

# Combined Effect of Sling Exercise Training and Fascia Therapy on Neck Pain, ROM and Quality of Life in Students Undergoing Long Distance Travel

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## ABSTRACT

**Background:** One common musculoskeletal condition that interferes with people's daily lives is neck pain. Between 42% and 67% of young adults are impacted. Chronic neck pain can limit range of motion and functional ability by causing muscle spasms and fatigue. Studies show that students who frequently travel long distances are particularly vulnerable to neck pain. Ergonomic issues such as repeated motions, exposure to stress and vibration, poor posture, and intensive physical activity are some of the causes of this illness. Individual factors that also play a part include age, body mass index, genetics, and a history of musculoskeletal pain. The sling exercise treatment is an exercise program or treatment approach that uses a sling and other accessory instruments to induce passive or active treatment, improving physical abnormalities, sensory-motor control, muscle strength, and muscular endurance. By applying little pressure to connective tissues, the Danis Bois method of fascia therapy helps to enhance side bending and cervical extension. The most used questionnaire for evaluating neck discomfort is the Neck Disability Index (NDI). It is a useful tool for people with neck pain because it includes ten questions about pain, lifting, and different activities of daily living (ADLs). This study examines the combined effect of sling exercise training and fascia therapy in reducing neck pain among students who travel long distances by bus.

**Materials and Methods:** The study was designed as an experimental investigation carried out in a tertiary care hospital in Puducherry. The study population consisted of students with neck pain based on selection criteria. Fifty eligible participants gave written informed consent and were randomized into two groups (n=25 each). Both groups received conventional therapy, which included hot packs, isometric neck exercises, and trapezius stretching; Group A also received sling exercise training and fascia therapy. The results were evaluated using the Neck Disability Index and craniovertebral angle.

**Results:** Group A (sling exercise training and fascia therapy combined with conventional exercise) significantly reduced pain, improved posture, and increased functional activity more than group B (conventional therapy and hot pack) for traveling students with neck pain, according to the current study.

**Keywords:** Neck pain, travel, sling exercise treatment, fascia therapy, Neck Disability Index (NDI).

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## INTRODUCTION

Neck pain is a common musculoskeletal disorder that affects people's daily lives. Approximately 42% to 67% of young adults are affected. Most people have experienced it at some point in their lives, making it quite common among the general population. It is a condition that has many risk factors in the general population. Muscle spasms and exhaustion can result from chronic neck pain, which can restrict range of motion and functional ability. According to studies, students who travel vast distances on a daily basis are especially prone to neck pain. According to one survey, 64% of RIMT University students report having neck pain as a result of regular bus riding. Long bus rides are a major contributor to neck pain in young adults.<sup>1</sup>

There are several causes for this condition, including ergonomic factors like repetitive motions, force and vibration exposure, poor posture, and intense physical activity. Age, body mass index, heredity, and a history of musculoskeletal pain are examples of individual characteristics that also have a role. Its growth is also influenced by psychosocial factors including work satisfaction, stress, anxiety, and depression, as well as behavioural elements like smoking and physical activity levels.<sup>2</sup> Students who use laptops, desktop computers, iPads, and cellphones run the risk of developing neck pain.<sup>3</sup> Long-term stress, anxiety, and depression are examples of psychological risk factors that significantly contribute to neck pain.<sup>4</sup>

The sling exercise is a specific form of exercise established by Meier to rehabilitate professional German athletes and later developed by Kirkesola to treat motor problems.<sup>5</sup> The sling exercise treatment is an exercise program or treatment approach that uses a sling and other accessory instruments to induce passive or active treatment, improving physical abnormalities, sensory-motor control, muscle strength, and muscular endurance. This helps reduce neck pain.<sup>6</sup>

The Danis Bois method of fascia therapy is a technique in which gentle pressure is applied to connective tissues, helping to improve cervical extension and side bending. It is a non-manipulative technique in which soft and deep pressure is targeted at the connective tissue or fascia of the body.<sup>7</sup> Conventional therapy, such as electrotherapy and isometric exercise training, is commonly used for neck pain management.<sup>8</sup> Isometric neck exercises help strengthen weak muscles without stimulating pain over sensitive tissue. Since these exercises are inexpensive and easy to perform, patients are more likely to adhere to the treatment.<sup>9</sup>

The Neck Disability Index (NDI) is the most commonly used questionnaire for assessing neck pain. It consists of 10 questions related to pain, lifting, and various activities of daily living (ADLs), making it a meaningful tool for individuals suffering from neck pain.<sup>10</sup> Forward head posture (FHP) is the most common cervical postural fault which may cause neck pain with different severity in almost all population.<sup>11</sup> For assessing craniocervical angle using modified universal goniometer is proved reliable<sup>12</sup> Therefore, this study examines the combined effect of sling exercise training and fascia therapy in reducing neck pain among students who travel long distances by bus.

#### NEED OF THE STUDY

Many students who travel long distances regularly experience neck pain due to prolonged sitting, slouched and forward head posture. They often suffer from chronic neck pain which restricts their neck range of motion (ROM), thus adversely affecting their productivity, well-being and overall quality of life.

#### AIM OF THE STUDY

The aim of the study is to find out the effect of sling exercise therapy and fascia therapy among student who suffers with neck pain who travels for long distance on daily basis for more than 1 hour.

#### MATERIALS AND METHODS

The study was designed as an experimental investigation conducted in a tertiary care hospital at Puducherry. The study population included students with neck pain based on selection criteria. A total of 50 subjects were included in the study with a duration spanning three months. Data collection focused both male and female subjects with forward head posture. Primary tools were utilized for assessment: Neck disability index, goniometer, craniocervical angle.

#### SELECTION CRITERIA

The inclusion criteria for the present study were: Participants must be college bus students, both male and female, within the age group of 18 to 25 years. They should be individuals who travel for more than one hour daily on a regular basis. Additionally, only students exhibiting forward head posture will be considered eligible. Hostel students will not be included, nor will those whose daily travel time is less than 30 minutes. Students who commute using their own vehicles are excluded, as those experiencing severe neck pain or headaches. Individuals with a history of injury or congenital deformities will also be excluded from participation.

#### PROCEDURE

Fifty eligible participants provided written informed consent and were randomized into two groups (n=25 each). Both groups received conventional therapy—comprising hot packs, isometric neck exercises, and trapezius stretching—while Group A additionally received sling exercise training and fascia therapy. Outcomes were assessed using the Neck Disability Index and craniocervical angle.

#### SLING EXERCISE

In the present study, neck exercise was performed.

- To perform this exercise, the subjects were instructed with a demonstration and explanation, for the accurate exercise performance, the subjects were assisted in each session with the therapist. Each movement repeated 10 times, which was 6 to 7 seconds of contraction and 5 seconds of relaxation. There were 4 techniques of Neurac which performed for the cervical vertebral portion functional disorder<sup>18</sup>



IJDDT, Volume 16 Issue 56s, 2026

**Figure 1: Sling Exercise Therapy**

**The First Technique**

With the subject supine and head supported by an inelastic sling, the therapist applies gentle superior traction to the cervical spine and occiput while compressing the sternocleidomastoid muscles with the thumbs to minimize cervical lordosis (Figure 1&2).

**The Second Technique**

In the prone position with the forehead on an inelastic sling, the therapist applies superior cervical traction while compressing the posterior neck with the thumbs and the sternocleidomastoid muscles with the fingers, reducing cervical lordosis and slightly elevating the chin (Figure 3).



**Figure 2: sling exercise in supine**



**Figure 3: sling exercise in prone**

**The Third Technique**

With the patient supine and the head and upper extremities supported by elastic slings, maintain a reduced cervical lordosis during shoulder adduction-abduction exercises, relaxing the neck only upon completion (Figure 4).

**The Fourth Technique**

In the supine copperfield exercise, the patient is suspended via scapular, pelvic and ankle slings with air cushions under the head, lowering the bed facilitates natural closed chain cervical sensory integration training (Figure 5).



**IJDDT, Volume 16 Issue 56s, 2026**

**Figure 4: Sling Exercise with Upper Limb**



**Figure 5: Closed Chain Sling Exercise**

**FASCIA THERAPY**

**Dannis Bois Method fascia therapy**

Developed by Prof. Danis Bois, DBM Fascia Therapy is a non-manipulative technique that utilizes gentle pressure and stretching to enhance connective tissue elasticity and reduce neck pain<sup>7</sup>. The method integrates three core elements: somatic sensing, specialized therapist touch, and

specific patient movements. Complementary conventional treatment includes 10-minute hot packs, isometric neck exercises (10-second holds, 5–6 repetitions), and multi-planar stretching. A 10-sec hold, 5–6 reps) will be given. A total of 45 min sessions three times a week on alternate days for three weeks were given to these patients (Figure 6a & 6b).



Figure 6a



Figure 6b

**Figure 6a&6b: Fascia Therapy**

**Conventional Exercise:**

**Isometric Exercise: (Neck flexion, neck lateral flexion)**

Seated isometric neck flexion (forehead/chin resistance)

and lateral flexion (temporal resistance) are performed as three 10-second contractions, each followed by 5 seconds of relaxation (Figure 7a&b).



Figure 7a

Figure 7b

**Figure 7a&b: Isometric Neck Exercise**

**Neck Stretch**

**Upper Trapezius Stretch:**

With the patient seated, the therapist stabilizes the shoulder

downward and laterally flexes the head to the opposite side, holding the stretch for 10 seconds with 5 seconds of rest, repeated 3 times (Figure 8).



**Figure 8: Trapezius Stretch**

**STATISTICAL ANALYSIS**

**Between the group analysis of neck disability index and craniovertebral angle:**

**Table 1: Showing the mean difference of group, A&B: (unpaired t-test value)**

	MEAN	SD	't'-value	'p'-value
<b>GROUP A</b>	6.52	2.43	6.4086	<0.0001
<b>GROUP B</b>	3.36	1.19		

The t value of Neck Disability Index between the group is 6.4086 with 28 degree of freedom and consider extremely statistically significant ( $p < 0.0001$ ) (table 1).

**Table 2: Showing the mean difference of group, A&B: (unpaired t-test value)**

	MEAN	SD	't'-value	'p'-value
<b>GROUP A</b>	9.44	4.38	4.3205	<0.0001
<b>GROUP B</b>	5.32	1.61		

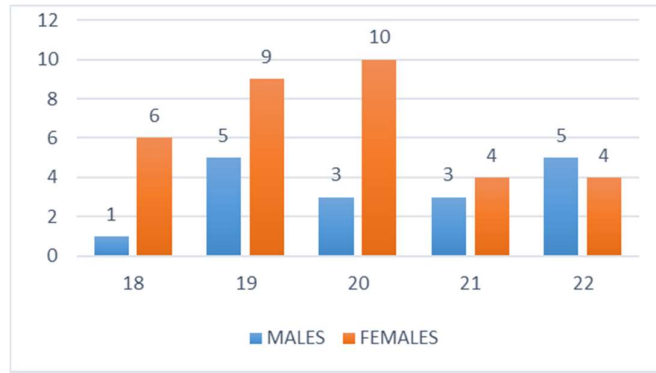
The t value of Craniovertebral Angle between the group is 4.3205 with 28 degree of freedom and considered extremely significant statistically ( $p < 0.0001$ ) (table 2).

two groups. The mean and standard deviation of the pre and post value of the neck disability index and craniovertebral angle are listed below after demographic data.

**RESULTS**

The statistical analysis of the study is done using web source.<sup>15</sup> A total of 50 subject were included in this study. The minimum age observed in this study was 19 and the maximum age observed in this study was 23 years in all Demographic data for both genders was given in graph 1.

**Demographic Data**



**Graph 1: Demographic data for both genders**

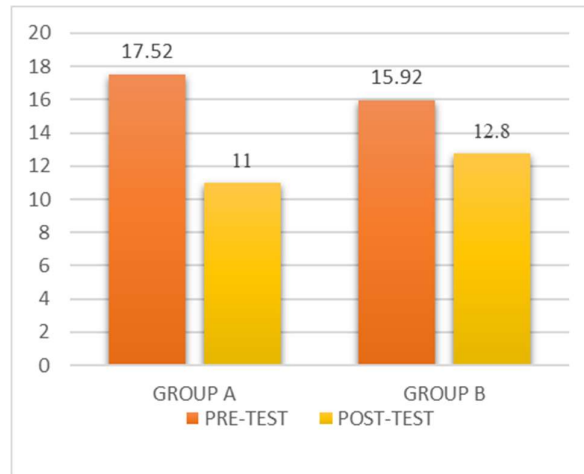
**Within Group Analysis of Group A and B**

The mean and SD of neck disability index pre and post values are  $17.52 \pm 4.17$  and  $11 \pm 3.13$  and “t” value is 6.243. The mean and SD of craniocervical angle are  $42.08 \pm 4.452$  and “t” value is -8.705 pre-test and post-test respectively. The mean and SD of neck disability index pre and post values are  $15.92 \pm 4.46$  and  $12.8 \pm 4.27$  and “t” value is 2.525. The mean and SD of craniocervical angle are  $40.08 \pm 2.691$  and “t” value is -7.576 (Graph 2). The statistical analysis was done with paired t test within

the Group A and Group B analysis were group A shows extremely significance ( $p < 0.0001$ )

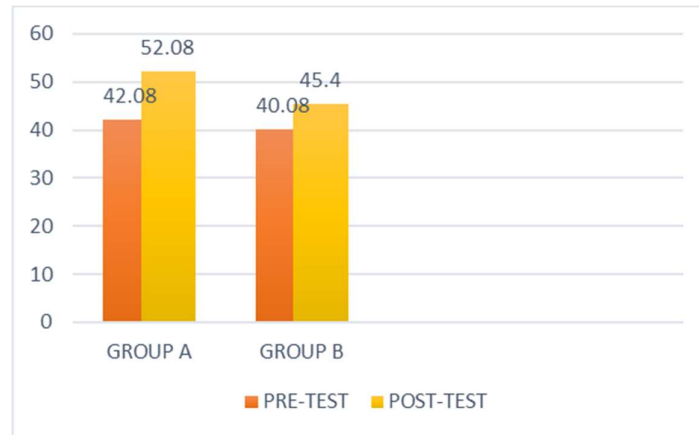
Within the group analysis, it has been shown that the pre and post test values of NDI and craniocervical angle shows extremely significant improvement in Group A than the Group B (Graph 3).

**Graphical Representation of within the Group Analysis of Pre and Post Test of Group A & B NDI (Paired T Test)**



**Graph 2: Within the Group of NDI**

**Graphical Representation of within the Group Analysis of Pre and Post Test of Group A & B Craniocervical Angle**



**Graph 3: Within the Group of CVA**

**Between the Group A and B of Neck Disability Index**

The mean and SD value of group A and Group B of neck disability index is  $6.52 \pm 2.43$  and  $3.36 \pm 1.19$  and “t” value is 6.4086 (Graph 4)

**Graphical Representation between the Group Analysis of Group A & B of Neck Disability Index: (Unpaired T Test Values)**

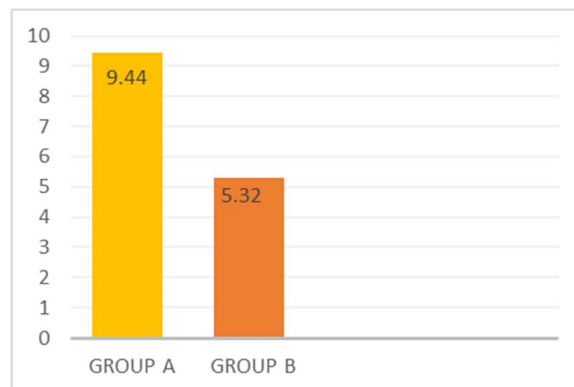


**Graph 4: Between the Group Analysis of NDI**

**Between the Group A and B of Craniovertebral Angle**

The mean and SD value of group A and group B of craniovertebral angle is  $9.44 \pm 4.38$  and  $5.32 \pm 1.61$  respectively and “t” value 4.3205 (Graph 5).

**Graphical Representation between the Group Analysis of Group A & B of Craniovertebral Angle: (Unpaired T Test Values)**



**Graph 5: Between the Group Analysis of CVA**

The statistical analysis done by using unpaired “t” test with the value of Group A and Group B shows significance of ( $p < 0.05$ ). between the group analysis of the post value shows in the Group A is significant than Group B. after the statistical analysis, it shows that there is a reduce neck pain in Group A (sling exercise training and fascia therapy along with conventional exercise) than control Group B (conventional exercise and hot pack) which shows that the group A is significant than group B.

## DISCUSSION

This study evaluated the effectiveness of sling exercise training and fascia therapy on neck pain, forward head posture and quality of life in students undergoing long distance travel on daily basis to college.

Based on the inclusion criteria 50 students between the ages of 20 and 23 who solely take buses were chosen, and they were split into two groups at random. Sling exercise treatment, fascia therapy, and traditional exercise were administered to 25 participants in the experimental group (group a). The remaining 25 participants from the control group (group b) received both traditional exercise and a hot pack. Before and after a 4-week physiotherapy session, the experimental and control groups were evaluated using outcome measures such as NDI and cervicovertebral angle.

In this study, patients with neck pain received fascia therapy and sling exercise training. They were also told to rest and repeat the exercise the next day. This demonstrated a significant improvement in students' neck pain reduction and posture correction to prevent neck pain recurrence.

Kuan-yin et al., (2021) has examined the effect of sling exercise training on patients with neck pain and they found that sling exercise training along with isometric exercise and stretches is useful in reducing pain and correcting posture.<sup>6</sup> Hence by using sling exercise training there was significant effect on neck pain by decrease in neck disability index. Cervical discomfort can be effectively alleviated by passive intervention that enhances muscular activity, lengthens muscle fibers, delays muscle exportation, and suppresses pathological condition-related muscle activity.

In patients with chronic neck pain, Syeda Aiman Batool et al. (2022) examined the effects of fascia therapy versus fascial manipulation on pain, range of motion, and function. They discovered that DBM fascia therapy, a non-manipulative technique that targets the body's connective tissue or fascia with soft, deep pressure, is effective in reducing pain and improving ROM.<sup>7</sup> It was shown that DBM fascia therapy has a physiological effect by enhancing fascial layering and blood flow after seven patients' somatic senses and particular body movements were manipulated by the therapist

The current study combined fascia therapy with sling exercise training to improve posture, lessen pain and enhance quality of life. For traveling students with neck pain, the present study found that group A (sling exercise training and fascia therapy together with conventional exercise) significantly reduced pain, improved posture, and

improved functional activity more than group B (conventional therapy and hot pack).

## CONCLUSION

This study concludes that experimental Group A who received sling exercise therapy and fascia therapy along with conventional exercise shows greater statistical significance in reducing neck pain and improving forward head posture and quality of life that Group B conventional exercise and hot pack by using neck disability index and cervicovertebral angle among students who travel for long time with neck pain for treatment duration of 4 weeks. Hence, the null hypothesis is rejected.

## LIMITATIONS AND RECOMMENDATIONS

Limitation of this study is small size sample. Did not measure blood flow at various level. The study analyzed only the short term benefits with respect to balance only and long term follow up is difficult. We recommend that further study can done BFR with any other intervention. Further can add more outcome measures like trunk stabilizations capacity, center of line, center of mass and reaction time to perturbation. Some of the ergonomics advices can also be given along with this survey.

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