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THE EFFECTIVENESS OF PERIPHERAL MAGNETIC STIMULATION FOR PAIN MANAGEMENT IN THE NEUROMUSCULAR DISORDERS-A PILOT STUDY

Dr. Samiullah Khan[1], Muhammad Zia Ullah Shah[2], Hina Hazrat[3], Zeshan Ahmad[4], Mansoor Ahmad[*5], Laiba Ali[6], Dr. Muslim Khan[7]

[1]*Assistant Professor, IQRA National University, Swat, Pakistan*
[2]*DPT Student, IQRA National University, Swat, Pakistan*
[3]*MSPT, Ibadat International University Islamabad, Pakistan*
[4]*DPT Student, Department of Physiotherapy, Riphah International University, Islamabad, Pakistan*
[*5]*Lecturer, IQRA National University, Swat, Pakistan*
[6]*DPT Student, Department of Allied Health Sciences, CECOS University of IT and Emerging Sciences Peshawar, Pakistan*
[7]*Associate Professor, IQRA National University, Swat, Pakistan*

[*5]mansoorahmad.ma1313@gmail.com

Corresponding Author: *
Mansoor Ahmad
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ABSTRACT

Background: *Non-invasive & comparatively with zero negative side effects in the pain management is desirable. Repetitive peripheral magnetic stimulation (rPMS) is considered electro-pain analgesic & curative. Therapeutic interventions are commonly indicated for the mangemange of neurological & musculoskeletal conditions. The aim of this study is to find the effectiveness of peripheral magnetic stimulation for pain management in the neuromuscular disorders.*

Method: *30 study's subjects (male-n=17, Female- n=13) with painful neurological & musculoskeletal acute, subacute & chronic conditions were selected for this pilot study. Each study's subjects were treated with rPMS for 3 months period & the parameter of rPMS was adjusted to each patient's specific conditions. Acute conditions patients received rPMS 3 times/week for 10 minuets/day while, sub-acute & chronic conditions received rPMS 5 times /week for 10 minuets/day. Pre-test & post-test pain was evaluated with VAS (visual analogue scale 0-10) & the patient's specific difficulties to perform ADLs was assessed by patient functional assessment questionnaires (PFAQ). Pre-test & post-test data were collected on the study's outcome measures & analysed for further results.*

Results: *The results of the study show considerably difference in the pre-tests & post-tests score on the outcome scales of the study. 78.34% study's subjects showed improvement in their painful conditions on VAS while 38.34% study's subjects showed improvement on PFAQ with the 3-month interventions of rPMS & at P-value >0.005.*

Conclusion; *The result of this study can be concluded that rPMS is effective, non-invasive & having zero-negative side effects therapeutic intervention for the management of painful neuromuscular conditions & improvement of patient's specific QoL.*

Keywords; *Painful neuromuscular conditions, rPMS, VAS, PFAQ*

Introduction

Non-invasive & comparatively with zero negative side effects in the pain management is desirable. Repetitive peripheral magnetic stimulation (rPMS) is considered electro-pain analgesic & curative. Therapeutic interventions are commonly indicated for the mangemange of neurological & musculoskeletal conditions. Pain is unpleasant sensory & emotional experience associated with tissue damage or loss causing nocieptive irritation in the form of decreased inhibition & structural brain reorganization. Pain in the neuromuscular structures can be caused by direct or indirect mechanism[1,2]. Pain can be acute, sub-acute or chronic based on its duration from onset, nocieptive & neuropathic, focal, general or diffuse in the its clinical presentation[3,4].

Chronic pain incidence has been reported to be 20-30% & pain killer is considered the main therapeutic interventions for the management of pain worldwide. Pain killers has variety of negative side effects including stomach ulceration, addiction, cost-effectiveness & temporal characters etc. among patients with chronic pain[5–9]. Therefore, pain management by non-invasive & zero-negative side effects for the chronic & acute neuromuscular conditions are desirable by bother pain experts, physicians & patients alike.

The curative & therapeutic effects of magnetic stimulation (rPMS) have been studied since 1880 known as transcrenial magnetic stimulation (TMS). rPMS has been proven now in many medicine branches for the pain management & preferred by osteopathic physicians as being non-invasive & cost-effective over medications with chronic negative side effects[10–12]. rPMS create electromagnetic induction –induced electric current across the targeted painful & nocieptive tissues without the practical contact by placing plastic enclosed activated coil around the tissues. The induced current depolarize the muscle cells & causes contraction in the targeted tissues, resulting in circulatory improvement, swelling subsidization & pain relief[13–15]. The aim of this study is to find the effectiveness of peripheral magnetic stimulation for pain management in the neuromuscular disorders.

Methodology

30 study's subjects (male-n=17, Female- n=13, aged 20.3±67.4 years) with painful neurological & musculoskeletal acute, subacute & chronic conditions & having difficulties in ADLs performance, were selected for this pilot study (one site-one arm study). Patients with metallic implants were excluded from the study & then the selected study's participants were briefed about the aim, procedure & duration of the study & written consent was taken after their willingness to participate in the study. Prior to the conduction of the study approval from the hospital's admin & ethical committee has been taken. The baseline clinical diagnosis of the patients enrolled for the study was as follow.

Table-1: study's subjects' clinical diagnosis

Diagnosis	No/%
Peri arthritis	10/33.3
Coxarthosis	6/20
Epicondylitis	4/13.3
Myopathy	5/16.6
Neuropathy	2/6.6
Gonorthrosis	3/10

All study's subjects were assessed by trained therapists at the department of physical therapy at the hospital & the device used as rPMS was BTL-6000 in the parameters as follow; a) magnetic field intensity 2-2.5T b) frequency 100-150Hz c) 10 minutes session/day for 5 days/week. Each study's subjects were treated with rPMS for 3 months period & the parameter of rPMS was adjusted to each patient's specific conditions. Acute conditions patients received rPMS 3 times/week for 10 minutes/day while, sub-acute & chronic conditions received rPMS 5 times /week for 10 minutes/day. Pre-test & post-test pain was evaluated with VAS (visual analogue scale 0-10) & the patient's specific difficulties to perform

ADLs, was assessed by patient functional assessment questionnaires (PFAQ). Pre-test & post-test data were collected on the study's outcome measures & analysed for further results.

Results

The results of the study show considerably difference in the pre-tests & post-tests score on the outcome scales of the study. 78.34% study's subjects showed improvement in their painful conditions on VAS while 38.34% study's subjects showed improvement on PFAQ with the 3-month interventions of rPMS & at P-value >0.005.

Table-2: Study's participants VAS pre-test & post-test score (P-value <0.005)

Pre-test score (baseline measurement)	Post-test score (final score)	Improvement
1.20±1.23	8.40±1.34	7.20±0.11

The means value of improvement on VAS was 7.20±0.11 for the study's subjects, which indicate a mild to moderate pain level of the outcome scale while in the PFAQ scale the means values was dropped as from moderate ADLs difficulties to little difficulties as shown in Table-2. Paired t-test was applied for further analysis of the PFAQ data & it shows statistically significant difference between the means pf pre-test & post-test score at the P-value >0.005.

Table-3: Study's participants PFAQ pre-test & post-test score (P-value >0.005)

PFAQ activity	Pre-test	Post-test	Post-test-2 (after 3 months follow up)
Mobility	1.23±2.34	0.67±0.54	0.53±0.34
Maintaining body posture	1.13±1.34	0.34±0.56	0.23±0.54
Carrying objects	1.33±1.59	0.83±0.69	0.73±0.54
Self-care	2.23±1.24	0.58±0.34	0.53±0.34

Discussion

The results of the study show considerably difference in the pre-tests & post-tests score on the outcome scales of the study. 78.34% study's subjects showed improvement in their painful conditions on VAS while 38.34% study's subjects showed improvement on PFAQ with the 3-month interventions of rPMS & at P-value >0.005. The means value of improvement on VAS was 7.20±0.11 for the study's subjects, which indicate a mild to moderate pain level of the outcome scale while in the PFAQ scale the means values was dropped as from moderate ADLs difficulties to little difficulties as shown in Table-2. Paired t-test was applied for further analysis of the PFAQ data & it shows statistically significant difference between the means pf pre-test & post-test score at the P-value >0.005. Non-invasive & comparatively with zero negative side effects in the pain management is desirable. Repetitive peripheral magnetic stimulation (rPMS) is considered electro-pain analgesic & curative. Therapeutic interventions are commonly indicated for the mangemange of neurological & musculoskeletal conditions. The aim of this study is to find the effectiveness of peripheral magnetic stimulation for pain management in the neuromuscular disorders.

The results of this pilot study shows considerable reduction in the pain intensity & others specific associated pain behaviours, as it shows pain relief from severe to mild level on VAS, which is in line with the finding of previous studies[16–22]. The decrease in pain intensity was accompanied with the associated improvement in the ADLs performance of the study's subjects, which is consistent with the findings of another study carried out by [23].

Conclusion; The result of this study can be concluded that rPMS is effective, non-invasive & having zero-negative side effects therapeutic intervention for the management of painful

neuromuscular conditions & improvement of patient's specific QoL.

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