
OSTEOARTHRISIS OF THE KNEE JOINT, THERAPEUTIC MODALITIES

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Abstract: The aim of this paper is to examine which physical procedures and kinesiotherapy exercises are used in the treatment of osteoarthritis of the knee joint and analyze their effects. Methodology: Study of therapeutic programs from patients with osteoarthritis knee joint is a retrospective, descriptive and analytical research. We used therapeutic programs from medical records of patients with osteoarthritis of the knee joint. The study was conducted at the Clinical Center of the University of Sarajevo at the Orthopedics and Traumatology Clinic, the total sample of 52 patients in the period from 01.01.2022. to 31.12.2022. Results: At our research 41 (79%) were women and 11 (21%) men. The largest number of respondents, 42% of them were aged 61-70 years, after which respondents aged 51-60 years and respondents from 71-80 years, who were 23% each in this study. The lowest number of respondents, 6% each, were aged 40-50 years and aged 81-90 years. On the basis of our research, we found out that a majority of knee osteoarthritis patients were female, and that the most vulnerable to osteoarthritis knee patients were 46-84 years of age. Physical modalities that were used are physical therapy, kinesiotherapy and medicament therapy. The most commonly used physical modalities are: IFS (63%), sonophoresis (48%) and magnetotherapy (40%), while the least used are DDS (17%), cryotherapy (15%), and electrophoresis (6%). When it comes to exercises, the most commonly used are: Exercises to increase the volume of movements (71%), strength maintenance exercises (63%) and exercises to strengthen the upper leg (60%). Extensor strengthening exercises (48%), individual exercises (31%) and m-quadiceps strengthening exercises (25%) are applied to the smallest extent. By concluding our research we provided information to which physical procedures and kinesiotherapy exercises are best fitted in the treatment of osteoarthritis of the knee joint, and to evaluate the physical and kinetic therapy treatment. The best effect in the treatment of osteoarthritis knee is obtained by combining physical therapy and physical training. The results shown that most of the subjects in whom the treatment was not successful were aged 51-60 years, while in other age groups the treatment was significantly successful. The treatment provided positive results and shown significant effectiveness in the treatment of pain, confirming the working hypothesis. Conclusion: A therapeutic program that is a combination of different treatments of physical therapy and kinesiotherapy exercises gives the best effect in the treatment of knee osteoarthritis. The results show that in 83% of respondents the therapy was successful, while only 17% of them were recommended further therapy.

Keywords: osteoarthritis, knee, physical medicine, a therapeutic program.

1. INTRODUCTION

Osteoarthritis is a degenerative disease of the joints, one of a progressive character. The disease first affects the cartilage of the joint, then the bone edges of the articular bodies, and last the articular sheath. Degenerative joint diseases (arthrosis) can develop in any joint, but are most common in the hand, hip and knee (Talić-Tanović et al, 2018). Arthrosis occurs after the age of 40, and after the age of 55 it increases with geometric progression (Tanović et al, 2014). Knee osteoarthritis (OA) affects about 14% of men and about 23% of women over 45 years of age, and 70% of members of both sexes after the age of 75 (Jandrić et al, 2009). Arthrosis affects the cartilage around the joint, the synovial sheath and connective cartilage, which under normal circumstances "wears out" by movement, but also constantly renews (Jang et al, 2021). With arthrosis, renewal is slower than wear, cartilage fibers weaken and eventually disappear. This leads to a change in the bones (Alkhawajah et al, 2019). The bone due to the intermittent deposition of mineral salts becomes firmer and growths (osteophytes) are formed (Talić-Tanović et al, 2018). Patients suffering from OA often complain of pain, and often there is an inability to perform daily activities inherent in man. Impossibility arises from incompetence at the social level, difficulties in social integration and economic independence (Vitaloni et al, 2019).

The etiology is unknown but there are many factors contributing to the onset of OA such as obesity, heredity, female sex after menopause, trauma and sports injuries (Talić-Tanović, 2018). Osteoarthritis affects many joints and patients may experience different symptoms. Initially, pain occurs when walking, especially in rough terrain, walking up and down stairs (Riddle et al, 2011).

The main clinical signs are: sensitivity of individual points on the edge of the joint or tendon annexes near the joint, hard thickening of the articular foreclosures of the bone (increase in bone mass), and sometimes an increase in the mass of soft tissues of the joint and around the joint, the appearance of marginal osteophytes that are actually the formation of new bone, crepitation in movements, limited and painful movements, and sometimes with major damage and unstable joint (Zhang et al, 2010). Joint pain can manifest itself in the form of burning or sharp punctures or in the form of a needle puncture. In some people, pain can occur and pass. Constant pain or pain that occurs during sleep may be a sign that the clinical picture of osteoarthrosis is deteriorating (Davis et al, 2011).

Physical therapy or physiotherapy is a branch of medicine that deals with the application of various forms of physical agents in the prevention, treatment and rehabilitation of patients. The goal of physical therapy is to use the body's own energy or to bring another form of energy into the human body in order to achieve the desired effect (analgesia, stimulation of contraction or relaxation of a particular muscle, increase the range of motion). According to the type of physical agent used, physiotherapy can be divided into mechanotherapy, thermotherapy, electrotherapy, phototherapy and therapy with natural factors. In mechanotherapy, the mechanics of kinesiotherapy, hydrotherapy, traction or massage are applied for therapeutic purposes. The use of heat or cold is a type of thermotherapy. They are obtained from various sources, and in Knee OA, therapeutic ultrasound is most often used for the purpose of heating and cryotherapy for cooling purposes. It is recommended that cryotherapy be used as a preparation for kinesiotherapy in the acute stages of knee OA, and deep thermotherapy in the chronic stage. In electrotherapy, direct galvanic current, low-frequency current, medium-frequency and high-frequency currents are used, while in OA knees interference currents are most often used. Phototherapy uses light rays as a source of energy, and for this purpose laser, ultraviolet rays and infrared rays are most often used. Therapy with natural modalities includes balneotherapy, climatotherapy and thalassotherapy (Talić-Tanović et al, 2018).

The aim of this paper is to examine which physical procedures and kinesiotherapy exercises are used in the treatment of osteoarthrosis of the knee joint and analyze their effects.

2. MATERIAL AND METHODS

Responders

The sample included patients diagnosed with osteoarthrosis of the knee joint. The research was conducted at the Clinical Center of the University of Sarajevo at the Orthopaedic and Traumatology clinic, on a total sample of 52 subjects.

Methods

The study included people of both sexes who were diagnosed with osteoarthrosis of the knee joint, older than 18 years and who opted for physical therapy. Patients who arbitrarily discontinued therapy before completing the therapeutic procedure were excluded from the study. The paper was conducted as a retrospective, descriptive and analytical research.

Statistical analysis

For data analysis, the SPSS 21.0 program was used. Before the main analyses, the normality of the distribution was checked, and the results show that the results were not normally distributed, which is why nonparametric statistics were used in the continuation of the work.

3. RESULTS

A total of 52 participants participated in the study, of which 41 (79%) were women and 11 (21%) men. The largest number of respondents, 42% of them were aged 61-70 years, after which respondents aged 51-60 years and respondents from 71-80 years, who were 23% each in this study. The lowest number of respondents, 6% each, were aged 40-50 years and aged 81-90 years. The average age of the subjects was $M=66$ ($SD=9.1$), while the average age of male subjects was $M=64.5$ ($SD=10.2$) and female subjects were $M=66.4$ ($SD=8.8$). The youngest was 46 years old and the oldest was 84 years old. The majority of respondents went to 10 procedures, 65%, while the smallest number of respondents went to 12 and 14 procedures (2%) each, respondents aged 61-70 years and in 71-80 years went to a smaller number of procedures (5 or 7 procedures), while respondents aged 40-50 and 51-60 went to a larger number of procedures (15 procedures). If we look at the average values of the number of procedures, we see that both men and women went to almost equal procedures, that is, the arithmetic mean is approximately equal, M for women = 10.6, and for men $M = 10.51$. (Table1).

Table 1. Age structure of subjects in relation to the number of physical therapy procedures

		Number of procedures											
		5		7		10		12		14		15	
		N	%	N	%	N	%	N	%	N	%	N	%
Age of respondents	40-50	0	0	0	0	2	6	0	0	0	0	1	10
	51-60	0	0	1	50	9	27	0	0	0	0	2	20
	61-70	2	50	0	0	14	42	0	0	1	100	5	50
	71-80	2	50	0	0	7	21	1	100	0	0	2	20
	81-90	0	0	1	50	1	3	0	0	0	0	0	0
	Total	4	100	2	100	33	100	1	100	1	100	10	100

When it comes to the type of therapy the subjects received, we see that both men and women went to physical therapy more. We analyzed whether there is a statistically significant difference in the use of therapies between men and women. The results of chi-squares show that only for medical therapy a statistically significant difference was obtained ($p < 0.05$), which means that women statistically significantly more often receive medication therapy than men. For physical and kinesiotherapy, no statistically significant difference was obtained. (Table 2).

Table 2. Sexual distribution of subjects based on the type of therapy.

	Sex				Chi-square
	Male		Female		
	N	%	N	%	
Physical therapy	10	91	37	90	
Kinesiotherapy	3	27	15	37	
Drug therapy	0	0	3	7	$p < 0,05$

The most commonly used physical modalities are: IFS (63%), sonophoresis (48%) and magnetotherapy (40%), while the least used are DDS (17%), cryotherapy (15%), and electrophoresis (6%). When it comes to exercises, the most commonly used are: Exercises to increase the volume of movements (71%), strength maintenance exercises (63%) and exercises to strengthen the upper leg (60%). Extensor strengthening exercises (48%), individual exercises (31%) and m-quadiceps strengthening exercises (25%) are applied to the smallest extent. (Table 3).

Table 3. The most commonly used physical procedures

	N	%
Inetrferent currents	33	63
Sonophoresis	25	48
Magnetotherapy	23	44
Manual massage	21	40
TENS	18	35
Paraffin	13	25
Ultrasound	10	19
Dija dynamic currents	9	17
Cryotherapy	8	15
Electrophoresis	3	6

Below we tested whether there were statistically significant differences between men and women in the number of subjects in whom tremor was successful. However, the results of chi-squares show that no statistically significant difference was obtained, treatments were equally successful for both sexes. (Table 4).

Table 4. Sexual distribution in relation to the success of treatment

		Sex			
		Male		Female	
		N	%	N	%
Success of treatment	The therapy was successful.	10	91	33	80
	Recommended further treatment	1	9	8	20
	Total	11	100	41	100

In the end, the success of the treatment according to age was examined and the results show that there is a statistically significant difference in the success of the treatment between different age groups. The results show that most of the subjects in whom the treatment was not successful were aged 51-60 years, while in other age groups the treatment was significantly successful. (Table 5).

Table 5. The success of therapy in relation to the age of the subjects

		Age of respondents										chi-square
		40-50		51-60		61-70		71-80		81-90		
		N	%	N	%	N	%	N	%	N	%	
Success of treatment	The therapy was successful.	3	100	6	50	19	86	12	100	3	100	p<0,05
	Recommended further treatment	0	0	6	50	3	14	0	0	0	0	
	Total	3	100	12	100	22	100	12	100	3	100	

4. DISCUSSION

The study included 52 patients diagnosed with osteoarthritis of the knee joint. Out of the total number of patients, 11 (21%) were male and 41 (79%) female, representing a significant difference between gender representation. A study conducted by Bliddal H. with collaborators in 89 respondents concludes that as many as 89% of affected persons are female (Biddal et al, 2011). These two studies correlate and show that women are more likely to be affected.

Autri Branco et al (2016) state in their research that out of the total number of respondents, both sexes are equally represented, and that gender does not represent a significant role in this study. Based on this, we can conclude that this study does not correlate with ours either in terms of the number of subjects with knee osteoarthritis or according to the sexual structure (Branco et al, 2016). The average age of the subjects was M=66 (SD=9.1), while the average age of male subjects was M=64.5 (SD=10.2) and female subjects were M=66.4 (SD=8.8). The youngest was 46 years old and the oldest was 84 years old.

Johnson et al (2016) report in their study of 215 patients that with the aging process which increases the possibility of osteoarthritis (Johnson et al, 2016).

We conclude that these studies are correlated and that the elderly are affected by this disease, and that the aging process itself leads to the risk of osteoarthritis. The most commonly used modalities of physical therapy in our research are IFS, namely 63% of patients, sonophoresis 48% of patients, and magnetotherapy 40% of patients, but that the best effect of therapy is achieved by a combination of physical procedures and kinesiotherapy.

In the research of Džananović et al (2007) found that a great improvement in the condition of people who used physical therapy was found, and therefore the two studies are correlated (Džananović et al, 2007).

A study conducted by Saw et al (2016) involving 74 subjects, 35 in the study group and 39 in the control group, showed us that physical therapy and exercise significantly lead to a reduction in pain in the main group compared to the control group (Saw et al, 2016).

Filardo et al (2012) state in their paper that the best therapy is a combination of different physical modalities (Filardo et al, 2012).

Yildiz et al (2015) also in his study of 90 subjects divided into two groups states that there was an improvement in the group in which ultrasound was combined with exercises compared to those who only had exercises (Yildiz et al, 2015).

Nguyen et al (2016) also stated that in patients who did kinesiotherapy, the pain decreased after treatment, which coincides with our research (Nguyen et al, 2016). The results show that in 83% of respondents the therapy was successful, while only 17% of them were recommended further therapy.

Matić et al (2009) in their controlled study of 56 subjects aged 30 to 81 years, came to the conclusion that kinesiotherapy in combination with physical modalities has good results in the treatment of osteoarthritis (Matić et al, 2009).

These two studies are correlated and tell us that the best effect for subjects is achieved through a combination of physical treatments and kinesiotherapy. The largest number of subjects 65% were included in therapy consisting of 10 treatments, while 20% went to 15 treatments, and 8% to 5 treatments.

Researcher Yildirim et al (2015) also use 10 treatments as a landmark in their research, and state that the effect of treatments in which the procedures last longer is better. These two studies are correlated in terms of duration of treatment and the effect on the target group of subjects (Yildirim et al, 2015).

Cheing and Hui-Chan (2004) conducted their research on four groups. The first group was treated only with TENS therapy, the second group with placebo effect, the third group only with exercises and the fourth group with a combination of TENS and exercises. They concluded that the best effect is obtained after 4 weeks of treatment, 5 times a week. As for the duration of therapy, these two studies do not correlate because the study by Cheing and associates lasted 50% longer compared to the therapy in our study, but as for the effect, we can say that the results of both studies correlate and lead to a decrease in pain and a better quality of life in the subjects (Cheing and Hui-Chan, 2004).

5. CONCLUSION

A therapeutic program that is a combination of different treatments of physical therapy and kinesiotherapy exercises gives the best effect in the treatment of knee osteoarthritis. The results show that in 83% of respondents the therapy was successful, while only 17% of them were recommended further therapy.

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Conflict of interest

There are no conflicts of interest to declare by any of the authors of this study.

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