COMPARATIVE STUDY REGARDING THE EFFECTIVENESS OF KINESIOTHERAPY IN THE TREATMENT OF KNEE OSTEOARTHRITIS

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Abstract: *We have performed a prospective observational study on 90 patients on the effectiveness of the conservative treatment of knee osteoarthritis. All patients included in the study received oral Nonsteroidal anti-inflammatory drugs (NSAIDs) treatment. The pharmacological therapy was completed with physiotherapy sessions in case of group I, or different electrotherapy procedures in group II. Patients in group III received only pharmacological treatment. Evaluation of patients was performed before treatment, on the 10-day of treatment, 3 and 6 months after finalization. Comparing the goniometric average values, physical therapy was proven effective in achieving and maintaining long term joint mobility. Regarding pain intensity at the 6-month assessment only with patients in group I, there were statistically significant differences compared with the values obtained before the treatment. Among the tested methods of treatment, the best and long lasting therapeutic results were obtained by combining the drug with a kinetic treatment.*

INTRODUCTION

The knee osteoarthritis, a degenerative disease of the knee, is a quite frequent health problem in the over 40-year-old population. Clinically, the malady is characterized by an insidious onset, chronic pain, leading even to functional incapacity.(1) In its early stages, treating the knee osteoarthritis requires a complex treatment, including a number of non-pharmacological measures combined with drugs with analgesic, anti-inflammatory and myorelaxant effects. The major concern of the conservative treatment is to reduce pain, inflammation and maintain joint mobility.(2)

The different electrotherapeutical methods are applied for the analgesic and musculotropic effect. The most widely used procedures in the treatment of knee osteoarthritis are ultrasounds, dyadinamic current, interferential currents, transcutaneous electrical nerve stimulation, Trabert current, galvanic baths and ionization.(3)

The aim of the kinetotherapy is to combat pain and inflammation, avoid deformations and faulty posture, tone the musculature, and maintain joint mobility and stability.(4)

The pharmacological treatment consists in the general or local administration of anti-inflammatory drugs. Regardless of the stages of the disease, the infiltrations with viscoelastic solution or platelet- and growth factor rich plasma, are proved useful.

PURPOSE

The purpose of this paper is to evaluate the effectiveness of different methods of conservative treatment recommended in early stages of knee osteoarthritis and establish a non-surgical therapeutic behaviour.

METHODS

Between the 3rd December 2013 and 9th May 2014, the County Orthopedic Clinic of Tîrgu-Mureş has conducted an observational prospective study on the effectiveness of conservative knee osteoarthritis treatment, in order to be able to establish the maximum efficiency treatment protocol.

The study included 90 patients diagnosed with knee osteoarthritis (Albach stage I and II). The selected patients paid a visit at the doctor's office presenting painful symptomatology on the level of the functional knee joints, without associated pathology representing contradiction to NSAID medication or electrotherapy.

Three groups of 30-30 patients were formed, all the patients included in the study received generic treatment with non-steroidal anti-inflammatory COX-2 selective inhibitor, administrated once a day, for ten days.

For the patients in group I, the pharmacological treatment was complemented by 30 minutes daily physical therapy sessions for 10 days at the doctor's office, continued with physical therapy sessions at the patient's home. The patients in group II beside the pharmacological treatment, benefited in electrotherapy treatment (ultrasounds – 0.4 W/cm², for 7 minutes and diadynamic electrical current set on long period, 15 minutes per day). The patients in the third group received only pharmacological treatment.

The patients' clinical and functional assessment was performed at the beginning and end of the ten days treatment and 3, respectively 6 months after treatment. To determine the active joint mobility a goniometric evaluation of the knee was performed. Pain intensity was estimated by visual analogue pain scale (VAS). The functional parameters were evaluated by using the WOMAC score.

Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS, version 17, Chicago, IL, USA). Data were labelled as quantitative variables. Quantitative variables were tested for normality of distribution using Kolmogorov-Smirnov test and were described by mean ± standard deviation and percentiles (25; 75%), whenever

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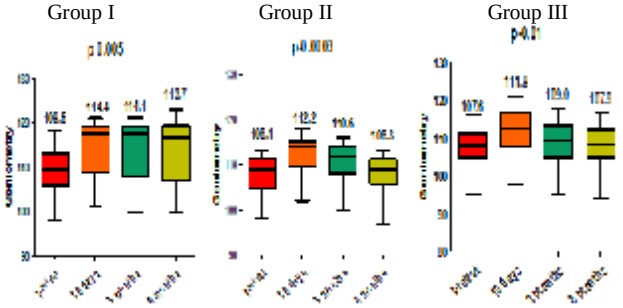
appropriate. Differences in the mean between groups were analyzed using ANOVA test. The level of statistical significance was set at $p<0.05$. Correlation between quantitative variables (BMI) has been investigated using Pearson's correlation coefficient (r) and evaluated for statistical significance at a level alpha=0.05.

RESULTS

Distribution by age and sex in the three groups was balanced.

The average values of the goniometric measurements are shown in table no. 1. The evolution of the average values between the three groups is shown in figure no. 1. The 10 day treatment shows significant improvement in the joint mobility of all patients, however, the positive result is shown only with group I at the 3 and 6 month evaluation.

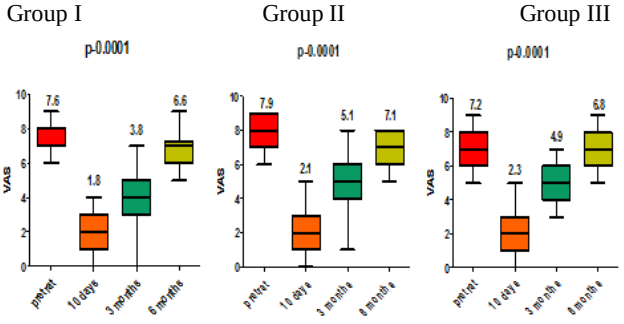
Figure no. 1. Evolution of the average goniometric assessments



Comparing the average goniometric values of the groups by the ANOVA test and the Bonferroni multiple compatibility test, statistically significant differences were found between groups I and III at the 3 months assessment and between groups I and II, respectively, between groups I and III after the 6 months evaluation.

The average values of VAS scores are shown in table no. 8. After the 10-day-treatment all three patients groups show significant improvement in pain intensity. The further evaluations show that the pain intensity has an increasing tendency with all patients, regardless of the administered therapeutic methods. The average values of the VAS scores are shown in figure no. 2.

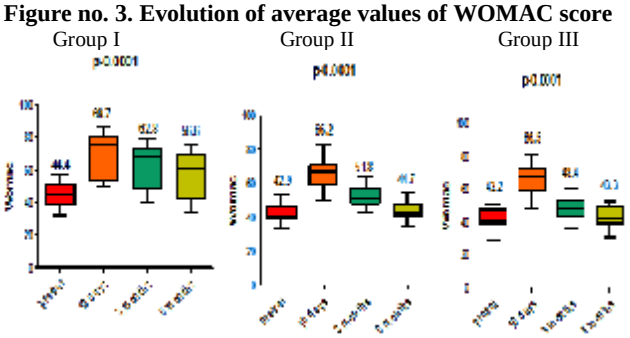
Figure no. 2. The evolution of the average values of VAS scores



After comparing pre-treatment values with values obtained in subsequent evaluations, we found that pain intensity shows a significant decrease at the six months evaluation just in case of group I, the difference remained significant compared with the mean pre-treatment. Statistically significant differences between group I and II and group I and III were noticeable at the three months evaluation.

The average values of WOMAC scores are shown in table no. 1. Figure no. 3 illustrates the evolution of the average values of the WOMAC. Functionality provides a significant improvement at the evaluation after the 10 days treatment in all patients, but this improvement was maintained at the 6 months assessment by only the patients in group I.

Figure no. 3. Evolution of average values of WOMAC score



At the 3, 6 months evaluation the results of the patients in group I present statistically significant differences compared to the results of the patients in group II and III.

After processing statistically the obtained data, a negative correlation was found between the body mass index (BMI) and the degree of joint mobility. The increase of the BMI entails decreased joint mobility. BMI is not correlated with the VAS values. BMI and WOMAC score values are negatively correlated. Increased body mass index entails decreasing functionality and quality of life.

Table no. 1. The average values of evaluations

	Group I (mean(SD))	Group II (mean(SD))	Group II (mean(SD))	p##
Goniometry (°)	p#-0.005*	p#-0.0003*	p#-0.01*	
Pre-treatment	109.5 (5.070)	108.1 (3.939)	107.6 (5.327)	
10 days	114.4 (5.757)	112.2 (4.289)	111.9 (6,.36)	0.16
3 months	114.1 (6.392)	110.6 (4.303)	109.0 (5.678)	0.001*
6 months	113.7 (6.893)	108.3 (4.053)	107.9 (5687)	0.0001*
VAS	p#-0.0001*	p#-0.0001*	p#-0.0001*	
Pre-treatment	7.633 (0.8899)	7.933 (0.9803)	7.233 (1.073)	
10 days	1.867 (1.074)	2.033 (1.299)	2.300 (1.489)	0.43
3 months	3.800 (1.730)	5.100 (1.668)	4.933 (1.230)	0.003*
6 months	6.600 (1.133)	7.133 (0.9732)	6.800 (1.031)	0.14
WOMAC	p#-0.0001*	p#-0.0001*	p#-0.0001*	
Pre-treatment	44.38 (7.593)	42.93 (5.162)	42.26 (5.800)	
10 days	69.75 (12.79)	66.25 (8.481)	66.53 (8.764)	0.39
3 days	62.85 (13.08)	51.86 (5.237)	48.38 (6.313)	0.0001*
6 months	56.62 (13.92)	44.73 (4.754)	43.35 (6.136)	0.04*

*The level of statistical significance was set at $p<0.05$. p# -data obtained by vertical comparison
p##-data obtained by horizontal comparison

DISCUSSIONS

Arthritis, in general, and osteoarthritis are largely studied and discussed topics. Currently, there is not yet a well-established protocol, suitable for conservative treatment of osteoarthritis. Many studies discussed about the effectiveness of different methods of conservative treatment (5,6,7,8,9), yet it is still unknown what those non-chirurgical therapeutic interventions are that interfere with the pathogenic mechanism of the disease. According to ACR (10), drug therapy for pain management is more effective in combination with other non-pharmacological strategies.

From our results, it appears that of the three recommended therapeutic options, the combined therapeutic approach is the most efficient. Immediately after drug treatment, at the 10 days evaluation, there was a significant amelioration in

pain intensity and improvement joint functionality with all patients included in the study. However, this improvement was maintained for a longer period only with the patients in group I. One possible explanation for this involution could be the fragmentary execution or un-execution of the recommended exercises due to lack of motivation or lack of family support. Another possible explanation could be the increased pain intensity. The effectiveness of therapeutic exercises performed by the patients in their own homes was tested by Baker et al.(11) Kuptniratsaikul V et al. (12) have studied the way in which regular exercises, to improve the strength of the quadriceps muscle, influence the pain intensity in patients with knee osteoarthritis. Segal NA et al. (13) studied how the weakening of the quadriceps muscle affects the development of osteoarthritis by accelerating joint space narrowing. This topic could be the subject of future studies.

Numerous studies published have demonstrated the effectiveness of various procedures for electrotherapy in relieving pain and improving joint mobility.(14,15,16)

After the statistical processing of the obtained data, we have discovered a negative correlation between the BMI and joint mobility. Functional results obtained in obese patients are lower than those obtained from overweight and normoponderal patients.

CONCLUSIONS

This study demonstrates the short term effectiveness of the tested therapeutic modalities. NSAIDs drug treatment, merged with different electrotherapeutical procedures, or administrated individually, has proven the short term effectiveness of the treatment plan; nonetheless the duration of symptom improvement is limited to a shorter period of time compared with the results obtained by the association of physical therapy with pharmacological treatment.

Physical therapy has been proven effective in the medium treatment in improving and maintaining joint mobility and functionality, however, the effectiveness in ameliorating painful symptoms was low.

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