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## Effects of lower deep neck extensors and trapezius strengthening on pain, disability and ROM in women with non-specific neck pain

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### Abstract

**Background:** Neck pain is the condition that impacts people globally. Non-specific neck pain is mostly diagnosed based on clinical criteria assuming there are no signs and symptoms that point to a more serious or particular illness.

**Introduction:** Prevalence of neck pain is increasing day by day. Previously many studies were done on lower deep neck extensor without combining it with trapezius strengthening. It will show the effect of lower deep neck extensor and trapezius strengthening on patients with non-specific neck pain, if study is found appropriate. The major goal of the study is to evaluate the benefits of a lower deep neck extensors [LDNE] exercise and trapezius strengthening program on, pain, disability and Range of Motion in women with non-specific neck pain to a General neck extensors (GNE) exercise program. Given that the LDNE and trapezius strengthening programs will have a greater impact than the GNE program.

**Methodology:** 24 women, aged >18 years with nonspecific neck pain of > 3months were randomly assigned to two groups. Group A received lower deep neck extensor muscle strengthening and trapezius strengthening. Group B received general neck exercise programme. The difference between groups was location of resistance applied during the exercises. In lower deep neck extensors resistance was applied in lower cervical spine at the vertebral arch C4. Whereas in the general neck exercise group was applied at the occiput for six weeks. In addition, pain intensity and cervical range of motion is measured.

**Result:** Awaited and will be produced at the time of presentation.

**Conclusion:** Awaited and will be produced at the time of presentation.

**Keywords:** Nonspecific neck pain, lower deep neck extensors, trapezius strengthening

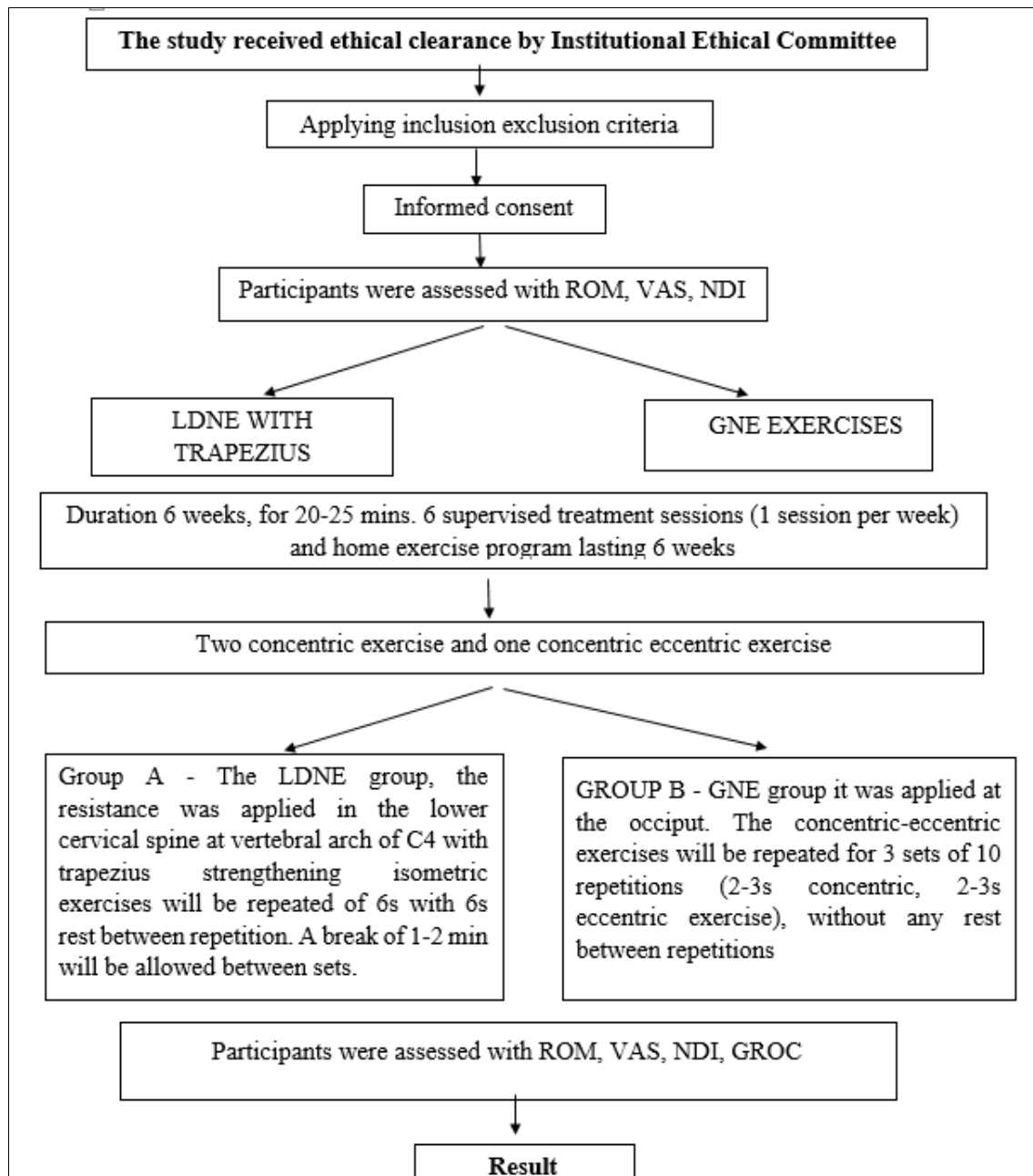
### Introduction

A condition that impacts people and society globally is neck pain (NP). It is 30% to 50% more common for neck pain to last over a year, and it is 11% more common for neck pain to limit activities <sup>[1]</sup>. There is typically no underlying illness or aberrant physical structure for the majority of neck issues. According to this viewpoint, Nonspecific Neck pain is mostly "diagnosed" based on clinical criteria, assuming there are no signs or symptoms that point to a more serious or particular illness also do not have an identifiable underlying disease or abnormal anatomical structure <sup>[2, 4]</sup>. Many physical impairments, including reduced cervical range of motion, are experienced by the majority of people with neck pain <sup>[3]</sup>. The yearly percentage of computer users with work related musculoskeletal disorder ranged from 33.8 to 95.3% <sup>[5]</sup>. The frequency of neck discomfort is greater among office workers than in the general population. Between 15% to 43.3% of administrative workers worldwide have reported having neck discomfort at least once in a year <sup>[6]</sup>. Earlier anatomist referred to trapezius as a 'shawl' muscle or 'musculus calcularis' (shaped like a monk's hood) because of its shape and location <sup>[7]</sup>. Women who work in offices frequently have upper trapezius muscle discomfort (trapezius myalgia), which also happens in other industries that require repetitive duties <sup>[8]</sup>. The majority of the time, working in a static position, stress, tension, and non-ergonomic posture all lead to overuse of the affected muscle <sup>[7]</sup>. Daily low-threshold motor unit activity in the trapezius muscle disrupts the intramuscular metabolic environment and frequently results in myalgia <sup>[9]</sup> General neck exercises are commonly prescribed by clinicians

in routine management of chronic nonspecific neck pain based in order to improve general muscle activity and function and reduce muscle guarding <sup>[10]</sup>. A few studies have examined the benefits of either non-specific or specific cervical extensor exercises in reducing neck pain and disability, strengthening and extending the muscles of the neck, improving cervical curvature and cervical range of motion, and increasing the cross-sectional areas of extensors <sup>[11]</sup>. In earlier research, patients with neck pain and scapula proprioceptive abnormalities were advised to engage in lower trapezius strengthening exercises <sup>[12]</sup>. The major goal of the study is to evaluate the benefits of a lower deep neck extensors [LDNE] exercise and trapezius strengthening

program on disability, pain, ROM and disability in women with non-specific neck pain to a general neck extensors (GNE) exercise program. Given that the lower deep neck extensors [LDNE] and trapezius strengthening programs will have a greater impact than the General neck exercise program. Prevalence of neck pain is increasing day by day. Previously many studies were done on lower deep neck extensor without combining it with trapezius strengthening. It will show the effect of lower deep neck extensor and trapezius strengthening on patients with non-specific neck pain, if study is found appropriate

## Method



### Conventional Treatment

1. Patient education.
2. Cold pack for tenderness, redness and swelling 10 mins.
3. Hot pack for pain 10 mins.
4. TENS (Duration - 10 to 15 mins) frequency between 100-150Hz, pulse width between 100-500 us Intensity- 12 and 30 mA (As tolerated by patients).
5. MFR.
6. Chin tucks- 3sets 6 reps 6 secs hold.
7. Trapezius stretching -3sets 6 reps 6 secs hold.
8. Neck isometrics -3sets 6 reps 6 secs hold.
9. Neck Range of Motion (active and passive movement).
10. Strengthening as per the protocol.
11. Traction (body weight / 7).
12. Soft collar and special pillow.

**Group A**

1. Conventional treatment.
2. Trapezius strengthening.
3. Front raise (Let your arms hang in front of you with the dumbbells in front of the thighs (palms facing the thighs). Your back is straight, your feet are planted flat on the floor, and your abdominal muscles are engaged).
4. Upright row (Holding a weight with an overhead grip and lifting it straight up to clavicle).
5. Shoulder shrugs.
6. Lower deep neck extensor strengthening.
7. Below C4 resistance is applied.
8. Using Thera Band.
9. Isometric exercise 3 sets 6 repetitions of 6 secs with 6 secs rest.
10. Break of 1-2 minutes will be allowed in between the sets

**Group B**

1. Conventional treatment.
2. General neck exercise (conventional treatment).
3. Resistance applied with the help of TheraBand above C4 region.
4. Concentric-eccentric exercises will be repeated for 3 sets of 10 repetitions (2-3s con-centric, 2-3s eccentric).
5. Without any rest between repetitions.

**Materials and Methods**

A comparative prospective study was conducted at Department of Orthopaedic Physiotherapy, Dr. A. P. J. Abdul Kalam College of Physiotherapy, Pravara Institute of Medical Sciences, Loni and received ethical clearance from the institute (ref no. Dr. APJAK COPT/BPT/UG/2023/69). It was conducted for duration of 6 months. Total of 24 participants had participated in the study. The inclusion criteria follow 1. Adult women aged  $\geq 18$  years with Nonspecific neck pain, at least  $\geq 3$ -months duration. 2. 30-50/100 mm on a Visual Analogue Scale (VAS). 3. All participants had to demonstrate poor performance ( $< 250$  s) on a neck extensor resistance test.

Regarding exclusion criteria

1. Neurological abnormalities in upper limb.
2. Pregnancy.
3. Previous cervical spine surgery.
4. Participated in a neck exercise program in the previous 12 months.

Total 24 participants were included and written informed consent was taken then baseline data and pre intervention assessment was done.

**Outcome Variables**

**The Neck Disability Index (NDI):** Functional ability was assessed on the base of neck disability index questionnaire. It is a patient completed condition specific functional status questionnaire with 10 items. It has sufficient support and usefulness to retain its current status as the most commonly used self-report measure for neck pain. Each section is scored on a 0 to 5 rating scale, in which zero means 'No pain' and 5 means 'Worst imaginable pain'. All the points can be summed to a total score. The test can be interpreted in percentage.

**Pain intensity will be rated by VAS**

It is a measurement instrument that tries to measure the

characteristics or attitude that is believed to range across a continuum of values. A straight horizontal line of fixed 10 cm length with the ends defined as the extreme limits of the pain to be measured, oriented from left (no pain) to right (severe). The patients were asked to mark on the line, the point that they feel represents their perception of current pain.

**Cervical Range of Motion**

- It was assessed by using Universal Goniometer.
- For assessment of cervical extension
- **Position of the participants:** Sitting on the stool without an arm rest
- **Position of the therapist:** Standing on one side of the participant
- **Placement of Goniometer:** The fulcrum was placed on the center of external auditory meatus, with stationary arm placed vertically and movable arm aligned along the imaginary line between the external auditory meatus and base of the nares, so the movable arm lies perpendicular to the stationary arm.
- **Instructions:** Participants were asked to look towards ceiling while measuring extension.

**GROC scale**

The Global Rating of Change Score (GROC) is a frequently used outcome measure that is used independently to measure improvements in a patient's condition or as an anchor for other outcomes measures. 15-point self-report scale (from -7 to 7), although other scale values have been used.

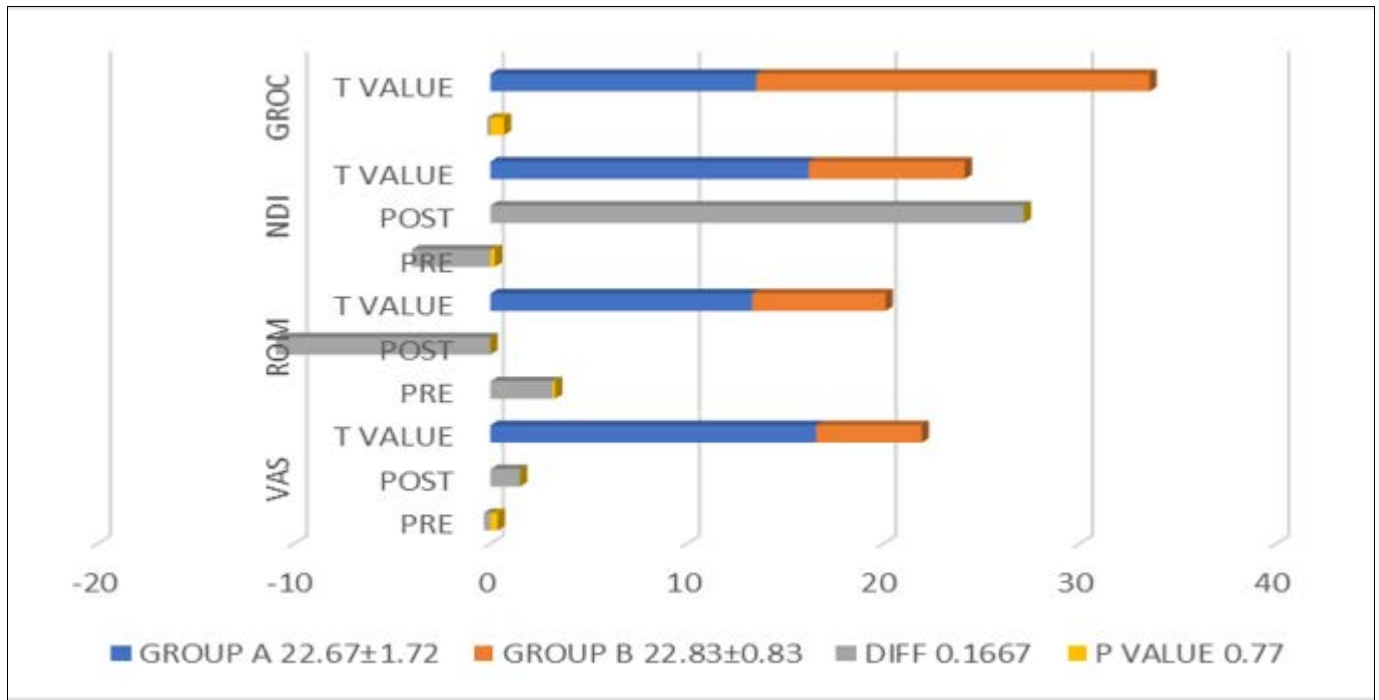
**Result**

After the intervention, difference within the groups were compared using Paired t Test and between the group, will be compared using Unpaired t Test.

The study was conducted to find out the effect of lower deep neck extensor and trapezius strengthening on pain, disability and Range of Motion in women with non-specific neck pain. The result was analysed on basis of data obtained from pre and post intervention using goniometer for measuring the cervical Range of Motion, VAS for assessing pre and post pain intensity, NDI questionnaire for functional activities and GROC scale for post outcome measure. The data was coded and entered into Microsoft Excel spreadsheet. The data analysis was done using Instat. Descriptive statistics included computation of means, standard deviations. A paired t-test (for quantitative data to compare before and after intervention in each group) and the independent t-test (for quantitative data between two groups) were used for comparison of all clinical indicators. Level of significance was set at  $p \leq 0.01$

**Demographics**

In this study, Adult women aged  $\geq 18$  years with chronic idiopathic neck pain of  $\geq 3$ -months duration. The participants are randomly distributed into two exercise groups: LDNE with trapezius strengthening and GNE. Both exercise programs involve a total of six super-vised treatment sessions (1 session per week) and a home exercise pro-gram (HEP) lasting six weeks (two exercise sessions per day). The duration of the exercise program was set at 6 weeks. Each supervised exercise session as well as home sessions about 20-25 min.



		Group A	Group B	Diff	P value
Age		22.67±1.72	22.83±0.83	0.1667	0.77
Vas	Pre	6.58±0.79	6.25±0.97	-0.33333	0.37
	Post	1.58±0.67	3.08±1.73	1.5	0.01
	T value	16.58	5.38		
ROM	Pre	38.42±4.19	41.58±5.55	3.167	0.13
	Post	60.42±2.71	49.50±2.97	-10.917	<0.0001
	T value	13.322	6.8		
NDI	Pre	71.53±7.53	67.75±8.19	-4	0.23
	Post	24.92±5.52	52.08±4.87	27.167	<0.0001
	T value	16.2	7.95		
GROC	T value	4.75±1.22	4.75±1.22	-0.1667	0.69

**Interpretation**

**Group A**

**LDNE with trapezius Strengthening:** The LDNE group, the resistance was applied in the lower cervical spine at the vertebral arch of C4 with trapezius strengthening.

The mean age of participants in group A was 22.67±1.72 years. The mean value for pre and post treatment for pain intensity on VAS scale in Group A are 6.58 and 1.58. The mean value for pre and post treatment for Range of Motion in Group A is 38.42 and 60.42. The mean value for pre and post treatment for NDI in Group A is 71.75 and 24.92. The mean value for post treatment for GROC scale in Group A is 4.75.

**Group B**

**GNE Exercises**

GNE group it was applied at the occiput. The mean age of participants in Group B was 22.83±0.83 years. The mean value for pre and post treatment for pain intensity on VAS scale in Group B are 6.25 and 3.08. The mean value for pre and post treatment for Range of Motion in Group B is 41.58 and 49.50. The mean value for pre and post treatment for NDI in Group B is 67.75 and 52.08. The mean value for post treatment for GROC scale in Group B is 4.58.

P value of age is 0.77 which is considered to be not statistically significant. Post - VAS P value is 0.01 which is statistically significant. Post Range of motion P value is <0.0001 which extremely significant. Post NDI P value is <0.0001 which is extremely significant.

**Discussion**

The present study aimed to compare the effects of lower deep neck extensors and trapezius strengthening on pain, disability and ROM in women with non-specific neck pain. This study was conducted on 24 females with the age group of ≥18 years according to the inclusion criteria and was randomly divided into two groups.

Subject of group A were treated with lower deep neck extensor exercise and trapezius strengthening. Subject of group B were treated with general neck exercises.

The mean age of the subjects in group A was 22.67 with 12 female subjects and the mean age of the subjects in group B was 22.83 the difference between both the groups was 0.77. The mean difference is 0.1667.

**In Group A (Lower deep neck extensor with trapezius strengthening)**

The mean value for pain was 6.58. After the intervention the mean value of pain among participants in group A was 1.58. The result of present study showed that lower deep neck extensor with trapezius strengthening is an effective technique for reducing pain. Extremely significant difference was seen pain.

In group B (General neck exercise) The mean value for pain was 3.92. After the intervention the mean value of pain among participants was 3.08. The result of present study showed that general neck exercise is an effective technique in reducing pain. Significant difference was seen in pain.

The result of present study showed that lower deep neck extensor with trapezius strengthening is more effective technique for reducing pain than General neck exercises. Mean difference was 1.5.

This finding is consistent with previous research by Giménez-Costa *et al.* 2022 Conducted study on title Specific versus non-specific exercises for the neck extensor muscles in women with chronic idiopathic neck pain. The study found that there is no between group interaction and significant main effect in pain <sup>[13]</sup>.

#### **In another study conducted by Andersen LL *et al.* 2008.**

Conducted study on title Muscle activation during selected strength exercises in women with chronic neck muscle pain. The study found that there is relevant and marked increases in trapezius muscle activation <sup>[9]</sup>.

#### **In another study conducted by Sai vispute *et al.* 2022**

Conducted study on title A comparative study of immediate effects of Myofascial Release Technique and Positional Release Technique on Trapezitis among the College Student. The present study concludes that MFR and PRT both are effective in reducing pain intensity on VAS scale <sup>[7]</sup>.

#### **In Group A (lower deep neck extensor with trapezius strengthening)**

The mean value for Range of motion is 38.42. After the intervention the mean value for range of motion 60.42. The result of present study showed that lower deep neck exercise with trapezius strengthening is effective technique in improving range of motion. Extremely Significant difference is seen in Range of motion.

#### **In group B (General Neck Exercise)**

The mean value for Range of motion is 41.58. After the intervention the mean value for range of motion 49.50. The result of present study showed that general neck exercise is effective technique in improving range of motion. Extremely significant difference is seen in Range of motion.

The result of present study showed that lower deep neck extensor with trapezius strengthening and General neck exercises are significant. Mean difference was-10.917.

This finding is consistent with previous research by Gimenez-Costa *et al.* 2022 Conducted study on title Specific versus non-specific exercises for the neck extensor muscles in women with chronic idiopathic neck pain. The study found that there is no between group interaction and significant main effect in range of motion <sup>[13]</sup>.

#### **In another study conducted by Andersen LL *et al.* 2008**

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#### **In another study conducted by Sai vispute *et al.* 2022**

Conducted study on title A comparative study of immediate effects of Myofascial Release Technique and Positional Release Technique on Trapezitis among the College Student. The present study concludes that MFR and PRT both are effective in reducing pain intensity on improving cervical range of motion <sup>[7]</sup>.

**In Group A (lower deep neck extensor with trapezius strengthening):** The mean value for Disability 71.75. After

the intervention the mean value for Disability 24.95. The result of present study showed that lower deep neck exercise with trapezius strengthening is effective technique in improving Disability. Extremely Significant difference is seen in Disability.

#### **In group B (General Neck Exercise)**

The mean value for Disability is 67.75. After the intervention the mean value for Disability is 52.08. The result of present study showed that general neck exercise is effective technique in improving Disability. Extremely significant difference is seen in Disability.

The result of present study showed that lower deep neck extensor with trapezius strengthening and General neck exercises are significant. Mean difference was 26.167.

This finding is consistent with previous research by Giménez-Costa *et al.* 2022 Conducted study on title Specific versus non-specific exercises for the neck extensor muscles in women with chronic idiopathic neck pain. The study found that there is no between group interaction and significant main effect in disability <sup>[13]</sup>.

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#### **Conclusion**

The present study concludes that combining lower deep neck extensor with trapezius strengthening is found effective for pain, ROM and disability along with the conventional treatment.

The study found that GNE is effective for pain, ROM and disability along with the conventional treatment.

The study also revealed that there is no statically significant difference in the effects of lower deep neck extensor with trapezius strengthening vs GNE in women with nonspecific neck but is almost equally effective in reducing pain and ROM and disability.

#### **Declaration**

**Funding:** No funding

**Conflict of Interest:** None

#### **Ethical Approval**

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