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Effect of Core Strengthening and Posture Correction Exercises with Stretching on Sciatic Nerve Root Compression

Nishitha, Prathap Suganthirababu, Vinodhkumar Ramalingam, Vignesh Srinivasan, Kumaresan Abathsagayam, Jagatheesan Alagesan

Saveetha College of physiotherapy, Saveetha Institute of Medical and Technical Sciences, Chennai, India

Email: prathap.scpt@saveetha.com

Abstract

Background: Sciatica is a common source of pain and discomfort that lasts longer and is more severe than lower back pain. Between 13 and 40% of people are thought to be affected by this condition at some point in their lives. It usually deteriorates because of bad posture. Sciatica has the potential to become chronic and intractable, with serious socioeconomic consequences.
Objective: To ascertain the impact of core strengthening and posture correction exercises with stretching on sciatic nerve root compression.
Methodology: Thirty-two sciatica patients were selected using inclusion and exclusion criteria. They were split into two groups randomly: conventional (n = 16) and experimental (n = 16). Core strengthening exercises along with TENS were given to the conventional group, whereas posture correction exercises with stretching along with TENS were given to the experimental group. All the interventions were performed 5 times a week for 6 weeks, with 2 sets of 10 reps. As an outcome measure, the Oswestry disability index was utilized to assess each subject's level of pain and disability.
Results: The mean and SD value of core strengthening at the pre-test was 50.63 and 6.18 and for the post-test was 34.00 and 4.32. As for posture correction exercises with stretching, the mean and SD value of pre-test was 50.75±5.16 and the post-test was 21.88± 3.76, respectively.
Conclusions: The study concludes that the posture correction with stretching activities was found to be more beneficial than core strengthening in reducing sciatic pain and disability.

Keywords

Sciatica, Core strengthening, postural correction exercises, stretching

Introduction

Sciatica is an enervating condition where the patient experiences pain that radiates from the lower back and throughout the limb. Sciatica strikes 12.2% to 43% of people at some point in their existence, with the prevalence varying from 2.2 to 34.2% per year and the estimated point prevalence rate ranging from 1.6% to 13.4% (Konstantinou et al., 2008). As a result, sciatica can have a significant impact on the lives of active people, especially since it primarily affects people between the ages of 30 and 50, on a community scale, sciatica imposes a significant financial burden, owing to the sickness leading to absence and medical fees (Gadjradj et al., 2022).

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A throbbing, stabbing, or searing pain is defined as sciatic pain, and the most common symptoms include mild to severe radiating pain in the lower back, buttocks, and legs; numbness or weakness along a nerve's course; movement-induced pain; loss of mobility; constipation; and urinary incontinence, along with a "pins and needles" feeling that might be felt in the legs, toes, or feet (Ropper et al. 2015). The spinal pathologies causing compression of the sciatic nerve at its roots are lumbar disc herniation, lumbar spinal stenosis, lumbar disc degeneration, and spondylolisthesis (Kumar et al., 2011).

Therefore, sciatica is triggered only by inflammation of the region or compression of the lumbosacral nerve roots (L4-S1), which constitute the sciatic nerve. The risk factors that are reported to cause sciatica are: height (Wahlstrom et al., 2012), physical workload with budgetary situation (Kaila-Kangas et al., 2006), smoking (Kaila-Kangas et al., 2003), distress symptoms (Shiri et al., 2007), and obesity/overweight (Shiri et al., 2014; Rivinoja et al., 2011). Work that requires a lot of physical exertion is a big risk factor for sciatica. Men appear to be protected from sciatica by recreational physical exercise, whereas obesity is a risk factor for women (Euro et al., 2018).

Core strengthening tends to be a popular method of rehabilitation. Muscle control is required around the specific location in order to maintain the functional stability that was achieved through core training. It aids in the body's stabilization and equilibrium. A posture is generally defined as the relative arrangement of the bodily parts in terms of the tangible posture. TENS (transcutaneous electrical nerve stimulation) is a recognized management option for persistent pain. TENS works on the basis of the Gate Control Theory of Pain (Vance et al., 2014). Stretching is routinely performed prior to a session to increase performance and reduce the risk of injury. For mechanical and neurological reasons, stretching stimulates muscles and soft tissues to lengthen.

The Lasegue test, popularly known as the straight leg lift test, is a fundamental neurological procedure used to diagnose sciatic dysfunction owing to lumbosacral nerve root irritation during a physical assessment of a patient with backache (Pesonen et al., 2021). The most extensively used outcome-measure questionnaire for low back pain is the Oswestry Disability Index (ODI). It is a self-administered ten-section questionnaire that assesses limitations on various daily chores. The focus of this research is to figure out which exercises are the most effective for treating sciatica, which has become one of the most common conditions as a result of pathologies, poor posture, and repetitive activities. It has an impact on an individual's balance and daily activities as it becomes a more common medical condition. We expect that by doing this study, we will be able to develop an appropriate treatment for sciatic nerve root compression and restore the functional capacities of the affected area.

Methodology

This experimental study included 32 participants who had sciatica. A straight-leg test was conducted to validate the condition, and the result should be affirmative. With both the genders, age group-ranging from 25 to 55 years were separated into two groups, excluding the participants who had been diagnosed with non-spinal-related or soft tissue problems potentially associated with sciatica, pregnancy, spinal tumors, rheumatoid arthritis, a history of spinal operations, or non-cooperative patients, with each of 16 members: the conventional group and the experimental group. The core strengthening along with TENS was offered to the

conventional group, and the exercises were Pelvic Bridging, Abdominal Curl-Up, Prone Cobra, and Opposite Quadrupled Arm or Leg (Akuthota et al., 2004). Postural correction with stretching exercises along with TENS was offered to the experimental group, and the exercises included postural education with exercises like the reverse high five, chest openers, and wall sits, along with stretching exercises (i.e., hamstring, calf, and sitting spinal stretch). TENS was given at a frequency of 2 Hz with a pulse duration of 0.2 ms to the patients (Hashmi et al., 2015) for the duration of 10 minutes. Each exercise should be performed five times per week for two sets of 10 reps, and that should be tracked for six weeks.

When the SLR elicits discomfort between 30 and 70 degrees of hip flexion in the sciatic nerve tract and beneath the knee, it is deemed positive (Ropper et al., 2015). Oswestry disability index (ODI) was a self-administered ten-section questionnaire that assesses limitations on various daily chores, roughly takes 1 minute to rate and 3.5–5 minutes to complete (Mehra et al., 2008). Each question is worth a maximum of 5 points, with the first response receiving 0, the second receiving 1, etc.

Table 1: Showing the demographic data of the participants.

Analysis	Average	Total
Age	25-40	15
	41-55	17
Gender	Male	21
	Female	11

To compile and assess the collected data, descriptive and inferential statistics were used. All parameters were averaged and subjected to mean and standard deviation. A paired t-test was conducted to ascertain whether there were any significant variations between pre-and post-test measurements, and an unpaired t-test was conducted to determine whether there was a significant difference between the two groups. A *p*-value of 0.0001 was utilized as the statistically significant cut-off.

Result

After statistical analysis of the quantitative data, it was found that there were statistically significant disparities between the values of the two groups.

Table 2: Comparison of pre and post-test values of the conventional group.

Outcome	Core-strengthening	Mean	SD	T-value	P-value
ODI	Pre-test	50.63	6.18	10.9055	<0.0001
	Post-test	34.00	4.32		

Table 2 contrasts the conventional group's pre-and post-test values using ODI; the pre-test value was 50.63, whereas the post-test value was 34.00. With a p-value of 0.0001, the results were extremely statistically significant.

Table 3: Comparison of pre and post-test values of the experimental group.

Outcome	Posture correction with stretching	Mean	SD	T-value	P-value
ODI	Pre-test	50.75	5.16	35.3922	<0.0001
	Post-test	21.88	3.76		

Table 3 contrasts the experimental group's pre-and post-test values using the ODI; the pre-test value was 50.75, while the post-test value was 21.88. With a p-value of 0.0001, the results were extremely statistically significant.

Table 4: Comparison of post-test values of the conventional and experimental groups.

Outcome	Post-test	Mean	SD	T-value	P-value
ODI	Conventional	34.00	4.32	8.4706	<0.0001
	Experimental	21.88	3.76		

The post-test outcomes for the conventional and experimental groups are contrasted in Table 4. The post-test result for the conventional group was 34.00 whereas the experimental group's post-test value was 21.88. As a result, it is considered extremely statistically significant with a *p*-value of 0.0001.

Discussion

The goal of the study was to explore if stretching exercises combined with posture correction or core strengthening exercises could help those with sciatica feel better. This contrast was illustrated over the course of six weeks. In the conventional group, the mean pre-test values of ODI were 50.63, which was decreased to 34.00 as a post-test value, which was taken after the administration of core-strengthening exercises along with TENS, while in the experimental group, the mean pre-test values of ODI were 50.75, which was reduced to 21.88 as a post-test value after the administration of posture correction with stretching along with TENS, indicating that both groups experienced significant pain and disability reductions. According to convenient criteria, this difference is statistically significant. This means that the mean value of the experimental group was lower than that of the control group.

Sciatica has been the subject of several studies, as it has become a prominent issue today. Farahpour and Esfahani determined in 2008 that the therapeutic exercise programme effectively improved CLBP patients' postural orientation, and because of the exercise therapy, the patients' pain and impairment were significantly reduced. By keeping the muscles and skeleton in balance, proper posture relieves strain on the human body (Kim et al., 2015). According to a 2010 University of Ottawa report, the most prevalent health concern associated with poor posture is back pain, which impacts more than 70% of Americans (Wang 2016).

Based on this data, we urge that posture modification be included on a regular basis in therapeutic exercise regimens. Most physiotherapists, as reported by O'Sullivan et al., 2012, believe that maintaining a good seated spinal posture is crucial in the rehabilitation of LBP. It

has been demonstrated that physiotherapy plays a key role in improving sciatica sufferers' overall standard of living. Combined with medical intervention, it is more effective than medical intervention alone (Mehreen et al., 2019). The study on the normal progression of disc morphology in sciatica patients was carried out by Jensen et al., (2006) and included 154 patients (70 women and 84 men, ages 18 to 65). It concluded that men were more likely than women to improve, according to their analysis of two active, conservative therapy protocols lasting for 8 weeks with 14 months of follow-up. 32 individuals were enrolled in this research (21 men and 11 women, ages 25 to 55) and underwent two separate sets of exercises over the course of six weeks. Additionally, it also highlights the fact that men improved more than women did.

Although spinal stenosis is an additional possibility, herniated of disc with spinal nerve compression is the most likely cause of sciatica (Koes et al., 2007). Ageing has also been shown to reduce the frequency of disc herniation (Ma et al., 2013), and the most common age group for sciatica caused by disc herniation is 35–45. The sciatica incidence in older patients is more than twice as high as it is in younger patients with foramen stenosis (Mostofi et al., 2020). Depending on the underlying cause and the severity of the condition, the improvement based on age is apparent.

Bello B, Danazumi and Kaka (2019) determined that there was no variation in disability or pain reduction between the two manual treatment modalities for LDHR care, lumbar stabilization, and stretching. During the eight-week experiment, which took place twice a week for ten minutes, the only topics given were plantar stretching, calf stretching, and hamstring stretching.

In this study, stretching was administered 5 times per week as 10 reps for 2 sets for a total of 6 weeks, and it provided effective relief from muscle stiffness. Postural correction not only reduces low back pain but also helps to minimize low back discomfort and headaches are lessened, resulting in increased amounts of energy, less stress in your shoulders and neck, and a reduced likelihood of aberrant joint surface wear. It also increases lung capacity and improves circulation and digestion.

Conclusion

As a result of the findings, it has been proven that posture correction exercises with stretching activities are more effective than core strengthening. That is, in sciatica, though the core strengthening exercises had a good outcome in reducing pain and disability, posture correction plays a significant role in preventing and relieving pain and disability, and stretching also aids in pain relief.

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