STUDIA UBB EDUCATIO ARTIS GYMN., LVIII, 2, 2013, pp. 77-86
(RECOMMENDED CITATION)

THE EFFECTS OF PHYSICAL THERAPY ON KNEE OSTEOARTHRITIS REHABILITATION

ANAMARIA KESE[1], DENISA ENESCU-BIERU[1], GERMINA COSMA[1] & SORIN TURCU[1]

ABSTRACT. Objectives: This study examines the rehabilitation of a 30 patients group diagnosed with primitive or secondary knee arthritis who received physical therapy. **Materials and methods.** The study was conducted on a group of 30 patients older than 40 years, diagnosed with primary or secondary knee arthritis, to their admission into the service of Physiotherapy and Rehabilitation Medicine, who were divided in two groups: a control group (n = 14) who received electrotherapy, massage and medical symptomatic pain relievers and the active group (n = 16), whose therapeutic program included electrotherapy, massage and physical therapy. Also, patients were evaluated in three phases: initial, at the end of hospitalization (14 days) after carrying out medical rehabilitation assistance and one month, at the end of kinetic program and after another 14 days of rehabilitation). **Results and discussion.** The evaluation of the two patients groups on the first and the last day of rehabilitation therapy using VAS scales, degrees of mobility and travel time distance of 20 meters reveals the following results: amplitude of motion of the knee showed a significant increase occurring at each reassessment. Knee mobility increase to the first group compared with the second and VAS pain scale were increased after treatment in both groups. Making treatment lead to improve your output in each group so every group increase growth rate of movement, without pain or discomfort from treatment. There is substantial decrease in the knee arthritis pain which has improved the joint mobility on different types of daily movements. **Conclusions.** Knee region is a complex anatomical and functional characterized by double role: to support the entire weight of the body and the preservation of properly walking on any terrain. The role of locomotion-term leverage, while providing knee stability and mobility, balance and swing, acceleration and deceleration. Therapy was established by the department team: medical rehabilitation, physiotherapist, physiotherapy assistant, masseuse. They prefer physical therapy instead of drug therapy for patients affected by chronic rheumatic degenerative diseases (including knee arthritis) due to significant effects of this therapy and also because this kind of therapy have no side effects.

Keywords: *physical therapy, primary or secondary knee osteoarthritis, rehabilitation.*

[1] Faculty of Physical Education and Sport, University of Craiova, Romania, email: *anamakese@yahoo.com*

REZUMAT. Efectele kinetoterapiei în recuperarea medicală a genunchiului. Introducere. Studiul a fost efectuat pe un lot de 30 de pacienţi cu vârsta peste 40 ani, diagnosticaţi cu gonartroza primară sau secundară. **Material şi metodă.** Pacienţii au fost împărţiţi în două loturi: un lot de control (n=14) care a beneficiat de electroterapie, masaj şi medicaţie simptomatica antialgică şi lotul activ (n=16), al cărui program terapeutic a cuprins electroterapie, masaj şi kinetoterapie. De asemenea, pacienţii au fost evaluaţi în trei faze: F1- iniţial, F2- la sfârşitul perioadei de spitalizare (după 14 zile), după derularea asistenţei medicale de recuperare şi F3 – la o lună, respectiv la sfârşitul programului kinetic, după încă 14 zile de recuperare). Evaluarea pacienţilor s-a facut în ziua 1 şi după 4 săptămâni, cu ajutorul scalei analog vizuale pentru evaluarea durerii la mişcarea pasivă şi activă (VAS). De asemenea au fost evaluaţi şi alţi parametri, precum mobilitatea în articulaţia genunchiului (în grade) pe mişcarea de flexie. **Rezultate şi discuţii.** Realizând evaluarea pacienţilor din cele două grupuri, după parametrii prestabiliţi (scala VAS, grade de mobilitate şi timp de parcurgere a distanţei de 20 metri), în prima şi ultima zi a terapiei de recuperare, s-au obţinut date a căror interpretare duce la următoarele: evaluarea amplitudinii de mişcare prin goniometrie la nivelul mişcării de flexie a genunchiului a demonstrat o creştere importantă a valorii acesteia, o creştere semnificativă producându-se la fiecare reevaluare; la fel şi pentru mobilitatea genunchiului la mişcarea de flexie. Scala VAS a durerii, după aplicarea tratamentului s-a îmbunătaţit semnificativ la ambele grupuri.

În privinţa evaluării timpului de parcurgere a distanţei de 20 de metri, pe teren plat, ambele grupuri realizează creşterea vitezei de deplasare, fără durere sau disconfort, în urmă tratamentului efectuat. **Concluzii.** Din rezultatele obţinute de-a lungul desfăşurării experimentului rezultă următoarele concluzii:

- Genunchiul asigură concomitent stabilitatea şi mobilitatea, echilibrul şi oscilaţia, acceleraţia şi deceleraţia.
- Terapia constituită s-a recomandat de către echipa secţiei: medic recuperare, kinetoterapeut, asistent fizioterapeut, maseur.
- Prin individualizarea strictă a programului de kinetoterapie în concordanţă cu starea biologică şi psihică a pacientului
- S-a preferat terapia fizicală şi kinetică celei exclusiv medicamentoase în cazul pacienţilor cu afecţiuni reumatismale cronice degenerative

Cuvinte cheie: *kinetoterapie, gonartroză primară sau secundară, recuperare medicală.*

Introduction

Knee arthritis occurs mainly in obese women after 45 years, consisting anatomically of femoral-patellar and femoral-tibial osteoarthritis. Knee arthritis, with an superior incidence to hip arthritis, but being for a long time well tolerated, is frequently encountered in rheumatology and rehabilitation services, but today begins to be increasingly more often treated in the orthopedic services. Primitive

knee arthritis - whose causes are not well known, appear in most statistics, with a marked predilection for women, at menopause age. From 4 patients with knee arthritis, clinical onset is between 40 and 70 years, with a maximum at 50, and is usually located in the femoral-patellar compartment to diffuse finally through the whole joint. There are frequent associations with obesity (45 to 65%) and varicose veins (20 to 44% of cases). Often meets almost typical picture of a patient around menopause, obesity, with large pool, lordosis, short legs, globular and painful knees, with *genu varum* and *flexum,* most often within an arthritis located in many articulations. Knee osteoarthritis appear side by flaws in architectural structures of the knee. The early clinical onset is in the third or the fourth decade of life and is usually unilateral (bilateral osteoarthritis if the above condition takes both knees) and is not accompanied by changes in osteoarthritis of other joints. Medical statistics now give 53% apparently primitive forms, compared to 47% secondary forms. Knee arthritis to obese people are also secondary caused by knees overweight. This study aims to highlight the effects of physical therapy in the rehabilitation of a 30 patients group diagnosed with primitive or secondary knee arthritis, unilateral or bilateral.

Materials and methods

The study was conducted on a group of 30 patients older than 40 years, diagnosed with primary or secondary knee arthritis unilateral or bilateral, to their admission into the service of Physiotherapy and Rehabilitation Medicine, who were divided in two groups: a control group (n = 14) who received electrotherapy, massage and medical symptomatic pain relievers and the active group (n = 16), whose therapeutic program included electrotherapy, massage and physical therapy. Also, patients were evaluated in three phases: initial F1, F2, at the end of hospitalization (14 days) after carrying out medical rehabilitation assistance and F3 - one month, at the end of kinetic program and after another 14 days of rehabilitation).

The criteria for inclusion in this study include:

- Patients and of both sexes, aged 40 years;
- BMI = 35 kg/m^2 (BMI – body mass index);
- Disease duration longer than 6 months.

Criteria for exclusion from the study were composed of:

- chronic rheumatic diseases (rheumatoid arthritis, ankylosing spondylitis, gout);
- presence of special co-morbidities (Diabetes or hypertension uncontrolled, severe liver or kidney disease, cardiorespiratory disease, obesity, cancer, trauma).
- those patients who used oral corticotherapy and those who made arthroscopy;
- the presence of psychiatric illnesses.

Evaluation of patients was done on day 1 and after 4 weeks, with Visual Analog Scale –(VAS).

Were also assessing the ether parameters such as the knee joint mobility (degrees) on the flexion/extension movement.

Patients included in this study are suffering of knee arthritis (clinical diagnosis and radiological staged).

Evidence bears out the following exam:

1 unilateral or bilateral damage to the knee;
2 the presence of spontaneous pain on palpation or on joint mobilization
3 inflammatory changes of the affected joints;
4 joint mobility, held or lost;
5 the condition of muscles (hypotonia, contracture or shift);
6 knee stability during gait and standing up;
7 alignment of lower limb joints in the spinal cord;
8 nutritional status of the patient.

Radiological aspects covered in knee x-ray are:

- narrowing of joint spaces;
- subchondral sclerosis;
- marginal osteophytosis;
- pseudocysts or geodes.

Electrotherapy techniques aim to obtain the painkillers effects or to stimulate the muscle atrophy. (Quadriceps). For the painkiller and hyperemic effect we used galvanic currents (dry galvanizing or galvanic baths), low frequency currents and TENS - (Electrical neuromuscular stimulation transcutaneous), Trabert currents, diadynamic currents, interference currents, laser, ultrasound, solux (infrared radiation) and shortwave.

Prevention of muscle atrophy is achieved by a series of electrical procedures stimulating the muscle contraction named low frequency currents (diadynamic RS currents and rectangular currents), the average frequency currents.

Physical therapy programs toning the skeletal muscle, restore the knee joint mobility and the dynamic control for walking.

Massage composed by sedative techniques on joint structures and toning techniques on adjacent muscle can be used to preparing the physical therapy and thereafter.

Also we can use physical therapy:

- Stretching;
- Aerobic Exercise, such as pedaling the bike (dynamic exercises) - a joint training (both for strength and for resistance).

And set the following parameters:

• intensity - determined in accordance with the principle of charging, that is greater than that used daily by everyday activities, above the training stimulus that causes an adaptive response of the body, it worked to a value of 70-85% of maximum heart rate (corresponding to 60-80% of VO2 max) initially, then the value of 40% maximum oxygen consumption is VOmax during exercise, maximum heart rate was determined by the formula 220-age (in years) the patient concerned;

• time - "the more intense the exercise is its duration will be the less", average session was 20-30 minutes (intensity being 70 of% of maximum heart strength);

• frequency - was 1 session / day.

Any kinetic treatment involves restoring functional knee entire distal segment in terms of muscle forces, stability and controlled movement at this level, to prevent complications such as chronic instability and osteoporosis by deconditioning syndrome.

Physical rehabilitation program - applied to a patient with knee arthritis kinetic must have:

• Obtain status of painless,
• correction of trophic isturbances
• knee stability and the dynamic control for walking,
• regional mobility for functional movement amplitude,
• coordination of limb movements and segmentation as a whole.

Any program should include exercises kinetic mobilization, first active, muscle toning, muscle stretching, to complete the exercises overall, represented by multiple variants of walking exercises and techniques to facilitate the balance exercises, always tailored to the severity pathology and patient's possibilities to perform well using material within the base of treatment options. Foot physical therapy should not be overlooked in the context of lower leg kinematics chain, essential for proper function, optimal.

Table no. 1. Distribution of cases

	No. cases	**45-50 years**	**> 50 years**
Men	7	4	3
Women	23	18	5
Total	30	22	8

All patients in this study group learn to control their steps through the following aspects: it involves movement step is carried out slowly, carefully run, the movements goes to the other mobile segments of the body; movements are smooth, without jar, to achieve simultaneous control of respiration.

Table no. 2. Frequence of knee arthritis

Knee arthritis	No. cases
Primitive	17
Secondary	13

To assess patients have used the following parameters:

1. Motion's amplitude (goniometry) in knee joints: knee extension (affected by atrophy of the quadriceps), knee flexion (row reduced pain, inflammation and joint immobilization).

Table no. 3. Evaluation of knee flexion amplitude at the beginning of therapy (F1) and at end kinetic recovery by age group.

Age group	45-50 years		> 50 years	
Stroke assessment	F1	F3	F1	F3
Flexion	85 degrees	114 degrees	81 degrees	103 degrees

2. For the pain parameter we used **visual analogue scale (VAS)** which patient was self-assessment in terms of pain intensity with a number from 0-100 (0 = absent pain, 100 = maximum pain).

0 ——————————————————— ***100***

In our case, the patient marks a point between the two values, depending on subjective perception of pain to active mobilization of the knee.

To assess the effect of therapy painkillers have used visual analogue scale VAS therapeutic outcome.

VAS for the treatment

No pain relief (disappearance of pain) **Complete**

0 ——————————————————— ***100***

3. Travel time for 20 meters distance. We evaluate the time travel for 20 meters on flat ground, normal walking, before and after the treatment.

Results and discussion

The evaluation of the two patients groups by preset parameters (VAS scales, degrees of mobility and travel time distance of 20 meters) on the first and the last day of rehabilitation therapy leads to the following results:

Amplitude of motion by goniometry in the movement of flexion of the knee showed a significant increase in its value (from 35° to 120°) by comparing the moments evaluations, a significant increase occurring at each reassessment.

Knee mobility flexion increase from 123.9° (± 12,5°) to the first group and 125.4° (± 14.8°) to the second, the final average values of 126.8° respectively 128.9°, improve output of 3.5° (± 4,8°) in the active group and 4.5° (± 8.3 °) in group control.

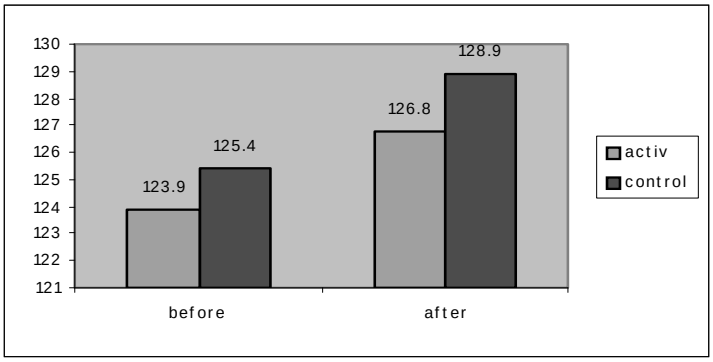

Figure 1. Evolution of the knee mobility parameter on knee flexion

VAS pain scale show an initial average 40.8 mm for both groups, with maximum–minimum values ±16,4 mm to active group and ± 15.5 mm to control group.

After treatment the values of both groups were increased, 15.6 (± 15.3) mm to the first and 15.3 (± 15.3)mm, the second (p = 0.469), reaching values final average of 25.1 mm and 25.3 mm.

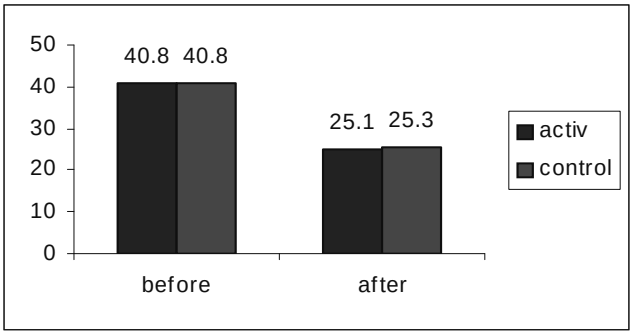

Figure 2. Evolution of the pain parameter to active motion

There is substantial improvement of pain in knee ostheoarhritis on the active movements.

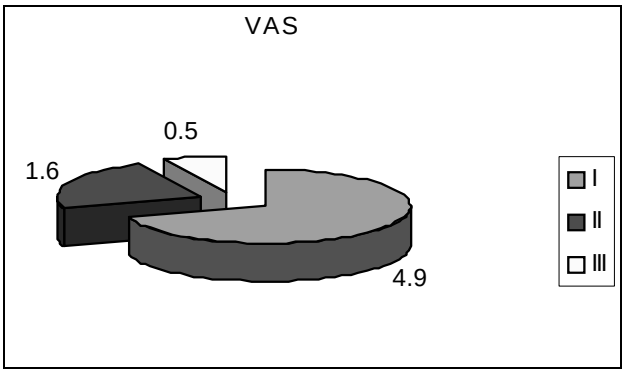

Figure 3. VAS score evaluation

Individual appreciated the three moments of evaluation and then to calculate the average and confidence interval CI for group study and sex.

Travel time to distance for 20 meters.

In terms of evaluation time distance for 20 meters on flat ground, we obtained content an average value of 20.4 (± 9.3) seconds, active group and 21.2 (± 6.2) seconds, for the control group.

Making treatment lead to improve your output in each group 2.1 (± 2) seconds, the first group and 2.8 (± 3) seconds (p = 0.054), in the second group reaching final average values 18.3 seconds, 18.4 seconds. Both groups achieved increases growth rate of movement, without pain or discomfort from treatment.

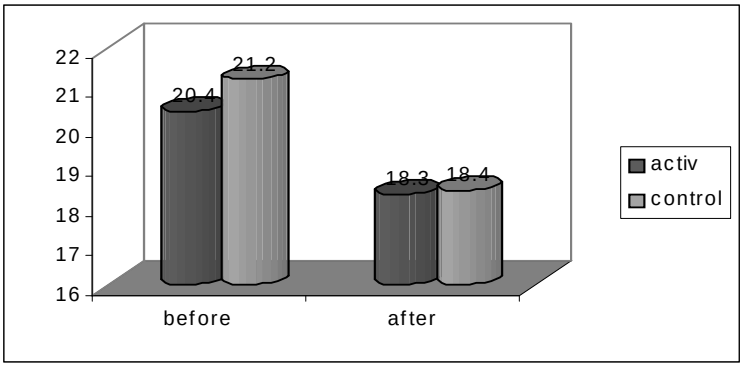

Figure 4. Evolution of the parameter travel time distance of 20 meters

There is substantial decrease in the knee arthritis pain which has improved the joint mobility on different types of daily movements.

Conclusions

From the results obtained during the conduct of the experiment was based on work we have drawn the following conclusions:

- Knee region is a complex anatomical and functional characterized by double role: to support the entire weight of the body and the preservation of properly walking on any terrain. The role of locomotion-term leverage, while providing knee stability and mobility, balance and swing, acceleration and deceleration.
- Therapy was established by the department team: medical rehabilitation, physiotherapist, physiotherapy assistant, masseuse.
- The work was always guided by the patient's response to the technique applied.
- The individualization of physical therapy program in strict accordance with biological and psychological condition of the patient (medication, physical, kinetic), we obtained clinical symptoms and shorten treatment duration.
- They prefer physical therapy instead of drug therapy for pacients affected by chronic rheumatic degenerative diseases (including knee arthritis) due to significant effects of this therapy and also because have no side effects.

REFERENCES

Basmajian J.V., 1984, *Therapeutic Exercise*, Ed. Williams&Wilkins, Baltimore.

Bellamy Nicholas, 2005, *The WOMAC Knee and Hip Osteoarthritis Indices: Development, validation, globalization and influence on the development of the AUSCAN Hand Osteoarthritis Indices*, Clin Exp Rheumatol.

Braddom R.L., 1996, *Physical Medicine and Rehabilitation,* W.B.Saunders.

Cordun Mariana, 1999, *Kinetologie medicala*, Ed. Axa, Bucuresti.

Denichi, A., Antonescu, D., 1977, *Gonartroza*, Editura Medicală, Bucureşti.

Kiss L., 1989, *Recuperare neuro-motorie prin mijloace kinetice*, Ed. Medicală, Bucureşti.

Kiss Jaroslav, 1999, *Fiziokinetoterapia recuperarea medicala in afecţiunile aparatului locomotor,* Ed. Medicala, Bucuresti.

Nica Adriana Sarah, 1998, *Compendiu de medicina fizica si recuperatorie*, Ed. Universitara „Carol Davila", Bucuresti.

Paun Radu, 1999, *Tratat de Medicina Interna – Reumatologie* – Vol. 1 si 2, Editura Medicala, Bucuresti.

Popescu Eugen, Ionescu Ruxandra, 2002, *Compendiu de reumatologie*, Ed. Tehnica, Bucuresti.

Popescu R., Marinescu L., 1999, *Bazele fizice şi anatomice ale kinetologiei. Testarea musculo-articulară,* Editura Agora.

Popescu, E.D., Ionescu, R., 1993, *Compendiu de reumatologie*, Editura Tehnică, Bucuresti.

Radulescu Andrei, 2005, *Electroterapie*, Ed. Medicala, Bucuresti.

Radulescu Andrei, Teodoreanu Elena, 2002, *Fizioterapie, masaj terapeutic, bioclimatologie*, Ed. Medicala, Bucuresti.

Sbenghe Tudor, 2002, *Kinesiologie–Stiinta miscarii*, Editura Medicala, Bucuresti.

Sidenco Luminita, 1999, *Bilantul articular si muscular,* Ed. APP, Bucuresti.

Sidenco Elena Luminita, 2003, *Masajul in kinetoterapie*, Ed. Fundaţia „Romania de maine", Bucuresti.

Tan J.C., Horn E.S., 1998, *Practical Manual of Physical Medicine and Rehabilitation - Diagnostics, Therapeutics, and Basic Problems,* Mosby.

Teleki Nicolae, Dragan Ioan, 1989, *Practica medicinii sportive*, Ed. Medicala, Bucuresti.

Trosc P., Radu D., 1978, *Genunchiul instabil dureros*, Editura Junimea, Iaşi.