ROLE OF PULSED ELECTROMAGNETIC THERAPY IN THE MANAGEMENT OF BACKACHE: A STUDY CONDUCTED AT ARMED FORCES INSTITUTE OF REHABILITATION MEDICINE, RAWALPINDI

Naveed Mumtaz, Khalil Ahmad, Akhtar Waheed, Syed Hussain Shah

Armed Forces Institute of Rehabilitation Medicine, Rawalpindi

ABSTRACT

Objective: To determine the role of pulsed electromagnetic therapy in providing pain relief for backache.

Study Design: This was a quasi experimental study.

Place and Duration: This study was conducted at Armed Forces Institute of Rehabilitation Medicine, Rawalpindi, Pakistan from Jan 2012 to June 2012.

Material and Methods: This study included 65 consecutive patients with backache. The pain was assessed on 11 points (0-10) Numeric Rating Scale (NRS) and patients with score ≥1 were included in the study. Detailed history was obtained and examination was performed. All patients were subjected to pulsed electromagnetic therapy. The pain was assessed at first week, 2nd week, third week and six week after start of the pulsed electromagnetic therapy. Data was compiled and analysed using SPSS version 17. A p-value < 0.05 was considered as significant.

Results: There was marked reduction in pain of patients with backache after treatment with pulsed electromagnetic therapy. Reduction in pain as calculated by the NRS (numeric rating scale) value after 1st week was 25.35% (p=0.002), after 2nd week was 43.66% (p=0.001), after 3rd week was 50.7% (p=0.001) and after 6 weeks was 71.83% (p=0.001).

Conclusion: Pulsed electromagnetic therapy is very effective in relieving pain in patients with backache.

Keywords: Backache, Pulsed electromagnetic therapy, NRS.

INTRODUCTION

Backache is one of the most common complaints for which the patients see the general practitioners[1]. Despite the large variety of treatments available for relief of backache, the effect on the patient's pain is small even for the commonly used treatments such as exercise[2].

Since its acceptance in 1979 by the food and drug administration (FDA), pulsed electromagnetic therapy has promising results in the management of the chronic low back pain. In 1995, scientists at the University of Kentucky found that each type of soft tissue responds differently to specific electromagnetic frequencies which result in healing and pain relief[3]. The benefits of pulsed electromagnetic therapy have been documented in multiple peer reviewed clinical studies for a wide range of medical conditions. Randomized double blind placebo controlled clinical trials using pulsed electromagnetic therapy have shown beneficial effects for backache, fibromyalgia, cervical osteoarthritis, osteoarthritis of the knee, lateral epicondylitis, recovery from arthroscopic knee surgery, recovery from interbody lumbar fusions, persistent rotator cuff tendinitis, depression, and multiple sclerosis[4-6].

There are very few studies on the effect of the pulsed electromagnetic therapy on backache in our set up. Therefore we conducted a study to see the efficacy of the pulsed electromagnetic therapy on improvement of the symptoms of backache.

PATIENTS AND METHODS

This was a quasi experimental study conducted at the Armed Forces Institute of Rehabilitation Medicine Rawalpindi. It included 65 consecutive patients with backache from January 2012 to June 2012. The pain was assessed

Correspondence: Dr Naveed Mumtaz, AFIRM Rawalpindi.
Email: iamnaveedmumtaz@gmail.com
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on 11 points (0-10) Numeric Rating Scale (NRS) and patients with score ≥1 were included in the study. Patients who were on any other form of treatment for backache such as oral medications, exercise, topical applications of medications or local heat therapy were excluded from the study. Patients with co-morbid conditions such as coronary artery disease, uncontrolled diabetes were excluded from the study. Detail history was obtained and examination was performed. Patients were asked about the radicular pain and neurogenic intermittent claudication. They were examined to check for the facet joint, iliolumbar and sacroiliac tenderness. Straight leg raising test and Patrick test was performed. Neurological examination was conducted to check the sensory and motor impairment. All patients were informed about inclusion in study, the procedure, its benefits and risks involved and consent was obtained. Approval from the hospital ethical committee was obtained prior to start of the study.

All patients were subjected to pulsed electromagnetic therapy which was administered by magnetomed 2000. The range of frequency is 0-100 Hz and intensity is 50-100 Gauss. The treatment sessions were given 10 to 20 minutes three times a week for total of three weeks. The pain was assessed at first week, second week, third week and six weeks after the start of the pulsed electromagnetic therapy. Follow up was carried out 6 weeks after the last session of the pulsed electromagnetic therapy. Data was compiled and analysed using SPSS version 17. Mean and standard deviation was calculated for quantitative variables like age and pain. Frequency and percentages presented for qualitative variables like gender, radicular pain, neurogenic intermittent claudication, facet joint, iliolumbar, sacroiliac tenderness, straight leg raising and patrick test, sensory and motor impairment. Pain was assessed at the 1st, 2nd, 3rd and 6th week. Paired sample t-test was used for comparison of pain with time and a *p*-value < 0.05 was considered as significant.

RESULTS

A total of 65 patients were included in the study. Out of these 43 (66%) were male and 22 (34%) were females. The male to female ratio was 1.95:1. The mean age of the patients in the study was 45.1 years (SD 1.47) (figure-1). The baseline characteristics of the patients included in the study are shown in the table -1.

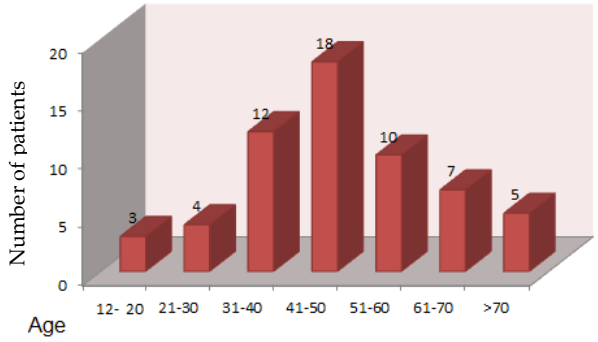

Figure-1: Age distribution of patients with backache reporting at Armed Forces Institute of Rehabilitation Medicine (AFIRM).

Table-1: Baseline parameters of the patients reporting at Armed Forces Institute of Rehabilitation Medicine (AFIRM) with backache (n=65).

Baseline parameters	Frequency	Percentage
Diabetes mellitus	3	4.6%
Hypertension	5	7.7%
Radicular pain	3	4.6%
Neurogenic intermittent claudication	6	9.2%
Facet joint	8	12.3%
Iliolumbar tenderness	10	15.4%
Sacroiliac tenderness	7	10.8%
Positive straight leg raising test	5	7.7%
Positive patrick test	4	6.2%

The result of the pulsed electromagnetic therapy showed that there was marked reduction of the pain in patients after treatment. At the start of the treatment the mean NRS pain value was 7.1. The reduction in the pain as calculated by the

NRS value after 1st week was 25.35% (p=0.002), after 2nd week was 43.66% (p=0.001), after 3rd week was 50.7% (p=0.001) and after six weeks was 71.83% (p=0.00) (table-2).

DISCUSSION

Backache is one of the common reasons patients seek medical advice. It results in decreased physical activity and debilitation of the patients. As a result it affects their working and they have to take time off from work[1]. So it has economical and physical effects[7]. There are many types of the treatments available for backache ranging from the hot or cold packs, exercise, topical analgesics (creams, ointments), nonsteriodal anti-inflammatory drugs (NSAIDs), muscle relaxants and some antidepressants, behaviour modifications, injections, manipulation, transcutaneous electrical nerve stimulation (TENS), acupuncture, acupressure and surgery depending on the type and cause of the backache[8-12]. Since its approval pulsed electromagnetic therapy has shown promising results in pain management and variety of acute and chronic conditions[3].

In our study pulsed electromagnetic therapy has significantly reduced backache. Similar study was conducted by the Lee et al, who compared the efficacy of pulsed electromagnetic therapy in placebo randomized control trial[3]. They found that the pulsed electromagnetic therapy reduced the pain in the patients with backache. They have used the pulsed electromagnetic therapy for 4 weeks and calculated the pain reduction after 4 weeks of therapy and reported a reduction in the NRS pain value up to 38% after 4 weeks.

In a double-blind, placebo-controlled trial, the infrared therapy demonstrated a reduction of back pain by 50% over six weeks of therapy but it caused thermal injuries, malignant hyperthermia and scleroderma[13].

Another study conducted by the Gibofsky who compared the efficacy of the NSAIDS valdecoxib and naproxen for the treatment of backache and compared it with placebo showed a reduction in pain upto 58.8% and 60.8% respectively after 12 weeks of therapy[10,14]. NSAIDS has shown acceptable result but the treatment duration is considerably more than the pulsed electromagnetic therapy and furthermore it is associated with undesirable effects such as gastrointestinal discomfort, peptic ulceration, renal and cardiovascular problems[15,16].

Transcutaneous electrical nerve stimulation (TENS) was introduced more than 30 years ago as a therapeutic adjunct to the pharmacological management of pain and despite its widespread use in treatment of backache trials have failed to demonstrate its effectiveness in back pain and its role is considered as controversial[7,8].

The exact mechanism of the pulsed electromagnetic therapy remains unclear but the mechanism of pulsed electromagnetic therapy may be explained on the basis of alterations in membrane calcium ion flux. The mechanism suggested to explain these effects is based on the diamagnetic anisotropic properties of membrane phospholipids. It is proposed that reorientation of these molecules during pulsed Electromagnetic exposure will result in the deformation of imbedded ion channels, thereby altering their

Table-2: Assessment of pain on numeric rating scale (NRS) scale at presentation, 1st week, 2nd week, 3rd week and 6th week post pulsed electromagnetic therapy (n=65).

Time	Mean ± SD (NRS Value for pain)	Reduction in pain score (%)	p value
At presentation	7.1 ± 2.27		
1st Week	5.3 ± 1.61	25.35	0.002
2nd Week	4 ± 1.15	43.66	0.001
3rd Week	3.5 ± 1.21	50.7	0.00
6th Week	2 ± 0.79	71.83	0.00

activation kinetics. Additional studies have demonstrated that sodium channels are similarly affected by pulsed Electromagnetic although to a lesser degree[17-21].

This results in an increase in the threshold of pain sensitivity and activation of the anticoagulation system. Pulsed electromagnetic therapy treatment stimulates production of opioid peptides, activates mast cells and increases electric capacity of muscle fibers. These effects reduce oedema and pain and increase the soft tissue, cartilage and bone healing[22-25]. Pulsed electromagnetic therapy increases amino acid uptake to about 45% and changes in trans-membrane energy transport enzymes, allowing energy coupling and increased biologic chemical transport work.

The use of the pulsed electromagnetic therapy for the backache is still not widespread and it is in an experimental stage. Our study shows benefit of the patients in terms of the pain relief from backache.

CONCLUSION

Pulsed electromagnetic therapy is non-invasive method. In present study pulsed electromagnetic therapy has resulted in reduction of pain in patients with backache. It appears extremely good for the management of patients with backache.

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