

## TO COMPARE THE EFFECTS OF INTERNAL ROTATION MOBILIZATION OF HIP WITH CONVENTIONAL PHYSIOTHERAPY TREATMENT IN PATIENTS WITH LOW BACK PAIN: RANDOMIZED CLINICAL TRIAL

Pavan Kumar <sup>1</sup>, Hrishikesh Yadav. K <sup>\*2</sup>.

<sup>1</sup> Associate Professor, Srinivas College of Physiotherapy and Research Center, Mangalore, Karnataka, India.

<sup>\*2</sup> Assistant Professor, Srinivas College of Physiotherapy and Research Center, Mangalore, Karnataka, India.

### ABSTRACT

**Background:** Much research is done on the association between the hip internal rotation and low back pain, but there is no retrievable clinical trial done on the treatment of the hip internal rotation deficit and its effect on low back pain making it necessary to establish the hypothesis by a randomized clinical trial.

**Material and Methods:** 52 subjects who met the inclusion criteria were randomized into either control group or experimental group. Control group was given conventional treatment alone which included moist heat and TENS whereas Experimental group was given hip internal rotation mobilization and the same conventional treatment for six consecutive days. Outcome measures were Visual Analogue Scale, Oswestry Disability Index and Internal Rotation Range of Motion were recorded.

**Results:** The results showed no statistically significant change between the experimental and control group except in Internal Rotation Range which improved significantly in experimental group than control group ( $P < 0.001$ ), but not in Visual Analogue Scale ( $P = 0.564$ ) and Oswestry Disability Index ( $P = 0.516$ ).

**Conclusion:** Experimental group and control group showed significant improvements in both pain and disability.

**KEY WORDS:** Low Back Pain, Hip Internal Rotation Mobilization, TENS, Visual Analogue Scale, Oswestry Disability Index, Internal Rotation Range of Motion.

**Address for correspondence:** Dr. Hrishikesh Yadav. K, Lecturer, Srinivas College of Physiotherapy and Research Center, Mangalore, Karnataka, India. **E-Mail:** [hrishi.yadav99@gmail.com](mailto:hrishi.yadav99@gmail.com)

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### INTRODUCTION

Low back pain is a major health and socioeconomic problem and is a leading cause of disability [1]. Eighty percent of adults have significant back pain during their lifetime [2]. Low back pain is one of the most costly elements to the society in terms of medical expenses and lost work time. Acute low back pain that lasts up to 3 months is the commonest presentation [3], and is frequently associated with reduced

mobility of the lumbar spine and hips [3]. Much of lower back pain is self limiting with 2-7% developing into chronic. Recurrent and chronic back pain accounts for 75-85% of all costs associated with low back pain [1].

For upto 85% of cases of low back pain a definite pathoanatomic or pathophysiologic diagnosis cannot be made [4]. A number of researchers have attempted to identify the causes of low

back pain. In spite of this, specific diagnosis and thus treatments of patients with back pain have been elusive. The challenges of diagnosis in patients with back pain are that it is often multifactorial, the factors involved are wide ranging [5].

Scenario in search of the cause of low back pain, a number of investigators have focused on the relationship between hip joint mobility and low back pain.<sup>6</sup> There is a logical explanation given in the literature about the pathomechanics of hip internal rotation deficit leading to low back pain [6,7]. Three case reports on the treatment of hip internal rotation restriction had shown promising results for low back pain [8-10]. Thus making it is necessary to establish the hypothesis by a randomized clinical trial. Objectives of the study were to find the effect of conventional physiotherapy treatment in patients with low back pain and to compare the effects of internal rotation mobilization of hip with conventional physiotherapy treatment in patients with low back pain. The findings of the study will give better treatment approach in the management of low back pain patients having internal rotation restriction of hip.

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For upto 85% of cases of low back pain a definite pathoanatomic or pathophysiological diagnosis cannot be made.<sup>4</sup> A number of researchers have attempted to identify the causes of low back pain. In spite of this, specific diagnosis and thus treatments of patients with back pain have been elusive. The challenges of diagnosis in patients with back pain are that it is often multifactorial, the factors involved are wide ranging [5].

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## MATERIALS AND METHODS

**Subjects:** Patients were recruited from the Department of Orthopedics and physical therapy, KMC hospital, Mangalore. Inclusion criteria were age between 20-55 years with mechanical low back pain with Passive hip internal rotation range less than 350 [11]. Patient were excluded if they presented with Non mechanical pain (unrelated to time or activity) [11], Low back pain with radiating symptoms, and low back pain with serious pathology (e.g. Cancer, fracture, infection) [12]. Previously undergone surgery of lumbar spine or hip [12]. Feeling unwell, weight loss.<sup>11</sup>Structural spinal deformity [11]. Non organic signs (waddell score more than 3) [13].

A priori power analysis calculation established that a sample size of 23 subjects per group would provide 80% power to detect a meaningful clinical difference with a pair wise comparison among the 2 groups at an alpha level of 0.05 (2-tailed test).

Two hundred twenty one patients were screened for inclusion in the study, with of them 169 not meeting the inclusion criteria. Therefore, 52 patients participated in this study. Following the baseline examination, patients were randomly assigned to either the experimental (n=26), or control group (n=26). Allocation was performed by using a randomized table of numbers created

prior to the beginning of the study. Index cards with the random assignments were prepared and placed in sealed envelopes.

A researcher who was blinded to the baseline examination findings opened the envelope and proceeded with treatment according to the group assignment. All participants gave informed consent upon enrollment in the study. Pre treatment measures of VAS (Visual Analogue Scale), ODI (Oswestry Disability Index) and PIRROM (Passive Internal Rotation Range of Motion) were taken. Experimental group was given hip internal rotation mobilization and conventional treatment. Control group was given conventional treatment alone. Conventional treatment included moist heat, TENS. The treatment was given for 6 consecutive days. After six days of treatment the outcome measures of VAS, ODI, and PIRROM were recorded by an independent blinded observer. The study protocol was approved by scientific committee and the Time bound research ethical committee (No. IEC/KMC/03/2010–2011). During follow-up, no patients were discontinued the training program.

#### **Treatment program:**

**Conventional Treatment:** Moist heat – The patient position was prone. A hot pack well insulated with a towel which was folded over it in layers to obtain a comfortable temperature was placed over the patient's lower back for 20 minutes [14]. TENS – The Patient position was prone, arms by the side, head turned to one side, area to be treated sufficiently exposed. Two electrodes were placed over the painful area of the lower back as indicated by the patient. The treatment was set with a frequency of 50 pps and pulse duration 20 msec. Current amplitude was increased maximum as tolerated by the subject. The treatment duration was 15 minutes [15,16].

**Stretching of external rotators:** Stretches were performed with the subject lying prone, the hip extended, and the knee flexed to 90. The therapist stood facing by the side of the hip which has to be mobilized. The therapist stabilized the pelvis with one hand and the other hand grasping the distal end of tibia took it perpendicularly away from the contralateral leg. Each stretch was taken into internal rotation, to the point where the patient reported a stretching

discomfort sensation in the buttock or proximal thigh. The stretch was held for 30 seconds. Three repetitions was performed in a session for 6 consecutive days [10].

**Strengthening of internal rotators:** The patient was positioned sitting by the side of the couch with knees bent, holding onto the couch. The therapist placed one hand at the medial side of the lower end of the thigh of the extremity to be strengthened. The other hand was placed at the lateral side of the leg above ankle. The patient was then instructed to push the leg outward in an effort to rotate the thigh medially. Manual resistance was given by the therapist. Three sets were performed in a session each set consisting of 12 repetitions. The exercise was given for 6 consecutive days [17,18].

**Articular mobilization:** The patient was positioned in supine. An inch of padding was placed beneath the pelvis just proximal and medial to the acetabulum. The therapist at the affected side supported the knee and distal thigh with one hand by grasping around medially to the posterior aspect. The therapist contacted the anterior aspect of the proximal femur with the heel of the other hand. A posterior glide was imparted by the proximal hand by leaning forward with the trunk. Three sets were performed in a session each set consisting of 10 glides. The treatment was given for 6 consecutive days. This posterior glide increases joint play movement necessary for internal rotation [19].

#### **Outcome measures:**

**VAS:** A horizontal line 100 mm in length drawn anchored by word descriptors at each end. The patient marked on the line the point that they felt represents their perception of their current state. The VAS score was determined by measuring the distance from the left hand end of the line to the point that the subject marks [20].

**Oswestry disability index :** There were 10 sections each one 6 statements of which the subjects had to choose one statement. The 6 statements were scored from 0 to 5 with first statement scoring 0 through to the last at 5 [21].

**Hip range of motion measurement:** The participant was positioned in prone on a treatment plinth with the hip in neutral abduction and adduction, the knee flexed to 90° and pelvis stabi-

-lized. The subject's arms positioned at his sides and his head turned to the side which was most comfortable. The non-tested lower extremity placed in slight abduction. The therapist stood facing by the side of the measuring leg. To familiarize the subjects with the procedures and to assure them that the lower extremity movements pain-free, the lower extremity to be tested passively moved once into medial rotation and once into lateral rotation. The goniometer was aligned vertically along the shaft of tibia and the starting range kept neutral. The therapist holding the movable arm of goniometer along with the tibia moved it passively perpendicularly away from the contralateral leg and range of motion was determined [22]. End range of motion is defined as the point in which the lower shank could no longer be moved without pelvic rotation. Passive range of motion was calculated averaged across the three trials [17,20].

**Procedure:** All patients underwent an initial baseline assessment of VAS, ODI and Hip passive internal rotation range of motion. At the completion of the 1-week intervention, all patients completed follow-up assessments. The testing procedures were the same as those used in the initial baseline assessments. This study utilized a single-blind, randomized controlled trial design. All evaluations were performed by the same examiner, who was unaware of the patients' group assignments.

**Statistical analysis:** Descriptive analysis was done and then subjected to test of normality. Inferential analysis was carried out by non parametric tests as the sample size was small which did not show a normal distribution. The confidence interval for the tests was kept at 95%.Mann Whitney test was used to compare the outcomes between the two groups and Wilcoxon Signed Rank test was used to compare the outcomes within the same group pre and post intervention [22,23].

## RESULT

The study was conducted on 52 patients with baseline status (patient characteristics and baseline values of the outcome measures) in both groups were highly similar in demography. The data was not analysed between right side and left side. No importance was given whether

the side was dominant or non-dominant. Previous studies have shown that the reference values in internal rotation between right side and left side or between dominant side and non-dominant side are similar [18,24].

**Table 1:** Summary of Participant Demographics\*.

	Experimental group (n=26)	Control group (n=26)
Age (years)	29.9±8.13	35.61±11.26
Male, female	16,7	14,9
Height (cm)	153.80±9.98	154.13±10.25
Weight (kg)	44.20±9.77	48.93±8.38
BMI	18.43±2.31	20.46±1.49
Hip (Left/ right side)	9,16	13,12
VAS	6.09±2.1	6.74±1.88
ODI	29.91±18.83	34.52±20.7
PIR ROM (°)	19.3±8.41	22.87±8.79

\*There was no difference among groups for any of the variables (P>.05)

**Table 2:** VAS was compared pre and post intervention for experimental group and VAS was compared pre and post intervention for control group.

		Mean ± SD	within groups	between groups
Experimental	Pre	6.09±2.1	4.26±1.95	P =0.564
	Post	1.82±2.14	(P <0.0001)	
Control	Pre	6.74±1.88	4.73±2.54	
	Post	2±1.8	(P <0.0001)	

**Table 3:** ODI was compared pre and post intervention for experimental group and for control group.

		Mean±SD	Within groups	between groups
Experimental	Pre	29.91±18.83	20.82±15.17	P = 0.516
	Post	9.08±10.96	(P <0.0001)	
Control	Pre	34.52±20.7	23.95±19.45	
	Post	10.56±10.53	(P p<0.0001)	

**Table 4:** PIRROM was compared pre and post intervention for experimental group and for control group.

		Mean ± SD	within group	between groups
Experimental	Pre	19.3±8.41	28.91±10.91	P <0.0001
	Post	48.21±10.39	(P <0.0001)	
Control	Pre	22.87±8.79	3.43±6.19	
	Post	26.3±8.75	(P =0.023)	

## DISCUSSION

The results in the study showed that both the groups showed similar improvements except for PIRROM which improved better in experimental group. There were significant improvements in

pain and disability in both the groups similarly. Experimental group did not show superior improvement than control group.

The better improvement in PIRROM was due to the direct focused treatment to increase the range of motion. However improvements were also seen in PIRROM in control group which can be attributed to time, post treatment relieve in spasm, guarding etc.

Similar improvements in both the groups can be attributed to the conventional physiotherapy and medical treatment given to both the groups overshadowing the beneficial effect of hip mobilization. Self-limiting nature of acute low back pain might have also had an impact since most of the patients referred to the hospital were of acute onset or acute exacerbation [21].

As it is known that low back pain is multifactorial [27]. other factors were not considered. The study was done on a general population. Study on sports population would have been more specific as with hip rotation restriction they would put more load to the back while running. It is already established that in sports population there is a stronger association between low back pain and hip rotation restriction [2,28,29].

In this study there was much emphasis on cause and effect of pain undermining the importance of altered pain mechanism such as central sensitization, neuromatrix etc. [30].

## CONCLUSION

Based on this study finding it can be interpreted that though IRROM is one of the factor causing low back pain, once there is an onset it becomes another entity which needs a conventional treatment for recovery. It can also be said that treating IRROM deficit of hip may prevent in recurrence of low back pain. As once the acute pain subsides the patient treated with internal rotation mobilization of hip with their restored normal ROM and strength would be minimizing stress on their back during activities. Further studies should be done with long term follow up to establish this hypothesis.

**Conflicts of interest: None**

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