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Efficacy of Physical Therapy in the Treatment of Gonarthrosis in Physically Burdened Working Men

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ABSTRACT

Introduction: Gonarthrosis is most frequently defined as the change involving damage of the articular cartilage of the knee joint, emergence of abnormal knee tissue, reactive changes in synovial membrane, and pathological synovial fluid. The site of initial damage most often remains unknown. Goal of the research: **The goal** of this research is to demonstrate the efficacy of individual physical therapy during the medical treatment for gonarthrosis in the working population engaged in physical labour, and to compare the state of pain and mobility before and after the treatment.

Subjects and research methods: The research encompassed 30 subjects diagnosed with gonarthrosis, and it was conducted in the Institute of Occupational Health and Sports Medicine of the Zenica-Doboj Canton. On the basis of the applied physical treatments, we divided the subjects into control group and treatment group. All the subjects were treated during 21 days. **Results and conclusions:** In the largest number of subjects in both groups gonarthrosis occurred primarily as a consequence of knee joint trauma, and then because of weight and physical strain. Of the total number of subjects covered by this research, 9 subjects in control and 8 in treatment group had gonarthrosis of their right knee. 4 subjects in the control and 5 in the treatment group had gonarthrosis of the left knee, while 2 subjects from each group had gonarthrosis on both knees. By the analysis of clinical symptoms of gonarthrosis prior to the treatment, it was found that all the subjects from both groups had pain symptom, in 13 subjects from the control and 14 subjects from the treatment group limited range of motion was established, while 8 subjects from control and 9 subjects from treatment group had swelling in the joint area. The condition of the subjects prior to the treatment was analyzed by means of pain scale, and it was found that both groups experienced moderate level of pain before the treatment. After the 21st day of treatment, the pain intensity was again measured in the subjects that underwent combined physical and medication treatments. In the subjects from the control group that also underwent electrotherapy, the average pain scale value amounted to $2,33 \pm 1,34$ after treatment, whereas in the subjects that underwent magnetotherapy and combined physical and medication treatments the pain scale amounted to $0,73 \pm 0,38$. The ANOVA test showed that there is a statistically significant difference in the pain scale before and after the treatment, and also that the improvement in the clinical picture and reduction of pain occurred in both groups of subjects.

Key words: gonarthrosis, physical therapy, working population

1. INTRODUCTION

Gonarthrosis is most frequently defined as the change involving damage of the articular cartilage of the knee joint, emergence of abnormal knee tissue, reactive changes in synovial membrane, and pathological synovial fluid. The site of initial damage most often remains unknown (1). It is known that, during the development of the process, the increased synthesis of the main collagen types, and also of proteoglycans, occurs as a reparative reaction of chondrocytes (2). The main result of the pathological process is the imbalance between the collagen synthesis and the damage of the articular cartilage. Each cause or process inducing cartilage degradation exerts effects on the

occurrence and progression of gonarthrosis. Gonarthrosis is diagnosed on the basis of clinical and radiological examinations (3). Magnetic resonance, bone scintigraphy, and arthroscopy are also quite important. However, in the future, the markers of articular cartilage decay will be the key for determining the time of the onset of the disease, its progression, and the advance of the treatment (4). Gonarthrosis, as a chronic disease of the knee joint most frequently causes pain and limited range of motion. Physiotherapy is a non-invasive method of treatment that includes a series of modalities with the purpose of symptom reduction in the clinical picture of gonarthrosis. There is strong evidence suggesting short-term positive effect of workout on

pain and function, although the type of exercise does not affect the outcome of the treatment. Workout, either group or individual, is very effective, while the physiatrist's recommendations improve prevention and treatment of gonarthrosis (5). In the daily physiatry practice, the application of physical treatment in patients suffering from gonarthrosis had excellent results. The outcome of the treatment depends primarily on the degree of the articular cartilage damage, the subject's age, and also on the treatment itself (6).

2. RESEARCH GOAL

The goal of this research is to demonstrate the efficacy of individual physical therapy during medical treatment for gonarthrosis in the working population engaged in physical labour, and to compare the state of pain and mobility before and after the treatment.

3. SUBJECTS AND METHODS

The research encompassed 30 subjects diagnosed with gonarthrosis, and it was conducted in the Institute of Occupational Health and Sports Medicine of the Zenica-Doboj Canton. On the basis of the applied physical treatments, we divided the subjects into control group and treatment group. All the subjects were treated during 21 days. During this period manual massage was given, as well as cryotherapy and kinesitherapy, with the use of analgesics and non-steroid antirheumatic drugs. Twice a week an ultrasound examination was performed. However, the criteria for the division of subjects were such that the subjects in the control group underwent electrotherapy, while the subjects in the treatment group underwent magnetotherapy. The level of pain before and after the treatment was assessed. Testing of the intensity of pain was conducted by means of visual analog scale (VAS) graded from 0 to 10, where 0 stands for the absence of pain, 1, 2, 3 are for mild pain, 4, 5, 6 for moderate amount of pain, 7, 8, 9 for severe pain, and 10 is for maximal and almost unbearable amount of pain. The pain assessment was conducted on the first and the twenty-first day of treatment. Joint mobility, swelling, and the mode of injury were also monitored. After the collection of data, a statistical analysis was performed, and the data were presented by tabular or graphical methods. The level of significance was $p < 0.05$. The ANOVA test was used.

4. RESULTS OF THE RESEARCH

The average age of the subjects in the control and treatment groups was not statistically significantly different. The average age of the subjects in the control group amounted to 47.93 ± 5.95 years, while the average age of the subjects in the treatment group amounted to 48.33 ± 8.67 ($p = 0.884$).

Groups	N	X	SD	SEM
Control	15	47.93	5.95	1.53
Treatment	15	48.33	8.67	2.23

$F = 0.022$; $p = 0.884$

Table 1. The age of the subjects

By the analysis of the length of service of the subjects included in this research it was found that there was no statistically significant difference in the length of service between the control and treatment groups.

Groups	N	X	SD	SEM
Control	15	24.20	5.08	1.31
Treatment	15	24.66	7.04	1.81

$F = 0.043$; $p = 0.837$

Table 2. Length of service

In the largest number of subjects in both groups gonarthrosis occurred primarily as a consequence of knee joint trauma, and then because of weight and physical strain. Chi-square test showed that there is no statistically significant difference in the manner of occurrence of gonarthrosis in the subjects from control and treatment groups, $\chi^2 = 0.066$; $p = 0.798$.

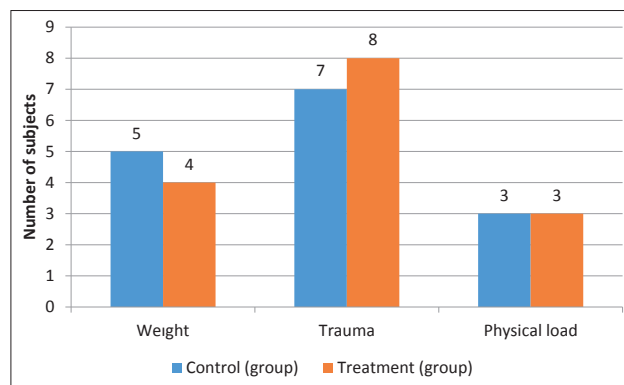


Chart 1. The cause of gonarthrosis

Of the total number of subjects covered by this research, 9 subjects in control and 8 in treatment group had gonarthrosis of their right knee. 4 subjects in the control and 5 in the treatment group had gonarthrosis of the left knee, while 2 subjects from each group had gonarthrosis on both knees. There was no statistically significant difference in the gonarthrosis localization between the two groups of subjects, and it occurred most frequently on the right leg, $\chi^2 = 0.063$; $p = 0.802$.

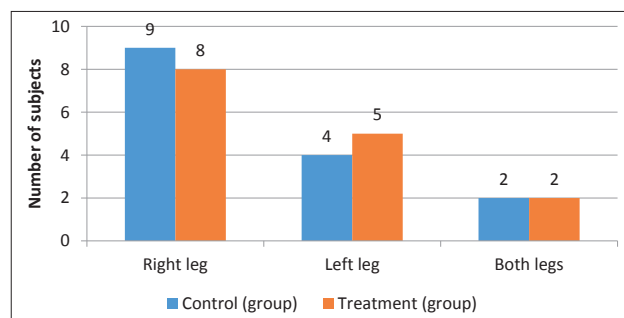


Chart 2. Gonarthrosis localisation

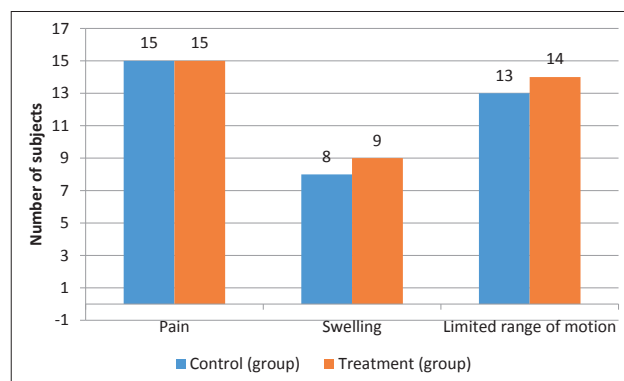


Chart 3. Clinical picture of the subjects prior to the treatment

By the analysis of clinical symptoms of gonarthrosis prior to the treatment, it was found that all the subjects from both groups had pain symptom, in 13 subjects from the control and 14 subjects from the treatment group limited range of motion was established, while 8 subjects from control and 9 subjects from treatment group had swelling in the joint area.

The condition of the subjects prior to the treatment was analyzed by means of pain scale, and it was found that both groups experienced moderate level of pain before the treatment, there was no statistically significant difference in the values ($p=0.768$).

Groups	N	X	SD	SEM
Control	15	6.00	1.51	0.39
Treatment	15	5.80	2.11	0.54

$F=0.089$; $p=0.768$

Table 3. Pain scale prior to the treatment

After the 21st day of treatment, the pain intensity was again measured in the subjects that underwent combined physical and medication treatments. In the subjects from the control group that also underwent electrotherapy, the average pain scale value amounted to 2.33 ± 1.34 , whereas in the subjects that underwent magnetotherapy and combined physical and medication treatments the pain scale amounted to 0.73 ± 0.38 .

The ANOVA test showed that after the 21st day of treatment, the subjects in the treatment group had better clinical picture, that is, they experienced lower levels of pain.

Groups	N	X	SD	SEM
Control	15	2.33	1.34	0.34
Treatment	15	0.73	0.38	0.22

$F=14.82$; $p=0.001$

Table 4. Pain scale after the treatment

The ANOVA test showed that there is a statistically significant difference in the pain scale before and after the treatment, and also that the improvement in the clinical picture and reduction of pain occurred in both groups of subjects.

Groups	N	X	SD	SEM
Control	Before treatment	6.00	1.51	0.39
	After treatment	2.33	1.34	0.34
Treatment	Before treatment	5.80	2.11	0.54
	After treatment	0.73	0.38	0.22

$F=19.03$; $p=0.001$

Table 5. Pain scale before and after the treatment

5. DISCUSSION

In addition to the preservation of and increase in the muscle strength and range of motion, physical therapy also enables proper function of the knee joint. Static isometric exercises in the course of the physical treatment have a great impact upon strengthening of m.quadriceps, especially of m.vastus medialis. By means of dynamic contractions the circulation block that occurred due to static movements is prevented. During treatment targeted exercises for stretching of shortened muscles and strengthening of weakened muscles are also incorporated, thereby both statics and dynamics in the biomechanics functioning of the joint are provided (7).

The study *Vujasin and Associates* analyzed 111 patients suffering from coxarthrosis treated in Rehabilitation Centre "Termal" in Vrdnik, of which 26 were men aged 58 to 79 and 85 were women aged 55 to 82. Of the total number of subjects only 17 had NO verified knee damage (and also no discomfort whatsoever caused by the knee), whereas 15 subjects with changes in the hip also complained of accompanying pain in the knee, that had not been diagnostically treated due to the lesser intensity of pain in comparison with the pain in the hip. That group of patients, although they suffered from knee pain and had a clinical picture indicating the existence of gonarthrosis, was not advised by doctors to do an x-ray of the knee, therefore, they do not have a diagnosis of gonarthrosis confirmed by an x-ray.

All remaining patients (79) have diagnostically confirmed arthritic changes in the hip and knee joints (attached x-ray report or orthopaedist's report referring to the x-ray image). 54 out of the 79 patients stated that the knee pain had been preceded by months-long or years-long hip pain. 27 out of the 42 patients who underwent surgery for coxarthrosis (fitted with a hip prosthesis) stated that they registered the knee pain after the hip surgery (8). In our research, subjects mostly had gonarthrosis localized in the right knee joint, therefore, all of them underwent equal physical treatment, whereby the groups differed solely with regard to the application of electrotherapy and magnetotherapy. Statistically significant improvement was established in the subjects after the physical treatment. Based on the pain scale, all subjects experienced lower levels of pain after the 21st day of treatment; however, the subjects from the treatment group experienced lesser pain, meaning that the magnetotherapy provided a higher degree of improvement.

6. CONCLUSION

Gonarthrosis presents a health, medical and socioeconomic problem in working population engaged in hard physical labour. Timely diagnosis of the problem and the application of physical therapy can help blocking the progression of the disease and reduction of disability, while increasing the efficiency of each worker. In addition to physical treatment, it is essential to educate patients ergonomically to continue doing at home the exercises they were taught, to teach them protective and relieving positions and the use of aids. This should lead to an improved quality of life, prevent early disability, and extend functional and working ability in physically active workers.

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