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THE EFFECT OF ELDOA ALONE AND ELDOA WITH CORE MUSCLE STRENGTHENING TO TREAT PAIN IN PATIENTS WITH PIVD: A COMPARATIVE INTERVENTIONAL STUDY

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ABSTRACT: This study was done to determine the effect of ELDOA alone versus ELDOA with core muscle strengthening to treat pain in patients with PIVD.Study is done on 30 females randomly placed in two groups; group A (ELDOA with core muscle strengthening) and group B (ELDOA alone).The Numeric Pain Rating Scale was used as outcome measures. All the patients were assessed at baseline before intervention and at the completion of 6 weeks of treatment. Data was analyzed using SPSS version 20.0. The patients treated with ELDOA combined with core muscle strengthening improved pain (Mean NPRS pre =7.13, post =3.40), Mean difference of NPRS visit 1 and NPRS week 6 for group A was 1.73 and mean difference of NPRS visit 1 and NPRS week 6 for group B was 0.93. Test statistics shows that Kolmogorov-Smirnov Z test value for NPRS of both groups at week 6 is .365 and p-value is .999 which is greater than .05. It is concluded that Group A and group B participants reported decrease in pain intensity on NPRS at week 6. So technique applied on group A participants (ELDOA with Core Muscle Strengthening) and the technique applied on group B participants (ELDOA alone) were effective in the management of pain. Study also strongly suggests that there was no significant difference between the effectiveness of techniques on reducing intensity of pain on NPRS so that null hypothesis was accepted.

Key Words: Pain, Core Muscle Strengthening, ELDOA, Posterior, Intervertebral Disc

INTRODUCTION:

Common forms of disc disorders are disc prolapse, disc extrusion and free sequestration. Disc prolapse is the frank rupture of nuclear material into the vertebral canal such that the central nucleus pulposus pushes through the annulus fibrosus and may cause radiculopathy. Factors like sneezing, awkward bending, heavy lifting, smoking, weight bearing sports, obesity, and ageing cause weakness of disc and thus lead to disc prolapse. Symptoms include back pain, numbness, weakness or paraesthesia in the leg and/ or foot, loss of bladder and bowel control and radiculopathy into groin or anterior thigh (3^{rd} or 4^{th} lumber level), into calf region and bottom of foot (1^{st} sacral level) and into lateral and anterior

thigh and leg region (L5 level). Mostly lumber disc prolapse occurs at age of 30 to 50 years of age in 80% population at level of L4-L5 and L5-S1 on the posterior and posterolateral aspect of disc accounting 37% of low back pain. [4-5, 8]

The spine consists of 33 vertebrae and intervertebral discs separating them. Lumbar vertebrae numbered from L1 to L5 form the largest segment of vertebral column. Weight mostly being put on L4-L5 and L5-S1 makes them more vulnerable to injury.Lumbar muscles include intrinsic or illiofemoral and extrinsic or illiothoracic group which carry out flexion. Lateral flexion is produced by ipsilateraloblique muscles, traversusabdominis and quadratuslumborum. Semispinalis and Multifidus are responsible for lumbar rotation. Erector spinae, illiocostalis, Longissmus and spinalis are primary lumbar extensors.Posterior and anterior longitudinal ligaments, Intertransverse ligaments, Interspinous ligament, Supraspinous ligament, Ligamentumflavum and Illiolumber ligament help to provide flexibility and support to the back muscles.Vertebral bodies with intervertebral disc between them forms the symphyseal joint andsuperior and inferior articular processes on adjacent vertebrae termed as facet joint make synovial joint in lumbar spine. Intervertebral disc between the adjacent vertebral bodies functions to absorb load of physical activities. [1, 3]

Loading on spine is axial in standing position and increased compression forces in slouched sitting. Range of lumbar flexion is 40-60°, 20-35° lumbar extension, 15-20° lateral flexion and 3-18° lumbar rotation. Lumber disc prolapse is diagnosed on basis of clinical history (onset, location, nature of pain, aggravating and relieving factors) and physical examination of nerves, movements of spine, muscle testing, straight leg raise test (lasegue test), X-Rays, CT scan and MRI. [4, 6-7]

Medical treatment includes medications as naproxen, Ibuprofen, narcotics such as codeine, oxycodone and acetaminophen, gabapentin, pregabaline, tramadol and amitripailine, muscle relaxants and cortisone injection. Surgical management includes microdisectomy.Physical therapy management includes ELDOA, core muscle strengthening, hydrotherapy, hot and cold Therapy, TENS, deep tissue massage, traction and flexibility exercises.[8-9]

Core muscle strengthening exercises include bicycle crunch, reverse crunch, bird dog, reverse pendulum, prone plank, press up, side double leg lift, flutter kick, swimmer, super man and dead bug exercises. They provide muscular control require to maintain functional stability to spine. Core muscles form box with the abdominals on anterior, gluteals and

Para spinals on posterior, diaphragm on superior and hip girdle and pelvic floor muscles inferiolrly.Major core muscles are transversusabdominis, multifidus, internal and external obliques, rectus abdominis, erector spinae, longissmusthoracics and diaphragm.Lattismusdorsi, gluteus maximus and trapezius are minor core muscles.[10-11]

Guy Voyer developed the technique of ELDOA (Elongation Longitudinaux avec DecoaptionOsteo-Articulaire) also called LOADS (Longitudinal Osteo-Articular De-coaptation Stretching) in 1979. It stretches the fascia and vertebral segments of spine through keeping both tension and posture for atleast one minute.It helps absorbing fluid by intervertebral joint, reducing stress over the spinal segment,increasing tone in spinal extensor muscles and thus improving alignment of vertebral segment and posture. For L4-L5 level, patient is asked to establish vertical alignment in axial extension while sitting on the floor with the arms at the side, legs relaxed, chin pulled back, knees bent at 90 degree, feet dorsiflexed and ankle eversed with the knees gently pressing toward the floor, arms extended and externally rotated, fingers fully extended and heel of palm pushing towards ceiling and maintaining the tension. For L5-S1, patient flattens spine, curls back the toes curled back, inverses the ankles, internally rotates the hip, swings the arms up over the head while maintaining tension in same position as for L4-L5. [11]

OBJECTIVE OF THE STUDY:

The aim of this study is:

- To Find out the Best Treatment Protocol between Core Muscle Strengthening with and without ELDOA to Treat Pain in Patients of PIVD

STUDY HYPOTHESES:

NULL HYPOTHESIS: (Ho):

Both techniques will be equally effective in the management of pain in patients of PIVD.

RESEARCH HYPOTHESIS: (HI):

- Any one of the techniques will be more effective than the other in the management of pain in patients of PIVD.

MATERIALS AND METHODS:

SOURCES OF DATA:

- Rauf Medical Centre, Abbottabad.
- Jinnah International Hospital, Abbottabad.
- Physiotherapy Clinic, Women Institute of Rehabilitation Sciences, Abbottabad

POPULATION: Female patients with PIVD
STUDY DESIGN: Comparative Interventional Study
SETTING: Study was carried out at Women Institute of Rehabilitation Sciences; Abbottabad.

DURATION OF STUDY: Six months after approval of synopsis.
SAMPLE SIZE: 30
SAMPLING TECHNIQUE: Convenient Sampling
SAPMLE SELECTION:A total of 30 patients were selected as per inclusion criteria and randomly placed into two groups A and B, where all the patients were females.

GROUP A = ELDOA with core muscle strengthening

GROUP B = ELDOA alone

INCLUSION CRITERIA:

- Age 29 to 49
- Patients with posterolateral disc prolapse
- Positive straight leg raise test at less than 60 degree,
- Scan demonstrating a herniated nucleus pulposus without significant stenosis

EXCLUSION CRITERIA:

- Spondylolisthesis,
- Caudaequina syndrome
- Progressive neurological deficits
- Any contraindication to extension exercises
- Stenosis
- Sacroiliac joint pathology
- Upper motor neuron lesion
- Conditions other than disc prolapse

APPLICATION OF INTERVENTIONAL TECHNIQUES: The patients were treated for 3 days in a week on alternate days, for six consecutive weeks. All the measurements were recorded twice, once at the first visit before treatment and once at the end of 6th week of treatment.

DATA COLLECTION PROCEDURE: Primary questionnaire was implicated to them. The questionnaire contained close-ended questions. Total 100 pregnant females were included in this study. The standardized NPRS questionnaire was implicated to the

subjects. The questionnaire contained close-ended questions. Data was primary that is I collected the data.

ETHICAL CONSIDERATIONS: A written informed consent was taken from all the patients. All the patients of the study were volunteered and selected from Abbottabad District only. Topic of study was also approved by ETGICAL COMMITTEE OF WOMEN INSTITUTE OF REHAILITATION SECIENCES, ABBOTTABAD.

DATA ANALYSIS PROCEDURE: All data was entered and analyzed by using SPSS version 20.

DATA COLLECTION INTRUMENTS:

- Numeric Pain Rating Scale

STATISTICAL ANALYSIS:

FREQUENCY OF GROUPS:

Groups	Frequency	Percent
Group A	15	50.0
Group B	15	50.0
Total	30	100.0

NUMERIC PAIN RATING SCALE (NPRS):

NORMALITY OF DATA FOR NPRS:

TEST OF NORMALITY:

Shapiro-Wilk Test:

Group of Subjects		Shapiro-Wilk		
		Statistic	**df**	**Sig.**
Numeric Pain Rating Scale Visit 1	**Group A**	.924	15	.220
	Group B	.851	15	.018
Numeric Pain Rating Scale Week 6	**Group A**	.897	15	.086
	Group B	.937	15	.344

DESCRIPTIVE STATISTICS FOR NPRS:

Group of Subjects		Numeric Pain Rating Scale Visit 1	Numeric pain rating Scale Week 6
Group A	Mean	7.13	5.40
	N	15	15
	Std. Deviation	1.246	1.183
Group B	Mean	6.53	5.60
	N	15	15
	Std. Deviation	1.125	1.682

DIFFERENCE OF MEANS OF TWO GROUPS:

Groups	Numeric pain rating scale visit1 Mean	Numeric pain rating scale week 6 Mean	Mean Difference
Group A	7.13	5.40	1.73
Group B	6.53	5.60	0.93

TEST OF SIGNIFICANCE:

Two-Sample Kolmogorov-Smirnov Z Test:

Test Statistics	Numeric Pain Rating Scale Visit 1	Numeric Pain Rating Scale Week 6
Kolmogorov-Smirnov Z	.548	.365
Asymp. Sig. (2-tailed)	.925	.999

RESULTS:

There were 30 females included in this study. They were divided into two groups; 50% females were in group A and they received ELDOA with core muscle strengthening and 50% were in group B and they received ELDOA alone.NPRS was used for the assessment of pain intensity. Following results were obtained;

p values = .220 for group A (NPRS at Week 1) and .086 for group A (NPRS at visit 6) and .344 for group B (NPRS at week 6) were considerably greater than Alpha value = .05 i.e. p-values 0.220 > .05, .086 > .05, .344 > .05**.** This showed that data in these groups came from normal distribution.

p value for group B (NPRS at visit 1) is less than alpha value of .05 i.e. p-value = .018 < alpha value = .05. This showed that normality of data was violated in group B (NPRS Visit 1). There were N=15 females in group A. Mean of NPRS at visit 1 for group A was 7.13 and standard deviation was 1.2.Mean for NPRS at visit 1 of N=15 females in group B was 6.53 and standard deviation was 1.12**.** Mean of NPRS at week 6 of N=15 females in group A was 5.40 and standard deviation was 1.1**.**Mean for NPRS at visit 6 of N=15 females in group B was 5.6 and standard deviation was 1.6**.**Mean difference of NPRS visit 1 and NPRS week 6 for group A was 1.73 and mean difference of NPRS visit 1 and NPRS week 6 for group B was 0.93.This showed that mean difference of NPRS at visit 6 for group B was lesser than that of NPRS at visit 6 for group A. Therefore, on the basis of difference of means, it is inferred that group A participants reported more decrease in pain intensity on NPRS at week 6 than group B participants. So technique applied on group A participants (ELDOA with Core Muscle Strengthening) was more effective than the technique applied on group B participants (ELDOA alone).

Test statistics showed that Kolmogorov-Smirnov Z test value for NPRS of both groups at week 6 is .365 and Asymp. Sig. (2-tailed) that is p-value is .999 which is greater than .05. So, on the basis of test statistics, it is strongly suggested that null hypothesis of this study is accepted and there was no significant difference between the effectiveness of techniques on reducing intensity of pain on NPRS.

CONCLUSIONS:

- Group A and group B participants reported decrease in pain intensity on NPRS at week 6. So technique applied on group A participants (ELDOA with Core Muscle Strengthening) and the technique applied on group B participants (ELDOA alone) were effective in the management of pain.
- Study also strongly suggested that null hypothesis of this study as accepted and there was no significant difference between the effectiveness of techniques on reducing intensity of pain on NPRS.

DISCUSSION: This interventional study was carried to find out the effects of ELDOA alone and ELDOA with Core muscle strengthening on pain in females with prolapsed lumbar intervertebral disc. Numeric Pain Rating Scale (NPRS) was used to measure pain. It was noted that those patient who received ELDOA with Core muscle strengthening improved more significantly as compared to those patients who received ELDOA alone. The improvement achieved with ELDOA can be sustained by performing core muscle

strengthening as well. Sajjad A., et.al (2014) conducted a study on patients in Railway Hospital, Rawalpindi and concluded that fascia stretching improves the pain and functional level in disc protrusion patients. Patients of the age 53.25 + 7.10 with male female ratio 3:1 were included in the study. The results showed that most commonly involved spinal segment was cervical disc protrusion at C5-C6 level (25%) and at level of L4-L5 (33.33%) in lumber disc protrusion. The pretreatment intensity of pain (FRI) was 2.58 ± 1.165 and post treatment intensity of pain was 0.92 ± 0.793, showed the significant difference ($P < 0.001$). FRI score on 1st evaluation was 21.42 ± 9.307 and after ELDOA Exercise on 4th assessment, the mean score was 7.92 ± 5.583. This also showed statistically significant ($P < 0.001$) difference. Hence the final conclusion was that the ELDOA exercises improve the pain and functional level in the spinal disc protrusion patients. [(12)] So, the results of this study are consistent with the above mentioned study.

Akuthota V., et.al (2004) concluded that core muscle strengthening has become an important component in physical rehabilitation. They carried out an uncontrolled prospective trial of "dynamic lumbar stabilization" for patients with lumbar disk herniation with radiculopathy. The study showed that dynamic lumbar stabilization program was similar to the modern concept of core stability program without the higher level sports-specific core muscles training. The final conclusion was that core muscle strengthening hasa theoretical basis in management and prevention of various musculoskeletal conditions. [(13)] On the basis of difference of means, it is inferred that group A participants reported more decrease in pain intensity on NPRS at week 6 than group B participants. So technique applied on group A participants (ELDOA with Core Muscle Strengthening) was more effective than the technique applied on group B participants (ELDOA alone). So this study supports the results of the above mentioned study confirming that core muscle strengthening is useful intervention in rehabilitation of patients with disc protrusion.

A study was conducted by Riley P. M., et.al (2016) on back pain in the young athletes and concluded that core strengthening exercises and bracing were effective in treatment of back pain. [(14)] Test statistics of this study showed that Kolmogorov-Smirnov Z test value for NPRS of both groups at week 6 is .365 and Asymp. Sig. (2-tailed) that is p-value is .999 which is greater than .05. So, on the basis of test statistics, it is strongly suggested that null hypothesis of this study is accepted and there was no significant difference between the effectiveness of techniques on reducing intensity of pain on NPRS.

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