

USE OF VARIABLE MAGNETIC FIELD OF LOW FREQUENCY IN
DEGENERATIVE KNEE JOINT DISEASE

Ewa BOERNER, Marzena KOBYLAŃSKA, Ewa BIEĆ, Barbara RATAJCZAK
Ewa DEMCZUK-WŁODARCZYK

The Academy of Physical Education, Departamen of Physiotherapy

Gonarthrosis is one of the most frequent pathologies of knee. Degenerative joint disease is the most prevalent disease of motor apparatus. First, non-clinical changes may occur in the second or third decade of life. 35% of people aged 45-65 years suffer from the disease and 60-75% of people over 65 years old. Gonarthrosis has third place after coxarthrosis and degenerative changes of spine. It affects 5% of population. 75% of cases are women. The disease makes women unable to work and often disable. Gonarthrosis is caused by repeated mechanical injuries, changes connected with strain put on the joint, which may be connected with walk of life of a person, sport injuries, excessive body weight and anomalies in body build [11].

Patients with degenerative changes are treated in a complex way and, apart from anti-inflammatory action, all kinds of pain-relieving agents are administered [4]. Physiotherapy plays significant role in analgesic treatment. The aim of physiotherapy is to reduce pain, muscle tone, tissue oedema and to prepare patient for kinesitherapy aimed at sustaining or restoring proper mobility in joints affected by the disease.

More and more frequently magnetotherapy is used. It consists in treatment with variable magnetic field of low frequency [5].

Treatment with magnetic field is a natural, biological form of therapy. It has been known since ancient times. It was known to ancient cultures of Egypt, Greece and Asia. Scientific bases for this kind of treatment appeared in the 20th century. Greater understanding has been obtained about properties of magnetic fields, their effect on human organism and better therapeutic apparatus was constructed [1,6].

Nevertheless, despite wide interest in biological effects of magnetic fields, scientific knowledge about the effects is still insufficient. The reason for that is a complex nature of mechanisms underlying activity of magnetic fields and their effect on alive organisms.

Therefore, the purpose of the study was to assess efficacy of magnetic field of low frequency in gonarthrosis.

Material and research method.

The subjects of the study were patients from Wrocław's outpatient clinic suffering from degenerative knee joint disease involving both knee joints. Chosen patients were not subjected to any other therapy during treatment. The research group consisted of 30 patients aged 56-65 (22 women and 8 men). Most of them complained about pain within the area of knee joints and limited mobility in knee joints.

Detailed characteristics of the group is shown in table 1.

Sex	women			men		
	number of patients	%	Mean age	number of patients	%	Mean age
total number of patients						
30	22	73.3	60.4	8	26.7	61.4

Before therapy, history of the patients was taken: first name, surname, age, sex, duration of the disease.

All patients were subjected to the procedures with magnetic field of low frequency. Apparatus of the type of Magnetronik MF-10, emitting sinusoidal impulse, 1-10mT range of intensity of magnetic field, frequency 20-50 Hz, was used in the procedures. During the procedures, first, small doses were used, then, the doses were gradually increased to maximal dose. Applicator in shape of a spool with 315 mm diameter adjusted to the shape of the area subjected to the procedure. Each procedure lasted 20 minutes. 15 procedures were recommended. First 10 procedures were carried out every day and following 5 procedures were carried out every second day. Having in mind biological rhythm of patients, it was recommended that each patient should have all his procedures carried out at the same time of day. All patients were examined before the therapy and just after its completion. The examinations involved the area of two lower limbs. They involved:

- measurement of the range of flexion motion in knee joints
- measurement of circumference of both limbs at three levels, with precision to 0.5 cm: on the level of knee crevice, on the level of medial head of quadriceps muscle of thigh, on the level of lateral head of quadriceps of thigh.
- Pain was assessed on Domżał's modified 11-degree- numeric scale [2], where 0 means lack of pain, 10 means severe pain.

Derived results were statistically analysed. Composition was assessed with K-S test and Lilliefors's test. Efficacy of magnetic field in reducing pain in people suffering from degenerative knee joint disease was assessed using Wilcoxon test. Differences in the range of mobility and circumference before and after the therapy were assessed using t-Student test.

Results of the study

The results of the assessment of efficacy of therapy with magnetic field in degenerative knee joint disease as far as pain, range of mobility and circumference are concerned, on the level of knee joint, lateral head and medial head of quadriceps muscle of thigh before and after the therapy are shown in table 2 and 3.

Method		median	minimum	maximum	Lower quartile	Upper quartile	Gap quartile	Wilcoxon test
Right lower limb	Before therapy	8.0	7.0	9.0	8.0	8.0	8.0	4.78
	After therapy	1.0	0.0	3.0	0.0	2.0	2.0	
Left lower limb	Before therapy	8.0	7.0	9.0	8.0	8.0	8.0	4.78
	After therapy	1.0	0.0	3.0	1.0	2.0	2.0	

Table 2.

Statistical characteristics of the level of pain and comparison between the values of pain (Wilcoxon's test) before and after therapy with magnetic field.

With bold letters – significance of difference at the level $p \leq 0.05$

Median value indicates that 50% of studied patients experienced before therapy chronic increasing in severity with every change of position. Whereas, after therapy, in 75% of studied cases there was a reduction of severity of pain to the level of slight pain occurring

every day with small intervals. The pain was similar in both lower limbs before physical treatment and after its completion. Comparative analysis indicates that therapy has statistically significant effect on both lower limbs (table 2)

Table 3.

Statistical characteristics of values of range of mobility and circumference before and after therapy and their comparison using t-Student test

Trait		Right lower limb			Left lower limb		
		x	sd	t-Student test	x	sd	t-Student test
Range of movement	Before therapy	120,50	9,43	6,87	120,50	9,11	6,54
	After therapy	122,26	9,13		122,33	8,70	
circumference at the level of knee joint crevice	Before therapy	46,83	5,71	3,16	46,68	5,37	3,6
	After therapy	45,0	5,74		45,50	5,30	
circumference at the level of medial head	Before therapy	49,63	5,83	2,46	49,95	5,64	2,98
	After therapy	48,73	5,86		48,68	5,09	
circumference at the level of lateral head	Before therapy	53,26	6,06	5,96	53,00	5,63	1,22
	After therapy	53,20	6,05		52,95	5,60	

With bold letters is written significance of difference in values at level $p \leq 0.05$

Analysis of the range of movement in knee joint in sagittal plane before and after therapy indicates marked reduction of limitation in flexion. Mean values of the range of movement indicate statistically significant increase in the range of flexion movement after therapy (table 3).

Also values of circumferences measured at the level of knee joint crevice of both lower limbs indicate significant reduction of circumference after procedures with variable magnetic field. It may suggest reduction of oedema and positive effects of the therapy in degenerative knee joint disease.

Calculated mean values of circumferences of both limbs at the level of medial head of quadriceps muscle of thigh indicate significant reduction of their circumference after therapy. No statistically significant variance was found in measurements of circumference of lower left limb before and after therapy at the level of lateral head of quadriceps muscle of thigh (table 3). It can be assumed that it was a result of reduction of oedema and not wasting of the mass of quadriceps muscle of thigh.

Discussion

Owing to advance in technique in recent years, many new physical therapeutic methods were developed. One of such methods is variable magnetic field of low frequency.

Research studies carried out by Sieronja and his co-workers [7,8,9] indicate that there is a wide spectrum of effects that magnetic field exerts on processes of aerobic and anaerobic

respiration. It was also found that due to increased emission of endogenic opiates, magnetic fields alleviate pain. It was found that in treatment of degenerative joint disease, therapy with magnetic field is one of the most beneficial physiotherapeutic methods.

On the basis of conducted study, the researchers came to the conclusion that magnetic field of low frequency has positive effect on alleviation of pain. It was also noticed by Sieroń and Krzaczek-Krupka [7] who claim that therapy with magnetic field of low frequency has positive effect on reduction of pain and, thereby, is an alternative method for analgesic pharmacological agents.

Increase in the range of movement in studied knee joints was probably connected with the fact that pain was reduced, for alleviation of pain contributes to improvement in mobility and maintaining necessary range of movement. Magnetic field of low frequency has also anti-inflammatory effect and that can also contribute to reduction of pain and improvement in mobility of joints, as well as to reduction of oedema. Observed significant statistical differences in measurements of circumference indicate that it is an effective anti-inflammatory therapy. Other authors [8,9,10] draw attention to the analgesic, anti-inflammatory and anti-oedema effects of magnetotherapy in treatment of degenerative changes. Many studies [3,4] confirm that there is reduction of pain, improvement of mobility in joints in patients suffering from gonarthrosis after this therapy.

The results obtained in the study are compatible with reports of other authors [6,7,8,9] who confirm that magnetic field of low frequency is effective in treatment of gonarthrosis.

The fact that magnetotherapy has become a prevalent physiotherapeutic method is a confirmation that it is a right choice of therapy of people with degenerative knee joint disease.

Conclusions

Therapy with magnetic field of low frequency has significant effect on reduction of the level of severity of pain in patients with degenerative knee joint disease

Therapy with magnetic field of low frequency contributes to the increase in the range of movement of joints

Reduction of circumference in the area of knee joints of patients subjected to magnetotherapy indicates that oedema was reduced as a result of therapy

WPLYW LECZENIA TOKSYN BOTULINOW NA POPRAW FUNKCJI LOKOMOCYJNEJ U DZIECI Z OBUSTRONNYM NIEDOWADEM KURCZOWYM

Eugeniusz BOLACH, Bartosz BOLACH, Anna PINDEL

*Zakład Sportu i Rekreacji Osób Niepełnosprawnych
Akademia Wychowania Fizycznego we Wrocławiu*

Wielkie porażenie dziecięce (paralysis cerebralis infantum – PCI), to nie postępujące zaburzenia układu nerwowego, a zwłaszcza ośrodkowego neuronu ruchowego, które powstają w czasie ciąży, porodu, lub w okresie poporodowym [5]. Wśród wczesnych przyczyn uszkodzenia wyróżnia się: nieprawidłowy rozwój mózgu, niedotlenienie okołoporodowe, krwawienie śródmózgowe znacznego stopnia, łożyska noworodków urazy i zakażenia okołoporodowe [4].