Original Article

Evaluation of the Effects of Microwave Diathermy in Patients with Chronic Low Back Pain

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Abstract

Introduction: Low back pain is very common in every community. About 60-80% of people suffer from back pain in their whole life. It is tagged as one of the most common causes for absence from work. Microwave diathermy (MWD) is an important treatment modality which is used as an adjunct to other treatment options. In our country, very few studies were carried out in this regard.

Objective: To find out the efficacy of MWD chronic LBP when given with other usual treatment options like various medications and back muscle strengthening exercise.

Methods: We evaluated 60 patients suffering from chronic LBP. Those who attended Orthopaedic department, CMH Barishal were divided randomly into two groups and treated with all conventional back pain modalities with or without microwave diathermy. Study design was case control study. It was conducted in CMH Barishal from January 2021 to December 2022. Patients were examined weekly for six weeks. After six weeks, the results were observed and compared. Data were collected by questionnaire and compared by Lattinen test score.

Results: Pre-treatment overall score with Lattinen test score system in MWD group was 9.75±4.45 and in non MWD group was 9.5±4.5. After 6 weeks, Group MWD score was 3.20±4.25 whereas Group non MWD score was 5.5±5.6. We found significant improvement of Lattinen test score with application of microwave diathermy after 6 weeks ($P<0.05$). There was significant improvement in MWD group ($P<0.05$).

Conclusion: This study reveals that MWD can be an effective adjunct to usual treatment modalities.

Key words: Microwave diathermy (MWD), Chronic LBP, Lattinen test score.

Introduction

Pain in the area between lower rib cage and gluteal fold is termed Low back pain. When the duration of pain is more than three months it is termed as chronic low back pain.[1] About 60-80% people suffer from low back pain in their whole life.[2,3] Mild to moderate low back pain is very common. This pain is usually of short duration and do not hamper daily routine activities. But these pains usually come again and again. Maximum patients recover with or without treatment. A small group of patients suffer from chronic pain and significant disability.[2] Back pain is the commonest cause of absence from work and in western countries.[1]

Analgesics, muscle relaxant, bed rest and various therapeutic modalities relief severe pain. MWD is an effective adjunct to other treatment options. It is proposed that MWD increases nerve conduction velocity and increases tissue temperature and thereby reduce pain perception. In addition to that, muscle spasm and ischemia is reduced by heat due to vasodilatation.[4]

MWD ultimately produces deep heat in a way where electromagnetic energy is converted to thermal energy. This leads to increased kinetic energy of molecules within the microwave field which produces energy in the form of heat.

As per Federal Communications Commission, frequencies for therapeutic microwave are 915 MHz (wavelength 33 cm) and 2,456 MHz (wavelength 12cm). With these wavelengths around 410ºC temperature at 1-3 cm depth of tissues was seen.[1,2] There are some contraindications for MWD. These are a) skin treated with radiotherapy, b) locally reduced blood supply, c) thrombosis at local part, d) sensitivity to thermal energy, e) local infection, d) if there is any electronic implant with the body like pacemaker and so on.[5] In this study, we utilized 2,456 MHz applicators. Though there is huge number of patients, articles regarding outcome of MWD is not much. But outcome of exercise and SWD in chronic low back pain is depicted in many articles.[2]

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Materials and Methods

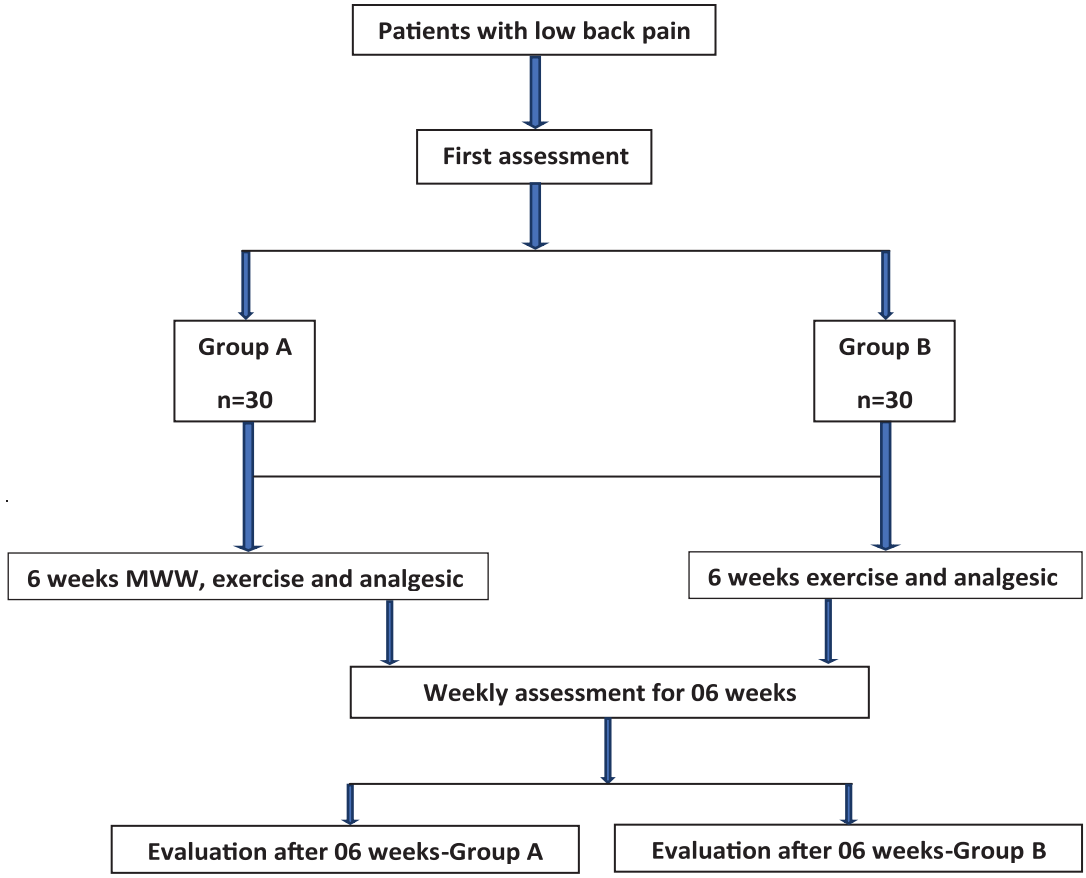
It was a case control study. Thirty patients were tagged as case those who received MWD and thirty patients were in control group those who did not receive MWD. Study was conducted in CMH Barishal. Study was conducted from January 2021 to December 2021. Sample size was 30 in each group.

A total of sixty subjects (35 males and 25 females, age range 20–75 years) were enrolled in this study during the period of January 2021 to December 2021. The patients were selected randomly from those who reported in CMH Barishal with chronic low back pain and inclusion and exclusion criteria are as follows:

Inclusion criteria: The patients of any sex, age of 18 years and above and below 70 years, with complaints of chronic low back pain affecting daily life who consented to participate in the study.

Exclusion criteria: The patients age of below 18 years and above 70 years, having low back pain for a period of less than three months, where the cause is traumatic, acute and inflammatory pain which is constant and progressive, present medical history of tuberculosis, malignancy or systemic steroid use, any spinal deformity, muscle wasting or progressive neurological deterioration, patients with any complications as well as those who are not willing to give consent were excluded.

All patients were examined and sociodemographic data including age (years), weight (kg), height (inch), body mass index (BMI, kg/m²), duration of symptoms (month), job and education level were collected. Musculoskeletal and nervous system were evaluated along with other relevant examinations and investigations. Information of other variables like pulse rate, BP (mmHg), Haemoglobin level (gm/dl), ESR, modified Schober's test etc. were collected. Patient's pain before starting treatment and after the treatment was assessed using the Lattinen test score (Table-I).[6] Tools used to gather data were checklists, interviews, observation and questionnaires. The outline of the study is depicted in Figure-1. All the patients were divided into two groups: Group A (n=30) termed as treatment group and Group B (n=30) termed as control group. Lattinen test score was analysed with the help of SPSS software compatible with Microsoft windows. Ethical clearance was obtained from local board of authority.



Flowchart-1: Outline of study plan

Then they were followed up every week for six weeks and the results were endorsed. The ultimate patient's clinical improvement was measured with Lattinen's test score.

Table-I: The Lattinen test[7]*

A	Subjective intensity	No pain	0
		Mild	1
		Uncomfortable	2
		Severe	3
		Unbearable	4
B	Frequency	Never	0
		Rare	1
		Frequent	2
		Very frequent	3
		Continuous	4
C	Analgesics intake	None	0
		Occasional	1
		Moderate	2
		High consumption	3
		Too much	4
D	Disability due to pain	None	0
		Slight	1
		Moderate	2
		Necessary aid	3
		Total dependence	4
E	Sleep	Normal	0
		Sometimes awake	1
		Many times awake	2
		Insomnia	3
		Sedatives needed	4

*Minimum score=0, Maximum score=20, The score from each group of questions should be added (A-E).

The data was analysed by IBM SPSS Statistics software package for Windows. Paired-Samples T test was used to determine the level of significance. The results were expressed as p value and $p<0.05$ was regarded as significant difference.

Results

We found no statistically significant different values for age of the patients, their sex, Body mass index, educational qualifications, job pattern and duration of sufferings between the two groups ($P>0.05$). Clinical examination and investigation findings of both groups were similar. In both group patients were between 20-40 years, most of them were army soldiers of various ranks, BMI was between 23-26. Their educational qualification is SSC most of the cases, some were HSC level. Most of them were suffering for more than 06 months.

The response to treatment was assessed at weekly interval by Lattinen test score. It showed the test score was gradually reduced and clinical improvement was steady with MWD. Pre-treatment overall score with Lattinen test score system in Group A=9.75±4.45 and in Group B=9.5±4.5. After 6 weeks, Group A score was 3.2±4.25 whereas Group B score was 5.5±5.6.

Treatment failure rate found 13% less with microwave diathermy (Table-II). We found significant improvement of Lattinen test score with application of microwave diathermy after 6 weeks ($P<0.05$). If we compare the result of conventional medication and exercise to MWD, it significantly decreases progression of disease and provides symptomatic improvement of chronic low back pain by six weeks therapy as evidenced by more left shifting area under curve in Figure-2, 4 in case of Group A. Left shifting of area under curve also occurs for Group B depicted in Figure-4.

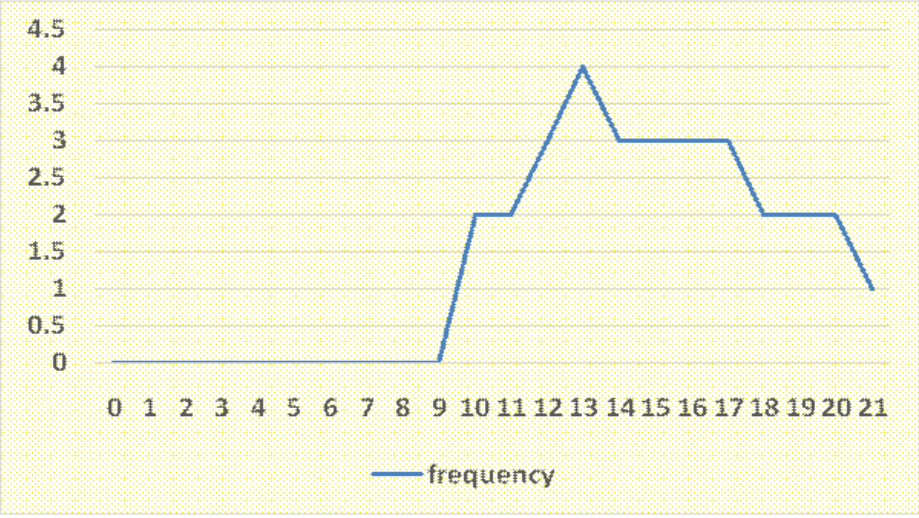


Figure-1: Lattinen score before treatment Group A

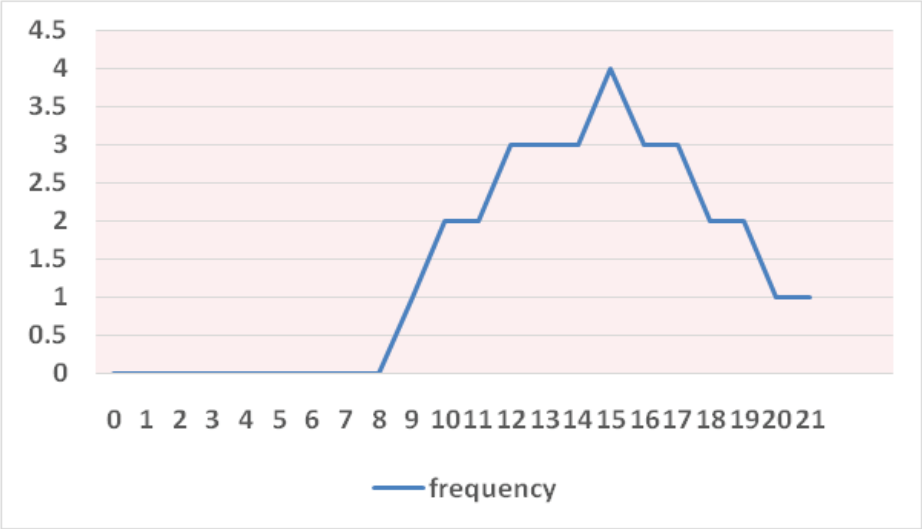


Figure-2: Lattinen score before treatment Group B

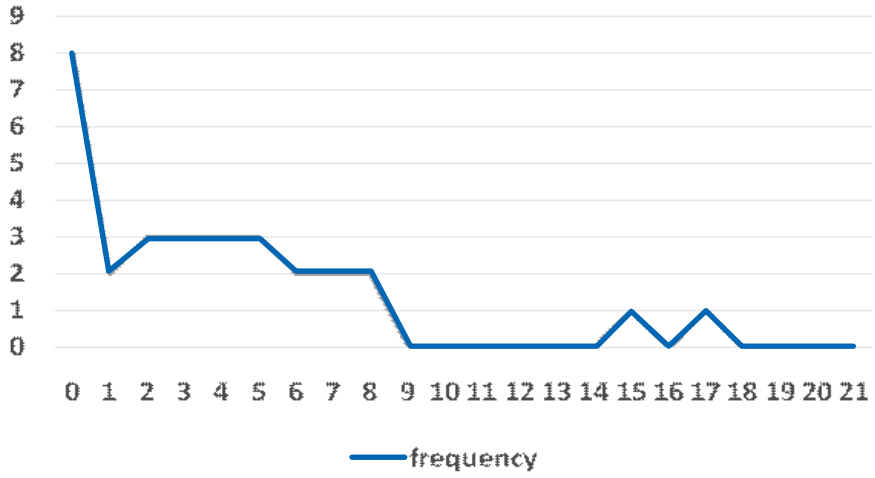


Figure-3: Lattinen score 06 weeks after treatment Group A

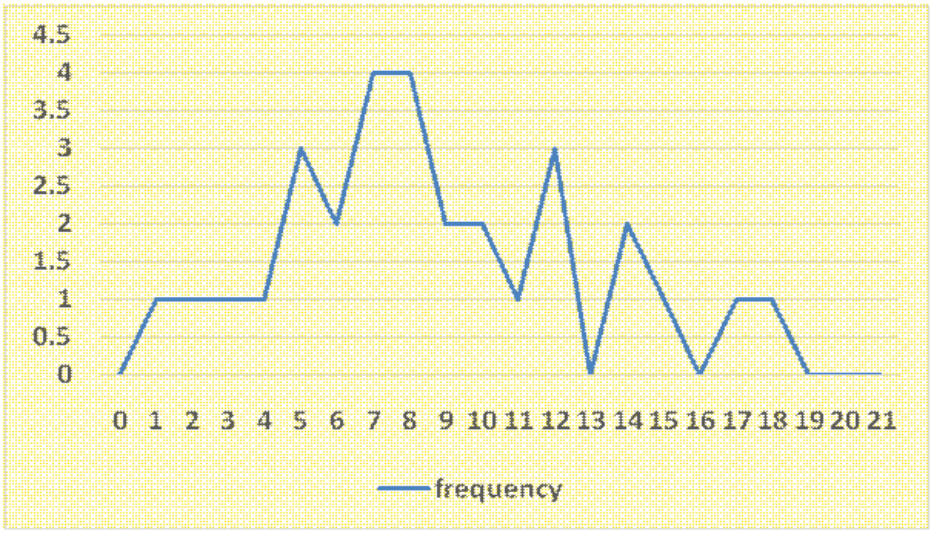


Figure-4: Lattinen score 06 weeks after treatment Group B

Table-II: Improvement of Lattinen test score with application of Microwave diathermy.

	Microwave diathermy given			
	Yes (Group A)		No (Group B)	
	n	%	n	%
Improvement and lower Lattinen score	28	93	24	80
No improvement	2	7	6	20

Discussion

This study does not deemphasize the various ongoing ways of treatment like back exercise and various medications. Rather, it is seen that MWD can effectively be a helping tool to improve the outcome and decrease treatment failure rate. Both the groups had good outcome but there is also treatment failure rate of 13% which has similarities to other studies.[1] There was gradual improvement of symptoms in the six weeks of study. But those who received MWD was better in comparison to non MWD group ($p<0.05$). The result we got was independent of initial severity or tenure of pain of both the groups.

There is not enough literature regarding the outcome of microwave diathermy to treat LBP. Multiple research projects have been conducted on a related deep heating modality that is shortwave diathermy. Zaman[7] reported in his study that pain relieved partially or completely after giving SWD than the exercise group or placebo group. Gibson et al found improvement in those who had SWD.[8] Shakoor et al also found similar results in case of neck pain with SWD.[9] In a meticulous review, Chard and Dieppe in their study proved SWD as an effective modality in case of osteoarthritis.[10] Ullah also found promising result with SWD.[11] Kerem and Yigiter in their study showed that 60 patients received short wave diathermy and there was significant improvement.[12] Study of Debsarma also revealed deep heat modality is more effective than superficial heat in chronic low back pain patients.[13]

Conclusion

This study reveals that microwave diathermy is an effective modality of treatment in case of chronic low back pain. But more research work is required to find out multicentric result with big number of population.

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