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IMPACT OF GLOBAL POSTURAL MUSCLE STRENGTHENING EXERCISE V/S CONVENTIONAL PHYSIOTHERAPY IN LUMBAR PIVD FOR IMPROVING DISABILITY AND QUALITY OF LIFE

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Background: When the gel-like substance within a spinal disc forces itself out through the outer covering onto the nerves of the spinal canal, a condition called prolapsed intervertebral disc (PIVD) will be experienced. This can result in a number of symptoms not limited to discomfort, numbness and weakness. PIVD may be due to injury, wear and tear as well as degenerative diseases associated with age. Intervertebral disk is a disc-shaped piece of tissue which lies between two vertebrae. This study will appraise the effectiveness of one of these regimens, GPMSE in combination with traditional physiotherapy in the management of pain.
Objective: The aim of this study is to determine the advantage of a specific exercise programme by means of an comparison of two different procedures. This paper intends to investigate the effects of a given exercise on the proprioception of this population, its sensory integration as well as overall operations.
Method: In this case, prospective study, one-hundred participants are involved in an experimental investigation with Lumbar Prolapsed Intervertebral Discs- PIVD. Group A comprised of half the patients who were treated with GPMSE and Group B which was treated with traditional physiotherapy.
Both the groups Group-A(GPMSE) and Group-B (conventional physiotherapy) received a specific treatment protocol, including moist heat packs, muscle strengthening exercises, mobility and flexibility. Both the groups continued receiving exercises.
Result: we can infer from the study's findings that patients who received GPMSE showed better results (Group A) compared to patients who received conventional physiotherapy (Group B).
Conclusion: A GPMSE can offer a more lasting relief and a more noticeable quality – of – life change than standard physiotherapy which is mainly aimed at symptom reduction by targeting underlying postural imbalances and muscle weakness.

Keywords: Global postural muscle exercises, Conventional physiotherapy, NPRS, DEET, DAET, NDI, SF-36, Exercise Protocol, Swiss ball exercises, Lower back pain.

INTRODUCTION

As it exits the intervertebral region, the nucleus pulposus is called an in the spine. This disease is a common cause of back pain. People who suffer with HDs often recall the exact moment when their agony began. Distinct from mechanical back pain, HD pain often feels like a burning or stinging sensation and may even go down to the legs. In more severe cases, the disease could be accompanied by sensory anomalies or weakness. HD injury may, under some circumstances, apply

pressure to the nerve or spinal cord, causing pain typical of either SC dysfunction or nerve compression. This condition is known medically as myelopathy [1]. DH can be extremely painful. It is crucial to remember that the majority of painful DH resolve in a matter of weeks. It's interesting to note that there are situations in which the patient experiences no discomfort at all from the disc herniation. Since MRI is the primary imaging modality for diagnosis, it is noteworthy to remark that MRI scans of asymptomatic individuals commonly reveal ruptured discs [2].DH management calls for an interprofessional team to work together. Initially, conservative measures are advised unless there is a significant neurological impairment in the patient. Because the effects of surgery are not always foreseeable, it is usually considered a last choice. Following surgery, patients frequently have ongoing pain & neurological abnormalities that may worsen [3].Physical therapy is essential to the majority of patients' recoveries. Results from treatment might vary from patient to patient based on a number of circumstances; however, those who maintain a healthy weight and exercise often tend to have better results than those who are less active. [4]

DH occurs when the nucleus pulposus sticks out of the intervertebral disc's thick collagenous ring, which is called the annulus fibrosus. The annulus of the disc seems to be damaged when the spine is bent over repeatedly or for an extended period of time. This projection starts at the innermost annulus rings and becomes larger as it extends outward [7]. • Herniations may develop suddenly or over the course of many weeks or months. The major cause of degenerative disc herniation (DH) is the aging process, which weakens and dehydrates the nucleus pulposus. This may happen to anybody at any point. The second leading cause of disc herniation, after injury, is trauma [8]. The most frequent site for DH is the LB, followed by the cervical region.• Congenital issues, such as short pedicles, and anomalies in connective tissues are other potential reasons. The higher incidence of DH in these places might be due to the biomechanical forces acting on the flexible section of the spine. Disc herniation, however, occurs less frequently in the thoracic spine [9].• Disc injury can occur by doing repetitive mechanical tasks like twisting & bending without rest intervals. • Other factors that may contribute to disc prolapse include being fat, smoking excessively, keeping poor posture, & living a sedentary lifestyle [5,10].

EXAMINATION

Finding the precise spot of compression might be helped by a thorough neurological evaluation. The following is a rundown of the sensory impairment, susceptibility, pain site, and reflex impairment that correspond to each granular degree of compression:

L1 Nerve: A lot of people report inguinal pain and numbness as symptoms. In most cases, the stretch reflex remains unaltered, and limitations in hip flexion are rare.

L2-L3-L4 Nerves: Starting from the back, the pain radiates down the leg and into the front of the thigh. The front of the thigh and, on rare occasions, the center of the lower leg might go numb as a result. Furthermore, the patellar reflex is weaker, and the AWA knee extension and hip flexion are both impaired.

L5 Nerve: Starting in the back, the pain travels down the leg and into the buttocks, outer thigh, outer calf, and upper foot, especially the big toe. You may experience numbness or tingling in the outer calf, the top of the foot, and the space between your first and second toes. You may also have trouble with hip abduction, knee bending, toe extension, ankle-width-attorney flexion, and inversion and eversion of the foot. The semitendinosus and semimembranosus muscle reflexes have been diminished [24].

S1 Nerve: The discomfort caused by this nerve often begins in the back and travels to various parts of the body, including the flank, the outside or posterior side of the thigh, the back of the calf, and the outside or sole of the foot. Additionally, it produces numbness or tingling in the following areas: the outside or sole of the foot, the right rear of the calf, the Achilles tendon, hip extension, knee flexion, and plantar side of the foot. Urogenital, fecal, and sexual problems in addition to mild weakness are possible outcomes.

S2-S4 Nerves: The bulbocavernosus and basal wink reflexes are nonexistent, and the pain starts in the sacrum or buttock area and travels to the back of the leg or the perineum. Sensitivity is lost in the medial buttock, genital, and perianal areas [25,46].

AIM

With an emphasis on enhancing Disability & Quality of Life, the study attempts to evaluate the effects of two distinct physiotherapy modalities on people with lumbar PIVD: GPMSE & Conventional Physiotherapy.

OBJECTIVES

1. Evaluating the impact of global postural muscle strengthening exercises on unstable surfaces in improving quality of life and reducing disability.
2. Examining the effects of traditional physiotherapy on quality of life and disability among lumbar PIVD patients.

METHOD :

Study Design

Experimental Study

Place of Study

Physiotherapy OPD, Sarvodaya Hospital

Sources of Data Collection

Physiotherapy OPD, Sarvodaya Hospital

- Yashoda Hospital, Nehru Nagar Ghaziabad

Sampling Method

Random sampling

Sample Size: 100

Selection Criteria

A. Inclusive criteria:

- Both the Gender (Males & Females)
- Age (35-45years)
- Weak Core Muscles
- Pain (NPRS less than 7)
- PIVD (stage 1 & stage 2)

B. Exclusive criteria:

- Mechanical Lower Back pain
- Surgery of Lower Back
- Vertebral Injury
- Postural Deformity
- Pregnancy
- Spondylosis
- Spondylolisthesis

Outcome Measures

- Pain: NPRS Scale [The Numerical Rating Scale]
- Disability: Rol

and & Morris Scale [RMS]

- “Dynamic Abdominal Endurance Test [DAET]

- Dynamic Back Endurance Test [DEET]
- Short Form-36 [SF-36]

Procedure Introduction:
This study is a prospective, experimental involving 100 patients diagnosed with Lumbar Prolapsed Intervertebral Disc (PIVD). The patients were randomly allocated into two groups: Group A (GPMSE) & Group B (Conventional Physiotherapy)."

Interventions:
Group A (GPMSE):
The Global Postural Muscle Strengthening Exercises (GPMSE) that Group A participants were performing were followed by targeted activities such as applying a moist heat pack, crunches, abdominal push, side crunches, exercises on a Swiss ball for hip flexion, back extension, & cat & camel exercises. For four weeks, participants were to attend sessions for treatment five days a week. To improve postural stability & stop more injuries, participants received back care advice & postural education. Participants were provided home safety measures to support the benefits of treatment & promote following therapy advice.
MOIST HEAT PACK:- Following the patient assessment, the following course of action was taken for group A, a moist heat pack was applied to the lumber region for 15 minutes in order to enhance the flexibility of the tissues and lessen discomfort and muscle pain.

CRUNCHES:-
The patient is laying on their back with their knees bent and their hands behind their head in a supine posture. As you gently guide the patient to lift their upper body and shoulder blades off the floor, relying only on their abdominal strength, you should also gently guide them back to their previous posture.
Routine should be followed 2-3 sets ,each at 8-12 reps.
IMPORTANCE OF CRUNCHES EXERCISE:-
Help the people to get desired strengthen abdominal muscles . The people who have weak muscle can suffer from muscle spasm and back aches. This exercise along with other exercise routine may help in strengthening the back and abdominal .

Position of the therapist:- At the side of the patient.
Position of the patient:- supine lying position.

SWISS BALL EXERCISE (Hip flexion and Back extension Exercises):-
The participants in this research were given Swiss balls in sizes that corresponded to their height. Subjects were given an orientation session to get acquainted with the swiss ball, and they were instructed to exercise barefoot for two or three days prior to the commencement of the training intervention.

CAT AND CAMEL EXERCISE:-
As you raise your lower rib cage, breathe deeply. Bend over and loosen your jaw. Hold your abs firmly in place. While exhaling, bring your chest down toward the floor and raise your eyes slightly.
BENEFITS:- It helps to mobilize the back , reduce stiffness and increase flexibility in trunk without irritating the neck.
Sets and repetitions:- 2 to 3 sets of 8 to 12 repetitions.

Group B (Conventional Physiotherapy):

Group B participants received conventional physical therapy in addition to targeted therapies such as the use of Moist Heat Packs, Spinal Isometric Exercises, & Spinal Extension Exercises. To help to decrease the chance of additional damage & enhance postural stability & back support, participants were recommended to utilize back supports. Similar to Group A, Posture Training & Spinal Care Advice were given. Participants received home safety measures for ongoing Lumbar PIVD care.

SPINAL ISOMETRICS :-

Keeping patient in supine lying position while therapist stands aside . keepin rolled towel under the lower back of the patient and asking him to push it downwards and to keep the pressure stable for 10 sec and then relax.

Sets and Repetitions: 2 to 3 set of 8-10 repetition.

WEEK	GOAL	EXERCISE
Week 1	• Alleviate acute symptoms. • Educate on proper body mechanics. • Promote gentle mobility and flexibility.	1. **Pelvic Tilts:** • 2 sets of 10 repetitions. 2. **Knee-to-Chest Stretch:** • Hold for 15-30 seconds, repeat 3 times on each side. 3. **Cat-Camel Stretch:** • Perform 10 cycles. 4. **Walking:** • Start with short walks, gradually increasing duration
Week 2	• Improve core strength and stability. • Enhance neuromuscular control	1. **Partial Crunches:** • 2 sets of 10 repetitions. 2. **Plank:** • Hold for 15-30 seconds, gradually increasing duration. 3. **Bird-Dog Exercise:** • 2 sets of 10 repetitions on each side. 4. **Bridging Exercise:** • 2 sets of 10 repetitions
Week 3	• Restore functional capacity. • Enhance strength and endurance	1. **Squats:** • 2 sets of 10 repetitions. 2. **Lunges:** • 2 sets of 10 repetitions on each side.
Week 4	• Consolidate gains. • Establish long-term exercise routine.	1. **Advanced Core Exercises (e.g., , side planks):** • 2 sets of 10 repetitions. 2. **Dynamic Stretches (e.g., leg swings):** • Perform 10 repetitions on each side. 3. **Cardiovascular Exercise (e.g., brisk walking, cycling):** • Aim for 20-30 minutes, 3 times per week.

RESULTS :

DATA ANALYSIS

“Statistical Test Descriptive Statistics

• Mean

• Standard deviation

Inferential Statistics

• Unpaired’ Test

Statistical Tool: All analysis were obtained using SPSS Version 23”
Along with receiving to targeted therapies such the use of moist heat packs, simple spine exercises, spine isometric training, & spinal extension exercises, individuals in Group B received traditional physical therapy. It was advised that participants use back supports to improve postural stability, reduce the risk of further harm, & support their backs. Posture training & advice on spinal care were provided, same like in Group A. The participants had continuous care for their Lumbar PIVD at home.

FORMULAE USED

1. Arithmetic Mean: Dividing the total number of numbers in a collection by their count yields this result. The notation for it is

$$A = \frac{1}{n}\sum_{i=1}^{n} a_i$$

A = arithmetic mean
n = number of values
a_i = data set values

2. SD: It quantifies how widely a collection of values may be distributed. It is denoted by;

$$\sigma = \sqrt{\frac{\sum(x_i - \mu)^2}{N}}$$

σ = population standard deviation
N = the size of the population
x_i = each value from the population
μ = the population mean

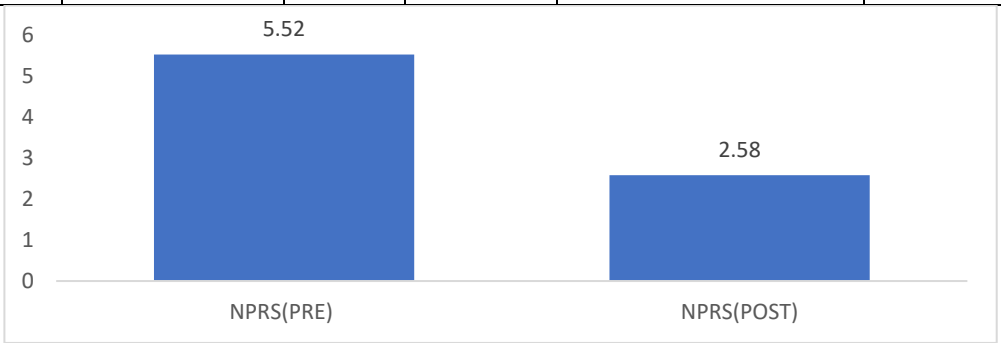
3. Unpaired t-test: One way to find out whether two unrelated groups are different is to use the unpaired t-test, sometimes called the independent t-test. To generalize from two separate samples to the population at large, statisticians employ the unpaired t-test. The comparison of the two samples' means allows us to draw this conclusion.

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

$\bar{x}_1$: Mean value of the first group
$\bar{x}_2$: Mean value of the second group
n_1 : Size of the first group
n_2 : Size of the second group
s_1 : Standard deviation of the first group
s_2 : Standard deviation of the second group

Table 1: Mean & SD for Group A Pre & Post NPRS

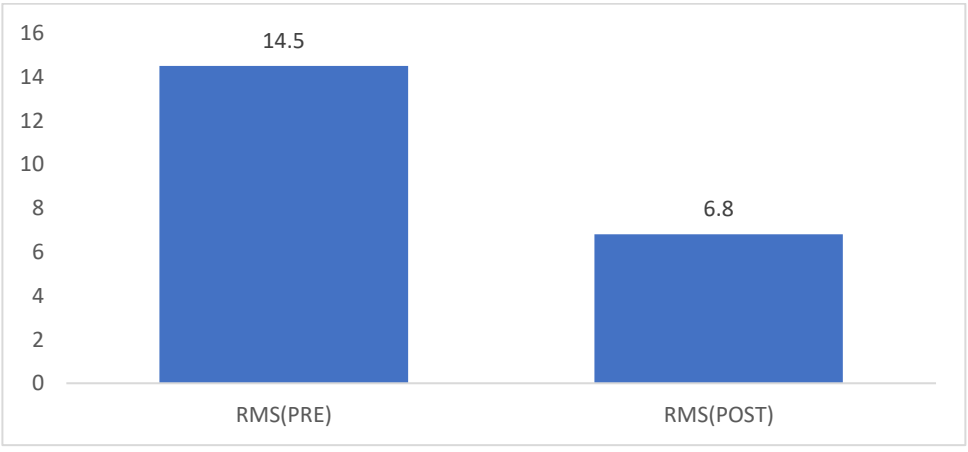
	NPRS	n	MEAN	SD	VARIANCE
GROUP A	PRE NPRS	50	5.52	1.313042891	1.724081633
	POST NPRS	50	2.58	1.162158442	1.350612245



"Graph 1: Mean value of Pre & Post NPRS of Group A

Table 2: Mean & SD for Group A Pre & Post RMS

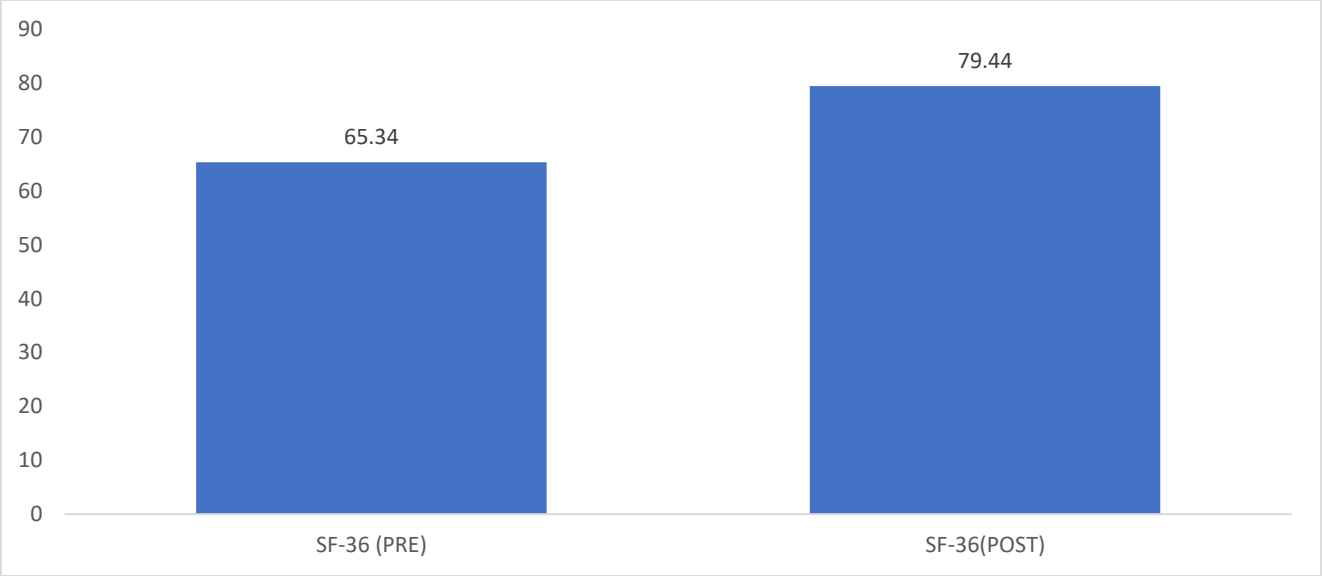
	RMS	n	MEAN	SD	VARIANCE
GROUP A	PRE RMS	50	14.5	1.96136146	2.36734694
	POST RMS	50	6.8	1.538618516	2.367346939



Graph 2: Mean value of Pre & Post RMS of Group A

Table 3: Mean & SD for Group A Pre & Post SF-36

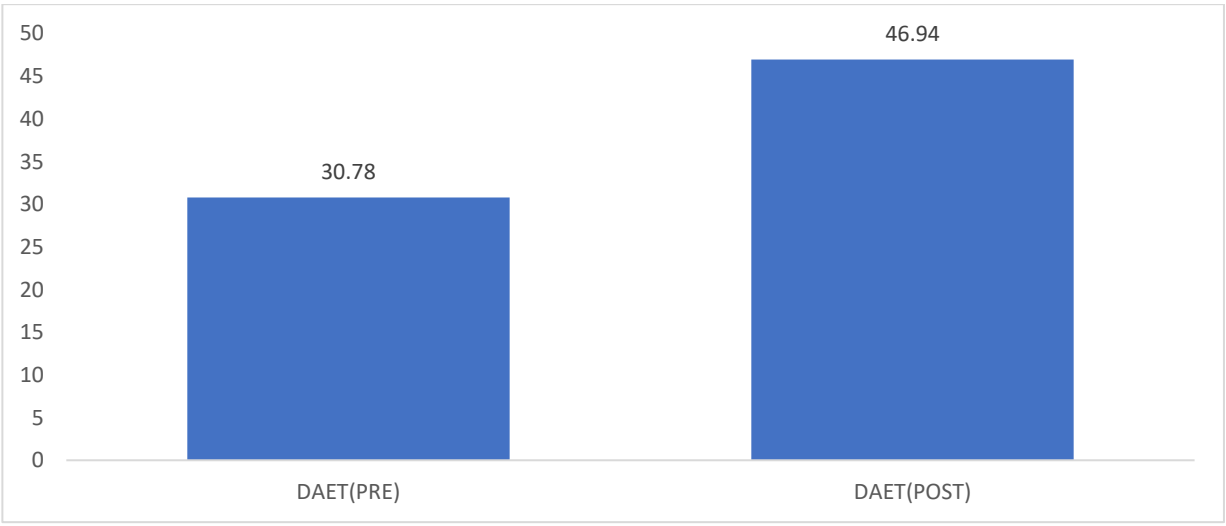
	SF-36	n	MEAN	SD	VARIANCE
GROUP A	PRE SF-36	50	65.34	8.297061196	68.84122449
	POST SF-36	50	79.44	7.404245886	54.82285714



Graph 3: Mean value of Pre & Post SF-36 of Group A

Table 4: Mean & SD for Group A Pre & Post DAET

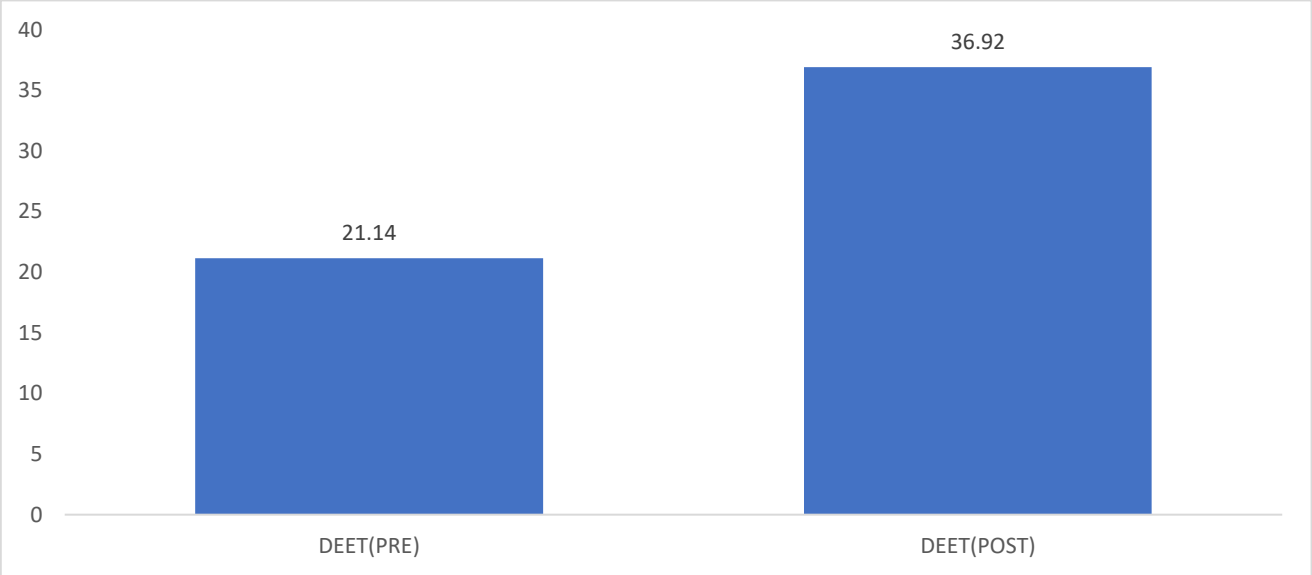
	DAET	n	MEAN	SD	VARIANCE
GROUP A	PRE DAET	50	30.78	3.955311593	15.6444898
	POST DAET	50	46.94	2.419394426	5.853469388



Graph 4: Mean value of Pre & Post DAET of Group A

Table 5: Mean & SD for Group A Pre & Post DEET

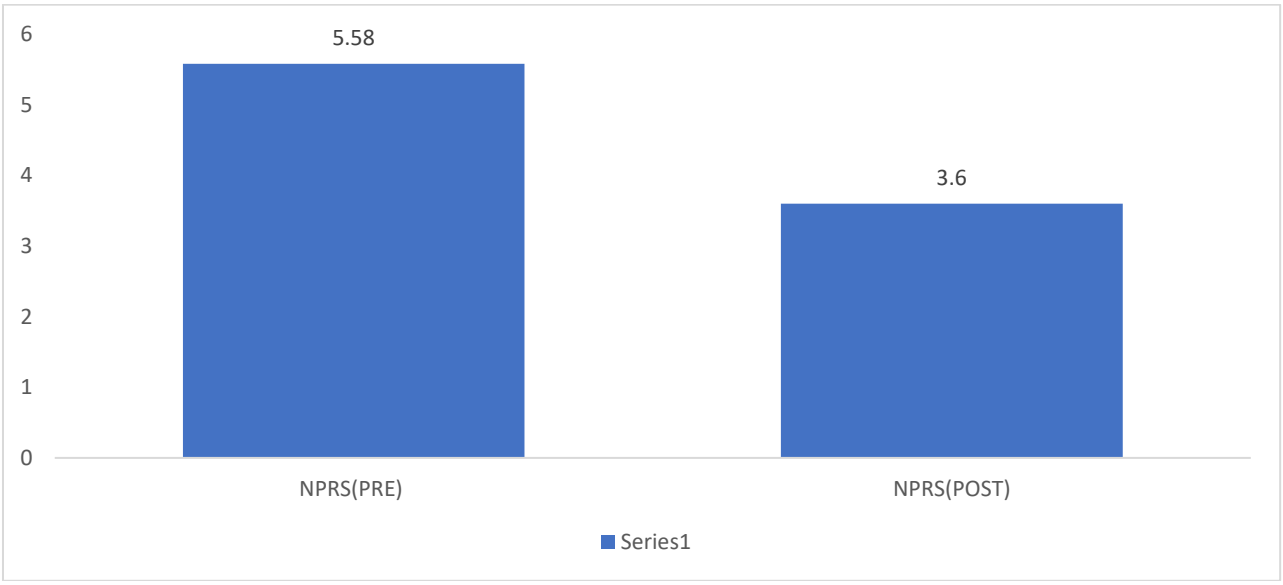
	DEET	n	MEAN	SD	VARIANCE
GROUP A	PRE DEET	50	21.14	2.213225553	4.898367347
	POST DEET	50	36.92	1.81647787	3.29959184



Graph 5: Mean value of Pre & Post DEET of Group A

Table 6: Mean & SD for Group B Pre & Post NPRS

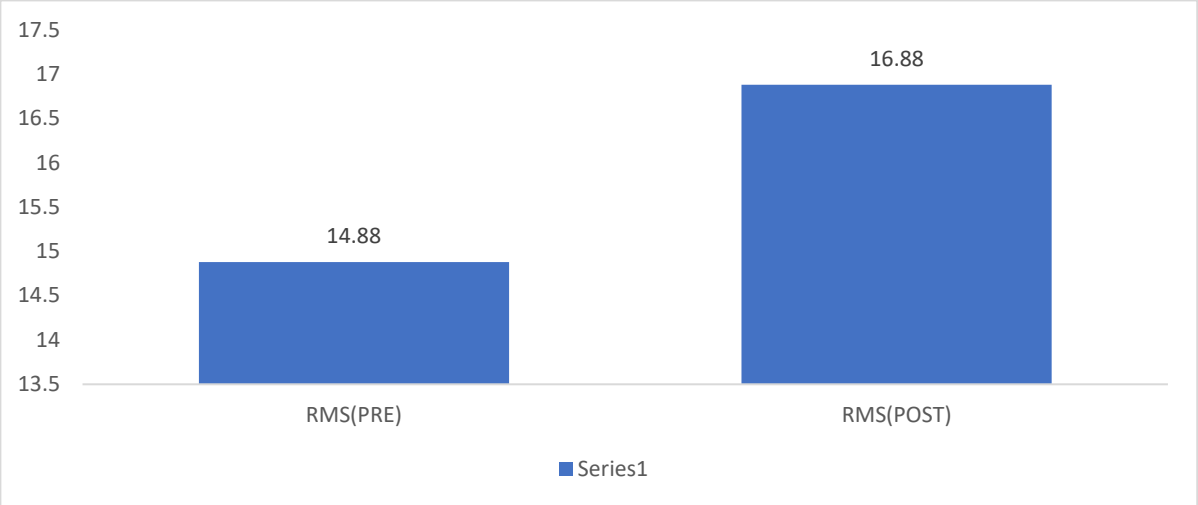
	NPRS	n	MEAN	SD	VARIANCE
GROUP B	PRE NPRS	50	5.58	1.341488664	1.799591837
	POST NPRS	50	3.6	1.22890361	3.822040816



Graph 6: Mean value of Pre & Post NPRS of Group B

Table 7: Mean & SD for Group B Pre & Post RMS

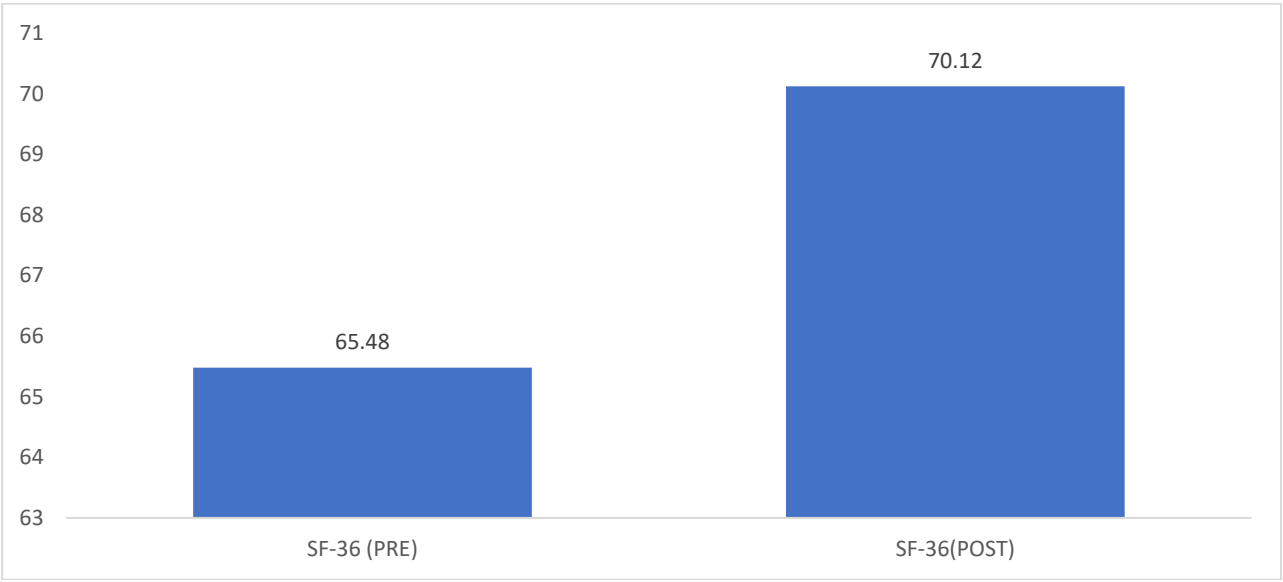
	RMS	n	MEAN	SD	VARIANCE
GROUP B	PRE RMS	50	14.88	1.955004045	3.822040816
	POST RMS	50	16.88	1.685956399	2.84244898



Graph 7: Mean value of Pre & Post RMS of Group B

Table 8: Mean & SD for Group B Pre & Post SF-36

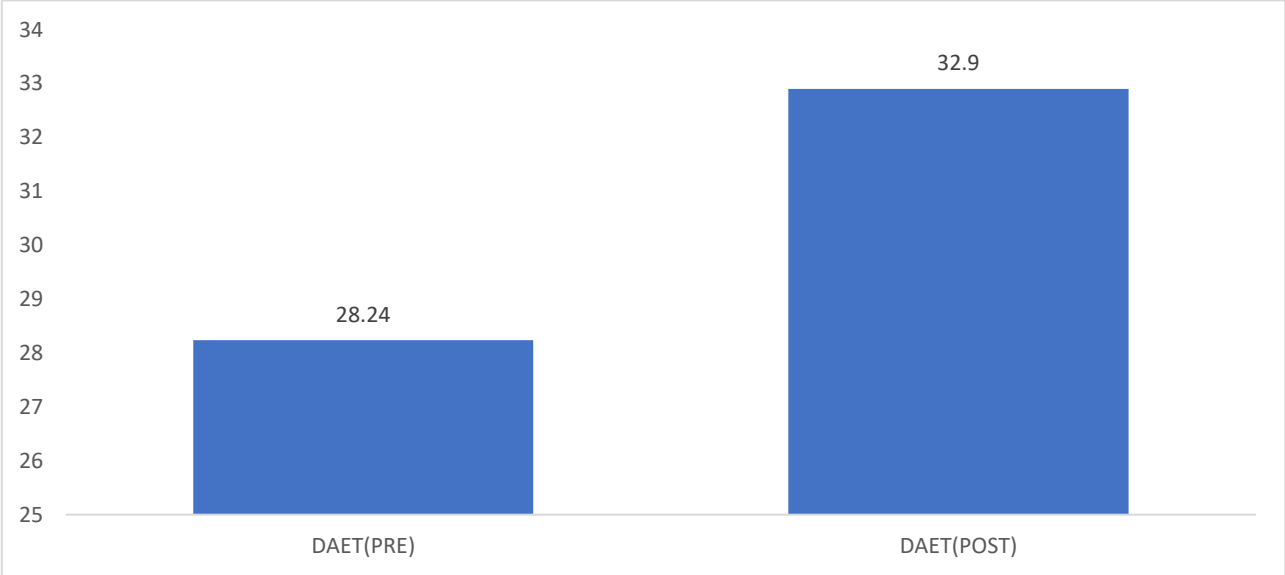
	SF-36	n	MEAN	SD	VARIANCE
GROUP B	PRE SF-36	50	65.48	8.008261041	64.1322449
	POST SF-36	50	70.12	8.16073226	66.597551



Graph 8: Mean value of Pre & Post SF-36 of Group B

Table 9: Mean & Standard Deviation for Group B Pre & Post DAET

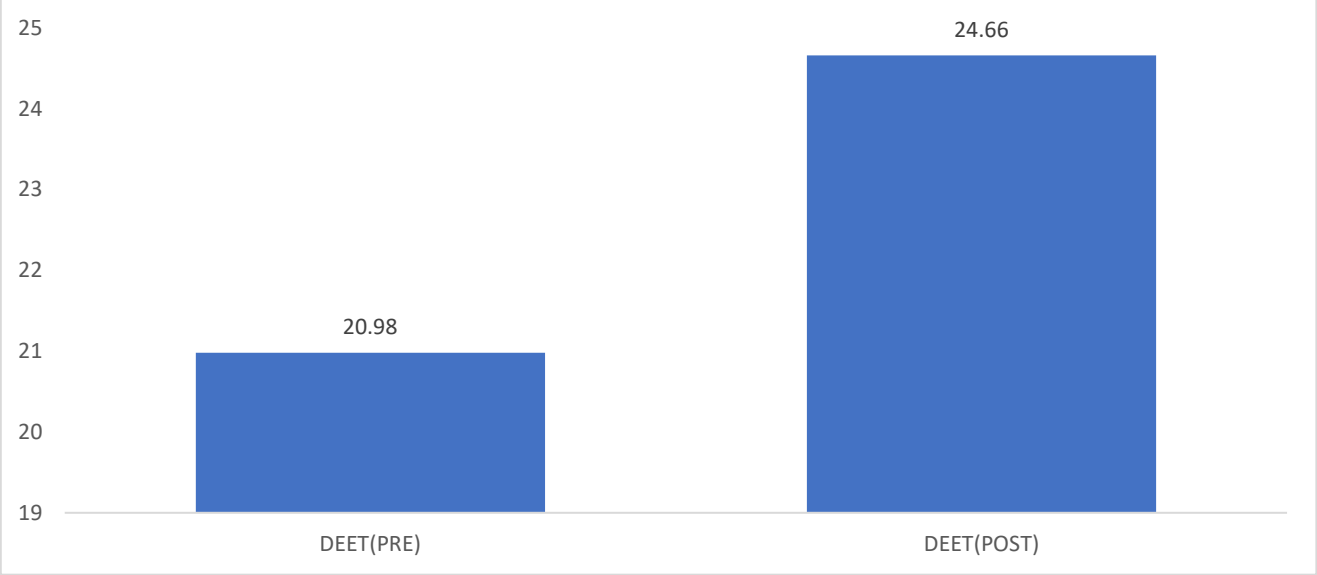
	DAET	n	MEAN	SD	VARIANCE
GROUP B	PRE DAET	50	28.24	4.063576388	16.51265306
	POST DAET	50	32.9	4.48694251	20.1326531



Graph 9: Mean value of Pre & Post DAET of Group B

Table 10: Mean & SD for Group B Pre & Post DEET

	DEET	n	MEAN	SD	VARIANCE
GROUP B	PRE DEET	50	20.98	2.5353823	6.4281633
	POST DEET	50	24.66	2.730104	7.453469



Graph 10: Mean value of Pre & Post DEET of Group B

Table 11: p-value of Post scores of NPRS, FMS, SF-36, DAET & DEET of Group A & B"

GROUP A & B	N	p-value
NPRS	50	4.624E-05
RMS	50	9.8479E-53
SF-36	50	3.623E-08
DAET	50	1.8369E-35
DEET	50	2.1589E-46

For this analysis, we used the SPSS program and the t-test (unpaired). No trial participant in Group A failed to finish all of their prescribed treatments. Furthermore, at each stage of the experiment, all patients were scheduled for follow-up sessions.

On the first day of therapy and again at the conclusion of the fourth week, assessments were carried out to record the outcomes for NPRS, RMS, SF-36, DAET, and DEET. Table 1 displays the mean and standard deviation (SD) of Group A's scores before and after the NPRS.

Table 2 also shows the mean and standard deviation of Group A's scores before and after the RMS. Table 3 shows the mean and standard deviation of the SF-36 scores before and after Group A. The mean and standard deviation for Group A's pre- and post-DAET scores are shown in Table 4 and Table 5, respectively.

Table 6 shows the mean and standard deviation of Group B's scores before and after the NPRS, and Table 7 shows the same data for Group B's scores before and after the RMS. Group B's mean and standard deviation before and after DAET administration are shown in Table 9, and in Table 8, the mean and standard deviation after SF-36 administration are shown in Table 8. Finally, Table 10 displays the mean and standard deviation values for Group B's pre- and post-DEET scores.

For the comparison of post-NPRS, RMS, SF-36, DAET, and DEET scores between Group A and Group B, the corresponding t-test values are 4.624E-05, 9.8479E-53, 3.623E-08, 1.8369E-35, and 2.1589E-46, respectively, as shown in Table 11. The results of the t-test show that Group A and Group B vary significantly with respect to their post-NPRS, RMS, SF-36, DAET, and DEET scores. Consequently, it can be inferred from these results that the targeted protocol interventions implemented in Group A (the experimental group) had a beneficial impact on NPRS, RMS, SF-36, DAET, and DEET scores in comparison to Group B.

DISCUSSION

As of yet, no research has proven that GPMSE is effective for lumbar PDVD. This study compared the effects of GPMSE vs traditional physiotherapy for treating lumbar PIVD. The patients receiving therapy had their NPRS, RMS, SF-36, DAET, & DEET scores recorded before the procedure & again following the end of the treatment. 1. Up until the conclusion of the fourth week, each patient had a single, 45-minute GPMSE therapy session. The study's findings show that, following the intervention, there was an important distinction in lumbar PVT complaints b/w the control & experimental groups. In instance, compared to the control group who received conventional physiotherapy, the experimental group that had GPMSE had significantly less lumbar PIVD symptoms. There were almost no adverse effects reported by the trial participants. Scores on the DAET and DEET assessments, as well as the NPRS and RMS, were collected on the last day of therapy. For NPRS, RMS, SF-36, DAET, and DEET, the difference between the pre- and post-test values was documented. We compared the two groups and determined their respective means and standard deviations for RMS, SF-36, DAET, and DEET before and after NPRS.

CONCLUSION

Finally the comparative report investigating the effects of Global Postural Muscle Strengthening Exercises (GPMSE) v.s. traditional physiotherapy on the Lumbar Prolapsed Intervertebral Disc (PIVD) in reducing disability and life quality is an interesting discussion of relevance to the management of this debilitating condition. Results indicate that GPMSE along with conventional physiotherapy are useful interventions that enhance the quality of life of people with the lumbar PIVD and reduce disability. Nevertheless, GPMSE seems to have some specific benefits to the long-term functional outcomes and to system increase in both spinal stability and functioning. A GPMSE can offer a more lasting relief and a more noticeable quality-of-life change than standard physiotherapy which is mainly aimed at symptom reduction by targeting underlying postural imbalances and muscle weakness. These outcomes carry far ramifications in terms of clinical practice by the health care professionals engaged in the treatment of lumbar PIVD. GPMSE is recommended as a major therapy to use on people with lumbar PIVD, especially those who have

gross postural defects and muscle weakness. There is still potentially a role of conventional physiotherapy in the treatment of acute symptoms and adjunctive care, but GPMSE is a treatment modality of choice in order to address the long-term functional outcomes and improve the quality of life.

SUMMARY

The study comparing the impact of Global Postural Muscle Strengthening Exercises (GPMS) versus conventional physiotherapy in Lumbar Prolapsed Intervertebral Disc (PIVD) for improving disability & quality of life sheds light on an important aspect of treatment efficacy in a prevalent musculoskeletal condition. Effective treatment techniques are necessary since Lumbar PIVD is a major source of disability and decreased quality of life for persons globally. In comparison to traditional physiotherapy, GPMS exercises may be more effective in controlling impairment caused by lumbar PIVD and improving quality of life. The goal of GPMS exercises is to strengthen the global postural muscles, which in turn improves lumbar stability, general posture, and muscular strength. It seems that this method provides clear benefits over traditional physiotherapy approaches when it comes to meeting the unique requirements of people with lumbar PIVD. Finding that GPMS exercises are useful in lowering disability due to lumbar PIVD is one of the study's main conclusions. By targeting postural muscles comprehensively, these exercises may contribute to better functional outcomes & reduced limitations in daily activities for affected individuals. Moreover, the observed improvements in quality of life suggest that GPMS exercises have a positive impact beyond symptom management, potentially enhancing overall well-being & psychological health. The comparison with conventional physiotherapy highlights the potential superiority of GPMS exercises in achieving therapeutic goals for lumbar PIVD patients. While conventional physiotherapy may focus on localized interventions or symptom relief, GPMS exercises offer a holistic approach by addressing underlying postural imbalances & strengthening core musculature. This difference in approach may explain the observed differences in outcomes b/w the two treatment modalities.

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