Original Article

The influence of kinesiotherapy in pain relief and reduction of medication prescribed for patients with coxofemoral degenerative joint disease

BURCEA CLAUDIA-CAMELIA¹, NEAGOE IOANA CRISTINA², GEORGESCU LUMINIȚA³

¹ Department of Fundamental Disciplines, Faculty of Nurse-Midwifery and Healthcare, “Carol Davila” University of Medicine and Pharmacy Bucharest, ROMANIA

²Department of Medical Assistance and Physical Therapy, Faculty of Sciences, Physical Education and Informatics, University of Pitesti, ROMANIA,

³Department of Physical Education and Sport, Faculty of Sciences, Physical Education and Informatics, University of Pitesti, ROMANIA

Published online: November 30, 2019

(Accepted for publication: November 15, 2019)

DOI:10.7752/jpes.2019.s6310

Abstract

The entire joint gradually wears down in coxofemoral degenerative joint disease, albeit the articular cartilage of the femoral head and acetabulum is affected the most. Coxofemoral degenerative joint disease's prevalence is increasing due to the elderly population's life expectancy increase, thus making these patients compelled to resort to pain relief medication. This medication includes nonsteroidal anti-inflammatory drugs, taken orally or topically, whose efficacy has been shown by various studies as high, but only during the first weeks, thereafter becoming futile.

Chronic pain experienced by the elderly population due to coxofemoral degenerative joint disease has a negative impact on their quality of life. Given the high risk of comorbidities and toxicity to medication, we have hypothesized that kinetic treatment of the coxofemoral degenerative joint disease is, if not an alternative to pharmacological therapy, at least a way to reduce the nonsteroidal anti-inflammatory and anti-rheumatic drugs taken, which would then lead to high pain relief/ prevention and maintaining independence in carrying out the physical activities of daily living in the old age patients affected by this joint disease.

We conducted a comparative study on patients with stage one and stage two coxofemoral degenerative joint disease, evaluating the results of two batches of female patients: an experimental one (who followed a kinetic programme we proposed) and a control group (who did not follow a kinetic program, but agreed to participate in assessments).

Due to the high risk of toxic reactions: gastro-intestinal, hepatic, renal, cardio-circulatory, cerebrovascular etc. the elderly patients are prone to have to the drugs in the nonsteroidal anti-inflammatory and anti-rheumatic drugs pharmacological group, as well as low effectiveness in the disease's late stages, the optimal pain management for joint pain in the coxofemoral degenerative joint disease is non-pharmacological, using kinesiotherapy or hip replacement. In designing the kinetic programme, we inserted predominantly proprioceptive neuromuscular facilitation techniques and stretching, as their therapeutic value is recognized. The operational strategy proposed, carried out based on the patient's functional capacities and permanently adapted to the progress made by them, both in terms of content, and dosage, at the same time considering the continuous evolution of degenerative processes led to a favourable outcome, demonstrating a significant decrease of joint pain, an enhancement of the possibilities to perform most of the domestic activities, but also a significant reduction of medication use; this verified our hypothesis.

Key words: coxofemoral degenerative joint disease, pharmacological therapy, kinetic therapy, proprioceptive neuromuscular facilitation techniques, stretching techniques

Introduction

Osteoarthritis of the hip joint, a chronic deforming and painful arthropathy, is most prevalent in the elderly patients (especially in women), but it is also quite common in adult patients (especially males). It may result from loss of the articular cartilage's physiological properties, which leads to its progressive degeneration. The entire joint gradually wears down in coxofemoral degenerative joint disease, albeit the articular cartilage of the femoral head and acetabulum is affected the most; this process implies, depending on the degree of seriousness of the disease, the change in structure and activity of the subchondral bone tissue –proliferative, persistent synovitis and subsequently, bone modifications of epiphyses in marginal osteophytes (cotyloid bones and femoral cephalic), formation of cysts (geodes) and subchondral sclerosis, periarticular ligamentous laxity,

muscular hypotonia, joint space narrowing/ disappearance, crepitus and reduction of the range of motion ((Gornea F., Ojog S., 2010; Jotanovic Z.et al., 2015).

As the anatomo-functional deterioration of the coxofemoral joint (loss of joint functional and structural quality) gradually and continuously progresses, the entire lower limb motor unit will bear the adverse consequences which will potentially lead to infirmity with disability both in statics, and in locomotion, as well as with regard to performing usual domestic activities, involving gait limitations and walking difficulties, climbing/going down the stairs and rising from a seated position. Over time, these impairments will lead to the patient losing their independence and to increased use of specialized health care services. Therefore, this will have a profound effect on the patient's quality and quantity of life, at the same time strongly impacting the family and society, seeing as treatment options for the coxofemoral degenerative joint disease are limited (Lespasio M.J., Sultan A.A., Piuzei N.S.et al., 2018).

Osteoarthritis of the hip joint's prevalence is increasing due to the elderly population's life expectancy increase, thus making these patients compelled to resort to pain relief medication. This medication includes nonsteroidal anti-inflammatory drugs, taken orally or topically. Their efficacy has been shown by various studies as high, but only during the first weeks of treatment, thereafter becoming futile; reporting was made depending on the disease's evolution stage. The fact that patients respond differently to nonsteroidal anti-inflammatory drugs administration is due to the existence of several phenotypes of pain associated with hip osteoarthritis. In an effort to relieve pain in order to be able to carry out various types of domestic activities or to be able to rest at night, many patients take too much medications which, due to comorbidities, have multiple side effects, such as: hepatic, gastrointestinal and renal toxicity, especially in older patients. Conservative treatment alternatives include intra-articular corticosteroid injections, hyaluronic acid or bone marrow concentrate injections with a high content of biofactors, cytokines and growth factors (TGF- β); these treatments, however, are only effective for a limited amount of time of just a few months (Fu K. et al., 2018; Darrow M.et al., 2018; Wu Y.et al., 2018; Bălăceanu A., 2007).

The complex treatment of hip osteoarthritis consists, depending on the degenerative changes of joint tissues and their manifestations, of medication (pharmacological) therapy to prevent/ relieve pain and kinetic (non-pharmacological) therapy to improve the articular mobility angles muscle strength and stability in statics and locomotion, and also to improve the pain level and reduce inflammation (Uusi-Rasi K.et al., 2017; Nolwenn P. et al., 2016; Burcea C.C. et al., 2015; Lupușoru, M.O. et al., 2015).

Material and methods

Chronic pain experienced by the elderly population due to coxofemoral degenerative joint disease has a negative impact on their quality of life. Given the high risk of comorbidities and toxicity to medication, we have hypothesized that kinetic treatment of the coxofemoral degenerative joint disease is, if not an alternative to pharmacological therapy, at least a way to reduce the nonsteroidal anti-inflammatory and anti-rheumatic drugs taken, which would then lead to high pain relief/ prevention and maintaining independence in carrying out the domestic activities in the old age patients affected by this joint disease.

The purpose of this study was to improve the inflammatory process and periarticular pain in the patient with coxofemoral degenerative joint disease and their ability to take care of themselves and perform domestic activities by preponderantly including proprioceptive neuromuscular facilitation techniques, stretching and posture techniques in the therapeutic scheme of the kinetic therapy.

The objectives of this study were to assess pain, ability to perform the domestic activities of the patients suffering from coxofemoral degenerative joint disease, as well as to determine how often are these patients prescribed medication.

The kinetic operational strategy, which aimed at improving symptomatology and keeping/ increasing the independence of patients with osteoarthritis of the hip, was prepared depending on the disease's functional-anatomical-clinical stage, comorbidities and related risk factors. Based on the strictly set objectives, posture techniques for the lower limb, proprioceptive neuromuscular facilitation techniques and stretching techniques were selected for the kinetic program; the purpose was to preserve/improve articular mobility in parallel with strength development, thus ensuring the coxofemoral joint has stability in dynamics; in other words, maintaining balance in locomotion and in performing the domestic activities. It also prevents falls, which is an important risk factor for these patients. The exercises used were as follows:

- to relieve pain, increase the extension pressure of the coxofemoral joint and prevent (stage one osteoarthritis) or correct (stage two osteoarthritis) the coxofemoral joint's flexum, increase the international rotation pressure of the coxofemoral joint, prevent (stage one osteoarthritis) or correct (stage two osteoarthritis) the external rotation of the coxofemoral joint - posture techniques for the lower limb and stretching techniques;
- proprioceptive neuromuscular facilitation techniques:
 - to tone the abductor and extensor muscles and hip internal rotation (stage one and stage two osteoarthritis)
 - slow reversal with opposition;
 - to relieve pain, selective tone of the abductor and extensor muscles and hip internal rotation (stage one and stage two osteoarthritis) - rhythmic stabilization;

- to get pseudo-coordination - isometric contractions in the shortened area;
- to relieve pain, reduce joint swelling, encourage the opposite status in the agonist muscles (stage two osteoarthritis) - repeated contractions

Results and discussions

Our study was comparative and it evaluated the results of two batches of female patients suffering from stage one and stage two coxofemoral degenerative joint disease.

The kinetic strategy we proposed was administered over the course of six months on a number of seven female patients – experimental group (who wanted to participate in this study), which we subsequently compared to the control group, made up of other seven female patients, who did not follow any kinetic program (either for fear, distrust or for financial reasons, etc., but who agreed, however, to be assessed by us).

The criteria for exclusion from the study were: female patients with end-stage coxofemoral degenerative joint disease or post-arthroplasty (total replacement) of the hip.

The statistical variables used in this research were both quantitative (age -years old), and category-wise (gender- male, female; background environment – urban, rural; pain scale, performance of activities of daily living and medication taken). The following were assessed, both in the initial tests, and the final ones: pain, on a scale from one to five (1= no pain, 2= pain in locomotion, 3= pain in statics, 4= resting pain, 5= nocturnal pain, which impedes rest); medication taken (1=no medication taken, 2=medication taken sometimes; 3= medication taken often, 4= medication taken very often, 5= medication taken permanently) and the carry out of domestic activities (1= no pain in domestic activities, 2= pain in high intensity domestic activities, 3= pain in moderate domestic activities, 4= pain in low intensity domestic activities, 5= domestic activities are impossible to perform because of the pain).

Data analysis of the experimental group showed an average of 70, 86 years and standard deviation of 3, 13 years; in the control group, the average was 67, 71 years and the standard deviation was 4, 19 years, according to table 1 presented below.

Table 1. Age distribution of female patients

	indicators				
group	Average	Median	minimum	Maximum	Standard deviation
experimental	70,86 years	71 years	67 years	76 years	3,13 years
control	67,71 years	68 years	62 years	73 years	4,19 years

The background environment declared by our study's patients was mostly urban (100% in the experimental group and 71,43% in the control group); table 2 shows the distribution of this data.

Table 2. Background environment distribution of the patients

	frequency	urban		rural	
		Absolute	Relative	Absolute	relative
group	experimental	7	100%	0	0%
	control	5	71,43%	2	28,57%

Patients' distribution depending on the arthrosic disease's stage of evolution showed that a percentage of 57,14% of the female patients in the experimental group had stage two and a percentage of 42,86% had stage one. The exact opposite was true for the patients in the control group, i.e.: 42,86% of the patients had stage one and 57,14% stage two. Table 3 below shows the distributions of patients depending on the coxofemoral degenerative joint disease's evolution stages.

Table 3. Distribution of patients depending on the coxofemoral degenerative joint disease's evolution stages.

	frequency	Stage one		Stage two	
		Absolute	Relative	Absolute	relative
group	experimental	3	42,86%	4	57,14%
	control	4	57,14%	3	42,86%

As far as the pain variable is concerned, it showed scores of 2 and 4 in the experimental group and 2,3 and 4 in the control group at the initial test, and scores of 1 and 2 in the experimental group and 2,3 and 4 in the control group at the final test. According to table 4, distributions of frequencies of replies from female patients in the experimental group showed that three patients said they had pain in locomotion and four patients said they had resting pain at the initial test, and at the final test, five patients experienced no pain and two patients had active pain.

These scores show a significant pain relief in the patients from the experimental group after the kinetic program was administered. In return, scores registered by patients from the control group show a progressive

increase of pain, which means a progression of osteoarthritis, and chronic pain experienced by this population group has a substantial impact on the functional decline of the patient with coxofemoral degenerative joint.

Table 4. Distribution of patients depending on the pain scores

	group	experimental				control			
	test	initial		final		initial		final	
	frequency	Absolute	Relative	Absolute	Relative	Absolute	Relative	Absolute	relative
Pain score	1	0	0%	5	71,43%	0	0%	0	0%
	2	3	42,86%	2	28,57%	2	28,57%	3	42,86%
	3	0	0%	0	0%	2	28,57%	2	28,57%
	4	4	57,14%	0	0%	3	42,86%	2	28,57%
	5	0	0%	0	0%	0	0%	0	0%
Scores' mean		3,14		1,29		3,14		2,86	
Standard deviation		1,07		0,49		0,90		0,90	

When asked to assess the administration of nonsteroidal anti-inflammatory drugs, both the patients from the experimental group, and the ones from the control group reported they were taking them often and very often. It follows, from table 5, that a percentage of 71% of the patients from the experimental group initially reported taking medication very often, and 42,86% said they were taking nonsteroidal anti-inflammatory drugs often; after six months of kinetic therapy, most patients (57,14%) completely stopped taking medication, and three other patients (42,86%) took less medication, using them only sometimes. A very often use of medication was reported by the control group, both in the initial test, and in the final one (four patients) and often use by three patients. The good results achieved by the experimental group support how kinesiotherapy helps reduce the inflammatory process and relieve pain.

Table 5. Distribution of patients depending on the scores of medication use

	group	experimental				control			
	test	Initial		final		initial		final	
	frequency	Absolute	Relative	Absolute	Relative	Absolute	Relative	Absolute	relative
Medication use score	1	0	0%	4	57,14%	0	0%	0	0%
	2	0	0%	3	42,86%	0	0%	0	0%
	3	3	42,86%	0	0%	3	42,86%	3	42,86%
	4	5	71,43%	0	0%	4	57,14%	4	57,14%
	5	0	0%	0	0%	0	0%	0	0%
Scores' mean		3,71		1,43		3,57		3,57	
Standard deviation		0,49		0,53		0,53		0,53	

Pain in performing the domestic activities was initially present in both groups for low and moderate intensity domestic activities. Thus, pain was reported as present by a percentage of 57,14% in low intensity domestic activities and 42,86% in moderate intensity domestic activities by the experimental group, and a percentage of 71,43% in low intensity domestic activities and 28,57% in moderate intensity domestic activities by the control group. In the final test, there were statistically significant differences between the two groups in terms of pain when carrying out domestic activities. Most patients from the experimental group (85,71%) conducted their domestic activities without experiencing any pain; just one patient experienced pain when performing high intensity domestic activities (14,29%). A percentage of 57,14% from the total patients from the control group reported pain in performing low intensity domestic activities and 42,86% complained of pain in carrying out moderate intensity domestic activities. The data analysed is shown by table 6 below.

Table 6. Distribution of patients depending on the pain scores of domestic activities

	group	experimental				control			
	test	Initial		final		initial		final	
	Frequency	Absolute	Relative	Absolute	Relative	Absolute	Relative	Absolute	relative
Pain scores of domestic activities	1	0	0%	6	85,71%	0	0%	0	0%
	2	0	0%	1	14,29%	0	0%	0	0%
	3	3	42,86%	0	0%	2	28,57%	3	42,86%
	4	4	57,14%	0	0%	5	71,43%	4	57,14%
	5	0	0%	0	0%	0	0%	0	0%
Scores' mean		3,57		1,14		3,71		3,57	
Standard deviation		0,53		0,38		0,49		0,53	

Conclusions

The correct management of osteoarthritis of the hip in the elderly population implies choosing non-pharmacological and pharmacological therapies depending both on the disease's stage of evolution, and the related risk factors.

Due to the high risk of toxic reactions: gastro-intestinal, hepatic, renal, cardio-circulatory, cerebrovascular etc. the elderly patients are prone to have to the drugs in the nonsteroidal anti-inflammatory and anti-rheumatic drugs pharmacological group, as well as low effectiveness in the disease's late stages, the optimal pain management for joint pain in the coxofemoral degenerative joint disease is non-pharmacological, using kinesiotherapy or hip replacement. The therapeutic value, which has already been recognized, of the proprioceptive neuromuscular facilitation techniques and stretching techniques led us to insert them preponderantly in designing the kinetic program. After six months of administration, it demonstrated a significant reduction of joint pain, enhancement of the possibilities to perform most of the domestic activities, but also significant reduction in medication taken; therefore, our hypothesis was verified.

The operational strategy proposed, carried out based on the patient's functional capacities and permanently adapted to the progress made by them, both in terms of content, and dosage, at the same time considering the continuous evolution of degenerative processes led to a favourable outcome in reducing both the symptomatology of the coxofemoral degenerative joint disease, and the functional decline of this disease. This was demonstrated by the results achieved by the experimental group.

References

- Bălăceanu, A. (2007). *Boli degenerative ale cartilajului*. În: Ionescu I, coord. Esențialul în reumatologie, Ediția a 2-a, Editura Medicală Amaltea, 462, 474
- Burcea, C.C., Lupusoru, M.O., Negreanu, L. et al. (2015). Identification of Osteoarthritis with Multiple Joint Involvement in Elderly Institutionalized Patients Concomitant with PsychoKinesiotherapeutic Intervention Strategies – A Preliminary Study. *Modern Medicine*, 22(4), 351-4
- Darrow, M., Shaw, B., Darrow, B., & Wisz, S. (2018). Short-Term Outcomes of Treatment of Hip Osteoarthritis With 4 Bone Marrow Concentrate Injections: A Case Series. *Clinical medicine insights. Case reports*, 11, 1179547618791574. doi:10.1177/1179547618791574
- Fu, K., Robbins, S. R., McDougall, J. J. (2018). Osteoarthritis: the genesis of pain, *Rheumatology*, 57(suppl_ 4), iv43–iv50, <https://doi.org/10.1093/rheumatology/kex419>
- Gornea, F., Ojog, S. (2010). *Patologiile degenerativ-distrofice ale articulațiilor*. În: Gornea F, red. Ortopedie și traumatologie, Ediția a 2-a, Centrul Editorial-Poligrafic Medicina, Chișinău, 553
- Jotanovic, Z., Mihelic, R., Gulan, G., Sestan, B., Dembic, Z. (2015). Osteoarthritis of the hip: An overview. *Periodicum biologorum*, 117 (1), 95-108. Preuzeto s <https://hrcak.srce.hr/139528>
- Lespasio, M. J., Sultan, A. A., Piuze, N. S., Khlopas, A., Husni, M. E., Muschler, G. F., & Mont, M. A. (2018). Hip Osteoarthritis: A Primer. *The Permanente journal*, 22, 17–084. doi:10.7812/TPP/17-084
- Lupușoru, M.O., Burcea, C.C., Văcăroiu, I.A., et al. (2015). The Rehabilitation of Elderly Institutionalized Patients with Osteoarthritis (Multiple Joint Involvement) Using Alternative Methods Associated to Drug Therapy, *Modern Medicine*, Vol.22, No.4, p. 355-358
- Nolwenn Poquet, Matthew Williams, Kim L. Bennell, Exercise for Osteoarthritis of the Hip, *Physical Therapy*, Volume 96, Issue 11, 1 November 2016, Pages 1689–1694, <https://doi.org/10.2522/ptj.20150597>
- Uusi-Rasi, K., Patil, R., Karinkanta, S., Tokola, K., Kannus, P., & Sievänen, H. (2017). Exercise Training in Treatment and Rehabilitation of Hip Osteoarthritis: A 12-Week Pilot Trial. *Journal of osteoporosis*, 3905492. doi:10.1155/2017/3905492
- Wu, Y., Goh, E. L., Wang, D., & Ma, S. (2018). Novel treatments for osteoarthritis: an update. *Open access rheumatology : research and reviews*, 10, 135–140. doi:10.2147/OARRR.S176666