ejpmr, 2018,5(3), 160-164

SJIF Impact Factor 4.897

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

EFFECT OF MCKENZIE THERAPY AND LUMBAR STRENGTHENING PROGRAM IN LUMBAR SPINE DERANGEMENT SYNDROME 1.

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Article Received on 27/12/2017 **Article Revised on 17/01/2018** **Article Accepted on 07/02/2018**

ABSTRACT

Introduction: Low back pain affects approximately 80% of individuals, and represents the most common reason of activity limitation in individuals less than 45 years of age. **Objective:** To determine the efficacy of a Lumbar Strengthening Program in Lumbar Spine Derangement Syndrome 1. **Methods:** In a 2-week intervention study, 40 patients with lumbar spine derangement syndrome-1 were studied. Patients were randomly divided in two Groups: Group-A (n=20) who were given McKenzie exercises; Group-B (n=20) performed the McKenzie exercises & performed Resistance Training for the Lumbar Extensors. Both groups were submitted to two consecutive weeks of treatment consisting of six times weekly. A Visual Analogue scale (VAS), Modified Oswestry Back Pain Disability Questionnaire (MOQ) was administered at pretest and posttest. Wilcoxon signed ranks test was used for the comparison between the pre and posttest values within Group A and Group B. Mann Whitney U test was used for comparison between the posttest values of two groups. **Results:** A significant reduction in the pain intensity ($p<0.05$), and increase in the functionality ($p< 0.05$) between pre & post treatment stages in both groups were found. Both groups showed significant differences as to the pre & post treatment stages in the McKenzie therapy and Resistance training for the Lumbar Extensor Muscle exercises, wherein Group B showed a more significant improvement when compared to Group A. **Conclusion:** McKenzie therapy with resistance training for lumbar extensors muscles produced a significantly greater decline in the pain intensity and improvement in function, when compared to Mckenzie exercises alone.

KEYWORDS: Lumbar spine derangement syndrome 1, McKenzie therapy, Visual analog scale, Modified oswestry low back pain disability questionnaire.

INTRODUCTION

Low back pain (LBP) is a condition that continues to place a great deal of stress on the healthcare systems of industrialized societies. Low back pain affects approximately 80% of individuals and represents the most common reason of activity limitation in individuals under 45 years of age.[1]

About two thirds of adults suffer from low back pain at some time. Low back pain is second to upper respiratory problems as a symptom-related reason for visits to a physician. There are wide variations in care, a fact that suggests there is professional uncertainty about the optimal approach.[2]

Among such disciplines McKenzie is one of the methods to classify low back pain.[7,8] The McKenzie method exists of 3 steps: evaluation, treatment and prevention. The symptoms of the lower limbs and lower back are classified into 3 subgroups: derangement syndrome, dysfunction syndrome and postural syndrome.[3]

Derangement classification is the most common syndrome that presents clinically. Derangement syndrome is the situation in which the normal resting position of the articular surfaces of two adjacent vertebra is disturbed as a result of change in the position of the fluid nucleus between these surfaces.[4]

In the lumbar spine, if in no other area, disturbance of the intervertebral disc mechanism is responsible for the production of symptoms in as many as ninety-five percent of patients with LBP & patients with low back pain caused by derangement are commonly between twenty and fifty-five years of age.[5] In derangement syndrome 1, due to minor posterior migration of the nucleus and its invasion of a small radial fissure in the inner annulus, there is a minimal disturbance of disc material. This causes mechanical deformation of structures posteriorly within and about the disc, resulting in central or symmetrical low back pain.[5]

A systematic review by Machado LAC et al. with a meta-analysis approach spine on The McKenzie method for low back pain concluded that there is evidence that the McKenzie method is more effective than passive therapies for acute back pain.[6] A systematic review by Helen A Clare et al on efficacy of McKenzie therapy for spinal pain concluded that for low back pain patients (Postural, Dysfunction & Derangement syndromes) McKenzie therapy does result in a greater decrease in pain and disability in the short term than do other standard therapies.[7]

Chronic low back pain is most often related to insufficient muscle strength and deconditioning.[8] Although some of these factors may have lead to a development of LBP, the consensus is that these factors arise as a consequence of the pain, associated inactivity and the subsequent onset of the disease process.[9]

A study by Sherry V. R et al. on lumbar strengthening in chronic low back pain patients examining the effect of exercise for isolated lumbar extensors muscles have concluded that lumbar extension exercise is beneficial for strengthening the lumbar extensors and results in decreased pain and perception of physical and psychological functioning in chronic low back pain patients.[10]

A study by Chidozie E. Mbada, Olusola Ayanniyi, Samuel O. Ogunlade on examining the effect of static and dynamic back extensor muscles exercise on pain intensity, activity limitation and participation restriction in patients with long-term mechanical low-back pain treated with the McKenzie Protocol (MP) had concluded that McKenzie protocol as well as the addition of static or dynamic back extensors exercises are effective & thus recommended in reducing pain and disability in patients with long-term mechanical low-back pain & that McKenzie protocol plus dynamic back extensors exercise resulted in better decrease in participation restriction.[11]

Conflicting results were demonstrated by Brian E. Udermann et al, to evaluate the effect of McKenzie therapy combined with resistance training for the lumbar extensors (RTLE) on pain, disability, and psychosocial functioning in CLBP patients where participants in one group received McKenzie therapy combined with RTLE, and the other group received McKenzie therapy only concluded that McKenzie therapy is effective at improving physiological as well as psychosocial variables in CLBP patients, but the addition of RTLE, at the level prescribed for this investigation, provided no added benefit.[12]

This effort of mine is to determine whether the inclusion of a strengthening program for the lumbar extensor muscles along with McKenzie therapy program is effective in the management of low back pain & thereby yield best results & greater benefits for the population.

METHODS

A Quasi experimental study involving 40 patients with lumbar spine derangement syndrome1 was conducted, The participants were attending the outpatient physiotherapy department of the college, C.U.Shah physiotherapy college, Surendranagar, Gujarat, India respectively. Inclusion criteria for this study were as follows: Patients fulfilling the criteria according to the McKenzie lumbar spine assessment, Patients with Derangement syndrome 1, (central or symmetrical pain across L4/5, rarely buttock or thigh pain, no deformity), Chronic low back pain (>3months), Age: 20- 55 year and other than this features excluded from the study.

The data was collected by assessing the patients. Subjects, who fulfilled the selection criteria, were informed about the study and requested to sign written informed consent forms. Experiments were conducted on 20 patients in Group A and on 20 patients in Group B. All the subjects completed a detailed orthopedic, McKenzie lumbar spine assessment.

Randomization into groups was achieved through odd/even assignment: the first patient was assigned to Group A, the second patient was assigned to Group B, the third patient was assigned to Group A, the fourth patient was assigned to Group B, and so forth through the 39th being assigned to Group A and the 40th patient being assigned to Group B. Group A was given McKenzie therapy. Group B was given lumbar extensor muscles strengthening program along with McKenzie therapy.

Each patient was evaluated prior to the first session, after every week of treatment and after the last session, for: Pain: Pain was assessed by the Visual Analogue Scale (VAS) ranging from 0 to 10 cm. Function: Functional ability was assessed using the Modified Oswestry low back pain disability questionnaire.

Group- A (McKenzie therapy) (EIL- Extension in lying, EIS – Extension in sitting, FIL- Flexion in lying, FIS – Flexion in sitting).

Typical treatment progression as for Derangement Syndrome 1;
- lying prone followed by lying prone in extension followed by 5 – 6 sets of EIL

For maintenance of reduction of the posterior derangement,
- If the patients were improving, EIL was replaced with EIS whenever necessary.
- If there was no improvement, the following progression was applied.

Progression 1

Extension mobilization combined at intervals with, rotation mobilization in extension were applied (in affected segment, the segment above & below), immediately followed by, Extension in Lying. If

improvement occurred, progression 1 was repeated. If there was no improvement following 24 hours of application of progression1, progression 2 was applied.

Progression 2
Extension mobilization applied to each of the appropriate segments. After 10 repetitions, continuous pressure was maintained at the affected level, & the patient was asked to perform EIL. The patients were instructed to continue lying prone, lying prone in extension. If the progress was satisfactory, the same program was continued. If there was no improvement, progression 3 was applied.

Progression 3
Extension mobilization, Rotation mobilization in extension was applied to relax patient & to provide with pre-manipulative information. Once centralization occurred, self-treatment program as on day 1 was followed. Once pain free for three days, EIL was reduced to 3times/day and replaced by EIS whenever necessary during the day.

Since the function to be restored in patients with lumbar derangement syndrome 1 is flexion, flexion procedures were begun. Once the patient's condition proved stable, FIL was gradually increased. When no further gain was obtained with FIL, progression to FIS day was done, always followed by, EIL. Patients were instructed to discontinue FIS, when full flexion was recovered. & continue, EIL, FIL, EIS, The patients were treated & were not permitted to obtain any other forms of manual therapy, electrotherapy, or other technique (e.g. analgesics, acupuncture, injection therapy, or taping) during the intervention period other than the designated protocol. All the patients were able to complete the 2 weeks treatment program.

Group- B (McKenzie therapy + Lumbar extensor muscles strengthening program).

The participants began the exercise training program with the first exercise position and progressed to the next exercises at their own pace when they could hold a given position for 10 seconds. On reaching the fifth progression, they continued with the fifth progression until the end of the exercise program.

The five exercise progressions
1. Participant was instructed to lie in the prone position with both arms by the sides of the body and lifted the head and trunk off the plinth from neutral to extension.
2. Participant lay in prone position with the hands interlocked at the occiput so that shoulders were abducted to 90° and the elbows flexed, and lifted the head and trunk off the plinth from neutral to extension.
3. Participant lay in prone position with both arms elevated forwards, and lifted the head, trunk and elevate arms off the plinth from neutral to extension.
4. Participant lay in prone position and lifted the head, trunk and contralateral arm and leg off the plinth from neutral to extension.
5. Participant lay in prone position with both shoulders abducted and elbows flexed to 90°, and lifted the head, trunk and both legs (with knees extended) off the plinth44.

Dosage: 10 repetitions for static hold in each exercise position for 10 seconds x 3sets/session.

Dynamic Back Extensors exercise.

Instead of the static posturing of the trunk in the prone lying position the participant were asked to move the trunk and the suspended limbs 10 times.

RESULTS
The mean age (mean ± SD) of the patients were 42.2 ± 13.37 and 42.55 ± 13.17 in Group A & Group B respectively. Group A comprised of 9 males (45%) and 11 females (55%) & Group B comprised of 10 males (50%) and 10 females (50%).

Table-1: Pre and post values of VAS and MOQ in Group-A and Group-B.

Variables	Group-A		p-value	Group-B		p-value
	Pre	Post		Pre	Post	
VAS	7.2 ± 1.10	5.1 ± 0.96	0.000	7.2 ± 0.96	3.55 ± 0.94	0.000
OSW	29 ± 4.87	16.9 ± 4.56	0.000	29.25 ± 4.56	11.45 ± 2.68	0.000

The analysis of pre values of outcome measures in group A & B described in Table -1 & Figure-1 did not evidence statistically significant difference between groups, showing that these were both homogenous in terms of age & gender.

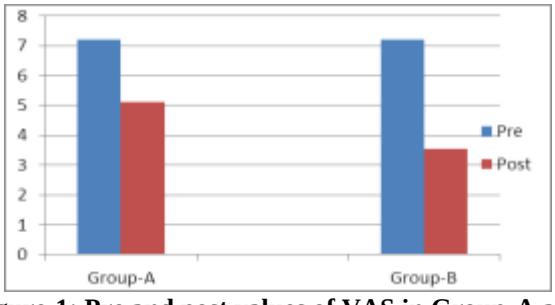

Figure-1: Pre and post values of VAS in Group-A and Group-B.

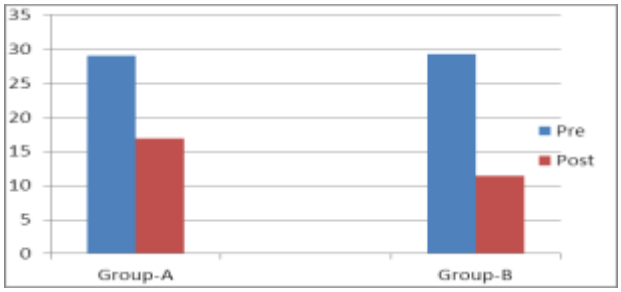

Figure-2: Pre and post values of MOQ in Group-A and Group-B.

Table-1 and Figure-1&2 shows the intra group comparison of VAS and MOQ of Group A, where the p value of all variables was 0.000 ($p<0.05$). So, a statistically significant difference was found after treatment for all variables, suggesting lumbar strengthening exercise is effective in reducing pain and improving function in patient with derangement syndrome 1. It also shows the intra group comparison of all variables of Group B, where the p value of all variables was 0.000 ($p<0.05$). So, a statistically significant difference was found after treatment for VAS and MOQ, McKenzie exercise is effective in reducing pain and improving function in patient with derangement syndrome 1.

Inter group comparison of VAS & MOQ in group-A and B shows significant difference in pain intensity ($p=0.001$) and functional capacity ($p=0.000$). There is statistically significant reduction of pain & improvement in function between Group- A & B. There is significant decline in the intensity of pain & improvement in function in Group B when compared to Group A. In this experimental study, null hypothesis was rejected.

DISCUSSION

The results found in this study disclosed that after a two week treatment program, both the groups, Group A, which received McKenzie protocol and Group B which received a lumbar extensor muscles strengthening program along with the McKenzie protocol, attained a significant reduction in the pain intensity and improvement in the performance of functional activities.

The findings are in accordance with the results of Machado et al (2006) in their study to evaluate the effectiveness of the McKenzie method for low back pain (LBP) had concluded that there is evidence that the McKenzie method is more effective than passive therapy for acute LBP reducing pain and disability & the studies by, Brian E. Udermann et al (2004) on patients with lumbar posterior derangement that received therapeutic exercise as described by the McKenzie method whose results indicated that exercises based on repeated movements is more beneficial in terms of pain reduction and recovery of function, significant improvements in range of motion, as well as in a variety of health-related quality-of-life measures in LBP patients than joint mobilization or the addition of resistance training for the lumbar extensors in the early stage of recovery from lumbar disc derangement & that repeated movement examination that were found to have decreased the patients complaints when utilized as therapeutic exercise, there by leading support for the McKenzie approach in the treatment of lumbar derangement.

Adding further strength to the results of this study are the results & conclusions of the systematic review by Helen A Clare, et al (2004) investigating the efficacy of McKenzie therapy in the treatment of spinal pain where the authors had concluded that for low back pain patients McKenzie therapy does result in a greater decrease in pain and disability in the short term than do other standard therapies & the randomized study by Brian M. Busanich et al (2004) determining the efficacy of the McKenzie method/McKenzie treatment in comparison with no treatment, sham treatment, or another treatment have concluded that the review provides evidence that McKenzie therapy is effective & results in a decrease in short-term (< 3 months) pain and disability for low back pain patients compared with other standard treatments, such as nonsteroidal anti-inflammatory drugs, educational booklet, back massage with back care advice, strength training with therapist supervision, and spinal mobilization. Two weeks of McKenzie therapy produced a better improvement in terms of pain reduction & functional performance than with stabilization & traction in patients with lumbar derangement syndrome 1.

The McKenzie protocol (MP) is one of the most frequently used types of physical therapy for back pain in various countries and has the potential advantage of encouraging self-help. Nonetheless, there is limited evidence in term of randomized trials to support its effectiveness in long-term LBP. The McKenzie protocol (MP) identifies with the school of thought that spinal joint dysfunction such as disc protrusion, loss of joint play; stress and strain among others are the major causes of back pain. Another school of thought is that weak muscles and/or trunk extensor to-flexor muscles imbalance are major contributors to aetiology of back pain.

Under this paradigm, muscle strength and endurance training are believed to be important in the management of LBP.

The inclusion of a lumbar extensor muscles strengthening program along with the McKenzie protocol resulted in a significant reduction in the pain intensity, and improvement in the performance of functional activities.

This study was conducted on forty patients with the mean age of 42.37±13.10 (mean ±SD) with derangement syndrome 1. The patients were divided into two groups. Control Group A received Mckenzie therapy & experimental Group B received resistance training for

lumbar extensors (RTLE) along with Mckenzie therapy for 6 days a week for 2 weeks and a re-evaluation taken after 2 weeks of treatment.

The results showed a significant decline in the pain intensity ($p<0.05$) & a significant improvement in function ($p<0.05$) in the post treatment stage in comparison to the pretreatment stage.

By comparing the post treatment variables in both experimental groups, the results revealed that there was significant difference between the groups A & B. There was a significant decline in intensity of pain ($p=0.000$) & improvement in function ($p=0.00$) in group B when compared to group A.

In the experimental conditions used in this study, though both McKenzie therapy, & McKenzie therapy & resistance training for lumbar extensors muscles, produced a significant decline in the pain intensity and improvement in function, McKenzie therapy with resistance training for lumbar extensors muscles produced a significantly greater decline in the pain intensity and improvement in function, when compared to Mckenzie exercises alone.

Ethical Approval

The study received the ethical approval from Deanship of scientific research and the study was conducted according to the ethical guidelines and principles of the Declaration of Helsinki.

ACKNOWLEDGEMENT

The author is thankful to all the participants and the assistants who have participated in the study.

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