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Efficacy of iliopsoas passive stretching vs movement awareness on back pain and disability among subjects with lumbar disc prolapse

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Abstract

LBP is found out to be one of the most common problem affecting lifestyle these days and is commonly associated with lumbar IVDP. Several concepts behind relationship between IVDP and LBP have been spotlighted but more recently muscular inefficiency and lack of physical activity is something that has drawn our attention under which the present study has focused on Iliopsoas muscle. The study consisted of 30 subjects with age group of 35-50 years recruited as per the inclusion and exclusion criteria. The assessment was taken based on VAS and ODI. Subjects were divided into two groups by simple random sampling method. Group A was administered passive IP stretch and Group B was administered movement awareness in the form of lunges for period of 6 weeks.

Group A and Group B both showed improvement in ODI and VAS score with the P value of $P < 0.001$ suggestive of strong statistical significance (student paired t test). The difference between two groups compared in terms of ODI score pre and post test showed moderate significance with P value of $P < 0.024$ with the mean difference of 5.949 and 6.615 respectively favouring Group B (student unpaired t test). Similarly both the groups showed reduction in VAS score with P value of $P < 0.001$ suggestive of strong significance but the difference between two groups showed less significance with P value of $P < 0.574$ and mean difference of 2.067 and 2.800 respectively (student unpaired t test).

Keywords: Lumbar intervertebral disc prolapse iliopsoas movement awareness lunges

Introduction

Intervertebral disc is a structure that is the central figure in spinal mechanics and pathology, consisting of annulus fibrosus and nucleus pulposus^[1]. As a part of natural ageing process or trauma, alterations to disc structure can sometimes push the disc material beyond the intervertebral disc space leading to a condition called intervertebral disc prolapse (IVDP)^[2].

In our modern lifestyle, though we claim to have eradicated many diseases, we still are falling victim to lifestyle oriented musculoskeletal problems. The major brunt unfortunately being the spine. Intervertebral disc prolapses being one of the commonest in this order have been an area of concern^[3, 4]. Studies have shown that 56% of adults are found out to have disc bulge. The highest prevalence is among 30–50 years of age group. Male: Female ratio being 2: 1. MRI scans show that between 20% & 35% of working adults have asymptomatic disc herniation. There is lifetime incidence of 2% for symptomatic disc herniation. 80% of general population may experience back pain but only 2-3% will have sciatica and commonest site being L4-L5 spine^[5].

Traditionally research and clinical practice have concluded on inflammatory process and altered mechanics of intervertebral disc as a cause of low back pain in intervertebral disc prolapse, but more recently it is proposed to be also related to muscular inefficiency and lack of sufficient physical activity: Iliopsoas being one among the common culprit^[6, 1].

Since Iliopsoas is not only a hip flexor but also a stabilizer to lumbar spine and plays a vital role in connecting the lumbar spine to the hip, it is an important contributor to the control of human movement and is involved in a wide range of activities from erect standing, forward bending, sitting, lying down and wide range of postural control actions and if tightened causes exaggerated anterior pelvic tilt as a result increases lumbar lordosis and influences the alignment of disc and its health^[7].

Iliopsoas stiffness is one of the most common cause of back pain. The proposed etiology includes insufficient flexibility, strength (force-generating capacity), impairment or imbalance (altered length tension relationship), that can place excessive strain on the IVD [1]. Having said this, it can be hypothesized that IP if remains tightened for prolonged period of time may be one of the factors contributing to IVDP or could be an outcome of IVDP.

Passive stretching of the IP muscles, to maintain flexibility has been proposed as a proactive strategy and is now in common use [8]. Whereas Awareness Through Movement" (ATM) is a process of verbally guiding a person through an activity during which movements usually are performed slowly and gently. It is thought that this process facilitates the learning of strategies for improving organization and coordination of body movement by developing spatial and kinesthetic awareness of body-segment relationships at rest and during motion, awareness of ease of movement, reducing effort in action, and learning the feeling of longer muscles in action [9, 10].

Lunging is a multi-joint exercise but when incorporated with movement awareness not only stretches the hip flexors but also activates the glutes, quadriceps and the spinal stabilizers like transverse abdominus, vastus medialis, gluteus medius etc. Both of these procedures are of different concepts which in one way or other reduces the disc tension resulting in reduction of LBP.11 [12, 13, 14],

Methodology and Procedure

Sample consisted of N=30 subjects,15 in each group aged 35-50 years, using simple randomized sampling using lottery method by assigning a unique number to each of the N population. The study was approved by the concerned centre Attitude Prime physiotherapy clinic and RV college of physiotherapy. Participants had to be in the age group between 35-50 years, LBP for more than a year with or without radicular pain with MRI support for disc bulging and positive Modified Thomas test. Subject weren't under pain medication during the study. Subjects with Lumbar radiculopathy, Spondylolisthesis, Hemi vertebrae, Spina bifida weren't included.

Pain was evaluated using a visual analog scale. The subjects were asked to indicate his perceived level of low back pain. The visual analog pain scale consists of a 10-cm line with descriptors at each end. At the left end, there is the number zero with the descriptor no soreness at all and at the right end there is the number ten with the descriptor soreness as bad as it could be. The visual analogue pain scale has been used as a valid and reliable measurement for determining the intensity of pain in human subjects. Similarly, for disability ODI scale was taken which is found out to be a gold standard outcome measures and a valid and vigorous measure.

Intervention

For passive IP stretching, Subject was made to sit at the end of the table with thighs half off the edge. Hand was placed behind subject's back and other under one knee flexing the thigh towards the chest and giving assistance as subject lies

down. Subject was asked to bend the knee towards the chest ensuring posterior pelvic tilt. The foot of the subject will be stabilized using the torso and passive force to stretch iliopsoas was given pressing the resting thigh to hip extension.30 seconds hold for each stretch with rest period of 10 seconds will be repeated for 5 times, 5 days a week for 6 weeks [9]. For Lunges, subject was asked to stand with a stride length of 3-foot difference.

Instructions to breathe in while lunging forward and breathe out while stepping backwards was given. Hip alignment and rotation was monitored while doing the procedure.3 sets of 10 repetitions with hold of 2 seconds at the end range was administered daily for 5 days a week for 6weeks [27].

Statistical Analysis

Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance. The following assumptions on data is made, **Assumptions: 1.** Dependent variables should be normally distributed, **2.** Samples drawn from the population should be random, Cases of the samples should be independent

Student t test (two tailed, independent) has been used to find the significance of study parameters on continuous scale between two groups (Inter group analysis) on metric parameters.

Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups, Non-parametric setting for Qualitative data analysis.

Results

Table 1: Gender distribution of subjects

Gender	Group A	Group B	Total
Female	9(60%)	7(46.7%)	16(53.3%)
Male	6(40%)	8(53.3%)	14(46.7%)
Total	15(100%)	15(100%)	30(100%)

The above table and graph shows that Group A in the study consisted a total of 60% females and 40% males where as in Group B, 47% were females and 53% were males. Numbers of participants were more in Group B.

Table 2: Age distribution of subjects

Age in years	Group A	Group B	Total
31-40	10(66.7%)	13(86.7%)	23(76.7%)
41-50	5(33.3%)	2(13.3%)	7(23.3%)
Total	15(100%)	15(100%)	30(100%)
Mean ± SD	40.20±4.96	37.00±2.90	38.60±4.31

The above table and graph shows that out of 30 subjects, 66.7% of participants in Group A and 86.7% of them in Group B were between the age group 31 to 40 years and 33.3% in Group A and 13.3% in Group B were between the age group 41 to 50.

Table 3: Comparative assessment at pre-and post for ODI and VAS score

	Pre	Post	difference	t value	P value
ODI					
➤ Group A	18.22±9.55	12.27±6.95	5.949	6.885	<0.001**
➤ Group B	25.87±10.64	19.25±8.99	6.615	8.341	<0.001**
➤ P value	0.048*	0.024*	-	-	-

VAS score					
➤ Group A	4.60±1.55	2.53±1.13	2.067	8.328	<0.001**
➤ Group B	5.60±1.24	2.80±1.42	2.800	10.693	<0.001**
➤ P value	0.061+	0.574	-	-	-

Between group: student t test (unpaired): Within Group-Student t test(paired)

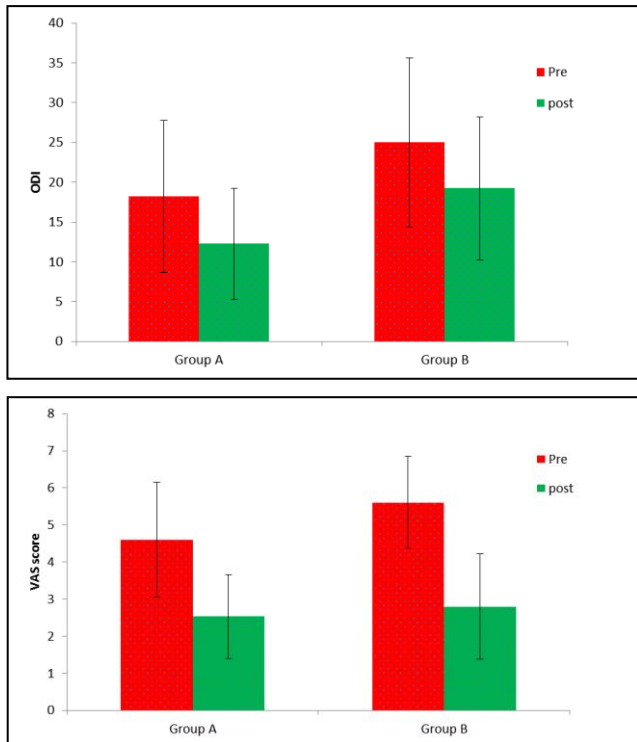


Fig 1: Comparative assessment at pre-and post for ODI and VAS score

- Subjects were age matched using student 't' test at $P=0.040$ and gender was matched using Chi-squared test at the value of $P=0.464$.
- Group A showed improvement in ODI score with P value of $P<0.001$ suggestive of strong statistical significance.
- Group B also showed improvement in ODI score with P value of $P<0.001$ suggestive of strong statistical significance.
- The difference between two groups compared in terms of ODI score pre-and post-test showed moderate significance with P value of 0.024.
- Similarly, Group A and B both showed reduction in VAS score with P value of $P<0.001$ suggestive of strong statistical significance but the difference between the two groups showed less significance with P value of $P=0.574$.

Discussion

Low back pain has become one of the major factor influencing lifestyle which adversely affects the quality of life these days among which one of the leading cause is found out to be associated with lumbar intervertebral disc prolapse. Various researches and studies have found out overuse and degeneration as a major cause of IVDP following which musculoskeletal structures at different levels are being compromised.

The present study was done among 30 subjects with low back pain having history of lumbar disc prolapse, who were divided into two groups with 15 participants each with an intention to find out efficacy between passive iliopsoas stretching and movement awareness through lunges on reducing back pain and disability.

Group A which had undergone passive iliopsoas stretching

showed a difference of 5.949 pre-and post-test in ODI score and 2.067 on VAS score and suggested strong statistical significance with p value of $P<0.001$.

Group B which had undergone movement awareness showed a difference of 6.615 compared to pretest ODI score and 2.800 on VAS score suggested strong significance with p value of $P<0.001$. Post-test significance between the groups in ODI was found out to be 0.024 which has moderate statistical significance but in terms of VAS it was found out to be 0.574 suggesting no statistical significance.

According to a study done by Hye Young Kim, MD, Jin Woo Park, MD et al, iliopsoas muscle can get triggered because of injuries or stress to spine and disc like in lumbar disc prolapse resulting in low back pain. Previous studies have shown that only 20-35% of disc prolapses are symptomatic⁵, but these symptoms would not have necessarily arisen from bulged disc but from other musculoskeletal compromises, one of which could be iliopsoas tightness. So both the techniques: passive IP stretch and lunges seemed to be equally effective in stretching the iliopsoas muscle directly or indirectly as done in study by Michael V Winters, Charles G Blake, Jennifer S Trost, which proved that both active and passive IP stretch showed similar effect on increasing extension ROM and decreasing low back pain among subjects.

The result supported movement awareness to be superior than passive IP stretching in terms of reducing disability among lumbar disc prolapse subjects as stated by Jein Weir et al in his study "Effect of lunges on hip flexors" which speculated that lunges do not only stretch the iliopsoas muscle but also strengthens it along with muscles like rectus femoris and gluteus.

Conclusion

The result concluded that both the techniques are equally significant for reducing pain but movement awareness is more beneficial in reducing disability among subjects with lumbar disc prolapse.

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