International Journal of Innovative Research and Advanced Studies (IJIRAS)
Volume 4 Issue 10, October 2017

ISSN: 2394-4404

Comparison Of Effect Of Pulsed Electromagnetic Energy Therapy V/S Hot Packs On Pain And Function In Subjects With Nonspecific Low Back Pain

Bhatt Pranali Mehulbhai

Post Graduate Student, Physiotherapy, SBB College, Gujarat, India

Sheth Megha Sandeep

Leturer, Physiotherapy, SBB College, Gujarat, India

Abstract:

Introduction: Nonspecific low back pain is a general term that refers to any type of back pain in the lumbar region that is not related to serious pathology and does not have any specific cause. Pulsed Electromagnetic Energy Therapy (PEME) is a reparative technique most commonly used in field of orthopedics.PEME is a combined therapy of electrotherapy and magnetodyne.The frequency of PEME is 27.12 Hz same as SWD. Effect of PEME depends upon interactions between electric fields, magnetic fields and biological tissue. PEME allows use of a very high peak power output without risk of increase in tissue temperature. PEME has been found effective in Osteoarthritis. Studies about effect of PEME in low back pain are very few.

Aim: To compare the effect of PEME therapy v/s Hot pack on pain and function in participants with Non-specific low back pain.

Method: An experimental study with 20 participants by convenience sampling was conducted at College of Physiotherapy. Participants were randomly allotted into 2 groups using random table. Group A was given PEME therapy with magnetodyne with frequency of 8 Hz for 30 minutes for 5 days in a week. Group B was given hot pack for 20 minutes. Both groups also received set of 10 repetitions of isometrics abdomen exercises and back flexion exercises.NPRS was used to assess pain and Modified Oswestry Low Back Pain Disability Index (MODI) was used to measure physical function. Level of significance was kept at 5%.

Results: Mean difference in NPRS score for Group A 2.45 ± 0.415(z=2.869,p=0.004) and Group B 1.3 ± 0.50 (z=2.825,p=0.005). Difference in mean NPRS between the groups was 0.85 ±0.474 (U=8, p <0.001). Mean difference in MODI for Group A was 20.9 ± 7.02(z=2.810, p=0.005) and Group B was 12.4 ± 5.42 (z=2.814, p=0.005). Difference in mean MODI between the groups was 8.9± 7.89 (U=19, p<0.01).

Conclusion: PEME is better than hot packs in reducing pain and improving function in patients with nonspecific low back pain.

Keywords: Pulsed Electromagnetic Energy, Non Specific Low Back Pain, Hot packs, Function

I. INTRODUCTION

Nonspecific low back pain (LBP) is a general term that refers to any type of back pain in the lumbar region that is not related to serious pathology and does not have any specific cause. Continuing Professional Educations (CPE'S) suggest that the frequency of non-specific low back pain is reportedly 75-84% of the general population which includes working individuals as well as unemployed.

Non-specific low back pain can be caused by: Traumatic injury, Lumbar sprain or strain and Postural strain. Low back pain is a self-limiting condition. Ninety % of people with LBP will recover in 3-4 months with no treatment. Seventy % of people with LBP will recover in one month with no treatment.

ISSN: 2394-4404

Fifty % of people with LBP will recover in two weeks with no treatment. Five % of the remaining ten % will not respond to conservative care (such as physiotherapy). The final five % are the more challenging cases that don't naturally improve. Pain can vary from a dull constant ache to a sudden sharp feeling. Nonspecific low back pain may be classified by duration as acute (pain lasting less than 6 weeks), sub-chronic (6 to 12 weeks), or chronic (more than 12 weeks). The condition may be further classified by the underlying cause as either mechanical, non-mechanical, or referred pain.

The manual therapies reviewed for the NICE Guidelines were spinal manipulation (a low-amplitude, high-velocity movement at the limit of joint range that takes the joint beyond the passive range of movement), spinal mobilization (joint movement within the normal range of motion) and massage (manual manipulation or mobilization of soft tissues).

Pulsed Electromagnetic Energy Therapy (PEME) is a reparative technique most commonly used in field of orthopedics for the treatment of non-union fractures, failed fusions, congenital pseudoarthrosis and depression. PEME is a combined therapy of electrotherapy and magnetotherapy. The frequency of PEME is 27.12 Hz same as SWD.

A number of laboratory experiments have demonstrated the healing and analgesic effects of PEME at the level of cellular and animal studies. The evidence in human beings is at best mixed, this is due to a number of confounding factors such as application of technique, treatment regime and dose/response relationship resulting in conflicting and heterogeneous results.

The aim of the study was to compare the effect of PEME therapy v/s hot pack on pain and function in participants with Non-specific low back pain.

II. METHODOLOGY

Twenty participants coming to the orthopedic department of the hospital were selected in the experimental study by convenience sampling. The study was conducted in the Physiotherapy Department of General Hospital in Ahmedabad. The duration of study was one month.

Males and females between the ages of 20-80 years having non-specific low back pain were included in the study. Patients having pain on the numerical pain rating scale (NPRS) of more than six with specific cause for low back pain and low back pain with radiculopathy were excluded from the study. The subjects were explained about the study and informed consent was taken. The subjects were randomly allocated to any one group, A or B using random table. Demographic data of the subjects was collected along with the outcome measures.

Numerical Pain Rating Scale (NPRS) was used to assess pain in low back The NPRS is a segmented numeric version of the visual analog scale (VAS) in which a respondent selects a whole number (0–10 integers) that best reflects the intensity of his/her pain. The common format is a horizontal bar or line. Similar to the VAS, the NPRS is anchored by terms describing pain severity extremes. Modified Oswestry Low Back Pain Disability Index (MODI) was used to measure physical function. This questionnaire has been designed with ten components to give the therapist information as to how the back pain has affected the ability to manage in everyday life.

Group A was given PEME therapy with magnetodyne using coil applicator with frequency of 8 Hz for 30 minutes for five days. Group B was given hot packs for 20 minutes for five days. Both groups also received one set of ten repetitions of isometric abdominal exercises and back flexion exercises (knee to chest, curl-up) for five days.

Level of significance was kept at 5%.

III. RESULTS

Eleven males and nine females with a mean age of 39.5±15.8 years participated in the study.

Wilcoxon test was used for statistical analysis of NPRS and MODI scores within both groups. Table 1 shows the mean difference in pain within groups. There was statistically significant difference seen in both groups. Table 2 shows the mean difference in function within groups. There was statistically significant difference seen in both the groups. Mann-Whitney test was used for statistical analysis of mean difference scores between the groups. Table 3 shows the mean difference of score between groups. There was statistically significant difference seen in between the groups

GROUP	PRE-NPRS	POST-NPRS	DIFFERENCE	Z	P	INFERENCE
A	4.125±0.582	1.4375±0.623	2.45 ± 0.415	2.869	0.004	Significant
B	3.3 ± 0.9775	1.75 ± 0.540	1.3 ± 0.50	2.825	0.005	Significant

Table 1: Mean Difference In Pain Within Groups

GROUP	PRE-MODI	POST-MODI	DIFFERENCE	Z	p	INFERENCE
A	34.875 ± 12.642	14.75 ± 7.166	20.9 ± 7.02	2.810	0.005	Significant
B	33.4 ± 12.402	12.4 ± 5.42	12.4 ± 5.42	2.814	0.005	Significant

Table 2: Mean Difference In Funtion Within Groups

Outcome Measures	Mean difference	U	P
NPRS	0.85 ± 0.474	8	<0.001
MODI	8.9 ± 7.89	19	<0.01

Table 3: Mean Difference In Between Groups

IV. DISCUSSION

Both the groups showed improvement in pain and function in participants with nonspecific low back pain but PEME was more effective than hot packs.

A randomized controlled trial in 2015 was conducted in New Zealand on 40 participants with acute nonspecific low back pain. They concluded that PEME appeared to be well tolerated with no adverse effect. However the study showed that PEME provides no additional benefit to routine physiotherapy. Gajjar BA et al (2014) described a study on 20 participants of Osteoarthritis and concluded that PEME therapy reduces pain and improves physical function in participants with knee Osteoarthritis. Similar to present study a systemic review was conducted in Australia by French SD EL (2006) and he concluded moderate evidence in a small number of trials that heat wrap therapy provides a small short-term reduction in pain and disability in a population with a mix of acute and sub-acute low-back pain, and that the addition of exercise further reduces pain and improves function. Omar EL in a trial in 2012 demonstrated that PEME is associated with

significant improvements in both pain and disability for participants suffering from radiculopathy. Harden (2007) reported statistically significant improvements in pain using the McGill pain questionnaire and the VAS in participants with chronic LBP.

Effect of PEME depends upon interactions between electric fields, magnetic fields and biological tissue. PEME allows use of a very high peak power output without risk of increase in tissue temperature. Research suggests that the mechanism by which PEME mediates its healing effects is by way of induction of ionic currents within target tissue. Exact mechanism by which PEME generates its analgesic effects is unclear, a number of experiments have suggested that exposure to PEME may stimulate endogenous and exogenous opiate pathways. These currents in turn stimulate changes in cellular calcium and cyclic adenosine monophosphate levels along with increased synthesis of collagen, proteoglycans, deoxyribonucleic acid and ribonucleic acid. PEME has also been shown to increase levels of reactive oxygen species and nitric oxide production, all essential for healing and remodeling of damaged tissue.

Long-term follow-up period was unable to be incorporated into the study. Data on participants' use of simple analgesics was not collected.

V. CONCLUSION

The result of the present study indicate that PEME is better than hot packs in reducing pain and improving function in patients with nonspecific low back pain. Thus the present study shows that PEME therapy can be used in clinical practice to relieve pain and improve function. Studies with long term follow up can be done. Analysis can be done about effect of PEME in different stages of nonspecific low back pain (acute, subacute, chronic) and in back pain of different causes.

REFERENCES

[1] Burton AK, Tillotson KM, Main CJ, Hollis S. Psychosocial predictors of outcome in acute and subchronic low back trouble. Spine (Phila Pa 1976). 1995 Mar 15;20(6):722
[2] Deyo RA, Weinstein JN. Low back pain. N Engl J Med. 2001 Feb 1; 344:363–370. www.ncbi.nlm.nih.gov
[3] Atlas S.J. Evaluating and managing acute low back pain in the primary care setting. J Gen Intern Med. 2001;16(2):120-131
[4] Gatchel RJ, Polatin PB, Mayer TG. The dominant role of psychosocial risk factors in the development of chronic low back pain disability. Spine (Phila Pa 1976). 1995 Dec 15; 20(24):2702-9.
[5] "Low Back Pain Fact Sheet". National Institute of Neurological Disorders and Stroke. November 3, 2015. Retrieved 5 March 2016. https://www.ninds.nih.gov/Disorders/Patient.../Fact-Sheets/Low-Back-Pain-Fact-Sheet
[6] Koes BW, van Tulder M, Lin CW, Macedo LG, McAuley J, Maher C. "An updated overview of clinical guidelines for the management of non-specific low back pain in primary care.". European Spine Journal. 19 (12): 2075–94. doi:10.1007/s00586-010-1502-y. PMID 20602122.
[7] Manusov EG. "Evaluation and diagnosis of low back pain". Prim. Care. 39 (3): 471–9. doi:10.1016/j.pop.2012.06.003. PMID 22958556.
[8] Balagué, Federico, et al. "Non-specific low back pain." The Lancet 379.9814 (2012): 482-491.
[9] Bassett CA, Schink-Ascani M, Lewis SM (Sep 1989),"Effects of Pulsed Electromagnetic Fields on Steinberg Ratings of Femoral Head Osteonecrosis". Columbia Presbyterian Medical Center. Clin Orthop Relat Res. 1989 Sep;(246):172-85.PMID: 2670386
[10] www.electrotherapy.org
[11] Moffett J, Fray LM, Kubat NJ (2012) Activation of endogenous opioid gene expression in human keratinocytes and fibroblasts by pulsed radiofrequency energy fields. Journal of Pain Research 5: 347.
[12] Rodriguez CS. Pain measurement in the elderly: a review. Pain Manag Nurs 2001;2:38–46
[13] Hawker GA. Measures of Adult Pain. Arthritis Care & Research 2011; 63,S240–S252
[14] Fritz JM, Irrgang JJ. A comparison of a modified Oswestry Low Back Pain Disability Questionnaire and the Quebec Back Pain Disability Scale. Physical Therapy. 2001; 81:776-788.
[15] Rawe IM, Lowenstein A, Barcelo CR, Genecov DG (2012) Control of postoperative pain with a wearable continuously operating pulsed radiofrequency energy device: A preliminary study. Aesthetic Plastic Surgery 36
[16] Krammer, A; Horton, S; Tumilty, S. Publication: New Zealand Journal of Physiotherapy physiotherapy.org.nz/assets/Professional-dev/Journal/2015-March/Tumility
[17] Gajjar BA, Sheth MS, Sharma SS, Vyas NJ. Effect of pulsed electromagnetic energy therapy on pain and function in participants with knee osteoarthritis. Int J Med Sci Public Health 2014;3:589-491
[18] Monash Institute of Health Services Research, Australasian Cochrane Centre, Level 1, Block E, Monash Medical Centre, Locked Bag 29, Clayton, VIC, Australia, 3168.
[19] Omar AS, Awadalla MA, El-Latif MA (2012) Evaluation of pulsed electromagnetic field therapy in the management of patients with discogenic lumbar radiculopathy. International Journal of Rheumatic Diseases 15: E101-E108. DOI:10.1111/j.1756-185X.2012.01745.x.
[20] Harden RN, Remble TA, Houle TT, Long JF, Markov MS, Gallizzi MA (2007) Prospective, randomized, single - blind, sham treatment – controlled study of the safety and efficacy of an electromagnetic field device for the treatment of chronic low back pain: A pilot study. Pain Practice 7: 248-255
[21] Li Q, Kao H, Matros E, Peng C, Murphy GF, Guo L (2011) Pulsed radiofrequency energy accelerates wound healing in diabetic mice. Plastic and Reconstructive Surgery 127: 2255-2262

ISSN: 2394-4404

[22] Thumm S, Löschinger M, Glock S, Hämmerle H, Rodemann HP (1999)Induction of camp-dependent protein kinase a activity in human skinfibroblasts and rat osteoblasts by extremely low-frequency electromagnetic fields. Radiation and Environmental Biophysics 38: 195-199

[23] Goodman R, Wei LX, Xu JC, Henderson A (1989) Exposure of human cells to low-frequency electromagnetic fields results in quantitative changes in transcripts. Biochimica et Biophysica Acta 1009: 216-220

[24] Kim SS, Shin HJ, Eom DW, Huh JR, Woo Y, Kim H, Ryu SH, Suh PG, Kim MJ, Kim JY (2002) Enhanced expression of neuronal nitric oxide synthase and phospholipase c-1 in regenerating murine neuronal cells by pulsed electromagnetic field. Experimental & Molecular Medicine 34: 53-59