-acute stages of soft-tissue and joint injuries in the knee complex. The method combines the use of soft-tissue stretching, straining the shortened muscles and manual mobilization to restore translational and angular mobility [13].

### **DISCUSSION**

**Stretching** is one of the main elements in athletes' training programs recommended by coaches and physical therapists in order to improve sports performance and prevent musculoskeletal injuries. The main purpose of this technique is to increase the length of muscle-tendon fibers, as stretching has several varieties: passive, static, dynamic, ballistic. Of all indicated types, the most common in sports is the static stretching because it is the easiest and does not require the intervention of another specialized person, as in passive stretching [14].

Static stretching is a strain technique for muscle groups where it is held in the final position in the area of mild discomfort, usually between 10-30 seconds. Similarly, dynamic stretching is performed with the difference that movements are performed more explosively and are not held at the end of the range of movement [15].

The principles of stretching are determined by the type of sport, the training or competition period, the duration of stretching, and last but not least, the state of muscle-tendon structures (**flexibility**). In sports like gymnastics, ballet, it is necessary to perform stretching because of the specific activities that require greater elasticity for better sports results. In contrast to this statement, literary data suggests that in collective and power sports the inappropriate inclusion of pre-workout stretching may also have negative effects associated with the reduction of power in explosive activities, speed and endurance, and vertical jump height. This loss of strength depends on the duration of stretching, but it is difficult to accurately determine the effect of their duration as stretching techniques are very rarely performed on their own [16].

One of the theories explaining the reasons for the negative impact of stretching on the performance of the athlete is the reduction in the number of contracted motor units due to a change in the transmission of the neuromuscular impulse [17]. Hence, the ability of muscles to handle large loads depends on muscle-tendon units. When these contractile structures function at high capacity, the forces primarily fall on the tendon tissue, and with reduced muscle tendon tolerance, the load is transferred directly to the muscle apparatus. Similarly, with higher energy absorption of the tendon of the muscle, the risk of muscle damage can be reduced. In this connection, after stretching, there is a tension of tendon fibers which lose part of their potential to a shock absorber, resulting in greater vulnerability to damage to muscle fibers [16]. It is assumed that the regeneration of the muscular-tendon

unit strength characteristics of the stretches returns more rapidly when the static stretching is followed by a dynamic. On the basis of this evidence, it may be said that stretching it is necessary to be included individually in the training program of athletes.

## CONCLUSION

The treatment of soft tissue injuries in the knee joint requires proper selection of physiotherapeutic techniques in accordance with the needs of athletes. Mandatory condition to maintain and exceed the achieved results is to prepare preventative strategies, adapted holistically and individually to the athlete's health.

## REFERENCES:

1. Popov N. [Kinesiology and pathokinesiology of a locomotor system.] NSA PRES. Sofia. 2009. [in Bulgarian]
2. Gramatikova M. [Kinesitherapy with dynamic knee joint instability.] Neofit Rilski, Blagoevgrad. 2017. [in Bulgarian]
3. Nenova G, Mancheva P, Kostadinova T. [Satisfaction in working of the kinesitherapist – a modern research.] *Social medicine*. 2016; 2:31-34. [in Bulgarian]
4. Nenova G. [Kinesitherapist – a necessary member of the multidisciplinary team in primary health care.] *General medicine*. 2016; 4:11-15. [in Bulgarian]
5. Nenova G, Mancheva P, Kostadinova T. [Integrated care in the work of the kinesitherapist.] *Health economics and management*. 2015; 2(56): 9-13. [in Bulgarian]
6. Kraev T. [Textbook on healing massage]: 1st ed. „Ersid“. Sofia; 2007. [in Bulgarian]
7. Subev Y, Unakov H, Marinov B, Nedev N. [The place of kinesitherapy in the complex rehabilitation of muscular skeletal dysfunctions.] Varna Medical Forum. 2016; 5(4): 315-318. [in Bulgarian]
8. Kostov R. [Physiotherapy for soft tissue injuries in the area of the knee complex.] Avangard Prima, Sofia. 2013. [in Bulgarian]
9. Kraydjikova L. [Manual methods for mobilization of musculoskeletal dysfunctions in the spine.] Avangard Prima, Sofia. 2011. [in Bulgarian]
10. Jeleu B, Kraydjikova L. [Massage - Hygiene, sports, healing and cosmetics.] Avangard Prima, Sofia. 2009. [in Bulgarian]
11. Singh S, Jagtap V, Devit P. Effect of post-isometric relaxation and reciprocal inhibition in osteoarthritis knee. *Asian J Pharm Clin Res*. 2017 Jun;10(6):135-8. [Crossref]
12. Dimitrova E. [Muscle relaxation and stretching in manual therapy.] NSA PRES, Sofia. 2008. [in Bulgarian]
13. Kostov R, Mihaylova N, Megova T, Stoyanova L. [Applying to pain suppressor mobilization stretching of the knee after arthroscopic meniscectomy.] Scientific works from a conference of health promotion and prevention. Ruse. 2009: 23-27. [in Bulgarian]
14. Thacker SB, Gilchrist J, Stroup DF, Kimsey CD. The impact of stretching on sports injury risk: A systematic review of the literature. *Medicine and science in sports and exercise*. 2004 Mar;36(3):371-8. [PubMed] [Crossref]
15. Peck E, Chomko G, Gaz DV, Farrell AM. The effects of stretching on performance Current Sports Medicine Reports. 2014 May-Jun;13(3): 179-85. [PubMed] [Crossref]
16. Gremion G. The effect of stretching on sports performance and the risk of sports injury: A review of the literature. *Sportmedizin und Sporttraumatologie*. 2005; 53(1):6–10. [Internet]
17. Lehr B. The Role of stretching in exercise performance and injury risk. *Connecticut interscholastic athletic Conference*. 2012; 3(3):2-4.

*Please cite this article as:* Shivachev Y, Bogomilova S. Prevention tools in the area of the knee complex - treatment and prophylaxis. *J of IMAB*. 2020 Apr-Jun;26(2):3160-3162. DOI: <https://doi.org/10.5272/jimab.2020262.3160>

Received: 19/07/2019; Published online: 27/05/2020



### Address for correspondence:

Yani Shivachev, Assist. prof.  
Department of Physiotherapy, rehabilitation, thalassotherapy, occupational diseases, Medical University of Varna and University centre of East medicine.  
E-mail: [qshivachevv@abv.bg](mailto:qshivachevv@abv.bg)