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## **Efficacy of suboccipital release versus mckenzie exercise in reducing pain and disability in patients with non-specific neck pain**

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### **Abstract**

**Background and Purpose:** The purpose of this study was to assess the efficacy of Suboccipital release and Mckenzie exercise in reducing pain and disability in patients with Non-specific neck pain.

**Materials and Methods:** A total of 30 non-specific neck pain patients were conveniently assigned to either a Group A (Suboccipital release) (n=15) or in a Group B (Mckenzie exercise) (N=15). Both group (age – 20 to 40 years) underwent 45 minutes per treatment session, 3 days in a week for 4 weeks. The outcome measures were evaluated at pre and post intervention by using VAS and CNFDS.

**Results:** The pre and post test scores were assessed by VAS and CNFDS in Group A and Group B. The calculated 't' values by unpaired 't' test values shown significant effects in Group A on VAS and CNFDS respectively.

**Conclusion:** There is a significant reduction in pain and disability, so it indicates that Suboccipital release is effective in Non-specific neck pain patients.

**Keywords:** Non-specific neck pain, suboccipital release, mckenzie exercise, visual analogue scale

### **Introduction**

Neck pain is an unpleasant sensory experience in the neck which may be manifested as fatigue, tension or pain that radiates to the shoulders, upper extremities or head. Non-specific neck pain refers to neck pain (with or without radiation) whose underlying cause cannot be traced to any specific systemic disease. Non-specific neck pain may be attributed to numerous structures in the neck and surrounding regions, such as the muscles, joint structures, ligaments, intervertebral disks, and neural structures.

Non-specific neck pain is neck pain with no particular precise illness being identified as the hidden reason for the objections. It is characterized as mechanical pain found in any place between the occiput and upper thoracic spine and encompassing muscles with no particular etiology. Various structures in the neck and close-by districts might be the wellsprings of Non-specific neck pain, for examples, muscles, joint structures, ligaments, intervertebral plates and neural structures.

The cervical spine is divided into upper and lower cervical spine. The muscles of entire back of neck are grouped into four layers from superficial to deep. Trapezius, Latissimus dorsi, Levator scapulae, Erector spine which splits into iliocostalis, longissimus, spinalis, multifidus, interspinales and suboccipital muscle. The suboccipital region is in between the occipital and spine of the axis vertebra, the four muscular layers are represented as trapezius, splenius capitis, semispinalis and longissimus.

The administration of neck pain is a typical clinical issue for by far most of individuals. It can be dealt with conservatively and the normal medicines could incorporate prescription, body mechanics preparing and exercise based recuperation. Physical therapy modalities may incorporate manual procedures, traction, stretching, massage, electrotherapies, thermal agent, ultrasound and general exercises.

Suboccipital release is also known as cranial base release. Muscle of the neck and upper back often contains many hyperactive trigger points. Occipital release is another technique that may be useful for treating trigger points. It has also been called as 'inhibitive cervical manual traction'.

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A mild traction is applied to the posterior cervical musculature and ligaments. Direct pressure is applied at the musculotendinous junction of the cervical muscles at the base of the skull, which facilitates relaxation of muscles.

Exercise programmes for managing neck pain differ with regard to duration, training frequency, intensity and mode of exercise. Stabilization exercises are exercises that are meant to maximize function and prevent injury progression or re-injury. They require coordination and training of the anterior and posterior cervical and shoulder girdle musculature.

Dynamic Neck Exercises is progressive-resistive strength training that involves movement of other parts of the body and neck. Strengthening exercises involve any exercise done by the individual/patient that includes resistance, for example isometric, isokinetic or isotonic. It could include strength training with machines, theraband, free weights or low load endurance exercises to train muscle control.

The Mckenzie method includes postural awareness and repetitive movement with the fundamental thought that a converse power can diminish pain and return functions. The Mckenzie intervention approach is a thorough technique for consideration utilized by physical therapists that stress self-treatment and improve mindfulness of pain in connection to stance and spinal development. Mckenzie directional exercises that are performed for the duration of the day may give another possibility of mechanical, cognitive and sensory perception of pain that modify pain expectation and related fear beliefs and ultimately to the correction of functional disabilities.

**Non-specific neck pain**

**Etiology**

- Idiopathic
- Ligament sprains
- Muscle strain
- Bad posture
- Whiplash injury – hyperextension, flexion or rotation of the neck.
- Acute torticollis
- Cervical radiculopathy – unilateral neck, shoulder or arm pain that approximates to a dermatome.
- Non-musculoskeletal causes – cardiovascular, respiratory or oesophageal disease, acute upper respiratory tract infection, sore throat.

**Epidemiology**

- Reports prevalence of 83 peoples per 100000 peoples.
- Age group between 13 years to 90 years.
- Men are affected slightly more than women.

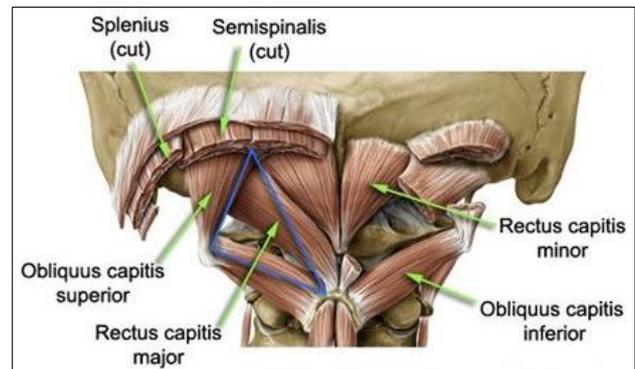
- Annual incidence has been reported to be 1073 per 100000 for men and 635 per 100000 for women.

**Clinical features**

- Pain develops in the neck and may spread to the shoulder or base of the skull.
- Movement of the neck feels restricted and moving the neck may make the pain worse.
- The pain sometimes spreads to the arm and as far as to the fingers, spread to the shoulder, or across the scapulae and may be associated with paresthesia or hyperesthesia.
- Sometimes pins and needles develop in the part of the arm or hand.
- Cervical stiffness, muscle stiffness and spasm.
- Headache, dizziness or pain in the spine.
- Rarely, it may be associated with dysphagia, syncope, triggering of migraine or pseudo – angina.
- Tenderness in muscles or intervertebral joints and localized areas of increased muscle tone that can be palpated as nodules or tender bands.

**Anatomical considerations**

**Deep neck muscles**

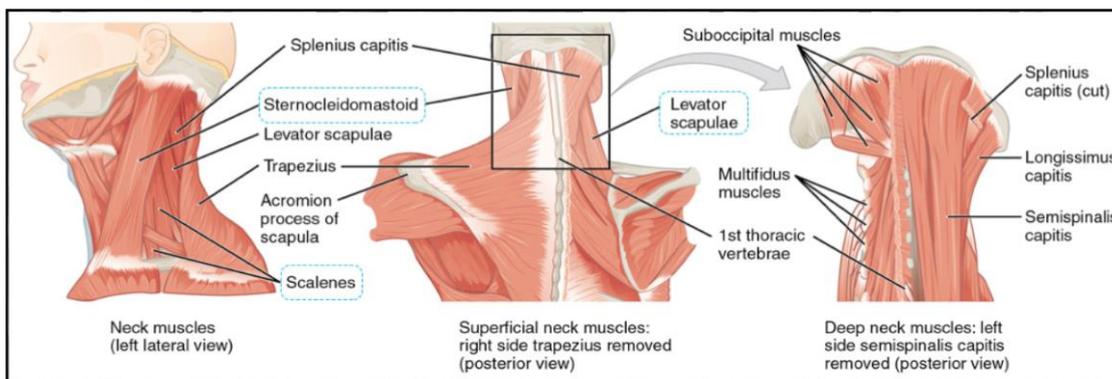


**Rectus capitis posterior major:** It goes from the spinous process of the axis (C2) to the occipital bone.

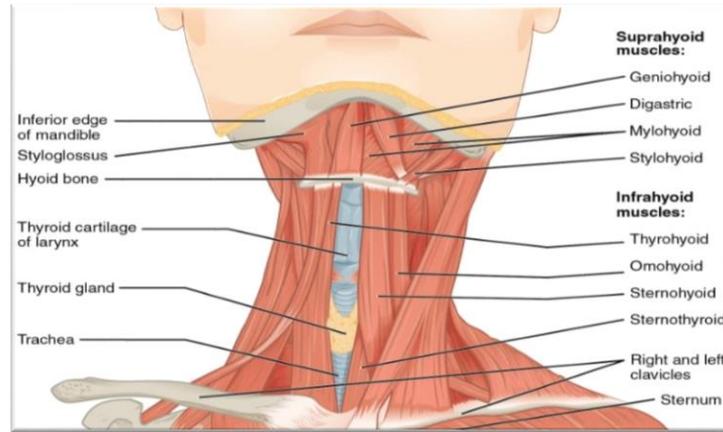
**Rectus capitis posterior minor:** It goes from the middle of the posterior arch of the atlas to the occiput.

**Obliquus capitis superior:** It goes from the transverse process of the atlas to the occiput.

**Obliquus capitis inferior:** It goes from the spine of the axis vertebra to the transverse process of the atlas.



**Neck Muscles**



**Anterior neck muscles**

**Operational definitions**

**Non-specific neck pain**

Non-specific neck pain is the general term that refers to any type of pain caused by placing abnormal stress and strain on muscles of cervical spine, in which movement of neck is restricted and moving the neck may induce pain worse but taking rest will alleviate the pain.

**Heintz MM, Hegedus EJ**

**Suboccipital release**

Suboccipital release is a soft tissue technique, which is appropriate for reducing tension in the soft tissues of the cervical spine, in particular the upper neck region, sub-occipital aspect of the spine. It releases the fascia and muscles surrounding and supporting the head and neck.

**Hallgren**

**Stabilization exercises**

Stabilization exercises is strengthening of muscles which utilizes strengthening exercises as well as stretching and aerobic conditioning to rehabilitate the neck. They are mean to maximize function and prevent injury progression or re-injury. They require coordination and training in the anterior and posterior cervical and shoulder girdle musculature.

**Bashir kaka**

**Dynamic exercises**

Dynamic exercises is a self-resistance method of putting muscle against muscle, and even more so, mind into muscle. It involves movement and are usually implemented during an active warm up for a higher intensity activity, such as sport and field activities.

**Riana Rohmann**

**Mckenzie technique**

Mckenzie theory states that the reverse force can probably abolish the pain and restore function. It is set of exercises that treat neck pain and prevent the recurrence of the pain. It is also known as Mechanical Diagnosis and Therapy (MDT).

**Robin Mckenzie**

**Statement of the study**

**(A) Objectives of the study**

To find out reduction in pain and disability with Suboccipital release in patients with non-specific neck pain.  
To find out reduction in pain and disability with Mckenzie exercise in patients with non-specific neck pain.

**(b) Aim of the study**

The aim of the study is to compare the effect of Suboccipital release versus Mckenzie exercise in reducing pain and disability in patients with non-specific neck pain.

**(c) Need for the study**

- Non-specific neck pain is a common problem with two third of the population experience neck pain in their lifetime.
- Neck pain leads to muscular tightness in both neck and upper back.
- The importance of the study is to reduce pain and disability by giving suboccipital release and Mckenzie exercise. These are commonly used in treating the pain to reduce it and enhance the function of the activities of daily living.

**Variables of study**

**(A) Independent variables**

- Suboccipital release.
- Mckenzie exercise.

**(b) Dependent variables**

- Visual Analogue Scale (VAS).
- Copenhagen Neck Functional Disability Scale (CNFDS).

**Assumption**

The study had been conducted assuming that ‘Suboccipital release will decrease the pain and disability in patients with non-specific neck pain’.

**Projected outcome**

Based on the review of literature, the outcome of my study will be that ‘Suboccipital release will reduce the pain and disability in patients with non-specific neck pain’.

**Hypothesis**

**(A) Null hypothesis**

There is no significant difference in efficacy of Suboccipital Release versus Mckenzie exercise in reducing pain and disability in patients with non-specific neck pain.

**(b) Alternate hypothesis**

There is significant difference in efficacy of Suboccipital release versus Mckenzie exercise in reducing pain and disability in patients with non-specific neck pain.

## Material and Methodology

### Materials

- Consent form.
- Theraband.
- Towel.
- Cotton.
- Pen & Pencil.
- Paper.
- Pillows.
- Treatment couch.
- Blankets.

### Methodology

#### (a) Study design

- The design that is used for this study is the Quasi Experimental Study.

#### (b) Sampling method

- Convenient Sampling Method

#### (c) Sample size

- A total of 30 patients were selected for the study based upon the fulfilment of the selection criteria's.  
Group A – 15 patients underwent Suboccipital release technique  
Group B – 15 patients underwent Mckenzie exercise.

#### (d) Study Duration

- 8 months.

#### (e) Treatment duration

- 45 minutes per session.
- 3 sessions per week for 4 weeks.

#### (f) Study setting

- Out Patient Department - Nandha College of Physiotherapy, Erode.
- LKM Ortho Speciality Hospital, Erode
- Government Headquarters Hospital, Erode.

### Criteria for sample selection

#### (A) Inclusion criteria

- 1) Subjects with Non-specific neck pain.
- 2) Age – 20 to 40 years.
- 3) Inability to perform the ADL activities.
- 4) Non-specific neck pain in the cervical region.
- 5) Possibly with radiating or referred in the occiput, nuchal muscles, shoulders and upper limbs without proven structural disorders in the cervical spine, nerve roots or spinal cord.

#### (b) Exclusion criteria

- 1) Signs and symptoms of neurological disorders.
- 2) Headache as a consequence of specific headache diagnosis.
- 3) History of malignancy and infection.
- 4) Trauma with or without proven structural disorders in the region of the neck, shoulder and head (eg. Whiplash injury).
- 5) Signs of cerebrovascular insufficiency (eg. Dizziness, drop attacks, cerebrovascular accident and TIA).
- 6) Chronic disease of locomotor system (eg. Polyarthritis, muscular disease).
- 7) Cervical disc prolapse.
- 8) Peripheral nerve entrapment.

- 9) Spinal stenosis and fibromyalgia.
- 10) Previous neck surgery.
- 11) Spasmodic torticollis, inflammatory rheumatic disease, psychiatric illness.
- 12) Spinal deformity and cardiovascular diseases.

### Parameters

- 1) Visual Analogue Scale (VAS).
- 2) Copenhagen Neck Functional Disability Scale (CNFDS).

### Procedure

#### Group A

Group A - Received Suboccipital release along with Neck Stabilization Exercise and Dynamic Exercise.

#### Suboccipital release technique

1. In this technique the participant are asked to be in supine on the table with the therapist stands at the head of the table.
2. The finger pads should be placed over the Suboccipital muscles bilaterally, just inferior to the superior nuchal line down at approximately the level of C2.
3. Traction is then applied with the fingers in an anterior, lateral and cephalad direction.
4. Then we use two handed combination moved with greater ease.

#### Neck stabilization exercises

The neck stabilization exercise training is designed to restore cervical muscle endurance and coordination. All the participants in this group performed the following exercises.

- **Chin tuck**

In standing position, participant pulls back the chin (as if trying to make a double chin) while keeping the eyes level. This was done for 15 repetitions.

- **Cervical extension**

In standing position, participant grasps the base of the neck, with both hands while extending the neck as far as possible. This was done for 15 repetitions.

- **Shoulder shrugs**

In standing position, participant shrugs the shoulders, bringing them up towards the ears. This was done for 15 repetitions.

- **Shoulder rolls**

In standing position, participant rolls the shoulders forward in a circle. Then, rolls the shoulders backwards in a circle. Then participant relaxes and repeats the procedure for 15 times.

- **Scapular retraction**

In standing position, participant brings the shoulder blades together in the back; participant then relaxes and repeats the procedure for 15 times.

#### Neck dynamic exercises

Dynamic exercises training are aimed at increasing muscle strength. The progression of exercises was done using different colours of theraband indicating varied resistance.

Participants started with the theraband with the least resistance, coloured red and progressed to those with increasingly greater resistance, green then blue. During the exercises, elongation was encouraged to be maintained at 100%.

▪ **Cervical extension-dynamic isometric (Sitting)**

The participant sits in an upright position and one end of the loop of theraband is attached to the participant's head and the other end to a sturdy stand. The participant bends forward, then holds and slowly returns to the starting position, keeping the spine posture erect throughout the exercise. This is done for 15 repetitions in either direction.

▪ **Cervical flexion-dynamic isometric (Sitting)**

The participant sits in an upright position and backs a sturdy stand. One end of a loop of theraband is securely attached to the sturdy stand and the other to the participant's head. The participant bends forward, then holds and slowly returns to the starting position, keeping the spine posture erect throughout the exercise. The number of repetitions is 15 in each direction.

▪ **Chest flies exercises (Standing position)**

With the participant in standing position, the middle of the theraband is fastened securely to a sturdy stand at shoulder level. The participant backs the sturdy stand, with one leg slightly in front of the other. The participant then grasps the bands at shoulder height with the elbows straight, and pulls bands inward with palms facing each other and then slowly returns. This was done 15 repetitions in each direction.

**Frequency**

Stabilization and dynamic exercise sessions were held three times a week on alternate days for four weeks each lasting approximately 4-5 minutes. Altogether, each participant had 12 treatment sessions.

**Group B**

**Mckenzie technique**

Procedure of treatment involved traditional treatment and Mckenzie exercise. The traditional treatment was applied in the form of strengthening exercises program (isometric neck flexors, extensors and lateral flexion). Muscle strengthening exercises seem to effectively reduce intensity, discomfort and duration of neck pain. An effective program should include strengthening neck muscles in the static mode and consist of 3 sets of 5 repetitions, once a day, 3 times per week over a period of 4 weeks.

• **Mckenzie protocol of treatment**

Fifteen patients with non-specific neck pain had received Mckenzie protocol additionally to the traditional treatment.

• **Direction selection**

Dysfunction is classified by the direction that is limited and painful, repeating the painful movement consistently produces symptoms on every occasion at end-range. There is no pain during the movement, but only when the restricted end range is achieved. Repeated movement in one direction have no effect on pain or range of the opposite movement.

• **Management of extension dysfunction**

Lower cervical extension dysfunction was common in these

study patients. Patients with limitation in extension due to restricted end range were received the following program.

• **Retraction**

The patients were in a relaxed comfortable sitting position with good back support, the patient then instructed to draw their head as far back as possible, with the head remaining horizontal, facing forward and not inclining up or down. This was repeated ten to fifteen times.

• **Retraction with patient overpressure**

The patients returned to the neutral sitting position and instructed to apply overpressure by pressing the chin with their fingers at the end of range of the movement. This was repeated ten to fifteen times.

• **Retraction with therapist overpressure**

The patients were in a relaxed comfortable sitting position with good back support and the therapist was standing at the side of the patients with the thumb; forefinger of one hand was applied against the patient's mandible and the heel of the other hand at the level of the first or second thoracic vertebrae. The therapist hand on the mandible stabilizes the head at end range of retraction and the heel of the other hand applied posterior-anterior force on the spinous processes of the upper thoracic segments, repeated five or six time.

• **Retraction with extension**

The patients were in a relaxed comfortable sitting position with good back support, the patients instructed to draw their heads as far back as possible, with the head remaining horizontal, facing forwards and then instructed to 'bend his head backwards as far as he can to look at the ceiling. Then returned to the neutral sitting position. The Patients were instructed to repeat the movements ten to fifteen times. An increase in the range of extension a minimal rotatory adjustment of the head position is repeated five to six time so that the nose was moved only (1cm) to either side of the mid line during this process the patients gained maximum end range.

• **Management of rotation dysfunction**

Loss of rotation was common in these study patients. Patients with limitation in roation due to restricted end range were received the following program.

• **Rotation**

The patient were in a relaxed comfortable sitting position with good back support. The patients instructed to retract their heads, but not fully and then rotate the head towards the side of pain. 'Turn as far as you can as if looking over your right-left shoulder'. After a second in that position they were instructed to return to the neutral posture. The same movements were repeated rhythmically ten to fifteen times, returning to the neutral position each time.

• **Rotation with patient overpressure**

The patients were instructed to repeat the same movements of some retraction followed by active. Then instructed and shown the following if performing left rotation; Place the right hand behind the head with the fingers reaching to the left ear and the left hand against the chin, apply extra pressure so the head is pushed further into rotation. After a second in that position they were instructed to return to the neutral

posture. The same movements were then repeated rhythmically ten to fifteen times, returning to the neutral position each time.

**• Rotation with therapist overpressure**

The patients were in a relaxed comfortable sitting position with good back support with the head in a slightly retracted. The therapist stands behind the patients with his right hand resting lightly on the patient’s right trapezius. The fingers should rest lightly over the clavicle and the tip of the thumb is placed firmly against the right side of spinous process at the level below that being mobilized. The therapist carried the patient’s head with his left hand. The patient asked to rotate their heads to end of range at which point the therapist produce a further rotation force using the left arm to rotate the head and the right hand applies a counter pressure against the spinous process at the segment below. The position is maintained for one or two seconds and then the head is returned to the neutral position. The movement was repeated five or six times.

**Isometric neck exercise (Traditional treatment)**

Isometric exercise is a form of exercise where the patient execute an isometric muscle contraction. In an isometric muscle contraction, the muscle exerts force without changing its length. In an isometric neck exercise, the neck is held in a non-moving or stable position to isolate the targeted muscle. The muscle is then allowed to grow stronger through resistance without movement or pain. If gradually the resistance is increased, the muscle grows in strength and endurance. Here all the exercises are instructed by the therapist and the patient does the exercise actively by giving resistance by their own.

**• Static flexion**

Put both hands on the forehead and gently push against the resistance. Tighten the neck muscles and try the best not to let the head move forward. Hold this position for around 8 seconds. Rest for 3 seconds, then repeat.

**• Static extension**

Place both hands against the lower back of the head. Apply slight forward pressure, but make sure to resist the movement while pushing the head back into the hands. Be conscious that the head does not fall back. Hold for 5 seconds. Rest for 3 seconds then repeat.

**• Isometric lateral flexion**

Place the right hand on the right side of the head, just above the right ear. Tighten the neck muscles and resist the pressure to move the head sideways. Hold the position for 5 seconds. Rest for 3 seconds, then repeat. Do the same procedure to the left side.

**• Isometric lateral flexion 2**

Place the right hand on the lower part of the right side of the head so that the hand is near the chin. Tighten the neck muscles and resist the movement by giving pressure and move the head to the right. Hold the position for 5 seconds. Rest for 3 seconds, then repeat. Do the same procedure to the left side.

**• Neck flexion**

Sitting upright, bend the head forward and give resistance on forehead against the movement. Try the best to touch the chest by chin. Hold for 8 seconds. Rest for 3 seconds.

**Repetition**

Repeat all the exercise – 8 to 10 times.

**Data presentation and analysis**

**Statistical tools**

For the pre and post-test experimental study, both paired and unpaired “t” test was used for each parameter in an intra-group analysis to find out the significance of improvement achieved through intervention. Then unpaired “t” test was used to find out the significance of the changes between two groups i.e., inter-group analysis.

**(a) Paired “T” test**

To compare the effect between two groups students “t” test for paired values.

**Formula for paired t-test**

$$S = \sqrt{\frac{\sum(d-\bar{d})^2}{n-1}}$$

$$t = \frac{\bar{d}\sqrt{n}}{s}$$

d = Difference between the pre-test and post-test

$\bar{d}$  = Mean Difference

n = Total number of subjects

S = Standard Deviation

**(b) Unpaired “T” Test**

The unpaired “t” test was used to compare the effects between two groups students “t” test for unpaired values.

**Formula unpaired “t” test,**

$$S = \sqrt{\frac{(n_1-1)s_1^2 + (n_2-1)s_2^2}{n_1+n_2-2}}$$

$$t = \frac{|\bar{x}_1 - \bar{x}_2|}{s \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

$n_1$  = Total number of subjects in Group A.

$n_2$  = Total number of subjects in Group B.

$\bar{x}_1$  = Mean difference between pre-test and post-test of group A.

$\bar{x}_2$  = Mean difference between pre-test and post-test of group B.

$s_1$  = Difference between pre test and post test of Group A.

$s_2$  = Difference between pre test and post test of Group B.

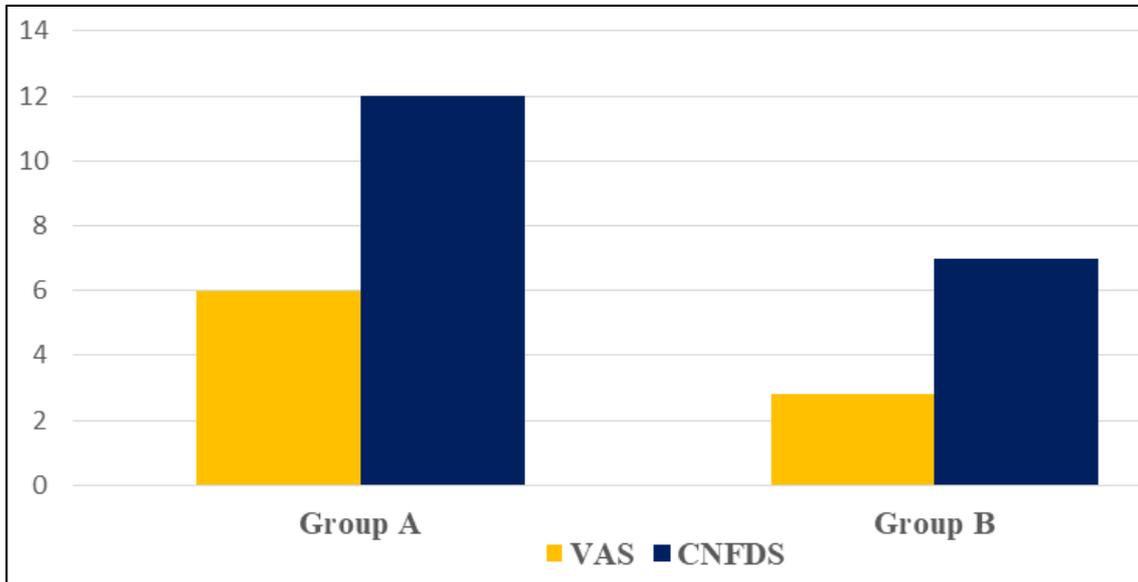
**Data presentation and analysis**

**Table 1:** Mean difference between group a and group b (vas and CNFDS)

Groups	Mean difference	
	Vas	CNFDS
Group A	6	12
Group B	2.8	7

Vas – Visual Analogue Scale.

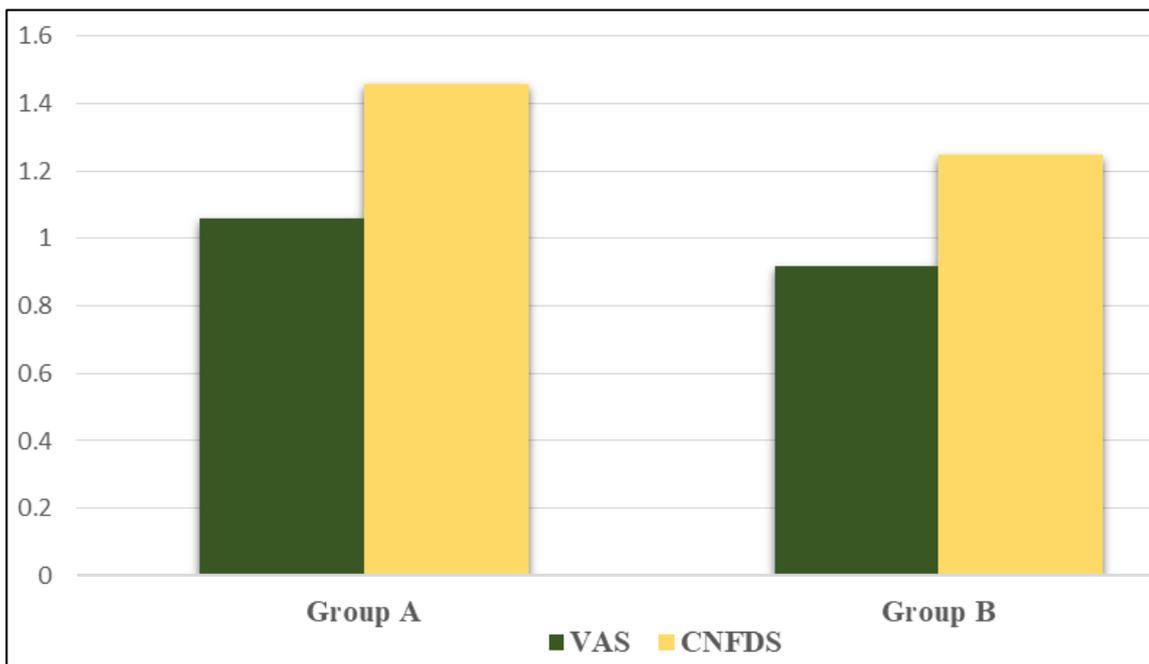
CNFDS – Copenhagen Neck Functional Disability Scale.



**Fig 1:** Graphical representation of mean difference between group a and group b (Vas and CNFDS)

**Table 2:** Standard deviation between group A and group B (VAS And CNFDS)

Groups	Standard Deviation	
	VAS	CNFDS
Group A	1.06	1.46
Group B	0.92	1.25



**Fig 2:** Graphical representation of standard deviation between group A and group B (Vas and CNFDS)

**Table 3:** Comparison of paired “t” test value and table value between group a and group B (Vas AND CNFDS)

Groups	Calculated Paired “T” Values		table value	Significance
	VAS	CNFDS		
Group A	22.1	31.8	2.15	Significant
Group B	11.77	21.67	2.15	Significant

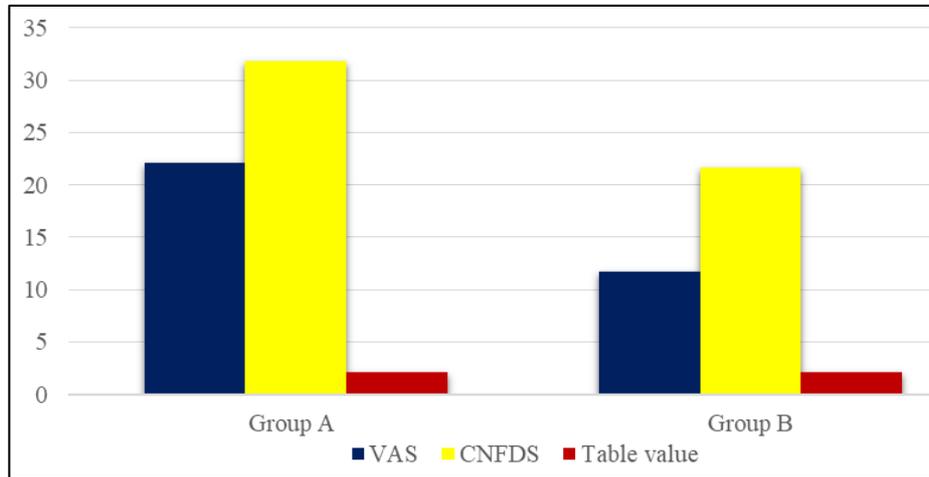


Fig 3: Graphical representation of comparison of paired “t” test and table value between group a and group B (VAS and CNFDS)

Table 4: Comparison of unpaired “t” test value and table value for vas and CNFDS

Parameters	Calculated Unpaired “T” Values	Table Value	Significance
VAS	9.88	2.05	Significant
CNFDS	10.2	2.05	Significant

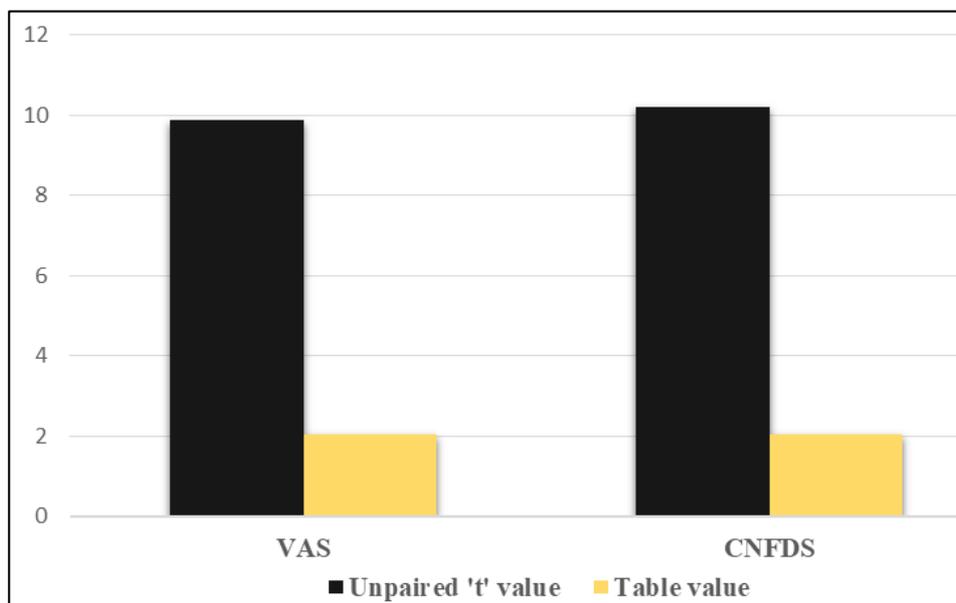


Fig 4: Graphical representation of comparison of unpaired “t” test values and table values for vas and CNFDS

**Results and Discussion**

**Results**

The study sample comprised 30 patients, of which 15 were Experimental group and 15 were control group. All the subjects underwent orthopaedic assessment performa. Among 30 subjects, 15 were treated with Suboccipital release and 15 were treated with Mckenzie exercise.

The pre and post test values were assessed by VAS and CNFDS in group A. The mean difference value is 6 and 12 respectively. The standard deviation value is 1.06 and 1.46 respectively. The paired “t” test value for VAS and CNFDS is 22.1 and 31.8. The paired “t” test value is more than table value 2.15 for 5% level of significance.

The pre and post test values were assessed by VAS and CNFDS in group B. The mean difference value is 2.8 and 7 respectively. The standard deviation value is 0.92 and 1.25 respectively. The paired “t” test value for VAS and CNFDS is 11.77 and 21.67. The paired “t” test value is more than table value 2.15 for 5% level of significance.

The calculated “t” value by unpaired “t” test were 9.88 and 10.2. The calculated “t” values were more than the table value 2.05 for 5% level of significance.

The paired “t” test values have shown that Suboccipital release were proved more effective than Mckenzie exercise for patients with non-specific neck pain.

The unpaired “t” test values have shown that there was significant difference between two groups in showing reduction in pain in patients with non-specific neck pain.

**Discussion**

This study aimed to investigate the effect of Suboccipital release and Mckenzie exercise.

In this study, there was a statistical significant difference in the impact of pain and disability in non-specific neck pain before and after Suboccipital release technique in all aspects. The result from statistical analysis of present study shows that both the techniques Suboccipital release and Mckenzie exercise shows improvement in both reduction of pain and

disability in non-specific neck pain. Within Group comparison, there was a positive impact and marked reduction of pain and disability in Suboccipital release technique. Thus, the effectiveness of Suboccipital release technique for the treatment of neck pain was good.

This technique was also cost effective and more practical than all other therapies and this technique also has no significant adverse effect especially when compared to drug therapy.

William P. Hanten *et al.*, has also stated that the effects of Sub-occipital release group showed clinical improvement in reducing functional disabilities and reducing pain.

Ylinen studied the mechanism by which the stabilization and dynamic exercises achieves its therapeutic effect on patients with non-specific neck pain is that the cervical muscles that tend to be weakened with neck pain are strengthened by strength or endurance exercises.

Ahlgren *et al.*, studied that the deep neck flexors and extensors scapular stabilizers and upper thoracic extensors are some of the muscles that are affected. Strengthening exercises for the shoulders and upper extremities reduce pain arising from the trapezius muscles and improved function.

Dusunceli *et al.*, compared three treatment protocol: physical therapy agent, physical therapy agent plus isometric and strengthening exercises and physical therapy plus stabilization exercises. They concluded that the stabilization protocol and physical therapy agent for neck pain patients were equally effective in reducing pain.

We recommend Suboccipital release to improve cervical function, because this demonstrated excellent effectiveness in the patients with non-specific neck pain.

This study has proved that Suboccipital release is effective than Mckenzie exercise for non-specific neck pain.

#### Limitations

- Study has been conducted on small sized sample only.
- This study done only on 20-40 years of age group.
- This study was not considered the body mass index of subjects.
- Range of motion, muscle power were not taken as variables.
- This study was limited to non-specific neck pain.
- This study was limited to assess only the pain intensity by using Visual Analogue Scale and disability by using Copenhagen Neck Functional Disability Scale.

#### Recommendations

- This study can be done with larger sample size.
- Same study can be done in different body mass index.
- Same study can be done in white collar jobs.
- Compare the effects of sex difference.

#### Summary and Conclusion

A prospective study of thirty non-specific patients considered to determine the effect of Suboccipital release and Mckenzie exercise in patients with non-specific neck pain.

Data analysis showed that there is significant reduction in pain and disability in both groups after the treatment regime. But when compared between two procedures for effectiveness, the results were more significant for Group A i.e. Suboccipital release.

The results of the study concludes that,

1. This study can be concluded by stating that both Suboccipital release and Mckenzie exercise have got

beneficial effect in reducing pain intensity and disability in patients with non-specific neck pain.

2. There was a significant reduction in pain and disability of both groups.
3. Comparatively there was more reduction of pain and disability in subjects who received Suboccipital release.
4. Through the results, alternate hypothesis is accepted and also the study could be concluded that there is a significant difference between "Efficacy of suboccipital release versus mckenzie exercise in reducing pain and disability in patients with non-specific neck pain."

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