ORIGINAL ARTICLE

Influence of shockwave therapy on pain in women with knee osteoarthritis

Marta Imamura[1], Fabio Marcon Alfieri[2], Pérola Grinberg Plapler[3], Wu Tu Hsing[4], Linamara Rizzo Battistella[5]

ABSTRACT

Osteoarthritis is the most common articular disease that causes pain to its sufferers. Shockwave therapy is among the many treatments that can be used. **Objective:** The objective of this study was to observe the influence of shockwave therapy on the intensity of pain in elderly women with knee OA. **Method:** In this study, 40 elderly females (69.57 ± 6.42 years) were submitted to weekly shockwave therapy with 2000 impulses at 2.5 to 4.0 bar, at a frequency of 8Hz, at the location most painful to touch in the knee, the medial articular interline, for three consecutive weeks. The effect of its application on the pain was evaluated by the visual analogue scale before and after the treatment. **Results:** There was a significant reduction ($p < 0.0001$) of pain intensity in the volunteers, going from 7.86 ± 1.07 cm to 5.32 ± 2.26 cm. **Conclusion:** The application of shockwave therapy has been shown to reduce pain in elderly females with osteoarthritis.

Keywords: Osteoarthritis, Knee, Arthralgia, Rehabilitation

[1] Physiatrist, Clinical Research Center, HCFMUSP Physical Medicine and Rehabilitation Institute.
[2] Physiotherapist, Coordinator of the Masters Course in Health Promotion, Adventist University Center of São Paulo.
[3] Physiatrist, Director of the Physical Medicine Division of the Institute of Orthopedics and Traumatology, IOT-HCFMUSP.
[4] Physiatrist, Physical Medicine Division of the Institute of Orthopedics and Traumatology, IOT-HCFMUSP.
[5] Tenured Professor at the FMUSP Legal Medicine, Medical Ethics, Social and of Labor Medicine Department.

Mailing address:
Instituto de Medicina Física e Reabilitação
Fábio Marcon Alfieri
Rua Domingo de Soto, 100
São Paulo - SP
CEP 04116-040
E-mail: fabioalfieri@usp.br

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INTRODUCTION

The most common articular disease in the world is osteoarthritis (OA).[1] It is the main cause of pain and functional impairment in the elderly.[2] Osteoarthritis is present in 10% of women's knees and in 13% of men older than 60 years.[3,4] It also reportedly affects at least 50% of people older than 65 years.[5] In Brazil, this disease affects between 6 and 12% of individuals older than 65.[6] Due to the increased aging of the population and with the prevalence of obesity, it is estimated that knee OA will probably increase in the near future.[5]

However, although highly prevalent and probably causing a negative impact on quality of life, still there is no cure for this disease, which hinders specific interventions against it.[2,7-9] Various treatments have been indicated as positive resources for the treatment of OA. Recently, a method that has been used in the treatment of musculoskeletal diseases is the extracorporeal shockwave therapy (ESWT). Shockwave therapy has been used to treat pain because it is not invasive, has low rates of complication, does not require hospitalization, and is relatively low cost when compared to other conservative treatments or to surgical procedures.[10] There is a report that the application of ESWT shows a chondroprotective effect in the inhibition of OA in rats[11] and that it even has a multifunctional effect on the bones and cartilage.[11] Although ESWT is also considered effective in reducing pain, few studies have applied this technique on humans.[10]

Since the functional consequences of pain due to OA are responsible for great morbidity, especially among the elderly, there is a need to develop new treatments for OA,[9] considering that ESWT can be also promising for OA.

OBJECTIVE

The objective of the present study was to observe the influence of a treatment with shockwaves on the intensity of pain in elderly women with OA of the knees.

METHOD

This study was a case series approved by the Committee of Ethics for the Analysis of Research Projects (CAPPesq Nº 0130/10). All the participants were informed about the procedures of the study and signed the free and informed consent form.

The study included individuals older than 60 years, who had received clinical and radiological diagnosis of primary osteoarthritis of the knee, with pain intensity (measured by the visual analog scale)[12] greater than or equal to six, with previous failure of two or more types of conservative treatment (medications, non-hormonal anti-inflammatories, physiotherapy, stretching, acupuncture, orthoses, and others).

Those who had received corticosteroid infiltration in the last 48 hours were not included in the study, as well as those who presented clinical manifestations predominant in other lower limb joints (hip and ankle) and the spine, clinical signs of associated neuropathy, including radiculopathies and peripheral neuropathies. Those who had systemic inflammatory diseases such as rheumatoid arthritis, ankylosing spondylitis, generalized polyarthritis, neoplasias, the presence of tumors or infectious processes in the place of application, associated endocrine or metabolic diseases, fibromyalgia, severe blood dyscrasia, or psychiatric disorders that needed monitoring were also not included in the study. The volunteers needed to be able to get to the hospital during the period of treatment.

Intervention

The application of radial shockwaves was made using the Swiss Dolorclast by EMS Electro Medical Systems, from Switzerland, which provides the pneumatic propagation of waves. This equipment has a control unit coupled with a manual device through a flexible tube. Compressed air pulses with variable amplitude are transferred to the manual device and applied directly to the injured site. The control unit modulates the supply of continuous compressed air at a frequency of 3Hz before its transference to the manual device via the connection tube. Inside the manual device, the compressed air promotes the acceleration of a projectile that triggers a metallic applicator base. The force of impact of the projectile on the applicator induces the formation of a shockwave. The patients received one application of 2,000 pulses of radial shockwaves per week, at pressures of 2.5 to 4.0 bar, at a frequency of 8Hz in the location most painful to the palpation, at the joint medial interline of the knee, for three consecutive weeks. Each weekly session lasted approximately 10 minutes. The post-application program was: three consecutive days of superficial heat on the areas applied for 20 minutes and the use of simple analgesics, if needed (Paracetamol 500mg, every 6 hours, or similar in case of allergy).

Evaluation

The evaluation was made by an independent observer who was not involved in the selection or treatment of the patients. The evaluation of pain intensity was made using the visual analog scale.[12] This scale consists of a 10 cm-long line that shows "absence of pain" on the one side and "intolerable pain" on the other. The pain intensity was measured according to the placement, marked by the patient, of a vertical line that crossed the horizontal line to indicate the pain intensity on a scale from 0 to 10.

Statistical Analysis

Data analysis was performed with the statistical package InStat3 for Windows, the principle of 'intention to treat' was used to deal with those who abandoned the treatment, and missing data were filled in with the mean of the remaining data. The results were described using means and standard deviations. The comparison of the results of Visual Analog Scale was done using the *Student t* test. The significance level was 0.05.

RESULTS

The study had 40 participants. Two patients stopped the treatment and one abandoned it to be treated for another disease. The data for mean age, time with disease, body composition, and side treated are shown in Table 1.

Upon analyzing the result relative to pain intensity, it was seen that it had a statistically significant reduction ($p < 0.0001$), going from 7.86 ± 1.07 cm to 5.32 ± 2.26 cm.

DISCUSSION

The results of the present study indicated that elderly women with knee osteoarthritis felt a reduction in pain after treatment with shockwaves. In this study, the pain issue is what was evaluated since this is the predominant symptom for most patients with OA.[13] The origin of pain in individuals with OA is not well understood. Hunter et al.[13] pointed out that biopsychosocial factors should be considered, for they are related to the continuation of pain. For this reason, the control of pain in this type of patient who has already undergone some treatment is a challenge. It is also significant that these patients develop a central sensitization as well as hyperalgesia and

Table 1. General characteristics of the sample

	N 40
Age (years)	69.57 ± 6.42
BMI (kg/cm²)	29.50 ± 5.51
Time with disease (months)	95.35 ± 74.92
Side affected R/L	17/23

BMI: Body mass index; R: right; L: left, values represented as mean ± standard deviation

secondary hyperalgesia, and that this type of chronic disease produces higher reported levels of pain, as well as worse functional performance and quality of life.[13-16]

In the present study, the participants' pain diminished after only three treatment sessions. This reduction in pain seen by these patients treated with ESWT confirms the findings, although in animal studies,[17] that this technique is effective for many orthopedic disorders. As for the reason for improvement after treatment with shockwaves, even though the exact mechanism remains unknown, there are a few hypotheses. Some studies show that ESWT is capable of inducing regression or retarding the advance of alterations due to OA in rats.[17-19] Others report that the ESWT would involve a stimulation of a neovascularization.[17,20,21] Another probable explanation given by Zhao et al.[10] is the alteration of the afferent pain mechanisms. Those authors used ESWT on individuals with knee osteoarthritis and also found a reduction in pain intensity as measured by VAS after treatment. In that way, it is believed that the use of ESWT brings beneficial results after only three short sessions, which may also have influenced the functional performance of these patients, since they are related factors.[14]

In the present study, there are a few limiting factors that need to be considered. One of them is the lack of a control group. Another factor would be a lack of classification through radiographic exam of the degree of intensity of the volunteers' knee osteoarthritis. However, it is noteworthy that in population studies disagreement has been found between radiographic diagnosis and knee pain in OA.[22] Still, these factors do not invalidate the beneficial result of the ESWT treatment for elderly individuals with knee OA. Nevertheless, future studies should be conducted, comparing this technique with others already acknowledged in the literature like therapeutic exercises, or even with a placebo group.

CONCLUSION

The conclusion of the present study was that shockwave treatment benefitted elderly females with knee osteoarthritis by reducing the intensity of their pain.

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