Study on the correlation between knee osteoarthritis and anxiety in patients aged over 55

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Abstract

Introduction. Osteoarthritis, which is a cause of chronic pain and disability with manifestation in any joint, with greater frequency in the joints of the lower limbs, upper limbs, but also at the spine level , affects around 250 million people in the entire world. This condition affects around 10% of the global population (18) and has an impressive impact on people, as it is one of the first 5 causes of disability. **Material and method.** The objectives of the treatment made by the patients diagnosed with knee osteoarthritis were: pain reduction, increased joint amplitude, increased muscle strength, increased muscle tone, increased quality of life and reintegration into the family and social environment. In the study, there were discussed demographic data regarding the patients. In order to assess the pain parameter, the VAS scale was used, as well as WOMAC subscales. To assess the quality of life of patients with knee osteoarthritis, the QOL scale (Quality of Life) was used. Anxiety was assessed with the help of a test that comprises the evaluation of symptoms at the cognitive, behavioral and physical level. **Results and discussions**. The pain was evaluated on the VAS scale, having a statistically significant evolution for the evaluation moments. Also with the help of the WOMAC index, two other parameters were evaluated, namely joint rigidity and functional capacity, the results being statistically significant in the 3 evaluation moments. The patients' anxiety was evaluated with the help of the anxiety test; the results obtained were statistically significant at the 3 evaluation moments. **Conclusions.** It is vital that the recovery treatment in osteoarthritis be individualized and adapted to the age group. In our group, it enabled the reduction of pain and anxiety, the increase of the functional capacity and the quality of the patients' lives.Taking into account the fact that the most affected group in the study group was the active professional one, we can evaluate the size of the recovery and the social, family and professional integration for these patients.

Key words: *knee osteoarthritis, the quality of life, anxiety, kinetotherapy,*

Introduction

Osteoarthritis, which is a cause of chronic pain and disability with manifestation in any joint, with greater frequency in the joints of the lower limbs (knee, hip, ankle), upper limbs (shoulder, hand), but also at the spine level (1), affects around 250 million people in the entire world (2). Osteoarthritis affects the joint structure, the subchondral bone, the capsule, the ligaments and the synovial membranes (3). The main symptom in osteoarthritis is the pain that causes the limitation of mobility (4), but also tiredness (5), decreased quality of life (6), but also muscle weakness (7), impaired muscle strength (8), changes in walking (9), all these worsening the preexisting pain (10).The patients diagnosed with osteoarthritis describe the occurrence of pain in static, but also dynamic activities, the affected joints being sensitive upon palpation and pressure (11) or at temperature difference (12). Some patients describe pain as a burning sensation (13), electric current, with perception disorders in evaluating the painful segment and mobilization difficulty (14). The pain is fluctuating during the day (15) or does not show changes (16). However, between 12-30% of the patients diagnosed with osteoarthritis report the decrease of pain intensity on the long term (17).This condition affects around 10% of the global population (18) and has an impressive impact on people, as it is one of the first 5 causes of disability (19).The osteoarthritis diagnosis involves clinical manifestations (joint pain) (20, 21) and radiological elements (22). Among the people diagnosed with knee osteoarthritis, 70-80 % have radiological diagnosis of the disease, but they do not show frequent pain at the joint level (23) while 10-15 % have been radiologically diagnosed and show frequent pain (24).

Studies (25) revealed the relationship between joint pain in osteoarthritis and the changes that occur and can be imagistically seen (by magnetic resonance) at the level of the knee joint- injuries at the bone or synovial level (26). The bone lesions of the subchondral bone microfracture type can determine nociception by increasing intra-bone pressure (27).

The imagistic result by joint magnetic resonance may sometimes not be consistent with the pain phenomenon. Thus, the changes on the images obtained by magnetic resonance can be found in over 80% of the patients that do not show pain (28), and 30% also have synovitis without pain (29).

In this context we can say that there are changes of neuronal signaling in the spinal cord and brain in the case of a continuous joint nociception, a phenomenon called central sensitization, to which the sensory input is amplified when it reaches nociceptive ways at the medullary level and in the brain, causing the frequency and gravity of pain (30).

Therefore, the central sensitization present in an important percentage of people with osteoarthritis (31) is an element of pain gravity (32, 33), explaining the difference between the intensity of the pain and the joint structures changes in this condition (34).

In the case of the synovitis, certain inflammatory molecules can directly activate the nociceptors in the joint, causing the phenomenon of peripheral sensitization. (35). The study of synovial fluid in osteoarthritis of the knee is now performed by modern methods: resonant Raman spectroscopy and surface-enhanced Raman scattering (SERS)(36).

An important risk factor in causing and evolving pain and radiological changes (37) in people with knee osteoarthritis is represented by the body weight. Each weight gain by 3-4 Kg / m², therefore of the body mass index, doubles the risk of knee osteoarthritis (38). Also, obesity is associated to the pro-inflammatory condition that can accelerate the process of joint degeneration (39) and increases the nociceptive sensitization by increasing pain (40, 41). Osteoarthritis should be understood in a biopsychosocial setting. The pain felt in knee osteoarthritis involves complex mechanisms represented by the joint pathology, the status of nociception at the central level; that is why the treatment is based on the improvement of the pain, the improvement of the physical and mental function (42) by using the pharmacological therapy (43,44).

Osteoarthritis is a chronic disease requiring long-term management. Patients diagnosed with this condition are behaviorally inhibited, avoid assuming the active role in the self-management of pain and continue having chronic pains (45). This is why self-management interventions are recommended as part of the effective management of osteoarthritis (46,47) It is essential for the self-management concept, including the notions of motivation, expectation, belief to model the experience of pain and accompanying behaviors contributing either to the adaptation to chronic pain or to disability.

Recommended self- management interventions include information on the health condition, the stress management techniques, the physical exercises, the skill to solve personal problems, which allows people diagnosed with osteoarthritis to effectively manage long-term disease symptoms (48).

The results of a meta-analysis on 13 studies published in 2009 proved the beneficial effect of self-management programs on pain, the improvement of the quality of life, which would play an important role in the treatment of osteoarthritis (49). The authors of this study presented that the weak effects for self-management programs are represented by the patient's perception of the disease, associated comorbidities and patient's education (50,51).

Osteoarthritis involves high economic costs (52), absenteeism from the professional activity (65), decrease in the work efficiency, decrease in the the work performance, decrease in the productivity. Pain, anxiety and the decreased quality of life caused by the disease should be also taken into consideration (53). The indirect costs caused by osteoarthritis are increased, more in women compared to men. Due to the demographic changes, the aging of the population, it is expected that the prevalence of this disease will increase in the coming years.

The non-pharmacological treatment includes, besides the elements of education of the person, (losing weight, avoiding prolonged standing, walking on the ground with elevations, weight lifting) physical exercise and the use of electrotherapy (54,55).

The electrotherapy procedures frequently used involve ultrasound with pain-relief effect and muscle relaxation (56). The muscle relaxation is explained by the vibrational action of the ultrasound waves in the tendons and muscles, and the effect of hyperemia

determines, with the help of the vegetative nervous system, arteriolar vasodilation at the capillary level, activating blood circulation (57).

The pharmacological treatment consists of the administration of selective NSAIDs (COX-2 inhibitors), pain-killers (opioids), but also of "slow acting medication".

A 2019 study (analys of study) evaluated the effectiveness of physical exercise in reducing pain, increasing joint function and quality of life in the hip and knee osteoarthritis, all these worsening the preexisting pain (10). According to a study that analyzed the data from 9 electronic databases, until 2017 it was found that physical exercise has significant benefits in reducing pain, increasing functional capacity and quality of life for a period of 8 weeks, the results being better for people under the age of 60 (58). The physical exercise can improve the patient's symptoms, being a relatively safe alternative compared to the pharmacological treatment.

For the walking parameter (time, distance), physical exercise involved the increase of the strength, especially for knee extensors/flexors, hip abductors, but also for other muscle groups (59,60). The favorable results were recorded at a time interval of up to 8 weeks.

Physical exercise is recommended in the treatment guidelines for osteoarthritis (61,62), having benefits in reducing pain, improving physical function (63, 64), improving the mood (65), lowering the risk of developing other diseases (cardiovascular, metabolic, bone, neurodegenerative) (66, 67). Thus, physical exercise inhibits nociception at the central level (68, 69), at the local one (70) and at the systemic level and plays a role in reducing inflammation (83) and degenerative action at the joint level (71,72, 73). In addition, physical exercise has the same results in reducing pain compared to pain-killers (73), but with very few adverse effects (74,75) However, it is necessary that the physiotherapist individualize the exercise, to adjust and modify the training parameters in order to manage the symptoms.

Weight reduction programs used to improve disability and reduce pain (76) also help in reducing inflammatory biomarkers (77) .

Research has shown that human lifestyle, sleep-wake rhythm and psychosocial factors can reduce or amplify pain (78), having a role in continue central sensitization (79).

These factors play a role in disability, which is why it is considered that sleep issues are related to the increased sensitivity of the patient with osteoarthritis and to the intensification of joint pain (80), which is why sleep may be a target for pain reduction treatment in osteoarthritis (81).

Among the people diagnosed with knee osteoarthritis, 40% have anxiety, depression, or both (82, 83,84), leading to a more serious pain (85). Anxiety (86) is associated with increased pain sensitivity in these people.

The study (87) published in 2019 investigated for 12 months the effect and role of anxiety in causing pain in osteoarthritis in a group of 4,730 people. It was found that higher anxiety, regardless depression, was associated to increased pain scores at people with knee osteoarthritis.

Some studies (88) proved that negative influences with changing vigilance lead to increased pain sensitivity, while positive influences decrease pain.

The purpose of this study was to evaluate the correlation between knee osteoarthritis and the manifestations of anxiety caused by the disease in people aged over 55.

Material and method. The study was performed in an outpatient regime, over a period of 6 months, being evaluated 123 patients.

The inclusion criteria in this study were:

[1] patients diagnosed with knee osteoarthritis of the knee (clinically and radiologically)
[2] diagnosis of knee osteoarthritis for at least 6 months
[3] aged over 55
[4] agreement to take part in the study

The exclusion criteria from the study were:

- patients diagnosed with knee arthroplasty
- decompensated associated comorbidities (cardiovascular, renal, pulmonary, digestive, neurological, metabolic)
- patients with mental disorders
- patients who did not agree to take part in the study

The objectives of the treatment made by the patients diagnosed with knee osteoarthritis were: pain reduction, increased joint amplitude, increased muscle strength, increased muscle tone, increased quality of life and reintegration into the family and social environment.

In the study, there were discussed demographic data regarding the patients (age, gender, living environment, height, weight, body mass index).

In order to assess the pain parameter, the VAS scale (0-100, 0 = no pain, 100 = maximum pain) was used, as well as WOMAC subscales (with 5 items regarding pain in standing, dorsal decubitus, sitting, walking, climbing stairs). By using WOMAC subscales, joint rigidity (in the morning and during the day), functional capacity (possibility of daily activities) and disability were assessed.

To assess the quality of life of patients with knee osteoarthritis, the QOL scale (Quality of Life) was used.

Anxiety was assessed with the help of a test that comprises the evaluation of symptoms at the cognitive, behavioral and physical level.

Also, for the patients' mental state (taking the age into account), the MMSE test (Mini test for the examination of the mental state) was used, the most used instrument in this context.

The study was performed for a period of 12 days, and the patients' evaluation was made at the beginning and the end of the treatment whereas the control was made 45 days later.

All patients received, according to the guidelines, pharmacological treatment with selective non-steroidal anti-inflammatory medication (general and topical administration) and pain-killers.

The recovery treatment included electrotherapy (medium frequency currents, ultrasound) and kinetotherapy in the outpatient regime, then the patients continued at home the kinetotherapy program for 30 minutes per day, 3 times a week.

The medium frequency currents have been used due to the physiological effects they present – pain-relief action, vasomotor, decontracting and trophic action. This type of current is a sinusoidal alternating current with a frequency between 3-10 kHz. In the study, it was used the interfering current with variable (modulated) rhythmic frequencies ("spectrum") and modulation 0-100 Hz or "spectrum" 0-100 Hz. Thus, the difference of the two currents linearly varies both ascending and descending on a period from 0-100Hz. The rhythmic alternation of inhibitory/exciting effects is, therefore, achieved with the following consequences: the activation of cellular functions, hyperemia at the level of the deep vessels, the performing of a deep micro-massage for the striated muscles.

Ultrasounds (54) were used for biological effects, that is: the increase of cell membrane permeability, molecular activation by increasing the energetic level of the external atomic electrons, by increasing the respiratory activity at the cellular level and the activation of oxidative processes. The pursued physiological effects were those of pain relief, hyperemia and muscle relaxation.

The pain relief effect is similar to the mechanism of low frequency current for pain relief and consists of inhibiting the painful transmission from the mechanical proprioceptors. Sonophoresis was chosen as an applying methodology (direct coupling) by using gel with a non-steroidal anti-inflammatory effect (55). In this context, the depth action was reduced and the contact material was denser. According to "the ultrasonophoretic index", the quantity of pharmacological substance entered into the skin is directly proportional to the intensity and duration of the application, but it also depends on the thickness of the tissues crossed and the physiological state of the skin. The use of ultrasound in this form improves the resorption capacity for the next sessions. The dynamic method of ultrasound application was used, having the advantage of homogenizing the ultrasounds effects in different tissue structures, under impulse regime. The application dose was 0.5W/cm², the impulse frequency was 1 Hz (54).

For all the procedures that were applied to patients, the indications and contraindications of application were considered.

The kinetotherapeutic program was daily performed, it lasted for 30 minutes per session and passive mobilizations were used, but also active or active with resistance. Also, exercises for coordination and for continuing the static and dynamic balance were used, which were useful in achieving the walking.

Statistical analysis

The recording of the data obtained in the evaluation was done in Microsoft Excel files and the values for the median and the standard deviation were used, and the application of the t-student test was useful to compare the obtained results and to observe if the working hypothesis was confirmed. After calculating the t test, we can appreciate the value of the p index, which shows the possibility of an error regarding the hypothesis. The results are statistically significant for $p < 0.05$.

Results

The present study included 123 patients aged over 55 and for which the average was 62. There were 69 female patients and 54 male.

Table 1. Distribution of the group by gender and age

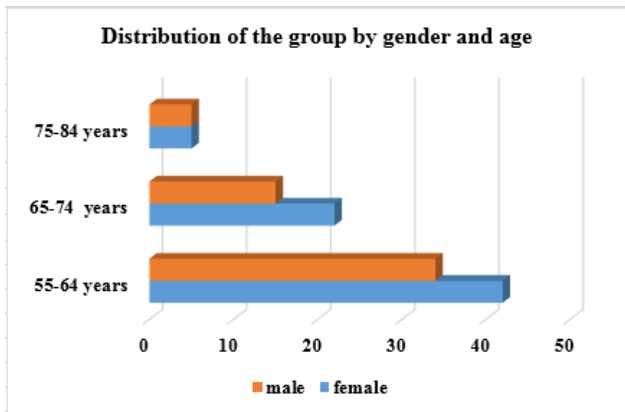| age/gender	55-64 years	65-74 years	75-84 years
female	42	22	5
male	34	15	5

Fig. 1. Distribution of the group by gender and age

After their origin, patients come from the urban area in higher percentage (52.03%) compared to the rural area (47.96%)

Table 2. Distribution of the group by gender and environment

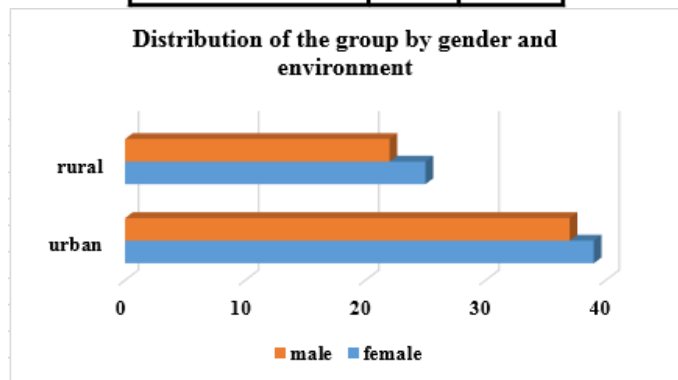| gender/environment	urban	rural
female	39	25
male	37	22

Fig. 2. Distribution of the group by gender and environment

The pain was evaluated on the VAS scale, having a statistically significant evolution for the evaluation moments, the applied student t test showed a value for p <0.05.

Table 3. The evolution of pain on the VAS scale

scale	VAS		
moment	initial	final	control
mediana and std dev	7±1.47	5±1.39	3±1.11
t-student test	0.0223	0.1974	

The evaluation of the same parameter using the WOMAC index has also showed statistically significant results, with p <0.05

Also with the help of the WOMAC index, two other parameters were evaluated, namely joint rigidity and functional capacity, the results being statistically significant in the 3 evaluation moments and with p <0.05.

Table 4. The evolution of the WOMAC index

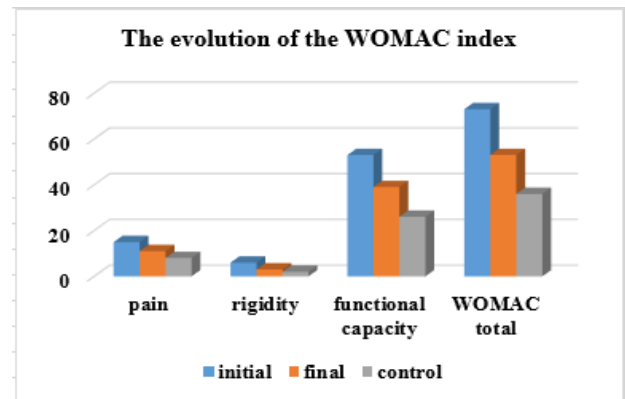| scale/moment/statistically	initial	final	control
pain	15±1.38	11±1.11	8±8.26
rigidity	6±0.69	3±0.45	2±0.45
functional capacity	53±2.72	39±3.27	26±3.22
WOMAC total	73±3.52	53±3.69	36±2.56

Fig. 3. The evolution of the WOMAC index in the study group

The quality of life parameter was very useful in our study, so it was evaluated with the help of the QOL scale. The results obtained after the recovery treatment are statistically significant, with p <0.05.

Table 5. The evolution of the QOL scale

scale	QOL		
moment	initial	final	control
mediana and std dev	81±14.61	86±10.01	94±7.95
t -student test	0.0011	0.0012	

The patients' anxiety was evaluated with the help of the anxiety test; the results obtained were statistically significant at the 3 evaluation moments.

Table 6. The evolution of the anxiety scale

scale	Anxiety scale		
moment	initial	final	control
mediana and std dev	35±2.3	26±2.37	19±1.83
t - student test	0.0123	0.0142	

Discussions

The group of patients studied has a higher percentage of female patients (56.09%) compared to male patients (43.91%).

The distribution of patients by age and sex shows higher percentages in the 55-64 age group with 76 patients, among whom 42 (34.15%) were women and 34 (27.64%) were men.

The next one is the second age group with 22 (17.88%) female patients and 15 (12.19%) male patients.

For the age group between 75-84, the number of patients was 5 (4.07%).

Taking into consideration the above, we can state that the active professional group is affected, which leads to costs for professional treatment and reintegration.

One of the symptoms of knee osteoarthritis, which is the pain, was decreased in the study group, the results obtained by evaluation using the VAS scale (28.57% decrease of the pain at the end of treatment and 57.14% during the examination) and WOMAC (26.67% decrease at the end of treatment and 46.67% during the examination) being valid.

The joint rigidity was reduced by 50% at the end of the treatment and by 66.67% during the examination.

The functional capacity registered an increase of 26.42% at the end of the treatment and 69.81% during the examination.

The test for evaluating the anxiety caused by the disease also registered a decrease with 25.71% at the end of the treatment and of 45.72% during the examination.

Conclusions

It is vital that the recovery treatment in osteoarthritis be individualized and adapted to the age group. In our group, it enabled the reduction of pain and anxiety, the increase of the functional capacity and the quality of the patients' lives.

Taking into account the fact that the most affected group in the study group was the active professional one, we can evaluate the size of the recovery and the social, family and professional integration for these patients.

Acknowledgements

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