

Effect of Interferential therapy along with McKenzie Extension Bias Exercises on Pain, Disability and Spinal Extensors Muscles Strength among the Patients with Chronic Low Back Pain

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Abstract

Chronic low back pain is one of the most common musculoskeletal disorders in different age groups in developing countries. Low back pain grows up gradually with other associated symptoms such as disability, muscular weakness and functional limitation that restrict the social and overall health wellbeing. 70% adult populations face one episode in their life. Chronic low back is a barrier in terms of economic burden in health care system among various musculoskeletal disorders. Promote and administered a rehabilitative program necessarily to fix and resolve the problems arising from and with chronic low back pain. The purpose of this study was to determine the effect of interferential therapy along with McKenzie extension bias exercise on pain, disability and spinal extensors muscle strength in patients with chronic low back pain.

Methods- 41 patients were recruited in this study but only 24 patients meet the criteria and participated in this study. After taking written consent form from the patients. Firstly, moist heat pack was implicated to patient for 15 minutes. The patient asked regularly about the temperature of heat pack and therapist also monitors the skin texture and suitability towards the procedure. Further implementation, Interferential therapy was given to lumbar spine for 30 minutes followed by Mckenzie extension bias exercises with 3 sets of 10 repetitions. This protocol was given for 6 days in a week for 4 weeks.

Results- The result of this study shows that there was significant improvement in pain, disability and spinal extensors muscle strength in order to decrease VAS, ODI and increase MMT score respectively with follow up 4 weeks protocol.

Conclusion- The study concludes that interferential therapy along with McKenzie extension bias exercise has been positive impact in reducing pain, disability and spinal extensors muscle strength in patients with chronic low back pain.

Keywords- *Chronic Low Back Pain, Interferential Therapy, ODI, VAS, MMT and McKenzie Extension Bias Exercises.*

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Introduction

Chronic low back pain is one of the most common musculoskeletal disorders in developing countries¹. 70% of adult populations experienced at least once episode in their life². Major cause is functional limitation due to muscular weakness in elderly population. Functional

incapability and progression leads the bad impact on social and overall health wellbeing³⁻⁵. Chronic low back pain is not further results of specific disease, but rather of a platform of cause such as inflammatory, degenerative, systemic, congenital disorders and also associated with occupation and daily living activities⁶.

Physiotherapy and other conservative treatment is the basic platform to manage spinal pain. Spinal exercises are very useful and play an important role to alleviate pain and improve muscle strength which helpful in overcoming the chances of reoccurrence the symptoms in related to lower back pain. Mckenzie, in fact advocates position and movement patterns, flexion or extension, that best relieve the patients symptoms. In the lumbar spine: Mechanical diagnosis and Therapy (1981), Mckenzie classifies lower back pain based on spinal movement patterns, positions and pain responses and describes a postural syndrome, derangement and dysfunction⁷.

In association with manual therapy and therapeutic exercises, electrotherapy is often used to minimize the pain and disability. In electrical stimulation, the impulses vary in frequency and intensity when stimulating the nerve which leads the inhibition the gait pathway and relief the symptoms related to lower back pain⁸. To determine the analgesic effect of interferential current on outcome measures such as NPRS (Numeric pain rating scale) which measure the intensity of pain and ODI (Oswestry disability index) questionnaire to check the functional independence are widely used and important for the quality of this study⁹. This study emphasized on the effect of interferential therapy along with McKenzie extension bias exercises on pain, disability and spinal extensor muscle strength in patients with chronic low back pain.

Objective: To determine the effect of interferential therapy along with McKenzie extension bias exercises on pain, disability and lumbar spine extensor strength in patients with chronic low back pain

Hypothesis

Experimental Hypothesis [H₁]- There will be significant of interferential therapy along with McKenzie extension bias exercises on pain, disability and spinal extensor muscle strength in patients with chronic low

back pain.

Null Hypothesis [H₀]- There will be significant of interferential therapy along with McKenzie extension bias exercises on pain, disability and spinal extensor muscle strength in patients with chronic low back pain.

Materials and Methods

This is a quasi-experimental study. 41 subjects were recruited, 24 out of 41 were included on the basis of inclusion and exclusion criteria. This study was conducted at physiotherapy OPD, CSSH hospital, Swami Vivekanand Subharti University, Meerut India. The informed consent form was taken from the each selected patient in this study.

Inclusion criteria included both gender (male and female), history of chronic low back pain, no history of trauma, tumor, infection, degenerative disease related to disc and vertebral column, no history of previous and recent surgery to spine and abdomen and neurological disorders such as neuropathy, paraesthesia, numbness and tingling sensation. This study was carried out in 6 days in a week for 4 weeks.

Outcome Measures

NPRS (Numeric Pain Rating Scale)

The Numeric pain rating scale (NPRS) is a unidirectional measure of pain intensity in patients including those with chronic pain. 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 pain. The 11- point numeric scale ranges from “0” representing one pain extreme (e.g. no pain) to “10” representing the other pain extreme (e.g. “pain as bad as you can imagine”). The NPRS can be administered verbally or graphically. Scoring range from “0 -10” points, with higher scores indicating greater pain intensity¹⁰⁻¹⁴.

ODI (Oswestry Disability Index)

Oswestry Disability Index is a good functional scale because it deals with activity of daily living and therefore is based on the patient response and concerns affecting

daily life. It is the most commonly used functional back scale. The disability index is calculated by dividing the total score (each section is worth from 0 -5). The 6 statements are scored from 0-5 with the first statement scoring 0 through to the last at 5¹⁵

MMT (Manual Muscle Testing)

This checks the strength of the spinal extension muscles¹³. Test procedure as follows:

(Normal) 5:- Prone with hands clasped behind head, patient extends the lumbar spine until the thorax is raised from the table (umbilicus). Patient raises head, shoulders and chest off the table.

(Good) 4:- Prone with hands on the back, patients extends the lumbar spine until the thorax is raised off the couch and in this back extensors can come to the end position but may waver or display some signs of effort.

(Fair) 3:- Prone with arms at sides, patient extends spine, raising body from the table so that the umbilicus clears the couch. Patient completes the range of motion

(Poor) 2:- Patient completes partial range of motion

(Trace) 1:- Contractile activity is detectable but no movement.

Procedure

After taking consent forms from the patients, patients informed and aware to the procedure that delivered to them to minimize the symptoms they had. The subjects were first given hydrocollator pack on lumbar region for 15-20 minutes in both groups to reduce muscles spasm and pain and to improve the extensibility of tissues. The temperature of hydrocollator pack was adequate for the targeted area. The hydrocollator pack was well covered with mackintosh sheet. During this phase therapist asked the patient about temperature of hydrocollator pack and his/her suitability towards the procedure.

Application of Interferential therapy- patients treated with interferential current with rubber electrodes in cloverleaf method with patients in prone lying position on couch. Rubber electrodes (5x7.5cm) were placed to counter pain circuit being positioned over the lumbar region of spine using gel and adhesive tape to fix the electrodes for smoothing and fulfill the procedure without any hindrance. The frequency, carrier frequency was set at 4000HZ with beat frequency of 100HZ delivered to the targeted area for 30 minutes. The intensity of interferential current was set according to the tolerance level of patients. After protocol, the electrodes were removed from the targeted area.

McKenzie extension bias exercises- Strengthening of lumbar spine extensor muscles is very important because it helps to provide a great deal of stabilization to this part of the body. The back extension both trains the activation of the spinal extensors and strengthens their ability to extend the back. The therapist was stand at side of couch and patient lies in prone lying position with forearm and elbow supported on couch. Therapist instructed the patients to raise upper trunk slowly in extension in pain free range and elbow and shoulder joint are lie in same line leaning on the forearm and curling of shoulders and upper trunk and then return to a starting position. 3 set of 10 repetitions with 3 sec interval in every repetition and 2 minute interval after completion of 1 set. Both protocols were given for 6 days in a week for 4 weeks.

Data Analysis

All analysis was obtained using SPSS version 20.0. Demographic data of the patients including age, height, body mass and BMI was summarized. The dependent variables for the statistical analysis were NPRS and ODI. A base line data was taken at the beginning of the study (pre-test values) and after the completion of the treatment (post -test values) to analyze the difference between them; paired t-test was used. A level of 5% was used to determine the statistical significance.

Results

Table-1, demographic data of patients with chronic low back pain

Number of Patients	Age (year)	Height(cm)	Body Mass (kg)	Body Mass Index (kg/m ²)
24	28	164	58	21.6

Table-2, Pre-post NPRS score (Mean, S.D, t-value and p-value)

Time Period	Mean	S.D	t- value	p-value	Remark (at 5% level)
1st Day	4.06	0.68	29	0.000	Significant
24th Day	0.44	0.51			

Table-3, Pre-post ODI score (Mean, S.D, t-value and p-value)

Time Period	Mean	S.D	t- value	p-value	Remark (at 5% level)
1st Day	34	0.08	18.78	0.000	Significant
24th Day	18	0.04			

Table-4, Pre-post MMT score of back extensor muscles

Time Period	Mean	S.D	t- value	p-value	Remark (at 5% level)
1st Day	2.25	0.58	15	0.000	Significant
24th Day	3.18	0.40			

Discussion

The purpose of this study to determine the effectiveness of interferential therapy along with McKenzie extension bias exercises on pain, disability and muscle strength in patients with chronic low back pain. 41 subjects were enrolled but only 24 participated in this study. In this study the subjects were selected on the basis of inclusion and exclusion criteria. The subjects were first introduced to hydrocollator pack followed by

interferential therapy with McKenzie extension bias exercises respectively. Before starting the exercises protocol the NPRS, ODI and MMT was measured, similarly then readings also noted down after 4 weeks. The result of this study revealed that interferential therapy with McKenzie extension Bias exercises is statistically significant and effective in improving the strength of muscles and decreasing the pain and disability.

Base line data such as demographic characteristics of patients was measured that shown in table-1. Data of ODI, NPRS and MMT for pre and post interventional study are expressed in terms of mean, S.D and S.E.M is shown in table- 2, 3 and 4 respectively. Further application of paired t-test implemented to assess the significant difference between pre and post intervention study in interferential therapy with McKenzie extension bias exercises significance difference for the 24 patients at 5% level of significance. Within the group pre and post values were assessed by paired t-test in both the groups which has mentioned in table 2, 3, and 4 respectively. p-value was significant at $p < 0.05$ with ODI, NPRS and MMT score (0.0000), (0.0000) and (0.0000). The 4 weeks application of interferential therapy with McKenzie extension bias exercises showed significance in terms of improving muscle strength of spinal extensor and also decreasing the pain and disability.

Regarding to support the result of this study, previous literature on effect of interferential therapy in various musculoskeletal disorders revealed positive impact in order to reduce pain and disability. A study was conducted by Marcelo Baptista Donhert et al¹⁶ on the effectiveness of interferential current as compared to transcutaneous electrical nerve stimulation in reducing chronic low back pain. 28 subjects participated in their study. The subjects were allocated in two groups. One group received interferential therapy while second group received transcutaneous electrical stimulation. Outcome measures were VAS, ODI and Ronald Morris disability questionnaire used in this study. There was positive result found in favor of interferential therapy in terms of reducing pain and disability with follow up one month protocol. Another research conducted by Emela Mujic et al¹⁷, on the 'effect of Mckenzie exercises for low back pain. 34 patients with symptoms of low back pain were participated in their study. All patients were assessed before and after the treatment. The demographic data include age, gender, and duration of symptom. Pain was assessed by VAS, spinal flexibility and movement was assessed by schober test. After this initial evaluation, patients received Mckenzie exercises daily, 5 times a day in series of 5-10 repetitions each time. All exercises were followed by correction of body posture. On completion of the treatment on the 15th day, post interventional assessment was done for the 2 outcome measures and documented for analysis. Their

study concluded that Mckenzie exercises for lower back pain are beneficial treatment for increasing flexibility of spine and improving the pain.

There is less empirical data available related to this study which shows a significant effect of interferential therapy along with McKenzie extension bias exercises in reducing pain, disability and spinal extensor muscle strength in patients with chronic low back pain. In this study interferential therapy has been shown the significant difference with spinal stabilization exercise on pre to post ODI, NPRS and MMT score with follow up 4 weeks or 24 days protocol.

This study may be of significance for the health care providers who treat chronic low back pain and consider recommending McKenzie extension bias exercises to patients to overcome the chance of reoccurrence the onset of problem that have.

Conclusion

This study concludes that interferential therapy with McKenzie extension bias exercises has been shown significant improvement in order to decrease pain, disability and back extensor muscle strength in patients with chronic low back pain. As to follow up data analysis, the result of this study were beyond desirable impact and important for better option of proposed protocol and advising also that this type of protocol may be administered to such type of patients for better health and wellbeing.

Conflict of Interest- There was no conflict of interest

Ethical Clearance: Taken from institutional ethical/research committee

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