INNOVATIONS IN KINESITHERAPEUTIC PRACTICE IN CONSERVATIVE TREATMENT OF GONARTHROSIS

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Abstract: Gonarthrosis is a chronic progressive disease that imposes a significant socioeconomic burden on society and health care systems (Dantas, Salvini, McAlindon, 2020). Worldwide, this disease is the most common. Due to an increase in the number of people with obesity, the prevalence of gonarthrosis is expected to increase further in the coming decades (Kloek et al, 2018). Although treating physicians generally recommend pharmacotherapy for osteoarthritis, concerns about its effectiveness and associations with adverse effects are growing. Doubts about the use of pharmaceuticals for osteoarthritis have increased interest in therapies perceived to be safer. (Perlman et al, 2019). Since cartilage degeneration is irreversible, control from an early stage throughout life is important for treatment (Toyoda, Maehara, Watanabe, Sato, 2021). Telerehabilitation can be a good opportunity to improve access to rehabilitation for people in rural and remote areas (Davis, 2012). Objective: The objective is to investigate innovations in kinesitherapeutic practice in the conservative treatment of gonarthrosis. Materials and methods: Materials and Methods: The following modern kinesiotherapeutic methods for reducing pain and swelling in knee osteoarthritis were examined: cryotherapy, kinesiotaping, and manual soft tissue mobilization or "manipulative mobilizing massage according to J. C. Terrier." Modern approaches applied for muscle contractures and limited range of motion in knee osteoarthritis included "Ergon IASTM (Instrument-Assisted Soft Tissue Mobilization)," Post-Isometric Relaxation (PIR) according to Levit, and stretching. Discussion: Characteristic dysfunctions in gonarthrosis are: swelling, pain, limited range of motion in the knee joint, myo-articular contractures, muscle imbalance, muscle hypotrophy, altered patellofemoral Q-angle, dysfunctions in locomotor activity (walking, going up and down stairs) and other. For the effective implementation of kinesitherapy, the correct selection of kinesitherapeutic agents to slow down the progression of the disease depending on the accompanying diseases, the degree of damage and other factors is very important. Conclusion: The conducted study explores innovations in kinesiotherapeutic practice in the conservative treatment of knee osteoarthritis. The investigated modern methods have their own specificities.
Keywords: gonarthrosis, osteoarthritis, knee joint, kinesitherapeutic methods, innovations

1. INTRODUCTION

Gonarthrosis is a chronic progressive disease that imposes a significant socioeconomic burden on society and health care systems (Dantas, Salvini, McAlindon, 2020). Worldwide, this disease is the most common. Due to an increase in the number of people with obesity, the prevalence of gonarthrosis is expected to increase further in the coming decades (Kloek et al, 2018). In women of advanced age, there is a significantly higher prevalence of knee osteoarthritis compared to older men. Differences in endogenous sex hormones, knee structure, biomechanics, and psychosocial characteristics may play a role in the increased risk of knee osteoarthritis in women. Patients with this condition report pain, swelling, limited mobility, and difficulties with activities such as climbing and descending stairs. These problems can negatively impact physical activity, causing difficulties in daily activities and reducing the quality of life (Hsieh, Lee, 2016). Although treating physicians generally recommend pharmacotherapy for osteoarthritis, concerns about its effectiveness and associations with adverse effects are growing. Doubts about the use of pharmaceuticals for osteoarthritis have increased interest in therapies perceived to be safer. (Perlman et al, 2019). Since cartilage degeneration is irreversible, control from an early stage throughout life is important for treatment (Toyoda, Maehara, Watanabe, Sato, 2021). Telerehabilitation can be a good opportunity to improve access to rehabilitation for people in rural and remote areas (Davis, 2012). Among the possibilities for conservative treatment of hip and knee osteoarthritis, the latest guidelines focus on non-pharmacological treatment. General physical activity and exercises play a crucial role. Programs should be tailored to the patient's phenotype (Gay, Chabaud, Guilley, Coudeyre, 2016). A study found that the MWM technique is related to reducing pain, improving gait, and increasing flexion and extension of the knee in patients with knee osteoarthritis (Alkhawajah, Alshami, 2019). The application of cryotherapy is widely described in the literature and is standard care for inflammatory conditions such as synovitis, arthritis, contusion, hematoma, dislocation, for reducing swelling. However, the

benefits of the therapy remain debatable due to practice discrepancies, including differences in clinical protocols and the application of cryotherapy (Chen, Lin, Ko, Kuo, 2020). Conservative treatment of primary knee osteoarthritis should include cryotherapy for pain relief, corrective techniques to address the disrupted anatomical relationship between knee components, traction to increase range of motion, PIR techniques to stretch tight muscle groups, and massage to reduce joint swelling (Bashev, Kraydzhikova, 2013).

2. MATERIALS AND METHODS

The following modern kinesiotherapeutic methods for reducing pain and swelling in knee osteoarthritis have been examined: cryotherapy, kinesiotaping, and manual soft tissue mobilization or "manipulative mobilizing massage according to J. C. Terrier." Modern approaches applied to muscle contractures and limited range of motion in knee osteoarthritis include "Ergon IASTM (Instrument-Assisted Soft Tissue Mobilization)," Post-Isometric Relaxation (PIR) according to Levit, and stretching.

"**Cryotherapy**, also known as the application of ice (cold therapy), is believed to control pain by inducing local anesthesia. It also reduces swelling, nerve conduction velocity, cellular metabolism, and local blood flow." It is strongly discouraged to apply ice directly to the skin. Cold gel or a cold compress can also be used.

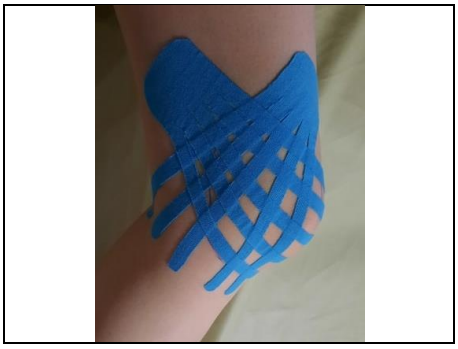
Cryotherapy can be applied once or twice for 4-5 minutes each time.

Pic 1: Cryotherapy

Kinesiotaping is an innovative technique in physiotherapy that uses specialized elastic tapes. The goal of the technique is to reduce pain and improve the treatment of soft tissues. These specialized tapes stabilize and stretch to a great extent, and depending on where they are applied, they can exert greater pressure.

Kinesiotaping is used to assist in the treatment of various orthopedic, neuromuscular, neurological, and other medical conditions.

Pic. 2: Sample application for reducing pain and swelling in the knee joint (Gramatikova, M. 2015)



Specifics of the tape: The tape is 5cm wide and 25-30 cm long. It is cut into 4 equally wide strips, with one end (the base) remaining intact and measuring 5cm in length. Two identical kinesiotapes are applied.

Application: Start by applying the base of one tape, then flex the knee to 90˚. Apply the strips one by one, applying tape tension from 10% to 15%. Rub the tape gently in the direction from the base (start) towards the anchors (ends) for 15-20 seconds to activate the adhesive. After applying the first tape, extend the knee joint. Apply the base of the second tape, flex the knee to 90˚ to apply the strips, again applying tension of 10-15%. One tape goes from medial to lateral, and the other goes from lateral to medial diagonally, passing through the ventral part of the knee joint.

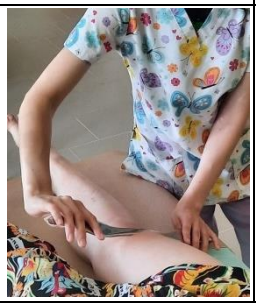
Dosage: 3-4 days. In case of mechanical damage, it can be replaced with a new one.

Application Direction: From proximal to distal.

"Ergon IASTM (Instrument-Assisted Soft Tissue Mobilization)" - The ERGON IASTM technique involves specific therapeutic approaches for the diagnosis and treatment of various conditions affecting the musculoskeletal system. Special stainless steel tools are used (Konstantinos F., Konstantinos M., 2015). This is an innovative therapeutic approach that combines static and dynamic manipulations of soft tissues with special instruments for the treatment of neuromuscular and skeletal pathologies (Nikolaev, Gramatikova, Mitova, 2021).

In a study conducted by (Subeva, P., Gramatikova, M., 2023), it was found that after applying the Ergon IASTM technique in knee osteoarthritis, the swelling in the knee joint decreases, taking into account accompanying conditions and other factors. However, further research is needed to confirm the effectiveness of the technique.

Pic 3: Ergon IASTM Techniques (and others)

rub	wave	snake	razor	excav
				

Post-Isometric Relaxation (PIR) according to Levit - This method is highly effective for relaxing muscles with increased tone, especially if trigger points are present. The technique of application is as follows:

- The hypertonic muscle is stretched to the point of pain or to the point where tissue resistance increases.
- The patient gently contracts the hypertonic muscle and holds the effort for 5-10 seconds. The isometric nature of the contraction is provided by the resistance applied by the therapist. Levit recommends that the patient inhales during this phase. The force of the muscle contraction should be minimal (around 10-20% of maximum effort).
- After the contraction, the patient relaxes the muscle, exhales, and only then the muscle is stretched to the new point of initial pain or initial resistance, but without overstretching. It is essential to achieve the obtained laxity without applying stretching. Stretching is only applied in the presence of contractures and adhesions.
- he procedure is repeated from this new threshold 3-4 times.

When the technique is applied to the spinal musculature, Levit recommends that the patient turns in the direction of the contraction and, respectively, in the direction of stretching in the corresponding phase (Popov, 2012).

Pic 4: Techniques for torn muscle in knee osteoarthritis

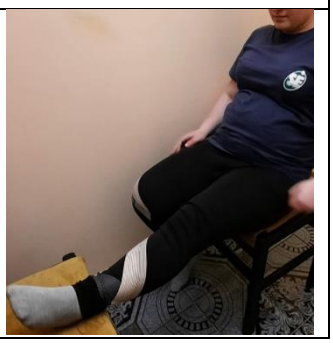
PIR of the hamstring muscles	PIR of m. rectus femoris	PIR of m. iliopsoas
		

Stretching is a fundamental method for recovery and increasing joint mobility. Unlike active and passive movements, which work up to the limit of tissue resistance, stretching involves reaching the end of the possible range of motion.

Types of stretching:

- Manual (passive) stretching: The patient is relaxed, and the stretching is carried out by the therapist's hands and body. Lately, stretching has been facilitated by combining it with joint mobilization – mobilization stretching, movement mobilization, and more;
- Mechanical stretching: This is also passive stretching. In mechanical stretching, the stretching is carried out by an external mechanism (brace, elastic traction, additional weight). It allows for prolonged stretching with low intensity;
- Muscle inhibitory stretching: Stretching is applied after specific techniques for relaxing shortened muscles. It is most often done manually by the therapist and less frequently by the patient as self-stretching;
- Self-stretching: This is performed independently by the patient. Stretching is usually achieved using body weight or the strength of the limbs (Popov, 2012).

Pic 5: Stretching for knee osteoarthritis

Stretching of the hip flexors (m. Iliopsoas)	Stretching of the hamstring muscle group	Stretching of the m. rectus femoris	Home self-stretching for knee flexion contracture
			

Manual soft tissue mobilization or "manipulative mobilizing massage according to J. C. Terrier" – specialized techniques activate joint receptors and improve passive joint movements. When combined with analytical and general developmental exercises aimed at improving muscle strength, pain is reduced, and joint mechanics and physiological movements are improved (Kraychikova, 2011). Research on patients diagnosed with knee osteoarthritis shows that manipulative massage according to Terrier and manual joint mobilization according to Mulligan, when combined with analytical exercises, have a positive impact on patients with knee osteoarthritis (Bashev, 2013).

Pic 6: Techniques from Terrier's massage Group A

A2 – Rubbing with fingers on the ligamentum patellae from lateral to medial	A2 for the next technique	A2 – Rubbing with index fingers on the ligamentum patellae from medial to lateral
		

3. DISCUSSION

Characteristic dysfunctions in knee osteoarthritis include swelling, pain, limited range of motion in the knee joint, myo-articular contractures, muscle imbalance, muscle atrophy, altered patellofemoral Q-angle, locomotor dysfunction (walking, climbing, and descending stairs), and others. For the effective implementation of kinesiotherapy, it is of great importance to select the appropriate kinesiotherapeutic means that can slow down the progression of the condition, depending on accompanying diseases, the degree of damage, and other factors.

4. CONCLUSION

The conducted research explores innovations in kinesiotherapeutic practice in the conservative treatment of knee osteoarthritis. The examined modern means have their specificity.

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