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A STUDY OF EFFECT OF PAIN REDUCTION IN OSTEOARTHRITIS KNEE PATIENTS BY MAGNETOTHERAPY.

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ABSTRACT

This trial aimed to test the effectiveness of a wearable Pulsed Electromagnetic Field (PEMF) device in the management of pain in knee Osteoarthritis (OA) patients. In this RCT, patients with radiographic evidence of knee OA were included. All were given PEMF(Actipatch) for a period of 6 months. Forty patients were included and thirty seven completed the study. After 6 month, PEMF induced a significant reduction in Numeric Rating Scale (NRS) pain . Twenty-six per cent of patients in the PEMF group stopped NSAID/analgesic therapy. No adverse events were detected. These results suggest that PEMF therapy is effective for pain management in knee OA patients .Future larger studies, including head-to-head studies comparing PEMF therapy with standard pharmacological approaches in OA, are warranted.

INTRODUCTION

Osteoarthritis is a degenerative synovial joint disease involving cartilage loss, synovial inflammation, subchondral bone lesions and meniscus extrusion[1], which cannot be cured .Knee OA is the most common form of joint disease[2] and the major cause of pain and physical disability among middle-aged and elderly people[3]. Nowadays, various treatment options are available for the management of this condition. They include: NSAIDs bisphosphonates therapeutic exercise, visco -supplementation with hyaluronic acid alone or in combination with bisphosphonates or NSAIDs to improve pain and functional activity[4]. These treatment modalities are effective in reducing pain and inflammation, but their long-term administration is associated with a high incidence of side effects or may not be applicable to the elderly.

Building upon these foundations, there is an urgent need for alternative therapies for this pathological condition. Pulsed electromagnetic field (PEMF) therapy has proved to be safe and has also shown promising therapeutic effectiveness on bone- and cartilage-related pathologies, including knee and cervical spine OA [5,6].

The aim of the present study, therefore, was to evaluate the efficacy for reduction of pain intensity, measured by numeric rating scale (NRS) , in patients affected by knee OA treated for 6 month with a wearable device using PEMF.

MATERIAL & METHODS

All patients provided their written informed consent. Eligibility criteria: diagnosis of primary OA of the knee according to the ACR criteria, including radiological evidence of OA[7]; age 40-70 years; symptomatic disease for at least 6 months prior to enrolment. Patients affected by secondary causes of OA, DIP joint OA, local or systemic infection, secondary FM, diabetes mellitus, systemic arthritis, coagulopathy, patients on anticoagulant therapy and patients who had received previous intra-articular steroid injection or with avascular necrosis of bone were excluded. The study took place at Dr.Ashok Singhal's magnetotherapy center, sambalpur, from June 2017 to October 2019.

All Patients were given PEMF wearable device. Patients were trained in the use of the PEMF device, which was worn all through the day , except , Bathing and sleeping. The device was kept in place with a wrap and switched off when not in use.

Each patient was re-evaluated at 1 months,3 months and 6 months. Statistical analyses were performed using SPSS version 21. We used analysis of covariance on the post-intervention values to assess the group differences with P-values, mean difference and 95% CI. Baseline values were included as covariates. A value of $P < 0.05$ was considered to be statistically significant. It was calculated that a sample size of 37 was sufficient, with a power of 80% using a two-tailed test with a level of 0.05

RESULTS

A total of fourty patients were recruited into this study. Participants attended clinic visits at the time of randomization (baseline) and at 1 month for a total period of 6 month. Three patients were lost to follow-up. Baseline characteristics, such as, sex, age, BMI, duration of disease and outcome parameters are reported in Table 1. No adverse events were detected during the study.

TABLE 1: Baseline demographic and clinical charact eristics of patients affected by knee OA.

Characteristic	All patients (n=37)
Age, mean , years	56.95
Gender (female/male)	20/17
Side (ul/bl)	17/20
BMI, mean, kg/m2	26.9
Disease duration, mean, years	5.1

After 1 month of treatment, there was a 50% reduction in NRS pain scores for subjects treated with the PEMF device

TABLE 2: Effect of electromagnetic field device therapy on pain.

	n	WITH MAGNETOTHERAPY		T value	p
		Mean pain score	SD		
At 1 months	37	2.38	0.594	18.037	<0.05
At 3 months	37	1.54	0.558	23.917	
At 6 months	37	0.95	0.621	26.665	

Our results showed that PEMF treatment reduced intake of NSAIDs/analgesics

Given that recruited patients continued to take prescribed analgesic therapy as needed, we analysed the changes in intake of NSAIDs/analgesics as shown in Table 3. Among the patients TEN patients (26%) stopped previously prescribed medications

TABLE 3: Changes in intake of NSAIDs/analgesics

NSAID/analgesic intake	at 1 month follow-up reduced NSAIDs/ analgesics	at 3 month follow-up reduced NSAIDs/ analgesics	at 6 month follow-up reduced NSAIDs/ analgesics
n = 37	5	13	19

DISCUSSION

Experimental studies had previously shown that PEMF therapy produces an anabolic effect on the two key cell types in the skeletal system, ie, osteoblasts and chondrocytes[8] that are involved in experimental and clinical OA. Furthermore, PEMF therapy possesses healing properties at the cellular level[9]. In the present study we investigated the efficacy of PEMF therapy for management of knee OA-related pain in elderly patients. We observed a significant decrease in pain at the 3-month follow-up in the knee receiving PEMF therapy. In this randomized clinical trial, PEMF therapy improved in knee OA patients. Although previous studies have reported contradictory results on the efficacy of this non-pharmacological approach, our results support previous high-quality randomized clinical trials. In our study, the electromagnetic therapy was applied for 12 h each day for a treatment duration of 6 months, whereas previous studies ranged from 20min in nine sessions for 3 weeks[10] to 2 h a day in 30 sessions for 6 weeks[11]. Thus, the absence of a standardized treatment protocol limits the comparison with previous studies. Additionally, the pulse frequency and duration were different among the randomized clinical trials available, further limiting the possibility of comparing efficacy and safety.. Exposure to PEMF can increase pain thresholds toward an analgesic response, without affecting thermal sensory threshold, in healthy subjects[12]. Another interesting aspect of the interaction between electromagnetic fields and pain is related to opioid function; it has been demonstrated in mice that the induction of analgesia by electromagnetic exposure was equivalent to a moderate dose of morphine[13]. In our study, OA patients treated with the PEMF device significantly reduced their intake of NSAIDs. Our data on the evidence for the regulation of pain threshold at two different anatomical sites indicates the need for specific studies designed to explore neuronal adaptation in a pulsed electromagnetic environment. Given that our data are limited to a low number of participants, and the long-term efficacy of the wearable device is unknown, the genera lizability of the results needs to be confirmed in a larger clinical trial with a longer duration of treatment. However, the use of a wearable PEMF therapy in knee OA can be considered as an alternative safe and effective therapy in knee OA, providing the possibility for home-based management of pain compared with previous studies. Taken together, these results suggest that PEMF therapy is a plausible option for the treatment of chronic pain in knee OA.

CONCLUSION

PEMF therapy produces a significant benefit in terms of reduction in knee-related pain, stiffness, and physical function in elderly patients with knee OA. Further studies need to be designed to determine effectiveness of PEMF therapy in the long-term follow-up and clarify its mechanism.

Conflict of interest- Nil.
Source of funding- Self.

ETHICAL CLEARANCE-

The study was conducted in the Department of Physiology after receiving approval from the Institutional Ethics Committee of VIMSAR, Burla, Sambalpur University.

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