A randomized controlled trial investigating the effects of the upper limb tension test on the treatment and management of pain and range of motion in patients diagnosed with cervical radiculopathy

Mohammed Qasheesh
PhD, Assistant Professor, Department of Physical Therapy, College of Applied Medical Sciences, Jazan University Jazan, Saudi Arabia.

How to cite this article: Mohammed Qasheesh. A randomized controlled trial investigating the effects of the upper limb tension test on the treatment and management of pain and range of motion in patients diagnosed with cervical radiculopathy Indian Journal of Physiotherapy and Occupational Therapy 2023;17(1).

Abstract

Introduction: The clinical diagnosis of cervical radiculopathy is a disorder of the nerve root that can be caused by a herniated disc, a spur, or cervical osteoarthritis. This condition is classified as a radiculopathy. Cervical radiculopathy is a common disease that affects the spinal cord. It is also the most common cause of arm pain and significant functional limitation. Cervical radiculopathy can occur at any point along the cervical spine.

Methods: Two arms parallel pretest-posttest experimental research design. Random sampling with total number of 40 subjects who have been diagnosed my medical doctors were selected by simple purposive random sampling method after giving due consideration to inclusion and exclusion criteria.

Results: The independent t-test further revealed that the readings which we got after the intervention were different and this difference was statistically significant. All the dependent variables, flexion (t=-6.0303, p=0.0001), extension (t=-4.0628, p=0.0002), side flexion to right (t=-5.4393, p=0.0001), side flexion to left (t=-3.9808, p=0.0003), and VAS (t=3.758, p=0.001) showed statistically significant difference after the treatment.

Conclusions: This study concluded that the Upper Limb Tension Test does reduce pain, symptoms and improve the range of motion for the cervical spine.

Key Words: Cervical radiculopathy, Upper limb tension test, Range of motion, Pain, Visual Analogue Scale.

Introduction

Cervical radiculopathy is a clinical diagnosis that is classified as a disorder of the nerve root due to a disc herniation, spur, or cervical osteoarthritis. Cervical radiculopathy is a common disease affecting the spinal cord and the most common cause of arm pain and significant functional limitation. Physiotherapists are frequently encountered with subjects with pain, tingling, weakness and restriction of cervical range of motion. The various conservative treatment procedures for cervical radiculopathy included intermittent cervical traction, handling and electrotherapeutic modalities such as shortwave diathermy, ultrasound therapy, TENS and neck work-outs. There would be a short term and long term protocol in dealing with the patient's condition. Late there has been a great deal of interest in mechanical reasons that might cause radiculopathy and methods for overcoming those problems were nervous system mobilization merits particular attention. 

Corresponding Author: Mohammed Qasheesh PhD, Assistant Professor, Department of Physical Therapy, College of Applied Medical Sciences, Jazan University Jazan, Saudi Arabia.
Mobilization of the nervous system refers to the movement of nerve tissue within the peripheral nervous system. David Butler has put forward a new approach which helps to explain Nerve Baroreceptors. David advocates that system of mobilization depends on Maitland’s gradations.

The upper limb tension test (ULTT) was developed in 1979 and popularized in recent years. The current study focused on mobilizing the nervous system by using the Upper-Limb Tension Test to see if it would alleviate the limitation of Range of Motion and previous pain in subjects with cervical radiculopathy.

The universal goniometer has been determined to be a reliable instrument for the measurement of one of the variables under investigation, which is the range of motion of the cervical spine. In this particular study, cervical radiculopathy was one of the most prominent symptoms, and the Visual Analogue Scale was used to measure its severity. Statement of problem: Subjects with cervical radiculopathy suffer from symptoms of pain, tingling, restricted movement and weakness. Subjects with these kinds of symptoms benefit from neural mobilization. This experiment examines cervical radiculopathy patient’s range of motion and pain.

The purpose of the current study was to research the relation between upper limb tension test and pain in subjects with cervical radiculopathy. When it comes to treating certain patient populations with neural mobilization, there is a paucity of evidence indicating that the treatment is effective, and the optimal dosage parameters (i.e., duration, frequency, and amplitude) are still in the process of being figured out. When applied in a clinical setting, these methodologies need to be implemented in a way that is both realistic and founded on consistent clinical reasoning.

**Methodology**
- **Design of study**
  - Two arms parallel pre test- post test experimental research design.
  - Ethical clearance was obtained from the departmental research and ethics committee of physical therapy department of Jazan University Saudi Arabia.

Random sampling.

A total number of 40 subjects who have been diagnosed my medical doctors were selected by simple purposive random sampling method after giving due consideration to inclusion and exclusion criteria. They were divided into a control group (A) of 20 subjects and an experimental group (B) of 20 subjects by random lottery sampling.

**Materials:** Universal 180 degree goniometer, Visual Analogue Scale sheet and 12 cm ruler with 1mm increments, Pencil, Papers and recording sheets, assessment charts.

1) Subjects who do not have any limitation that might preclude walking.

**Inclusion Criteria:**
- Participants who have cervical radiculopathy as diagnosed by a medical professional, age from 30 years to 60 years. Subjects who would be able to tolerate the procedure of ULTT.
- Subjects having radicular pain in either one of the upper limbs in male and female.

**Exclusion Criteria:**
- Every patient who suffers from cervical instability, spinal compression, or tumors.
- All participants who satisfied the inclusion criteria were randomly selected and granted consent to participate in the study. Subjects were properly treated and given correct management according to the following outlined protocol over 12 days with one session each day.

In addition to the conservative management that both groups received. The experimental group received neural mobilization for the upper limb using the upper limb tension test according to the below mentioned protocol.

Both groups of subjects were recorded for their cervical range of motion on the first and twelfth days of the study protocol Cervical flexion, extension, side flexion to right and side flexion to left were recorded using a universal 180 degree goniometer.
They were compared against the normal values suggested by the American orthopedic association. Pain score was measured by visual analogue scale (VAS) and was recorded on the first and twelfth day. The extreme words of no pain and pain as bad as possible have been translated into Arabic language, as this study setting was in Jazan region Saudi Arabia.

Protocol:

Control group (A) – Total duration 60 minutes.

• Short wave diathermy with 20 minutes, 20 minute's; intermittent cervical traction, 20 minute's isometric and active neck exercises performed in the PT department for 12 days.

In experimental group (B), treatment was conducted for 60 minutes.

Short wave diathermy with 20 minutes, treatment for 12 consecutive days using disc electrodes.

For 20 minutes, cervical traction every day for 12 days. The studies were done in the department of physical therapy for 20 minutes, one time a day for 12 days.

Neural mobilization of arm for the affected arm limb using the upper limb tension test for median nerve. Initially the treatment session was started with gentle oscillations and then progress into a series of repetitions.

The independent samples t-test and paired samples t-test were used to find the differences between male and female students.

Table 1 gives the demographic details of the 40 subjects who were selected for the study.

<table>
<thead>
<tr>
<th>Age group</th>
<th>Control group (A)</th>
<th>Experimental group (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male Subjects</td>
<td>Female subjects</td>
</tr>
<tr>
<td>30-35</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>35-40</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>40-45</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>45-50</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>50-55</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>55-60</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>

To find out the difference between the control and experimental groups an independent t-test was performed which showed before the treatment there wasn’t any difference between both the groups [Table 1]. Hence both the groups were considered similar and considered as matched groups.

Result

The data was tabulated and the difference between the intergroup and the intergroup variable selected for both the t-test groups was determined. After factoring the p-value, the probability level was set at a >= .05. Five percent chances of the study result is not attributed to extraneous sources.

Figure: Therapeutic intervention of Neural Mobilization Technique.

Graph 1. Comparison of means between baseline readings of both the groups.

The independent t-test further revealed that the readings which we got after our intervention were different and this difference was statistically significant [Graph 2].
**Graph 2.** Comparison of means difference between the readings after the intervention between both the groups.

All the dependent variables, flexion ($t=-6.0303$, $p=0.0001$), extension ($t=-4.0628$, $p=0.0002$), side flexion to right ($t=-5.4393$, $p=0.0001$), side flexion to left ($t=-3.9808$, $p=0.0003$), and VAS ($t=3.758$, $p=0.001$) showed statistically significant difference after the treatment, when both the groups were compared. It was found out that the group B or experimental group shown better improvement in term of increase in range of motion as well as decrease in pain.

**Within Group Analysis**

To find out the difference with in the same group before and after the treatment a paired t-test was performed and the findings are shown in table 2, which shows that both the groups have shown improvement after the treatment and range of motion was increased which was statistically significant, also there was decrease in pain in both the group after treatment.

**Table 2: Comparison of difference with in the group before and after the intervention in both the groups.**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pre Test Mean ± SD (N=20)</th>
<th>Post Test Mean ± SD (N=20)</th>
<th>T-Test</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group A</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flexion</td>
<td>$30 ± 4.23$</td>
<td>$33.5 ± 3.75$</td>
<td>-4.7422</td>
</tr>
<tr>
<td>Extension</td>
<td>$28.6 ± 4.31$</td>
<td>$34.1 ± 3.58$</td>
<td>-7.1796</td>
</tr>
<tr>
<td>Side Flexion Rt</td>
<td>$28.9 ± 3.77$</td>
<td>$33.35 ± 3.24$</td>
<td>-7.16</td>
</tr>
<tr>
<td>Side Flexion Lt</td>
<td>$29.7 ± 2.87$</td>
<td>$34.05 ± 3.79$</td>
<td>-7.9299</td>
</tr>
<tr>
<td>VAS</td>
<td>$6.17 ± 1.48$</td>
<td>$3.62 ± 1.44$</td>
<td>7.1452</td>
</tr>
<tr>
<td><strong>Group B</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flexion</td>
<td>$29.6 ± 4.59$</td>
<td>$39.5 ± 2.33$</td>
<td>-13.1372</td>
</tr>
<tr>
<td>Extension</td>
<td>$30.2 ± 3.39$</td>
<td>$38.2 ± 2.74$</td>
<td>-9.7851</td>
</tr>
<tr>
<td>Side Flexion Rt</td>
<td>$29.95 ± 3.42$</td>
<td>$38.35 ± 2.54$</td>
<td>-14.4282</td>
</tr>
<tr>
<td>Side Flexion Lt</td>
<td>$28.95 ± 2.86$</td>
<td>$38.4 ± 3.08$</td>
<td>-15.3008</td>
</tr>
<tr>
<td>VAS</td>
<td>$6.08 ± 1.39$</td>
<td>$2.26 ± 0.73$</td>
<td>12.6802</td>
</tr>
</tbody>
</table>

The results of this study showed a significant improvement, statistical significance ($P<0.05$) for flexion, extension, right side flexion, left side flexion and vas scores at the control group which were treated with traditional methods.

In addition, the treatment group showed improvement with a statistically significant difference ($P<0.05$) with reference to the flexion, extension, right side flexion and left side flexion, in favour of the treatment group.

This study proved that there was a significant difference in the pain levels of Visual Analogue Scale scores. The experimental group showed a highly significant value at 99.5% ($P<0.05$) with a value of 12.68. Compared to the control group, there was a significant difference in the pain relief scale in the experimental group.

The study showed that using the tension test for the upper limb as a method to mobilize neurons actually showed better results than a control for the movement of the cervical spine and pain.

**Discussion**

The purpose of this study was to study the effect of the upper limb tension test in the cases of cervical radiculopathy as a therapeutic method for mobilizing the nervous system in order to limit the pain and improve the range of motion.

This study has indicated that conservative and experimental methods of treating cervical radiculopathy subjects led to improvement in the subjects' pain and laxity of the spine. However the experimental group responded better than the control group to the treatment as discussed below.
None of the suggested statistical procedures were able to guarantee adequate results. There has been research to improve the pain and other symptoms by mobilizing the nervous system.\textsuperscript{16&17}

Butler described that one can treat pain via nervous system mobilization. A double-blind study was conducted by Sheereen FJ et al, 53 subjects were recruited, two-arm parallel-group randomized comparative design. She evaluates the effectiveness of two procedures, namely NT (neurodynamic technique) and CBMT (carpal bone mobilization technique), in conjunction with TGE (tendon gliding exercises) as a standard adjunct. The results of this study showed that each group had made significant progress over the course of the study. The NT group performed better than the CBMT group in terms of the severity of symptoms, functional status, and nerve conduction speed; the only exceptions to this were pain and grip strength. A visual analogue scale (VAS) was utilized in the evaluation of the primary outcome measures, which included the evaluation of pain intensity, functional status, grip strength, and motor nerve conduction study.\textsuperscript{18}

The study shows that all the team members that attended traditional therapy were out of the training session after just one session.

This study is of great clinical relevance, since it adds another dimension to the management of cervical radiculopathy symptoms.

**Conclusion**

This study conclude the Upper Limb tension test does reduce the pain symptoms and improve the range of motion for the cervical spine.

Other factors could be the release of root cause pain. Pain relief plays an important role in reducing neck spasm that, when relieved, allows the Cervical spine to move freely

**Limitations of the research.**

Subjects with neuritis or radiculopathy of different nerve roots are included in the study. Another weakness would be the chosen sets of upper limb tension test. The base test tends to have a slight positive bias towards the median nerve.

Acknowledgment: Author thanks all the participants and who collaborating in the study.

**Conflict of Interest:** None

**Source of Funding:** receive no fund part or full.

**Ethical Clearance:** Obtained from research ethical committee.

### References


