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The quality of life - an indicator for assessing the recovery program in patients diagnosed with degenerative disorders

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Abstract

Introduction. Osteoarthritis is a chronic joint disease, a progressive non-inflammatory arthropathy-type. Globally, around 1.7 billion people are affected by musculoskeletal and rheumatic diseases, which indicates an increase in the last 20 years of around 45%. **Material and method.** The objectives of the treatment of patients diagnosed with osteoarthritis were: decreasing the pain, increasing joint mobility, muscle strength, trophic and muscle tone, increasing the quality of life and reintegration into the social and family environment. Demographic data and the functional status were assessed using the VAS scale, the WOMAC scale, the QOL scale. **Results and discussions.** The pain, the most important symptom in osteoarthritis, was diminished in the patients from the group, the evaluation on the VAS scale, but also on the WOMAC scale has showed the value reduction and the statistical significance of this decrease. The quality of life in the group patients after the application of the complex recovery treatment, especially of the kinetotherapy program. **Conclusions.** The application of the individualized recovery treatment and adapted to the age group has allowed the improvement of the values of the parameters of pain, rigidity, functional capacity. The recovery of patients aged 55-65 is important to ensure the percentage of professionally active persons, to reduce medical costs, as well as those generated by absenteeism, and the socio-professional reintegration of these patients.

Key words: *osteoarthritis, the quality of life, the complex recovery treatment , kinetotherapy,*

Introduction

Osteoarthritis is a chronic joint disease, a progressive non-inflammatory arthropathy-type, which is characterized by the damage of articular joint, the subchondral bone, changes at the level of the periarticular structures, of the synovium. Osteoarthritis is determined by genetic factors (1,2,3) and environmental factors (sex, age, life-style, weight, endocrine-metabolic disorders) (4). For the bearing joints (hip, knee) the inflammatory process involves the damage of walking, the decrease of muscle strength in the lower body, joint deformities, instability at the knee level. Coxartrosis is a chronic disease, with a long evolution, characterized by joint limitation, functional disability and difficulty in performing daily activities. Frequently, patients diagnosed with coxarthrosis also have associated comorbidities (respiratory, cardiovascular, digestive, renal, metabolic conditions) (5,6). Knee osteoarthritis is a chronic joint disease that causes pain and the decrease of the functional capacity with negative consequences on social integration, mental capacity, and the quality of life. A review of 62 studies from 4 databases has evaluated the quality of life through several questionnaires. Thus, it was found that obesity, the decrease of the physical activity (7) and the female sex were the factors that decreased the quality of life. Additionally, the patients' educational level, the psychological stress, the depression, the social and inter-family relations (8,9).

A study from 2019 (10) on 6472 participants shows that osteoarthritis at the level of the lower limb affects between 10-20% of people over 60 (11) involving economic and social costs (12), but also medical costs increasing by 80-90 % the costs for possible hip or knee prostheses (13,14,15).

A study performed in South Korea on 9512 participants over 50 allowed the evaluation of the risk factor and the quality of life in patients with otheoarthritis. It was found a higher prevalence in women (43.8%) compared to 21.1% in men.

The prevalence of obesity in a higher percentage in women has also determined the decrease of the quality of life in this population group (16, 17,18) .
The study presents the results from databases for 2 years, corresponding to patients diagnosed with osteoarthritis, noticing an increased opioid use in the treatment of the condition. Of the 2857999 patients with knee osteoarthritis, 12.2% have received opioid treatment as first treatment. The factors associated with osteoarthritis (depression or comorbidity) have represented the reason for the administration of these drugs (19,20).
Also, they should benefit from a proper quality of life, to delay the cognitive degeneration (21) as much as possible by interacting with their friends, participating in physical, social activities, maintaining control over their own lives (diet, weight, exercise, physical exercises, daily walks, avoiding sedentariness and isolation).
An observational and transversal study published in 2014 in which 1849 patients with gender and hip osteoarthritis over 50 were evaluated. The average age was 68.5 +/- 9.5 years. Of the patients, 61.5% had knee osteoarthritis, 19% hip osteoarthritis and 19.5% both, the latter also having a low quality of life (22). Globally, around 1.7 billion people are affected by musculoskeletal and rheumatic diseases, which indicates an increase in the last 20 years of around 45% (23).
The consequences of these conditions have an impact in the socio-economic field and are found in the absenteeism from the professional activity (50%) and in the incapacity for work and disabilities (60%), which leads to the early retirement of patients. This is why it is important to early diagnose and apply individualized and complex treatment (24,25).
The treatment for osteoarthritis of the joints of the hand, hip and knee takes into account the recommendations of the American College of Rheumatology (ACR) in 2012, the Osteoarthritis Research Society International (OARSI) in 2008 and 2014, but also the recommendations of the European League Against Rheumatism (EULAR) of the National Institute for Clinical Excellence (NICE) in England, as well as the American Academy of Orthopedic Surgeons (AAOS). (26,27,28,29).
For patients diagnosed with osteoarthritis, the recovery procedures must be individualized and involve the use of the two treatment possibilities, namely the pharmacological one and the non-pharmacological one which involves electrotherapy and kinetotherapy procedures. (26,30,31)
The therapeutic management of osteoarthritis has the purpose of reducing the pain and the inflammation, improving physical function, educating the patient to practice therapeutic exercise, weight control and use of support walking devices (32). Also, the administration of simple analgesics and NSAIDs for pain control and increase of the quality of life (33).
Also, the recovery program in osteoarthritis includes a physical exercise program for increasing the muscle strength and endurance, increasing the joint mobility, maintaining muscle tone, as well as occupational therapy (34, 35).
In the recovery program, electrotherapy (36) is recommended by applying low and medium frequency currents and ultrasound (37,38,39).
Taking into account the adverse effects at the cardiovascular and digestive level, NSAIDs represent the second step in the management of osteoarthritis, being useful for the improvement of the symptoms, but the guides recommend them on the short term (ACR, 2008), (26,40,41).
However, to reduce the occurrence of gastrointestinal complications, it is recommended the associate with a selective non-steroidal anti-inflammatory, COX 2 inhibitor, a proton pump inhibitor (42,43,44,45). Also, the administration of non-steroidal anti-inflammatory medicine under topical form is better tolerated than the oral administration (46,47,48).
Another review from 2019 had as purpose evaluating the effectiveness of physical exercise on pain, joint function and quality of life in a knee / hip osteoarthritis. From 9 electronic databases, were evaluated the results obtained from 6472 patients who confirmed the benefits of physical exercise for decreasing the pain, increasing the functional performance, increasing the quality of life in 8 weeks of treatment. The better results, especially the pain perimeter, were obtained in patients diagnosed with osteoarthritis, under the age of 60 (49).
In another study published in 2019, it allowed a review of the effects of physical exercise on pain, physical function, quality of life, progress of disease in people with osteoarthritis on the lower body. For a period of 7 years, the published studies were analyzed and it was found that performing physical exercises for 150 min per week allowed the decrease of pain, the improvement of physical function and the quality of life for a period of up to 6 months (50).

The purpose of the study was to evaluate the quality of life after applying a medical recovery program in patients diagnosed with degenerative disorders

Material and method: The study was performed over a period of 6 months, under ambulatory regime. 72 patients were evaluated at the beginning and the end of the treatment, as well as at the examination performed eight weeks after the end of the treatment. The study inclusion criteria were the following:

- patients diagnosed with degenerative disorders (clinically and radiologically)
- over 50 years of age
- a diagnosis of degenerative disorder for at least 6 months
- agreement to take part in the study

The study exclusion criteria were:

[1] patients diagnosed with degenerative disorders, but with arthroplasty (hip, knee)
[2] associated, decompensated comorbidities
[3] neuro- psychiatric disorders
[4] patients who did not consent to take part in the study

The objectives of the treatment of patients diagnosed with osteoarthritis were: decreasing the pain, increasing joint mobility, muscle strength, trophic and muscle tone, increasing the quality of life and reintegration into the social and family environment.

Demographic data (sex, age, weight, height, body mass index) and the functional status were assessed using the VAS scale (for pain), the WOMAC scale (for pain, rigidity, disability), the QOL scale (for the quality of life). At the clinical evaluation, the symptoms represented by pain (assessed with the VAS scale (0 = minimum pain, 10 = maximum pain) and joint rigidity accompanied by limited mobility (assessed with the goniometer) were used. Also, questionnaires were used to evaluate the functional joint capacity (WOMAC for supporting joints, Lequesne Index). The WOMAC scale evaluates the pain parameter (static and while moving), joint rigidity (at different moments) and functional capacity. The Lequesne functional index evaluates the pain that occurs during the first movements, as well as the discomfort that occurs during joint mobility.

During the study period (10 days) all the patients received pharmacological treatment (selective non-steroidal anti-inflammatory drugs, pain-killers) and performed kinetotherapy under the supervision of the physiotherapist, and, at home, they continued the recovery program (3 times a week). Electrotherapy has also been applied: low frequency currents (TENS), ultrasound.

Conventional TENS - electric current with frequency of 50-100 Hz, duration of 30-200ms, I = 10-40mA. The effect quickly installs (10-15 min) and lasts for several hours. The ultrasound was applied due to their physiological effects, that is: pain-killer (effect similar to that of the low-frequency currents), muscle relaxant (which is explained by the vibrational action of ultrasonic waves on tendon and muscle proprioceptors and which reacts to frequencies of 150 Hz), hyperaemic (activating blood circulation), anti-inflammatory (due to metabolic and vasomotor action) and fibrolytic (38,29). The chosen coupling form was direct, using the ultrasonophoresis process to allow the anti-inflammatory action of the applied gel (Voltaren gel in our case) (36). The application of ultrasound in impulse regime was preferred (the impulse duration/ pause duration rapport being 1: 4) in order to reduce the thermic effect and to potentiate the decontracting effect, allowing therefore to avoid the adaptation and the overloading of the tissues on which they were applied. In the study, the impulse frequency of 1 Hz, that is 60 impulses/min was used, and the impulse period was 1 second (Physiologic with ultrasound).

All the applied procedures took into account application indications and contraindications.

The kinetotherapy program lasted for 30 minutes per session and included passive, active and active with resistance mobilizations, coordination exercises, maintaining static and dynamic balance (25).

During the recovery program, but also at home, the patients received indications regarding the healthy lifestyle that involves: healthy diet, weight loss or maintaining their weight, avoiding exposure to coldness and moisture, avoiding prolonged standing, walking on uneven ground, lifting heavy weights (51).

Statistical analysis

The data obtained from the evaluation were processed statistically (median, standard deviation) using Microsoft Excel 10.The t-student test was useful for comparing the obtained results and verifying the working hypothesis. The statistical significance level is established at 5% ($p < 0.05$)

Results

The study group consisted of 72 patients aged over 55 (the average was 58).

Table 1. Distribution of group according to sex an age

age/sex	55-64years	65-74 years	>75 years
female	21	12	9
male	14	10	6

Of these, 58.34% were female and 41.66% male.

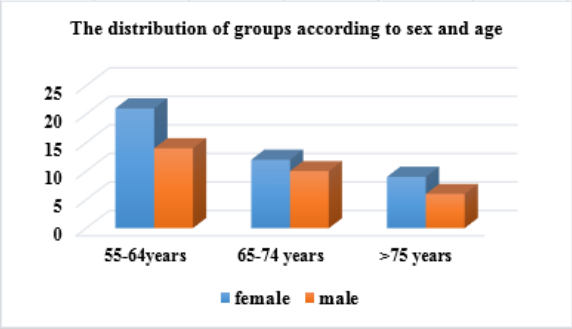

Fig .1. Distribution of group according to sex an age

It is worth mentioning the patients' origin environment. Thus, it is observed a higher percentage of the urban area (57.14% in women and 53.34% in men) in both sexes compared to the rural area (42.86% in women and 46.67% in men).

Table 2. The distribution of groups according to sex and environment

sex/environement	urban	rural
female	24	18
male	16	14

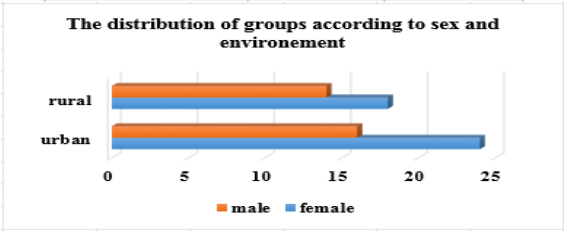

Fig. 2 The distribution of groups according to sex and environment

The pain evaluation on the VAS scale shows a statistically significant evolution at the 3 evaluation moments, and the t-student test is statistically significant with p <0.05. Also, for the pain parameter evaluated by the WOMAC scale, the results are statistically significant at the 3 evaluation moments, with p <0.05

Table 3 The evolution of the pain

scale		VAS	
moment	initial	final	control
mediana and std dev	7±1.42	5±1.22	3±0.67
t-student test	0.0215	0.0491	

Table 4 The evolution of the parameters of the WOMAC Index

scale/moment/statistically	initial	final	control
WOMAC pain	15±1.49	11±1.18	8±0.92
WOMAC rigidity	6±0.68	3.5±0.06	2±0.45
WOMAC functional capacity	53±2.79	39±3.35	25±2.45
WOMAC total	73.5±3.59	53.5±3.81	35±2.75

The evaluation of the parameters of articular rigidity, but also the functional capacity using the WOMAC scale allowed to obtain significant data, for each parameter and at the 3 moments of evaluation, the t-student test being statistically significant, with p <0.05.

By analyzing the results of the evaluation on the three parameters of the WOMAC Index, it is found a favorable evolution after the applied treatment, materialized by obtaining statistically significant data, with p <0.05.

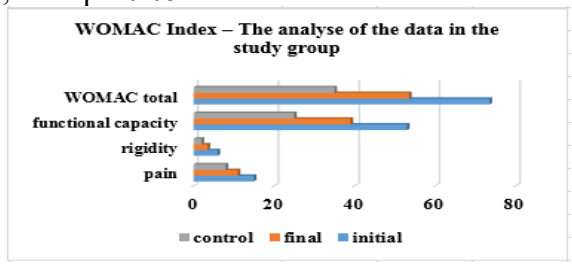

Fig. 3 The analyse of the data in the study group

Table 5 WOMAC Index – The analyse of the data in the study group

t student test WOMAC	initial	final
pain	0.0142	0.0152
rigidity	0.0409	0.0497
functional capacity	0.0128	0.0267
total	0.0134	0.0237

Also, the parameter for the quality of life evaluated using the QOL scale has pointed a good evolution of the studied patients, with statistically significant results, p <0.05

Table 6 The evolution of the quality of life

scale		QOL	
moment	initial	final	control
mediana and std dev	81±9.91	90±6.88	100±5.27
t-student test	0.0018	0.0016	

Discussion

The study group has predominantly female patients (as shown by some published studies), especially from the urban area. By age groups, there is a higher percentage for both sexes in the 55-64 age group (50% in women and 46.66% in men), as well as in the 65-74 age group (28.57% in women and 33.34% in men). In this context, we can also think about the medical-socio-economic impact of degenerative diseases. The pain, the most important symptom in osteoarthritis, was diminished in the patients from the group, the evaluation on the VAS scale (a 28.5% reduction at the end of treatment and a 57.1% reduction at the control examination), but also on the WOMAC scale (26.66% reduction at the end of the treatment and with 46.66% at the control examination) has showed the value reduction and the statistical significance of this decrease. Also, the joint rigidity was reduced by 41.6% at the end of the treatment and by 66.7% at the control examination. The functional capacity has improved by 26.41% at the end of treatment and by 52.83% at control

examination. The quality of life in the group patients after the application of the complex recovery treatment, especially of the kinetotherapy program, improved by 11% at the end of the treatment and by 23.45% at the control examination.

Conclusions

The application of the individualized recovery treatment and adapted to the age group has allowed the improvement of the values of the parameters of pain, rigidity, functional capacity. The decrease of the pain and the increase of mobility and functional capacity allow a functional status proper to the age. The improvement of the values of the evaluated parameters has allowed the increase of the patients' quality of life, values appreciated based on the QOL questionnaire

In the recovery of patients over 55 with degenerative diseases, the non-pharmacological treatment (physical therapy and physical exercise) as well as pharmacological therapy, according to age, was also important . The recovery of patients aged 55-65 is important to ensure the percentage of professionally active persons, to reduce medical costs, as well as those generated by absenteeism, and the socio-professional reintegration of these patients.

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Informed consent: An informed consent was obtained from the patients included in this study.

References

1. Stoicănescu D, Cevei M, Suciu R., Cseppento C. Calitatea vieţii la pacienţii cu coxartroză şi afecţiuni cronice asociate. Acta Medica Transilvanica .2013;2(1):118-121.
2. Cornelis FM, Luyten FP, Lories RJ. Functional effects of susceptibility genes in osteoarthritis. Discov Med. 2011;12:129-139.
3. Valdes AM, Spector TD. Genetic epidemiology of hip and knee osteoarthritis. Nat Rev Rheumatol. 2011;7:23-32.
4. Lane NE. Clinical practice. Osteoarthritis of the hip. N Engl J Med. 2007;357:1413-1421.
5. Van Dijk GM, Veenhof C, Schellevis F, Hulsmans H, Bakker JP, Arwert H, et al. Comorbidity, limitations in activities and pain in patients with osteoarthritis of the hip or knee. BMC Musculoskelet Disord. 2008;9:95.
6. Reeuwijk KG, de Rooij M, van Dijk GM, Veenhof C, Steultjens MP, Dekker J. Osteoarthritis of the hip or knee: which coexisting disorders are disabling? Clin Rheumatol. 2010;29:739-747.
7. Silisteanu SC, Silisteanu AE. The importance of physical exercise-bone mass density correlation in reducing the risk of vertebral and non-vertebral fracture in patients with osteoporosis. Balneo Research Journal. 2018, 9(2), 64-68.
8. Vitaloni M, Botto-van Bemden A, Sciortino Contreras RM, Scotton D, Bibas M, Quintero M, Monfort J, Carné X, de Abajo F, Oswald E, Cabot MR, Matucci M, du Souich P, Möller I, Eakin G, Verges J. Global management of patients with knee osteoarthritis begins with quality of life assessment: a systematic review. BMC Musculoskelet Disord. 2019 Oct 27;20(1):493.
9. Duica L, Antonescu E, Pirlog M, Purnichi T, Szakacs J, Totan M, .. & Bota, G. Clinical and biochemical correlations of aggression in Young patients with mental disorders. Revista de Chimie. 2018, 69(6), 1544-1549.
10. Siew-Li Goh, Monica S.M. Persson , Joanne Stocks , Yunfei Hou , Jianhao Lin , Michelle C. Hall , Michael Doherty , Weiya Zhang . Review Efficacy and potential determinants of exercise therapy in knee and hip osteoarthritis: A systematic review and meta-analysis. Annals of Physical and Rehabilitation Medicine. 2019;62: 356–365.
11. Pereira D, Peleteiro B, Arau´ jo J, et al. The effect of osteoarthritis definition on prevalence and incidence estimates: a systematic review. Osteoarthritis Cartilage. 2011;19:1270–85.
12. Sharif B, Kopec J, Bansback N, et al. Projecting the direct cost burden of osteoarthritis in Canada using a microsimulation model. Osteoarthritis Carti-lage. 2015;23:1654–63.
13. Katz JN, Losina E, Barrett J, et al. Association between hospital and surgeon procedure volume and outcomes of total hip replacement in the united states medicare population. J Bone Joint Surg2001;83:1622.
14. Katz JN, Barrett J, Mahomed NN, et al. Association between hospital and surgeon procedure volume and the outcomes of total knee replacement. J Bone Joint Sur 2004;86:1909.

15. Culliford D, Maskell J, Beard D, et al. Temporal trends in hip and knee replacement in the United Kingdom. Bone Joint 2010;92:130–5.
16. Lee S, Kim SJ Prevalence of knee osteoarthritis, risk factors, and quality of life: The Fifth Korean National Health And Nutrition Examination Survey, Int J Rheum Dis. 2017 Jul;20(7):809-817.
17. Silişteanu SC, Antonescu E. The influence of the body weight index (BMI) in the recovery of the degenerative diseases of the joints. Balneo Research Journal, 2016;7(2):66-71
18. Totan M, Antonescu E, Catana MG, Mitariu M M C, Duica L, Filip CR, ... & Mitariu, S. I. C. C-Reactive Protein-A Predictable Biomarker in Ischemic Stroke. Revista de Chimie. *2019*, *70*(6), 2290-2293.
19. Cho SK, Jung SY, Choi S, Im SG, Kim H, Choi WS, Jang EJ, Sung YK. Factors related to the use of opioids as early treatment in patients with knee osteoarthritis. Arthritis Res Ther. 2019 Nov 4;21(1):222. doi: 10.1186/s13075-019-2004-x.
20. Duica Lavinia, Depression - multiple psychopathological facets, Mental Health-actual views in psychology, medicine and anthropology. Sep. 2016, p 20-24.
21. Birlutiu V, Stef L, Mitariu S I C, Filip C R, Duica L, Antonescu E, ... & Manea, M. M. The Biochemical Biomarkers Determination in Alzheimer Dementia. *REVISTA DE CHIMIE*. *2018 69*(11):4055-4059.
22. Bernad-Pineda M, de Las Heras-Sotos J, Garcés-Puentes MV. Quality of life in patients with knee and hip osteoarthritis. Rev Esp Cir Ortop Traumatol. 2014 Sep-Oct;58(5):283-9. doi: 10.1016/j.recot.2014.04.005. Epub 2014 Jul 8.
23. Hosu CD, Moisoiu V, Stefancu A, Antonescu E, Leopold LF, Leopold N, & Fodor, D. Raman spectroscopy applications in rheumatology. Lasers in medical science, *2019*; 34(4): 827-834
24. Antonescu E, Bota G, Serb B, Atasie D, TATARU CD, Totan M, ... & Oswald, I. Study of the Total Serum Concentration of Serrum Ionized Magnesium in Children and Adolescents from Sibiu Area. *REVISTA DE CHIMIE*;*2018*:*69*(12), 3389-3392.
25. Silisteanu SC, Silisteanu AE. The importance of the elemental functional mobility coefficient in assessing the functional status of the coxofemoral joint. Balneo Research Journal. *2018*; *9*(1): 38-42.
26. Hochberg MC, Altman RD, April KT, et al. American College of Rheumatology 2012 recommendations for the use of nonphermacologic and pharmacologic therapies in osteoarthritis of the hand, hip and knee. Arthritis Care Res. 2012; 64: 465-74.
27. Zhang W, Moskowitz RW, Nuki G, et al. OARSI recommendations for the management of hip and knee osteoarthritis: II. OARSI evidence-based expert consensus guidelines. Osteoarthritis and Cartilage, 2008; 16: 137-62.
28. Zhang W, Moskowitz RW, Nuki G, et al. OARSI recommendations for the management of hip and knee osteoarthritis: I. Critical appraissal of existing treatment guidelines and systematic review of current research evidence. Osteoarthritis Cartilage, 2007; 15: 981-1000.
29. Zhang W, Nuki G, Moskowitz RW, et al. OARSI recommendations for the management of hip and knee osteoarthritis part III: changes in evidence following systematic cumulative update of research published through January 2009. Osteoarthritis Cartilage.2010; 18: 476-99.
30. Silisteanu SC, Antonescu E, Szakacs J, Totan M, Filip CR, Serb B H, ... & Mitariu SIC. Study on Changes in Some Physiological Parameters Under the Action of Therapeutic Ultrasound. Rev. Chim. (Bucharest). 2017; 68: 1306-1309.
31. Hugo L, Hoeksma D, Cornelia HM, et al. A comparison of the OARSI response criteria with patient's global assessment in patients with osteoarthritis of the hip treated with a non-pharmacological intervention. OsteoArthritis and Cartilage; 2006: 14, 77-81.
32. Silisteanu SC, Haidamac, AD. The purpose of the complex treatment for patients with posttraumatic lesions at the hand level. Balneo Research Journal. 2016; *7*(4): 135-142.
33. Val Jiménez CL, López-Torres Hidalgo J, García Atienza EM, Navarro Ruiz MS, Hernández Cerón I, Moreno de la Rosa L. Functional status, self-rated health and level of physical activity of patients with osteoarthritis. Aten Primaria.. 2017 Apr;49(4):224-232. doi: 10.1016/j.aprim.2016.06.002. Epub 2016 Jul 26.
34. Deyle GD, Allison SC, Matekel RL, et al. Physical therapy treatment effectiveness for osteoarthritis of the knee: a randomized comparison of supervised clinical exercise and manual therapy procedures versus a home

exercise program. Phys Ther. 2005; 85: 1301-1317.
35. Silisteanu SC, Antonescu E, Moisii V. The importance of the recovery treatment in increasing the quality of the lives of the patients with the carpal tunnel syndrome. Balneo Research Journal. 2016; 7(3): 81-88.
36. Rutjes AW, Nuesch E, Sterchi R, et al., 2009, Transcutaneous electrostimulation for osteoarthritis of knee. Cohrane Database Syst Rev, 4: CD002823.
37. Silisteanu SC, Mitariu L, Ranga R, Antonescu E, Duica CL, Racheriu M, ... & Manea M. M. Potentiating the Effect of Treatment with Voltaren Gel Using Ultrasonic Frequencies of 1 MHz. Revista de Chimie. 2018; 69(7): 1749-1751.
38. Nelson AE, Allen KD, Golightly YM, et al. A systematic review of recommendation and guidelines for the management of osteoarthritis: The chronic osteoarthritis management initiative of the U. S. Bone and joint initiative. Seminars in Arthritis and Rheumatism; 2014; vol. 43(6) :701-712.
39. Silisteanu SC, Silisteanu AE, Antonescu E. The study on the importance of effects after the ultrasound use in the recovery of patients with lower lumbar discopathy. Balneo Research Journal. 2018; 9(4): 433-437.
40. Bjordal JM, Klovning A, Ljunggren AE, et al. Short-term efficacy of pharmacotherapeutic interventions in osteoarthritic knee pain: a meta-analysis of randomised placebo-controlled trials. Eur J Pain,.2007; 11: 125-38.
41. Chou R, Helfand M, Peterson K, et al. Comparative effectiveness and safety of analgesics for osteoarthritis. Comparative Effectiveness Review No.4, 2006.(Prepared by the Oregon Evidence-based Practice Center under Contract No. 290-02-0024). Rockville, Md: Agency for Healthcare Research and Quality
42. Chan FK, Abraham NS, Scheiman JM, et al. First International Working party on Gastrointestinal and Cardiovascular Effects of Nonsteroidal Anti-inflammatory Drugs and Anti-platelet Agents. Management of patients on nonsteroidal anti-inflamatory drugs: a clinical practice recommendation from the First International Working Party on Gastrointestinal and Cardiovascular Effects of Nonsteroidal Anti-inflammatory Drugs and Anti-platelet Agents. Am J Gastroenterol. 2008; 103: 2908-18.
43. Rostom AM, Muir K, Dube C, et al. Prevention of NSAID-related upper gastrointestinal toxicity: a meta-analysis of traditional NSAIDs with gastroprotection and COX-2 inhibitors. Drug Health Patient Saf. 2009; 1: 47-71.
44. Rostom A, Moayyedi P, Hunt R. Canadian Association of Gastroenterology Consensus Group. Canadian consensus guidelines on long-term nonsteroidal antiinflammatory drug therapy and the need for gastroprotection: benefits versus risks. Aliment Pharmacol Ther. 2009; 29: 481-96.
45. Bhatt DL, Scheiman J, Abraham NS., et al. ACCF/ACG/AHA 2008 expert consensus document on reducing the gastrointestinal risks of antiplatelet therapy and NSAID use: a report of the American College of Cardiology Foundation Task Force on Clinical Expert Consensus Documents. J Am Coll Cardiol. 2008; 52: 1502-17.
46. Latimer N., Lord J, Grant RL, et al. Cost effectiveness of COX-2 selective inhibitors and traditional NSAIDs alone or in combination with a proton pump inhibitor for people with osteoarthritis. BMJ, 2009, 339: b2538.
47. Bjordal JM, Klovning A, Ljunggren AE, et al. Short-term efficacy of pharmacotherapeutic interventions in osteoarthritic knee pain: a meta-analysis of randomised placebo-controlled trials. Eur J Pain. 2007;11: 125-38.
48. Makris UE, Kohler MI, Fraenkel L. Adverse effects of topical nonsteroidal anti-inflammatory drugs in older adults with osteoarthritis: a systematic literature review. J Rheumatol. 2010; 37: 1236-43.
49. Goh SL, Persson MSM, Stocks J, Hou Y, Lin J, Hall MC, Doherty M, Zhang W. Efficacy and potential determinants of exercise therapy in knee and hip osteoarthritis: A systematic review and meta-analysis. Ann Phys Rehabil Med. 2019 Sep;62(5):356-365.
50. Kraus VB, Sprow K, Powell KE, Buchner D, Bloodgood B, Piercy K, George SM, Kraus WE . Effects of Physical Activity in Knee and Hip Osteoarthritis: A Systematic Umbrella Review. Med Sci Sports Exerc. 2019 Jun;51(6):1324-1339.
51. Silisteanu SC, Silisteanu AE. The importance of the nutrition and of the body weight index in the recovery of the patients older diagnosed with coxarthrosis. Balneo Research Journal.2017; 8(1): 15-20.