

Effect of Rhythmic Stabilization Exercise v/s Conventional Physiotherapy on Pain and Disability with Patients of Chronic Mechanical Low Back Pain

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Abstract

Purpose: The purpose of this study was to find out the effect of rhythmic stabilisation (RS) on pain and disability on chronic mechanical low back pain (CMLBP). 60 individual who had complaints of CMLBP were randomly assigned to one of the two groups: the RS group (n=30) and conventional group (n=30). The exercise program of the experimental group consisted of RS. The control group performed back muscle strengthening exercises. Over the course of four weeks, the groups participated in or performed strengthening exercises for 30 minutes, 5 times per week. Subjects were assessed a pre-test and post-test using Visual Analogue Scale (VAS) and Modified Oswestry Low Back Pain Disability (MOD) Questionnaire.

Results: The results showed that low back pain significantly improved in the experimental group, and that the MOD questionnaire significantly decreased. However, there were no significant changes in the control group.

Conclusion: This study showed that RS can be used to improve low back pain and disability. The findings indicate that the experimental group experienced greater improvement than the control group by participating in the rhythmic stabilization program.

Keywords: Chronic low back pain, rhythmic stabilisation, pain, disability

Introduction

Low back pain is an extremely common symptoms in the general population affecting up to 85% and is the most common disability in those under the age of 45. It is tiredness, discomfort, or pain in the low back region, with or without radiating symptoms to the leg or legs¹. Population is facing number of obstacles in their daily life. The main causative factor that can cause low back pain is poor posture while sitting, standing, and lifting heavy weights². Low back pain may be mechanical or non-mechanical in nature, and mechanical condition related with chronic low back pain. Mechanical pain is the general term that refers to any type of back pain caused by placing abnormal stress and strain on muscles of the vertebral column³. A number of interventions used to treat low back pain include the use of physical exercise aiming to activate abdominal and/or back extensor muscles with the goal of reducing pain and disability⁴. Exercise can be prescribed for patients with chronic low back pain with three distinct goals. The first and most

obvious goal is to improve back flexibility and strength, and to improve performance of endurance activities. The second goal of exercise is to reduce the intensity of back pain. The third and most important goal of exercise is the reduction of back pain-related disability⁵. Neurophysiologic studies have linked pain development in the lumbar spine region with disturbances in the mechanoreceptors and probably with impairment of the superior proprioception centres. Therefore, exercise programs that enhance proprioception may be beneficial for managing chronic low back pain. Proprioceptive neuromuscular facilitation (PNF) exercises are designed to enhance the response of neuromuscular mechanisms by stimulating proprioceptors. The primary goal of proprioceptive neuromuscular facilitation treatment is to help patients achieve their highest level of function⁶. Rhythmic stabilisation is one a proprioceptive neuromuscular facilitation technique. Indications for rhythmic stabilisation include Limited range of motion, Pain particularly when motion is attempted. The rhythmic stabilisation technique uses alternating isometric

contractions against resistance, no motion intended. The therapist applies multidirectional resistance by placing manual contact on opposite sides of the body. As the patient holds the selected position applies resistance simultaneously in opposite direction⁷.

Methodology & Materials

Study Design: Experimental study.

Study Population: Patients having Low back pain for more than 3 months of duration were included as per the inclusion criteria.

Study Setting: Out-patient department of Physiotherapy, M.A. Rangoonwala College of Physiotherapy & Research Centre, Pune.

Sample Size: 60 subjects aged between 20 to 40 yrs.

Group A: Rhythmic stabilization (n=30)

Group B: Conventional therapy (n=30)

Study duration: 4 weeks

Inclusion Criteria:

1. Age 20-40 years.
2. Both male and female.
3. Back pain more than 3months.
4. Non-specific low back pain i.e mechanical
5. Pain intensity 1 to 6 on visual analogue scale

Exclusion Criteria: (Any history of)

1. Sign of nerve root pain.
2. Spine pathology.
3. Spondylosis and spondylolisthesis.
4. Past history of vertebral fracture.
5. Systemic disease like tuberculosis of spine
6. Abdominal surgery
7. Renal disease
8. Spondylitis

Outcome Measure

1. Visual analogue scale
2. Modified Oswestry Low Back Pain Disability Questionnaire

Study Method and Procedure

Study Participants

A convenient sample of 60 subjects between the age of 20 to 40 years included for this study after screening the subjects according to the inclusion and exclusion criteria. The subjects then divided equally into 2 groups by chit method:

1. Group A received rhythmic stabilisation exercise
2. Group B received conventional therapy

Study Design

Subjects are evaluated at the beginning of the therapy and re-evaluated after 4 weeks. This is done to note the changes after the treatment.

Method: Subjects selected randomly following the inclusion and exclusion criteria, and evenly divides into 2 groups:

Group A: (rhythmic stabilization)

30 subjects randomly selected in this group. They received rhythmic stabilisation exercises 5 times a week for 4 weeks with supervisions.

Rhythmic Stabilization

- Participants performed 3 sets of 15 repetitions at maximal resistance hold it for 8 sec for both lumbar flexors and extensors.
- Rest interval between the repetitions was for 30 secs and between sets was for 1 min.
- Total treatment was taken 30 mins

Procedure

- Resist an isometric contraction of the patient's trunk flexor muscles. "Stay still, match my resistance in front".
- Next, take all the anterior resistance with left hand and move right hand to resist trunk extension. "Now start matching me in back, hold it."
- As the patient responds to the new resistance, move left hand to resist trunk extension. "Stay still, match me in back."
- The direction of contraction may be reversed "Now hold in front again. Stay still. Now start matching me in the back."

Group B: (Conventional Therapy)

Procedure

- 30 subjects randomly selected in this group. They received conventional back exercises 5 times a week for 4 weeks with supervisions for 2 weeks and 2 weeks unsupervised.
 - Group B regard as the control group which include conventional back exercises.
- Cat and camel
 - Single Knee to Chest Stretch for both legs
 - Abdominal curl ups (one with only cervical flexion and second with half curl up)
 - Bridging
 - Unilateral straight leg lowering for both legs
- Each exercises performed for 10 repetition of above exercises with 5 second hold.
 - Rest interval between the repetitions was for 30 secs and between sets was for 1 min.
 - Total treatment time is taking 30 mins.

Progression

Group	1 st and 2 nd Weeks	3 rd Week	4 th Week
GROUP A	3 sets of 15 repetition with 8 sec hold	4 sets of 15 repetition with 10 sec hold	5 sets of 15 repetition with 12 sec hold
GROUP B	10 repetition and 5 sec hold each exercise	13 repetition and 8 sec hold each exercise	15 repetition and 10 sec hold each exercise

Statistical Analysis

Rhythmic stabilization group

Table 1: Comparison of the pre and post VAS and ODI scores in rhythmic stabilization group using paired t test

		N	Mean	Std. Deviation	t value	P value
VAS	PRE	30	4.53	1.224	27.625	<0.001**
	POST	30	1.20	0.805		
ODI	PRE	30	13.33	3.809	33.202	<0.001**
	POST	30	4.80	3.167		

Table demonstrate comparison of the pre and post VAS and ODI scores in rhythmic stabilization group using paired t test. After 4 weeks intervention of rhythmic stabilization shows significant result ($p=0.001$)

Conventional group

Table 2: Comparison of the pre and post VAS and ODI scores in conventional group using paired t test

		N	Mean	t value	P value
VAS	PRE	30	4.13±1.383	16.089	<0.001**
	POST	30	2.50±1.196		
ODI	PRE	30	12.80±3.210	23.084	<0.001**
	POST	30	8.60±2.699		

Table 2 demonstrate comparison of the pre and post VAS and ODI scores in conventional group using paired t test. After 4 weeks post intervention control group shows significant results ($p=0.001$)

Table 3: Comparison of the mean difference (pre-post) VAS & ODI scores among both the groups using unpaired t test (N=60)

Mean difference	Group	Mean	t value	P value
VAS	Conventional	1.63±0.556	10.781	<0.001**
	Rhythmic stabilization	3.33±0.660		
ODI	Conventional	4.20±0.996	13.761	<0.001**
	Rhythmic stabilization	8.53±1.407		

Table 3 demonstrate comparison of the mean difference pre and post VAS & ODI scores among both the groups using unpaired t test. There was a significant improvement post 4 weeks of intervention.

Discussion

The aim of study was to find out the effect of rhythmic stabilization exercise in nonspecific low back pain. It primarily aimed to assess the effect of 4 weeks rhythmic stabilisation on pain and disability. There was statistically significant difference in VAS score readings of the 2 groups when analysed using paired t-test but clinically it was found that group A, which received rhythmic stabilization showed better results than group B which received conventional exercises.

This study showed a considerable decreased in VAS score in group A. Muscles are made up of fibres that

stretch and contract in order to do something. Myotatic stretch reflex that gives signal to the muscle to contract if it senses that it is being overstretched. A Golgi tendon organ which signals the muscles to relax when your tendons are stretched too far^{8,9}. Proprioceptive Neuromuscular Facilitation (PNF) utilizes both of these sensory responses in its approach to improving pain, flexibility, range of motion and even strength. When PNF exercises are performed correctly, the client will eventually adapt them into their everyday movements, thereby sloppy postures and habits putting chronic strain on the muscles, causing soreness, stress and eventually leading to injury will be corrected and their muscle spasms and pain will decrease greatly¹.

Rhythmic stabilization group also showed an improvement in functional ability could be seen as a direct result of reduction in pain and improving flexibility thereby providing further support for the effectiveness of rhythmic stabilization exercises for chronic low back pain treatment⁷.

Rhythmic stabilization exercises are based on co contraction of antagonistic muscle groups to maintain trunk and whole body position, we can assume that this technique improved significantly static strength of the associated musculature and perhaps muscle co-ordination. Trunk stabilization is a necessary requirement for performing several everyday tasks such as rising from a chair or carrying an object. In these movements, the trunk muscles work almost in an isometric fashion to maintain trunk integrity⁴.

The present study showed a considerable decrease in VAS score in Group B also, where intervention was given in the form of conventional back exercises. This is supported by the Systematic Review based on Exercise Therapy for Low Back Pain, done by Maurits van Tulder, which shows significant reduction of pain after conventional exercises in chronic low back pain. As there is pain reduction due to exercises there is improvement in functional ability in daily life.

As the study shows difference in VAS and ODI in both groups but statistically group A that is rhythmic stabilization shows better improvement in both outcome measures. When rhythmic stabilization are performed, the ability of skeletal muscles to trigger tensile force that is obtained at an early period greatly contributes to neural responses, not adaptive changes in the muscles themselves. Such proprioceptive responses to stimuli

lead to repetitive contraction of the muscles, causing concurrent contraction of the rectus abdominis, oblique abdominal, and transverse abdominis muscles. Consequently, concurrent contraction of the spinal stabilization muscles occurs, and muscle strength is increased, raising internal abdominal pressure and strengthening the trunk, helping functional movement of the human body, greatly effecting an increase in lumbar flexibility and a reduction of low back pain. This leads to greater ability to perform day to day activity, leads to improvement in disability¹⁰. K. Yong Park, KyoChul, Seo. (2014). The Effects on the Pain Index and Lumbar Flexibility of Obese Patients with Low Back Pain after PNF Scapular and PNF Pelvic Patterns. *Journal of Physical Therapy And Science*, 26(10), pp 1571-1574.

The results of Oswestry disability index (ODI) when analysed with paired t-test showed significant difference ($p \leq 0.05$) in all the 2 groups but clinically it was found that group A, which received rhythmic stabilisation showed better results than group B which received conventional exercises. Kumar, Zutshi and Narang (2011) did a study to examine the efficacy of trunk proprioceptive neuromuscular facilitation (PNF) training on chronic

Hence based on our present study, Experimental group showed significant improvement in pain and disability in chronic low back pain patient as compared to conventional group.

Conclusion

Present study concludes that the Rhythmic stabilization reduces pain and improves disability after 4 weeks of intervention when compared with Conventional treatment.

Limitations

- No follow-up was taken to see the durability of the effects of the treatment.
- Only chronic cases were taken.

Recommendations

- Investigation of long term effect of rhythmic stabilization programme with large number of sample and longer session can be assessed.
- Other age group criteria should be included.

Ethical Clearance

This study was approved by ethical committee of our institute.

Source of Funding: self

Conflict of Interest: NIL

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