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Research Article

EVALUATION OF INFRARED RADIATION FOR PATIENTS WITH KNEE OSTEOARTHRITIS

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ABSTRACT

Background: osteoarthritis is a disease that affects the joints of human body. This pathology can cause a very strong pain in different joint function. Therefore, the effects of infrared contribute to reduce the pain and improving functional capacity patients with osteoarthritis of the knee. **Objective:** to evaluate the response of the application of infrared in the treatment of patients with osteoarthritis of the knee. **Method:** a prospective, randomized, longitudinal and observational study was carried out with only one evaluator, in which patients over 50 years of age were included. It was randomly distributed into two groups sample 1 the infrared group and sample 2 the simple massage group. The follow-up time was 6 months from the second week of March 2020 to the end of August 2020. **Results:** the study carried out using the WOMAC questionnaires evaluating patients with osteoarthritis of the knees which indicated significant statistical differences in the three variables with corresponding values of pain with P=0.00239, stiffness with P=0.00576 and functional capacity with P=0.00950, P< 0.05 which showed some improvement in the symptoms in the infrared group, not being the same in the simple massage group. Limitations: The COVID 19 pandemic limited this research. Conclusion: the infrared radiation can be used as a reliable and effective method for treatment reducing pain and inflammation on patient with osteoarthritis of the knee.

Keywords: Knee Osteoarthritis, Infrared Therapy, Pain, Functional and Capacity.

INTRODUCTION

Osteoarthritis of the knee is a common disease that affects all joint of the human body, generallyin adults, but it can also affect young people practicing sport. This pathology generates painit can sometimes be accompanied by loss functional capacity and stiffness of joint function. The frequency of patients who suffer from this pathology may increase depending on the lifestyle of the population and the type of direct treatment of the symptoms (López, 2011)(1). This indicates that this disease is causing a serious public health problem, however changing the lifestyle of people generally adult. (Oinas J *et al.,* 2016, Hsieh R, *et al.,* 2012). For the treatment of this pathology there are different types of methods among which we have the infrared. The treatment with infrared radiation helps reducing the pain, recovering the stiffness and functional capacity all of the affected joint function. Currently, due to the aging of the world population and with the numerous growths of some diseases such as obesity, hypertension or diabetes mellutis, the World Health Organization (WHO) estimates around 130 million people with osteoarthritis worldwide for the year 2050 (Wittenauer for R, 2013). This prevalence considers and places osteoarthritis among the most dangerous diseases in our society. At present, this pathology can be improved by technological advances but does not have a definitive cure. However, the use of infrared combined with massage helps to regenerate dead cells through a series of stimulations by emission of waves that tries to repair cell damage through the emission of waves (Martin R, 2008). The main objective of this research is to evaluate the response of the application of infrared for the treatment of patients with osteoarthritis of the knees.

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MATERIALS AND METHODS

A prospective, randomized, longitudinal and observational study were carried out with only one evaluator. All patients were older than 50 years with osteoarthritis of type I; II and III on the Kallgren scale were included. Patients who met the above inclusion criteria and did not meet the exclusion criteria were recruited. The follow-up time was 6 months from the second week of March 2020 to the end of August 2020 (26 weeks). 108 patients with an age range between 50 and 72 years of age with a diagnosis of osteoarthritis of the knee were selected and was randomly distributed into two groups (sample 1, the infrared group and sample 2 simple massage). The corresponding treatment was applied to each group for a period of 6 months. The degree of pain reduction and the increase in functional capacity and knee mobility were measured. To obtain information on the evolution of the state of patients' health, a survey related to the WOMAC index (44) were used, and a comparison between two treatment methods used (with infrared and simple massage) was carried out at the end of the investigation.

Table 1: characteristics of variables according to the type of intervention:

Variables	Infrared group	Simple massage group
Pacients with osteoarthritis (right leg)	39(69,6%)	39(73,6%)
Sex(women)	40(71,4%)	36(73,6%)
Age (years)	60,90 ±5.58	62,58±6,0
Status(married)	31(54.4%)	25(47,2%)
weight(kg)	66,76 ±5.07	61,42 ±5,07
Size(m)	1.59 ±0.58	1.57±0.04
Body mass index(IMC)	26,36 ±2.37	24,71±1.81
Race (half blood)	43(76,8%)	25(47,2%)
School level(primary)	30(53,6%)	25(47,2%)
Work area(housewife)	21(37,5%	33(62,3%)
Socioeconomic level(average)	32(62,5%)	22(41,5%)
Degree of osteoarthritis (II)	33(58,9)	25(47,2%)

Source: database of stata 16 software for treatment of osteoarthritis of the knee according to survey results.

Table 2 evolution of 3 variables analyzed in the infrared group according to time.

Variables	Baseline values X(DS)	Values per month X(DS)	Values 3 months X(DS)	Values six months X(DS)	P values
WOMAC PAIN	3,61+/-0.56	2,83+/-0,66	2,09+/-0,82	0,98+/-0,78	0.00239
WOMAC STIFFNESS	0,24+/-0,43	0,62+/-0,52	1,22+/-0,57	1,63+/-0,59	0.00576
WOMAC FUNCIONAL CAPACITY	0,07+/-0,26	0,50+/-0,50	1,35+/-0,55	1,70+/-0,53	0.00950

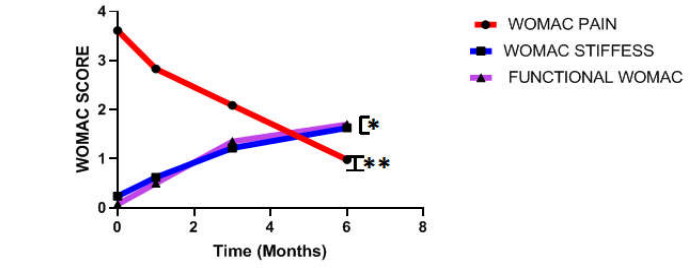
Source: databases of Graph Pad prism 8.01 with evolution of variables analyzed in the infrared group according to time

Table 3 evolution of 3 variables analyzed in the massage group according to time.

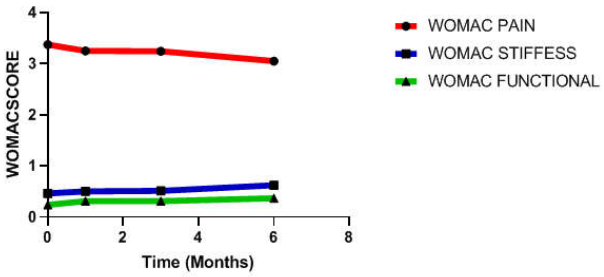
Variables	Baseline values X(DS)	Values per month X(DS)	Values 3 months X(DS)	Values 6 months X(DS)	P values
WOMAC PAIN	3.37+/-0,65	3,25+/-0,73	3,24+/-0,79	3,05+/-0,76	0.1250
WOMAC STIFFESS	0,46+/-0,50	0,50+/-0,50	0,51+/-0,50	0,62+/-0,52	0.1250
WOMAC FUNCTIONAL CAPACITY	0,24+/-0,43	0,31+/-0,46	0,31+/-0,50	0,37+/-0,52	0.1250

Source: databases of Graph Pad prism 8.01 with evolution of variables analyzed in the massage group according to time.

Graphic of the three variables analyzed (infrared group)



Graphic of the three variables analyzed (massage group)



DISCUSSION OF RESULTS:

Considering that all the patients of the two treatment groups start out in the identical clinical situation on the WOMAC evaluation scale (in subscales of pain, stiffness and functional capacity), whose values are reflected as follows:

Infrared group (WOMAC pain 3.61+/-0.56; stiffness 0.24+/-0.43; functional capacity 0.07+/-0.26; and total baseline WOMAC 3.92+/-1.25). Simple massage group (WOMAC pain 3.37+/-0.65; stiffness 0.46+/-0.50; functional capacity 0.24+/-0.43 and total baseline WOMAC 4.07+/-1.58). We can notice a variation of means throughout the study according to the type of treatment for each group. During the period from March 15 to August 15, 2020, with 108 patients with knee osteoarthritis studied, the mean ages were 60 and 62 years. It was randomly distributed into two groups (sample 1 the infrared group and sample 2 the simple massage group. In the same way, a comparison of the means of weight was made between the 66 kg infrared group and the 61 kg simple massage group, body mass index (BMI) with 26, and 24, the height of 1.59 in the infrared group and 1.57 for the simple massage group (table 1).

The application of the WOMAC questionnaires was used at the beginning and at the end of the treatment, in which significant statistical differences were highlighted in the three variables pain, stiffness, and functional capacity.

In section A of the WOMAC questionnaire in which the parameter was evaluated and it was observed that in the infrared group there was some improvement in the symptoms with a value of P=0.00239 (table 2) at the beginning and at the end of the treatment, not being the same for the simple massage group obtaining a value of P=0.1250 (table 3). In the evaluation of sections B, which refers to rigidity and C, functional capacity, there were also statistically significant differences in the infrared group with values of P=0.00576 and P=0.00950 at the beginning and at the end of the treatment. although they were not statistically significant in the simple massage group with respective values of P=0.1250 and P=0.1250

In the research carried out by Bagnato GL *et al.,* (2012) Unlike Qingguang Z, Min F, Li G, *et al.,* (2015) an infrared emitter was used for a period of 1 month as treatment. The patients were divided into two groups n = 30 (in the FIR group) and n = 30 (in the placebo group). And in that of Qingguang Z, *et al.,* (2015) (5) added Chinese massage and six infrared cameras, three times a week for a period of 2 weeks only. They followed n = 20 women with osteoarthritis of the knee. The WOMAC index of osteoarthritis was then used before and after this treatment. The following results were found from these 2 previous studies: In the study carried out by Bagnato GL *et al.,* The VAS scores of the placebo and FIR groups were (95% confidence interval CI = -1.14 to 0.31; P < 0.05) and at the end of the study (95% confidence interval CI = -2.57 a - 0.89, P = 0.01). The effect size was -0.43 after one week of treatment and -1.38 after one month of treatment. The mean decrease in VAS values was ≥20% in the FIR

group. The number of patients in the FIR group with joint effusion was lower (40%) compared to baseline (80%), while there was not as much change among the placebo group.

They concluded that the Far Infrared Emitting Plaster could be used as a highly effective non-pharmacological alternative to treat osteoarthritis knees. In the Qingguang Z, I *et al.,* Also, the results demonstrated some statistically significant mean differences in knee pain relief, stiffness relief and improvement in physical function with a value of (P < 0.05). The results of the patients who had a greater gait obtained a faster gait speed, with a higher percentage in less time compared to the Chinese massage method with a value of (P <0.05) where no significant differences were found. in the range of motion. In the study carried out by Spahn, G., Plettenberg, H., Hoffmann, M. *et al.,* (2017) only infrared was used as an option for treatment with a number of 137 patients ages between 45 and 78 years. The treatment lasted for a period of 5 weeks. The results in comparison with Ogaya S, Kubota R, Chujo Y, Hirooka E, Kwang-Ho K, On the one hand, the results were 76.6% (n = 105) of all knees examined, with cartilage damage (ICRS-grade III/IV). Of the patella with 43.8%, the medial femur with 34.3%, the medial tibial plateau with 17.5%, the trochlea with (8.8%) and the lateral joint compartment (femoral 2.2%, tibial 15.3%). However, there were no significant differences.

Sorpkor, S. *et al.,* (2019). This research reported that near infrared could be an excellent option for pain relief. N = 14 community-dwelling adult patients with knee pain ranging in age from 50 to 85 years underwent to different tests, including infrared. After the intervention it was possible to show that the use of infrared is useful for patients with degenerative diseases.

All the investigations that were carried out on this subject, those selected patients have an age range greater than 40 years. For this reason, it is stated that knee osteoarthritis can generally affect people over 50 years of age. The authors concluded that the pain has its main source in the brain. This pain is the result of a series of mechanisms that can work with the transmission of electrical impulses from the brain. All the methods used in the different publications selected, the majority have some methodological defect. The combination of infrared with other methods generates a significant result compared to the simple use of this device as a method of treatment of patients with knee osteoarthritis and that short-term therapy reduces the effectiveness of the type of treatment. Referring to the methodological quality used in the different selected publications, the majority present some methodological defect. All the researches mentioned pain and functional capacity as indicators that participate as the first signs and symptoms of this degenerative pathology.

CONCLUSIONS:

1. The study carried out using the WOMAC questionnaires as a treatment method for patients with osteoarthritis of the knees indicated significant statistical differences in the three variables with corresponding values of pain with P=0.00239, stiffness with P=0.00576 and functional capacity with P=0.00950, P<0.05 which showed some improvement in the symptoms in the infrared group, not being the same in the simple massage group where there were no statistically significant differences and improvements with a value of P=0.1250.
2. Infrared therapy has shown to be a reliable and effective method in the treatment of osteoarthritis, since it has shown a positive effect in reducing pain and inflammation of the knee.
3. The combination of infrared with other methods generates a significant result in comparison with the simple use of this apparatus as a treatment method for patients with osteoarthritis of the knee and that short-term therapy lowers the effectiveness of the type of treatment.

PERSPECTIVES

Infrared could be a new method in the future to relieve knee pain in degenerative diseases such as osteoarthritis.
Further research is required on infrared for the treatment of the knee with osteoarthritis due to the fact that there is very little information.

CONFLICT OF INTERESTS:

The authors declare that they have no conflict of interest.

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