International Journal of Physical Education, Sports and Health 2025; 12(2): 394-398


**P-ISSN:** 2394-1685
**E-ISSN:** 2394-1693
Impact Factor (RJIF): 5.93
IJPESH 2025; 12(2): 394-398

https://www.kheljournal.com
Received: 18-01-2025
Accepted: 22-02-2025

**Dr. Riya**
Assistant Professor, Department of Orthopaedic Physiotherapy, Dr. APJ Abdul Kalam College of Physiotherapy, PIMS-DU, Loni, Maharashtra, India

**Dr. Mohit Kumar Chatterjee**
Assistant Professor, Department of Neuro-Physiotherapy, Dr. APJ Abdul Kalam College of Physiotherapy, PIMS-DU, Loni, Maharashtra, India

**Corresponding Author:**
**Dr. Riya**
Assistant Professor, Department of Orthopaedic Physiotherapy, Dr. APJ Abdul Kalam College of Physiotherapy, PIMS-DU, Loni, Maharashtra, India

# Effectiveness of nerve flossing and core muscles strengthening exercises in reducing back pain and disability in low back pain: A comparative study

**Riya and Mohit Kumar Chatterjee**

**Abstract**
**Introduction:** Low back pain is considered as one of the commonest problems, in which pain is felt in the lumbo-sacral spinal and para-spinal regions which encompass the buttocks and upper thigh. It is one of the most common medical problems that lead to absence from work, the disability arising from pain resulting in significant economic impact. Benefit of nerve flossing and core training exercises that facilitates spinal stability and balance have often been emphasized by researchers to develop strength, endurance, flexibility, and neuromuscular control as a cost effective and enjoyable way to prevent lower back pain and injury.
**Methodology:** It is a comparative experimental study design. 30 subjects were taken ranging from 30 to 55 years of age according to the inclusion criteria and were then divided into two groups with 15 in each group.
**Results:** The data obtained from VAS and ODI scores for pre and post intervention were compared within the groups utilizing Paired sample t-test, the results imply that the interventions of both the group were effective in improving pain as in VAS scores and disability as in ODI scores. But when compared in between the groups utilizing independent sample t-test, the results revealed that there were no statistically significant differences in the scores of VAS, but there is statistically significant difference in the scores of ODI.
**Conclusion:** The result of this study revealed that nerve flossing along with core muscle strengthening exercises were more effective than core muscle strengthening exercises alone in improving pain and disability according to visual analogue scale and Oswestry disability index in non-specific low back pain patients.

**Keywords:** VAS, ODI, low back pain, nerve flossing, core muscle strengthening

## 1. Introduction
Low back pain is considered as one of the commonest problems, in which pain felt in the lumbo-sacral spinal and para-spinal regions which encompass the buttocks and upper thigh. Low back pain is one of the most common medical problems that lead to absence from work, the disability arising from pain resulting in significant economic impact. Low back pain can lead to activity restriction such as carrying objects, sitting or standing for a long time, twisting and squatting, which can result in participation limitation and functional disability [1]. Frequency of low back pain increases as age advances, and its prevalence in the elderly population of age 40 and older as high as 20 to 40%. On the other hand, the prevalence of low back pain is about 10 to 25% in the age group from the late teen to age 40. Low back pain in this age group is characterized by high incidence without any clear-cut diagnosis being specified [2].
Nerve flossing aims to examine the neural tension in nerves and mobilize those with neural tension by passive or active movements by using tensioning, sliding and single joint movement techniques and focused on restoring the ability of the nervous system to tolerate the typical compressive, friction, and tensile forces associated with daily and sport activities. With this method, tension was gently applied to the involved nerve root that caused mild pulling but no pain and a low amplitude repetitive movement was introduced in the direction of the sensed neural tension [3].

The core has been describing as a box with the abdominals in the front, paraspinal and gluteal in the back, diaphragm as the roof and pelvic floor and hip girdle musculature as the bottom. Particular attention has been paid to the core because it serves as a muscular corset that works as a unit to stabilize the body and spine, with and without limb movement [4]. Core stability is the ability of body to control the whole range of motion of a joint thereby not creating deformity, neurological deficits, or incapacitating pain. Core stability is the strengthening of the corset of muscles surrounding the back and abdomen [5]. Core strengthening has reached a wide spread in recent years, considering that several studies have observed in CLBP delayed or decreased activation of lumbar multifidi and transverses abdominus and loss of physiologic tonic activation of transversus abdominus during gait and extremity movement. Dysfunction of these muscles may determine loss of lumbar spine [6].

Benefit of nerve flossing and core strengthening exercises is that it facilitates spinal stability and balance, it has often been emphasized by researchers to develop strength, endurance, flexibility, and neuromuscular control. But the effects of both nerve flossing and core muscle strengthening exercise in low back pain is limited. Therefore, the purpose of this study was to identify the effects of neural flossing technique and core muscles strengthening exercises in reducing back pain and disability in patients with non-specific low back pain.

## 2. Methodology

**2.1 Study Design:** Comparative experimental study design

**2.2 Study setting:** Study was conducted at physiotherapy department of Dr. APJ Abdul Kalam College of Physiotherapy

**2.3 Sampling Method:** Random sampling (chit method)

**2.4 Sample size:** 30 subjects

**2.5 Inclusion Criteria**

- Both males and females with age 30-55years
- Low back pain for more than a month.
- Participants having radiating pain to the leg
- Back pain located below scapula and above the gluteal fold

**2.6 Exclusion criteria**

- Inflammatory disorders
- Past history of abdominal surgery
- Any other systemic illness or psychological disorder
- Any recent history of trauma, fall or injury to back

## 3. Procedure

The subjects were invited to participate in study. The study was explained to the subjects in details. Patients were placed into two groups either nerve flossing along with core strengthening exercises or only core muscle strengthening exercises.

Subjects were assessed through Performa and informed consent was taken. Pre intervention data was taken using VAS [7] (Visual analogue scale) and ODI [8] (Oswestry Disability Index) for pain and disability.

**Intervention was given for 3days a week for 4 weeks.**

**Group-A: Nerve flossing along with core muscle strengthening**

For Nerve flossing technique, it was performed actively with the participant sitting on a couch. The participant flexed the knee of the target lower extremity backwards beside the couch as far back as possible and flexed the neck at the same time, holding both the flexed knee and neck in this position for 5 sec. The participant in turn extended the neck and the knee of the target lower extremity, abducted and flexed the hip until pain was felt and did not push beyond that point. This extended position was equally maintained for 5 sec. This procedure was repeated for 15 times for 3 sets with an interval of 5 min between each set. As the nerve became less sensitive, the participant increased the stretching effect by dorsiflexing the ankle and extending the toes of the foot upward toward the shin.

Fig 1: Starting position - Patient flexing knee and neck

Fig 2: Ending position - Patient extending knee and neck

- For Core muscle strengthening, the participants were given the following exercises with rest time 2-3 min between the set of exercises

**Front Plank**

- **Starting position:** Subject assumes a front plank position with elbow under the shoulder and upper arm perpendicular to the ground.
- **Procedure:** Slowly lift the pelvic off the ground, supporting points will be on elbow and feet.

**Fig 3:** Patient performing front plank

**Side plank**

- **Starting position:** Subject assumes a side plank position with elbow under the shoulder and upper arm perpendicular to the ground.
- **Procedure:** Slowly lift the pelvic off the ground, supporting points will be elbow and feet.

**Fig 4:** Patient performing side plank

**Curl ups**

- **Starting position:** Supine lying position with hands at back of head.
- **Procedure:** Slowly curl your trunk, letting your shoulders and upper back lift off the ground. Return slowly to starting position.

**Fig 5:** Patient performing curl ups

**Back bridging**

- **Starting position:** Supine crook lying position with hands at the side of body, palms facing downwards.
- **Procedure:** Slowly raise the hips off the ground so that only forearms and heels are touching the ground

**Fig 6:** Patient performing bridging exercise

**Group-B: Core muscle strengthening exercises**

In this group only core muscle strengthening exercises were given and no nerve flossing was given along with it.

**Front Plank**

- **Starting position:** Subject assumes a front plank position with elbow under the shoulder and upper arm perpendicular to the ground.
- **Procedure:** Slowly lift the pelvic off the ground, supporting points will be on elbow and feet.

**2. Side plank**

- **Starting position:** Subject assumes a side plank position with elbow under the shoulder and upper arm perpendicular to the ground.
- **Procedure:** Slowly lift the pelvic off the ground, supporting points will be elbow and feet.

**3. Curl ups**

- **Starting position:** Supine lying position with hands at back of head.
- **Procedure:** Slowly curl your trunk, letting your shoulders and upper back lift off the ground. Return slowly to starting position.

**4. Back bridging**

- **Starting position:** Supine crook lying position with hands at the side of body, palms facing downwards.
- **Procedure:** Slowly raise the hips off the ground so that only forearms and heels are touching the ground.

Patients in both groups were re-assessed for pain and disability at the end of 4th week.

Subjects were given moist heat for 15 minutes prior to exercises.

Both groups were asked to perform core stability exercises for 6 repetitions for the 1st week and the repetitions were increased every week.

1st week-6 reps
2nd week-9 reps
3rd week-12 reps
4th week-15 reps

Hold for 5 seconds after every repetitions.

**5. Results**

Total 30 participants were included in this study and all were divided into two groups (15 each) and all went under 4 weeks of treatment session including Nerve flossing and core strengthening exercises.

- **Within group comparison:** The data obtained from VAS and ODI scores for pre and post intervention were compared within the groups utilizing Paired sample t-test. The results of paired sample t-test imply that the interventions of both the group were effective in improving pain as in VAS scores ($p$<0.01) and disability as in ODI scores ($p$<0.01).
- **Between group comparison:** The comparison of the collected data between the groups was done utilizing independent sample t-test. The post comparison results revealed that there were no statistically significant differences in the scores of VAS ($p$>0.05), but there is statistically significant difference in the scores of ODI between the groups ($p$<0.01).

**Table 1:** Between group comparision of VAS scores

| Unpaired t-test | VAS | | | |
|---|---|---|---|---|
| | PRE | | POST | |
| | Group A | Group B | Group A | Group B |
| Mean | 4.53 | 4.20 | 2.80 | 3.33 |
| S.D. | 1.060 | 1.207 | 1.014 | 1.291 |
| Number | 15 | 15 | 15 | 15 |
| Maximum | 6 | 6 | 5 | 5 |
| Minimum | 3 | 2 | 2 | 1 |
| Range | 3 | 4 | 3 | 4 |
| Mean Difference | 0.33 | | 0.53 | |
| Unpaired T Test | 0.804 | | 1.258 | |
| P value | 0.4284 | | 0.2187 | |
| Table value at 0.05 | 2.05 | | 2.05 | |
| Result | Not-significant | | Not-significant | |

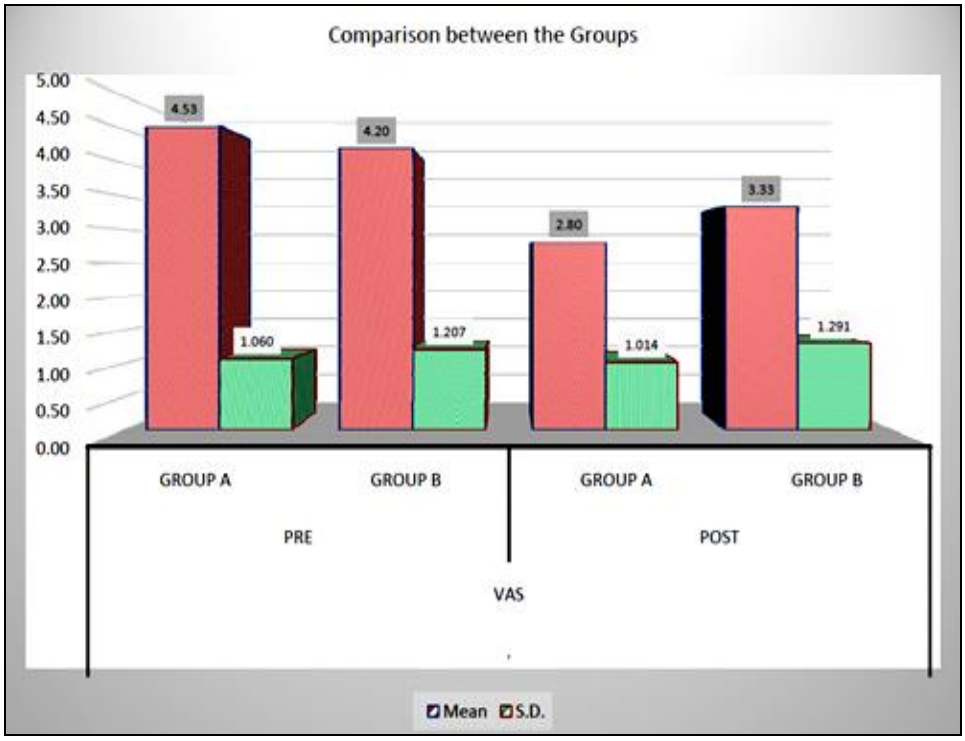


**Fig 7:** Graphical representation of pre and post intervention for both group A and B using visual analogue scale

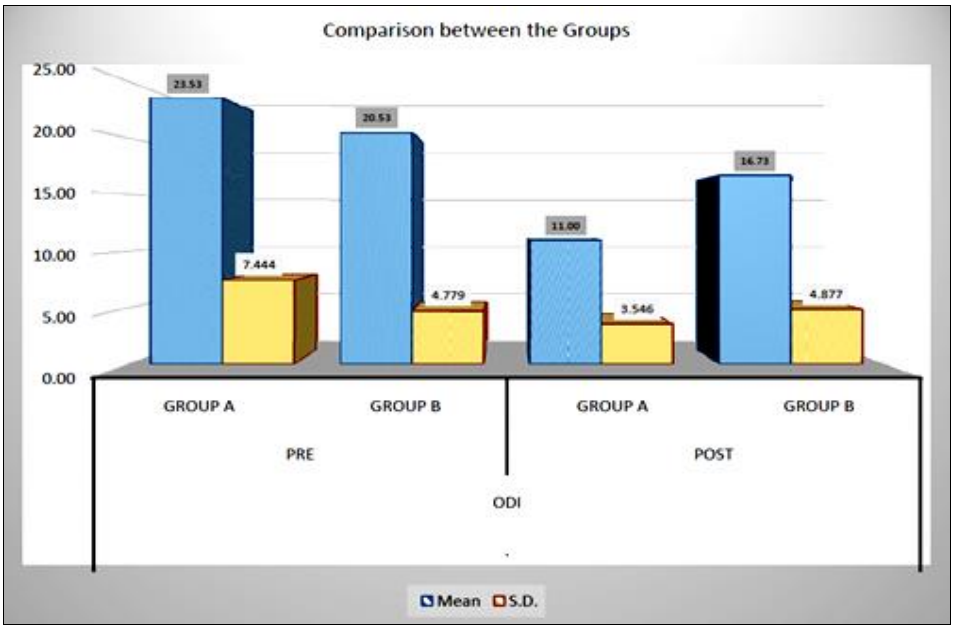


**fig 8:** graphical representation of pre and post intervention for both group a and b using Oswestry Disability Index

**Table 2:** Between group comparision of ODI scores

| Unpaired T-Test | ODI | | | |
|---|---|---|---|---|
| | PRE | | POST | |
| | Group A | Group B | Group A | Group B |
| Mean | 23.53 | 20.53 | 11.00 | 16.73 |
| S.D. | 7.444 | 4.779 | 3.546 | 4.877 |
| Number | 15 | 15 | 15 | 15 |
| Maximum | 40 | 29 | 18 | 25 |
| Minimum | 12 | 12 | 3 | 8 |
| Range | 28 | 17 | 15 | 17 |
| Mean Difference | 3.00 | | 5.73 | |
| Unpaired T-Test | 1.314 | | 3.683 | |
| P value | 0.1997 | | 0.0010 | |
| Table value at 0.05 | 2.05 | | 2.05 | |
| Result | Not-significant | | Significant | |

## 6. Discussion

The present study was done to compare the effects of nerve flossing along with core strengthening exercises and core strengthening alone in reducing pain and disability in low back pain patients. This study was a comparative study between two groups. The current study comprised of 30 subjects that were divided into 2 groups. Each group was given a session for 1 hour for 3 days a week. This study has been conducted for 4 weeks. The data was collected before and after intervention using VAS (visual analogue scale) and ODI (Oswestry disability index).

The result of the present study when compared on the basis of VAS and ODI showed that both Group A and Group B shown significant improvement within the group but when compared between groups, Group A has shown more improvement.

When calculated between the groups there was improvement for VAS between GROUP A and GROUP B where mean difference was 0.33±0.53, but it was not statistically significant. But there was statistically significant improvement for ODI between group A and group B where mean difference was 3.00±5.73. There was more improvement in nerve flossing along with core muscle strengthening group as compared to core muscle strengthening group only, which may be due to restoration of neural physiology following NFT which causes a dynamic variation in neural pressure (by stretching at one end and relaxing at the other end), hence leading to evacuation of intraneural oedema which might be present in acute sciatica [9, 10] And also the disability was reduced, thereby signifying an improvement in the condition of the patients. This result agrees with the findings of some previous studies where Motor control plays a critical role in stabilizing the spinal system [11]. Maintaining lumbar spinal stability involves three interactive systems: the passive support system, which relies on the ligaments and fascia's of skeletal muscles; the active contraction system, in which lumbar spinal movement and stability are maintained by contracting the core muscles; and the central nervous system, which plays a leading role in motor control [12]. The central nervous system can respond to sensations produced in the active and passive systems by using the central nerves to control motor coordination [11, 13]. The central nervous system governs physical actions, and prevents interference in order to maintain spinal stability and lumbar spinal movement [14].

Thus, from the results of the present study it is clear that nerve flossing and core strengthening exercises are efficiently effective individually but nerve flossing technique along with core strengthening exercises shown more reduction in pain and disability in individuals in low back pain.

## 7. Conclusion

The result of this study revealed that nerve flossing technique along with core muscle strengthening exercises were more effective than core muscle strengthening exercises alone in improving pain and disability according to visual analogue scale and Oswestry disability index in low back pain patients

## 8. Limitation of this study

- The sample size was small according to this research so more accurate result was not found.
- Some subjects were overweight so they were not able to perform exercise effectively.
- Some patients face difficulty in performing side planks.

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