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Original article

STRATEGIES TO IMPROVE KINETIC MEANS FOR REHABILITATION REGARDING KNEE TRAUMATIC PATHOLOGY IN ATHLETES

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Abstract*

Aim. Kinesiotherapy, also called movement therapy, is a medical prescription act, whose obligation to follow, i.e. to apply it, devolves upon the kinesiotherapist.

Traumatic pathology in sportsmen often poses difficulties both in terms of diagnosis, and emergency treatment in many cases, and after that, treatment and recovery.

Applicative goal – referring to the introduction of a kinetic and rehabilitative programme with a view to achieving normal functioning in the shortest possible time and return to sport.

Hypothesis – Application of kinetic programs in professional athletes having suffered meniscal injuries and anterior cruciate ligament injuries will result in the return to ADLs under optimum conditions and the quickest return to sport as possible.

Research methods used:

Specialised literature analysis method;

Anamnestic interview;

Observation method;

Case study method;

Measuring, exploring and assessment method;

Registration, processing and graphical representation of data method

The rehabilitation programs were strictly followed, abiding by the didactic principles (starting from easy to heavy, from simple to complex etc.), as well as by those specific to kinesiotherapy (treatment individualization), and the subjects participated consciously and actively, succeeding in acquiring the exercises specific to the kinetic programme easily. The kinetic and rehabilitation programme was divided into three phases, each one having adequate periods and purposes.

Given that the knee is a segment affected by a number of injuries, I have sought to point out how important it is to apply an appropriate and specific treatment, kinetic in nature, for functional rehabilitation when it comes to the meniscus and anterior cruciate ligament injuries.

Carry out of the kinetic programme proposed determined, apart from the correct lesion recovery, the decrease in the frequency of muscle pain, articular mobility increase and muscle strength enhancement.

Conclusions. An extremely important role in preventing trauma is played by medical gymnastics, stretching, mobilizations, controlled restoration of the body following effort.

Keywords: kinesiotherapy, knees, athlete, trauma, pathology.

Introduction

Athletics is a sports branch based on individual racing, but in certain cases, such as relay race or games between representative teams, also on racing between teams. Covering a given distance in the shortest time possible, under certain specific conditions for runners; in respect of jumps, the goal is to propel oneself upward in order to achieve a flight as long or as high as possible; and in respect to throwings, the athlete's goal is to propel the competition item through the air at a distance as high as possible, under certain imposed conditions (Macri, 2012).

Kinesiotherapy, also called movement therapy, is a medical prescription act, whose obligation to follow, i.e. to apply it, devolves upon the kinesiotherapist. He/ she also has the obligation to asses, quantify the motion or functional deficit of the patient to benefit from the passive kinesiotherapy exercises so that he/she may, over the course of treatment's progress, assess the extent to which the patient benefited from the prescribed treatment means (Albu, 2004).

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The increasing number of people loving and practicing sports, as well as their desire and need to achieve sports performances as competitive as possible have led to a permanent increase in the number of injured sportsmen. Traumatic pathology in sportsmen often poses difficulties both in terms of diagnosis, and emergency treatment in many cases, and after that, treatment and recovery. (Drăgan, 1994).

The knee is the body's largest joint. The special attention it receives is grounded on a few general medical observations, namely:

1) Compared to other large joints (hip, scapulohumeral), it is less covered and protected by soft tissues, which explains its frequent exposures to the action of external harmful factors;
2) It is very stressed in statics and locomotion, fact which expedites the more pronounced wear of its constituents;
3) The knee joint has numerous implications in pathology, being the core of numerous traumas and of certain in inflammatory and tumoral processes (Papilian, 2010).

The knee participates in a series of ordinary activities (sitting on a chair wearing shoes, picking up an object), as well as in certain professional activities, which explains its role in maintaining a good functional index (Sbenghe, 1987).

The knee is a joint with an extremely complex organization and functioning. For these reasons, joint pathology is very varied also, and in sports practice it is the most frequently injured. The joint is fragile, sensitive both to trauma, and microtrauma.

The femorotibial joint is an imperfect trochlear joint, resulting from the contact between the femur's lower extremity and the tibia's upper extremity. In order to become perfect and congruent, it has two menisci. It is the bulkiest joint in the body, so the strongest too. Menisci's role in the knee biomechanics is very complex.

The bone segments comprising the joint composition are held together by a joint capsule, strengthened by six ligaments: anterior (patellar ligament), posterior, lateral, internal, latero-external and two cruciate ligaments (Pasztai, 2001).

The knee joint injuries may cause significant functional sequalae, sometimes incompatible with sports activity (Poenaru, 1985).

Men and women are approximately equally involved in professional sports activities, but 2/3 of the people suffering from traumas are men. From the total accidents registered by the specialized clinics, those occurred while performing sports activities sum up about 20% (Smîdu, 2010).

Research objective

Theoretical objective – consisting in preparing a general theoretic framework with regard to knee traumas occurring in professional athletics.

Applicative objective – referring to the introduction of a kinetic and rehabilitative programme with a view to achieving normal functioning in the shortest possible time and return to sport.

Research tasks

- Bibliographic research focused on the identification of requirements to be met in the post-traumatic rehabilitation of the knee in the professional athlete.
- ADLs and IADLs testing;
- Conducting the assessment to set out the muscle strength level and the degree of articular mobility;
- Setting out the action objectives, methods and means;
- Building-up the experimental plan;
  Choosing the experimental cases;
  Choosing the exercise program;
- Carrying out the kinetic and rehabilitative program proposed
- Data arrangement and processing;
- Drawing conclusions and their implications.

Hypothesis

Application of kinetic programs in professional athletes having suffered meniscal injuries and anterior cruciate ligament injuries will result in the return to ADLs under optimum conditions and the quickest return to sport as possible.

Research methods used:

Specialised literature analysis method;
Anamnestic interview;
Observation method;
Case study method;
Measuring, exploring and assessment method;
Registration, processing and graphical representation of data method

Presentation of the experimental cases

The case study was conducted on 2 patients:

M.I., gender M, 19 years old– meniscus tear which on admission had the following degrees of impairment, i.e. of daily activity and knee joint: knee flexion in active manner is 80^0, and the passive is 98^0. Internal rotation = 26^0, and the external one = 46^0.

Gait, coordination and stability are totally affected.

The rehabilitation programs were strictly followed, abiding by the didactic principles (starting from easy to heavy, simple to complex etc.), as well as by those

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specific to kinesiotherapy (treatment individualization), and the subjects participated consciously and actively, succeeding in acquiring the exercises specific to the kinetic programme easily.

The kinetic and rehabilitation programme was divided into three phases, each one having adequate periods and purposes.

The second patient, B.A., gender M, 21 years old –ligament tear. The knee joint movements reported in mobility were as follows:

Active flexion = 68^0, Passive flexion = 63^0 Internal rotation = 23^0,External rotation = 48^0.

Gait, coordination and stability are totally affected

Results

Given that the knee is a segment affected by a number of injuries, I have sought to point out how important it is to apply an appropriate and specific treatment, kinetic in nature, for functional rehabilitation when it comes to the meniscus and anterior cruciate ligament injuries. The result I obtained was a fast rehabilitation and return, with regard to the carry out by the patients to their daily activities and specific to their occupation, which were a landmark in establishing the urgent or late treatment methods of knee injuries.

Table 1 - Values reported by mobility in the injured knee joint from patient 1

	Active flexion	**Passive flexion**	**Internal rotation**	**External rotation**
Initial	80^0 (57, 14%)	98^0 (61, 25%)	26^0 (74, 28%)	46^0 (92%)
Final	120^0 (85, 71%)	158^0 (98, 75%)	32^0 (91, 42%)	49^0 (98%)

Normal values of knee joint movements are the following:

- Active flexion – 0^0- 140^0;
- Passive flexion – 0^0 – 160^0;
- Internal active rotation – 20^0 – 35^0;
- External active rotation – 40^0 – 50^0;

Table 1 and Fig. 1 show an improvement in the knee joint flexion of more than 85% in the active flexion and over 98% in the passive one. Rotation has also been recovered in over 91% and external rotation at exactly 98%.

	Patient 1	Patient 2
Active flexion	120^0	120^0
Passive flexion	158^0	148^0
Internal rotation	32^0	35^0
External rotation	49^0	50^0

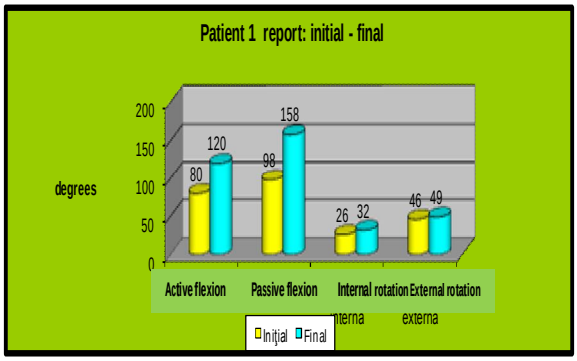

Figure 1 - Values reported by mobility in the injured knee joint from patient 1

Table 2 and **Fig. 2** show an improvement in knee joint flexion of more than 85% in active flexion and over 92% in the passive one. External and internal rotations have been fully recovered.

	Active flexion	**Passive flexion**	**Internal rotation**	**External rotation**
Initial	68^0 (48.57 %)	127^0 (79.37 %)	21^0 (60%)	38^0 (76%)
Final	120^0 (85.71 %)	148^0 (92.5%)	35^0 (100%)	50^0 (100%)

Table 2 - Values reported by mobility in the injured knee joint from patient 2

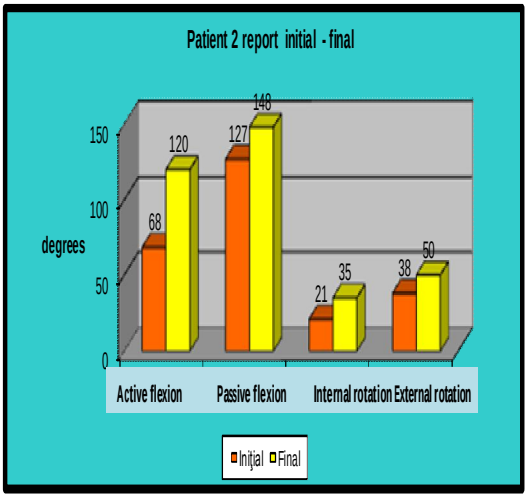

Figure 2. - Values reported by mobility in the injured knee joint from patient 2

Table 3 Comparison of how the two patients recovered their mobility

Table 3 and Fig. 3 show that patient 1 recovered best the mobility of flexor muscles, as compared to patient 2 who recovered best the rotator muscles.

Comparison between the mobility recovery by the 2 patients

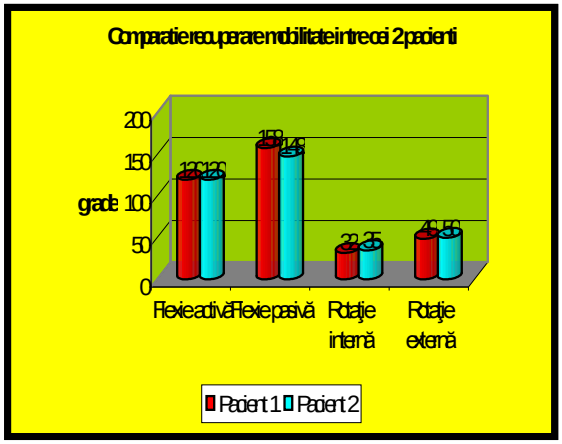

Figure 3 – Comparison of how the 2 patients recovered their mobility

Table 4 – Comparison between how the 2 patients recovered strength

Name	Muscle strength	Initia testin	Final tes
M.	Quadriceps strength	3	5
M.	Ischiotibials strength	4	5
B.A	Quadriceps strength	4	5
B.A	Ischiotibials strength	3	5

Quadriceps strength

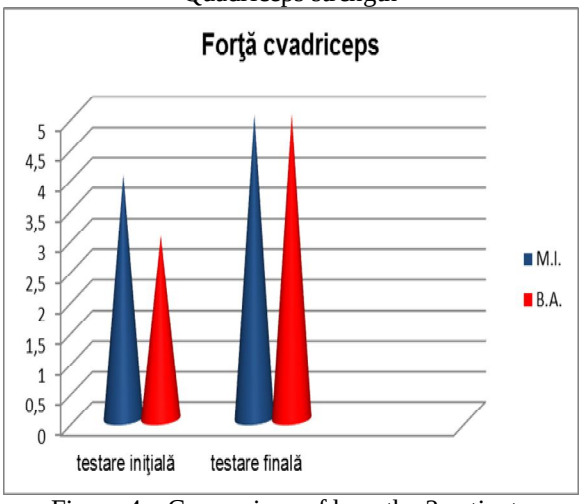

Figure 4 – Comparison of how the 2 patients recovered quadriceps strength

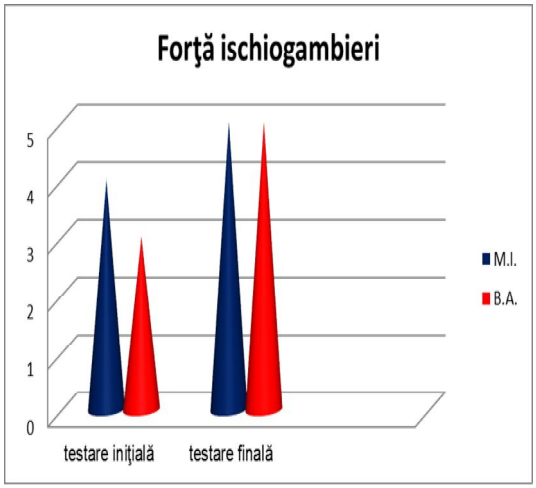

Figure 5 – Comparison of how the 2 patients recovered ischiotibials strength

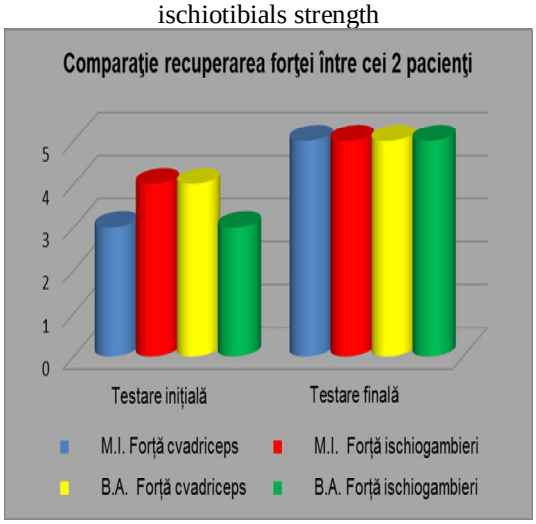

Figure 6 – Comparison of mobility recovery by the 2 patients

As you can see in **table 4** and **Fig.4, 5, 6**, muscle strength on quadriceps increased significantly from 3 to 5 in M.I. and from 4 to 5 in B.A, and ischiotibials strength increased as well from 4 to 5 in M.I. and from 3 to 5 in B.A., fact which comes to support the applied programme's effectiveness, giving the patients the possibility to return to their daily activities and gradually, to sport.

Pain scale

Table 5 – comparative assessment of pain in the 2 patients

Name	Initial testi	Final testin
M.I	4	1
B.A.	4	1

Comparative assessment of pain in the 2 patients

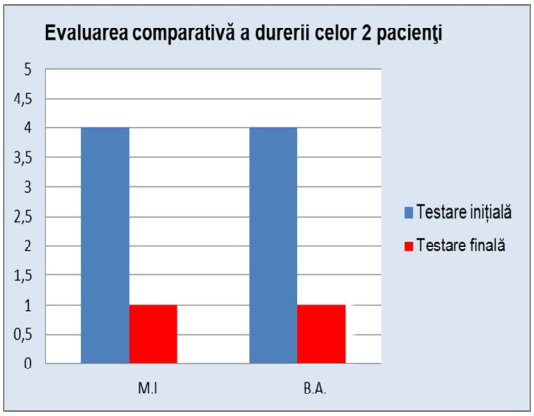

Figure 7 – Comparative assessment of pain in the 2 patients

As you can see in table 5 and Fig.7, post – immobilization pain decreased in intensity during the kinesiotherapy programs from 4 on the pain scale, standing for an intense pain when mobilizing the joint, to 1, standing for the mild feeling of discomfort when mobilizing the knee; it completely disappeared after a few exercises of warming-up and massage.

Discussions

Kiss, conducted a study in his book "Fiziokinetoterapia şi recuperarea medicală" (Physio-kinesiotherapy and medical recovery) with regard to the physical - kinetic treatment after meniscectomy where he is conducting an approach by phases of post-operative knee recovery without sustaining or favoring the development of a local inflammatory reaction.

Muwaffak Al-Shoaibi (2013) in his doctoral thesis titled, „Consideraţi clinico-statice asupra indicaţiei de reconstrucţie a ligamentului încrucişat anterior la vârsta medie şi înaintată" (Clinical static consideration on the anterior cruciate ligament reconstruction in middle-age and old age) conducts a clinical-static study with regard to the reconstruction after having suffered an anterior cruciate ligament tear. He emphasizes in his work the importance of ligamentoplasty of anterior ligament in old ages with the hope to optimize the quality of life in the patients to have been included in the experiment.

Fieroiu (2007) in his work titled "Aspecte privind recuperarea posttrumatică a leziunilor de menisc" (Considerations concerning the post-traumatic recovery in meniscus injuries) conducts a research concerning the role kinesiotherapy holds in the pathology recovery of the knee injured by the meniscal injury.

Conclusions

I have found out, from the specialized articles, that the segment of the body most exposed to trauma is the lower limb, standing for 63% of the total trauma, out of which 3% is held by meniscal injuries and 2, 2% ligament injuries;

Full rehabilitation of athletes with meniscus injuries and ligament tears is based on a well-managed rehabilitative programme, focused especially on restoring stability, attention being directed toward muscle strength restoration of limb's stabilizers, remaining un important objective;

An extremely important role in preventing trauma is played by medical gymnastics, stretching, mobilizations, controlled restoration of the body following effort;

The case study was conducted on 2 patients, one with meniscal tear, and the other with ligament tear;

It can be said that the subjects undergoing the complex kinesiotherapeutic treatment registered significant improvements with regard to the initial stage's level, as compared to the final one.

Carry out of the kinetic programme proposed determined, apart from the correct lesion recovery, the decrease in the frequency of muscle pain, articular mobility increase and muscle strength enhancement.

It is noticed that in terms of flexion movement, patient 1 was the one to recover best as compared to patient 2 who recovered best the rotator muscles.

Medical rehabilitation is a therapeutic complex extremely useful in the recovery from this suffering and also is the only way to ensure maximum exploitation of the remaining functions.

In both cases, subjects succeeded in acquiring correctly the exercises proposed by the kinetic programme, in performing them with ease, actively and consciously participating in the kinesiotherapy sessions.

Aknowledgements

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References

Albu C, Vlad T, Albu A, 2004, „Kinetoterapia pasivă", Editura Polirom, Bucureşti, pag.16;

Drăgan I, 1994, Medicină sportivă aplicată, Editura Editis, Bucureşti, pag.152;

Fieroiu E., 2007, Aspecte privind recuperarea posttrumatică a leziunilor de menisc, revista Citius Altius Fortius, Nr.15, pag. 44;

Kiss T, 2007, Fiziokinetoterapia şi recuperarea medicală, Editura Medicală, pag. 178;

Macri A, 2012, Metodica disciplinelor atletice, Editura Universitaria Craiova, pag.7;
Muwaffak Al-S, 2013, Consideraţi clinico-statice asupra indicaţiei de reconstrucţie a ligamentului încrucişat anterior la vârsta medie şi înaintată, teza doctorat;
Papilian V, 2010, „Anatomia omului vol.1 – Aparatul locomotor", Editura Medicală, Bucureşti, pag.131;
Pasztai Z, 2001, Kinetoterapia în recuperarea funcţională posttraumatică a aparatului locomotor, Editura Universităţii din Oradea, pag.116;
Poenaru D, Petrescu P, Buşe I, 1985, Traumatologie şi recuperare funcţională la sportivi, Editura Facla, Constanţa, pag. 201;
Sbenghe T, 1987, Kinetologie profilactică terapeutică şi de recuperare, Editura Medicală, Bucureşti;
Smîdu N, Smîdu D, 2011, Importanţa cunoaşterii factorilor de risc în traumatologia sportivă, vol.3, nr.1, pag.1.