

Compare the effectiveness of between Isometric Strengthening Exercise and Postural Correction in Patients with Neck Pain

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Abstract

Introduction

Neck pain is second only to low back pain as the most common musculoskeletal disorder in population surveys and primary care, and, like low back pain, it poses a significant health and economic burden, being a frequent source of disability. While most individuals with acute neck pain do not seek health care, those that do account for a disproportionate amount of health care costs. [1]

Neck pain increases with age in men and women and this appears to differ from low back pain. While in men it peaks between 40 years and 50 years of age and it is more common in women than men. Numerous studies have investigated environmental causes of neck pain, but findings have been conflicting and no clear picture exists at present.

Methodology

A convenience sample of 30 subjects with neck pain randomly assigned into two groups like group A and B. The Group A subject received Isometric Strengthening Exercise and Hot Pack. The Group B subject received Postural Correction, Hot Pack. All two groups were treated for four weeks.

Instrumentation For Data Collection: - Instrumentation for Data Collection is Visual analogue Scale (VAS) – For Pain and Functional rating index (FRI) – For functional limitation/disabilities

Results- Comparison of VAS & FRI between groups was done by using ANOVA. No significant difference was found from 0 to 1 week ($P > 0.05$). But significant difference found at 2 to 4 weeks in all 2 groups. ($P < 0.05$)

Conclusion

In the present study, there was significant difference between the Isometric strengthening exercise treatment and Postural Correction for neck pain. The Isometric strengthening exercise protocol has been found to be more beneficial than the Postural Correction.

Keyword- Isometric strengthening exercise, Postural Correction, Hot Pack, Visual analogue Scale (VAS) and Functional rating index (FRI).

Introduction

Neck pain is second only to low back pain as the most common [musculoskeletal disorder](#) in population surveys and primary care, and, like low back pain, it poses a significant health and economic burden, being a frequent source of disability. While most individuals with acute neck pain do not seek health care, those that do account for a disproportionate amount of health care costs. Furthermore, in the setting of the [whiplash syndrome](#), neck pain accounts for significant costs to society in terms of insurance and litigation, and days lost from work. Much neck pain is not attributable to a specific disease or disorder and is labelled as 'soft-tissue' rheumatism or muscular/mechanical/postural neck pain. Most chronic neck pain is attributed to whiplash injury, another enigmatic diagnosis. Despite decades of research and posturing to explain chronic neck pain on the basis of a specific disease or injury, and despite increasingly sophisticated radiological assessment, little advance has been made in either achieving a specific structural diagnosis or, more importantly, in reducing the health and economic burden of chronic neck pain.^[1]

Neck pain is one of the most common persisting symptoms in the general population with an estimate lifetime prevalence of 67% among adults of age group 20 to 69 years. Limited range of motion and a subjective feeling of stiffness may accompany neck pain, which is often precipitated or aggravated by neck movements or sustained neck postures. Headache, brachialgia, dizziness and other signs and symptoms may also be present in combination of neck pain.^{[2] 22}

Patient with neck pain may have reduced neck strength in flexion, extension and rotation. Neck strength in all directions was significantly lower in patient with neck pain. Some study reports on the responses to specific strength training of the extensor, flexor and rotator muscles of the neck.¹⁵

Highland and Dreisinger et al⁵⁵ performed a study on changes in isometric strength and range of motion of the cervical spine after eight weeks of clinical rehabilitation. They that all groups showed significant gain in average strength, range of motion and decreased pain.

Alan Jordan et al¹¹ done treatment including a combination of active and passive elements. The passive elements were Hot Pack for a duration of 20 minutes, continuous US (3w/cm² for 5 minutes) and manual traction. The active element included instruction of the home exercise program. The treatment protocol was given for six weeks. They found that self-reported improvements for pain and disability show approximately 50% reduction.

Aims and Objectives

To compare the effectiveness of Isometric Strengthening Exercise and Postural Correction in patients with neck pain.

Hypothesis

Experimental Hypothesis

The Isometric Strengthening Exercise on neck pain will be effective than Postural Correction.

Null Hypothesis

The Isometric Strengthening Exercise on neck pain will be not effective than Postural Correction.

Review of Literature

ANATOMY OF NECK

There are total seven cervical vertebrae in which first, second and seventh is called atypical and third to sixth are typical. The atlas is first cervical vertebrae supports the head. The axis is second cervical vertebrae is an axle for rotation of the atlas and head around the strong dens. The seventh cervical vertebrae has a long spinous process than other cervical vertebrae.^{21,58}

Cervicovertebral joint is formed by the articulation between the cranium and vertebral column provides a wide range of movements. It consists of the atlanto axial joint and atlanto-occipital joint. The atlanto axial joint is formed by the articulation of atlas and axis & has three synovial joints, a pair between lateral mass and a median complex between the dens of axis and anterior arch and transverse ligament of the atlas. The lateral atlanto axial joints are formed by the articulation of inferior articular facet of lateral mass of atlas and superior articular facet of axis. The median atlanto axial joint is pivot between the dens and ring formed by anterior arch and transverse ligament of atlas. The main movement of atlanto axial joint is rotation head^{21,58}.

The atlanto occipital joints are formed by the superior aspect of each concave facet of lateral mass of atlas articulates with occipital condyle. The bone are connected by anterior capsule and posterior

atlanto occipital membranes. The movements of these joints are flexion with a little lateral flexion and rotation²¹.

The movement of the cervical spine is produced by following muscle as-

- Flexion- Sternocleidomastoid, Scalenus anterior, Para vertebral muscle.
- Extension- Splenius, Semispinalis, Rectus Capitis posterior, Upper Trapezius, Intrinsic, Erector spinae.
- Rotation- Sternocleidomastoid, Small Intrinsic
- Lateral flexion- Scalenus anticus, Scalenus medius, Scalenus posterior, Small Intrinsic, Sternocleidomastoid⁵⁶



Fig. 2.1 Posterior view of cervical muscle

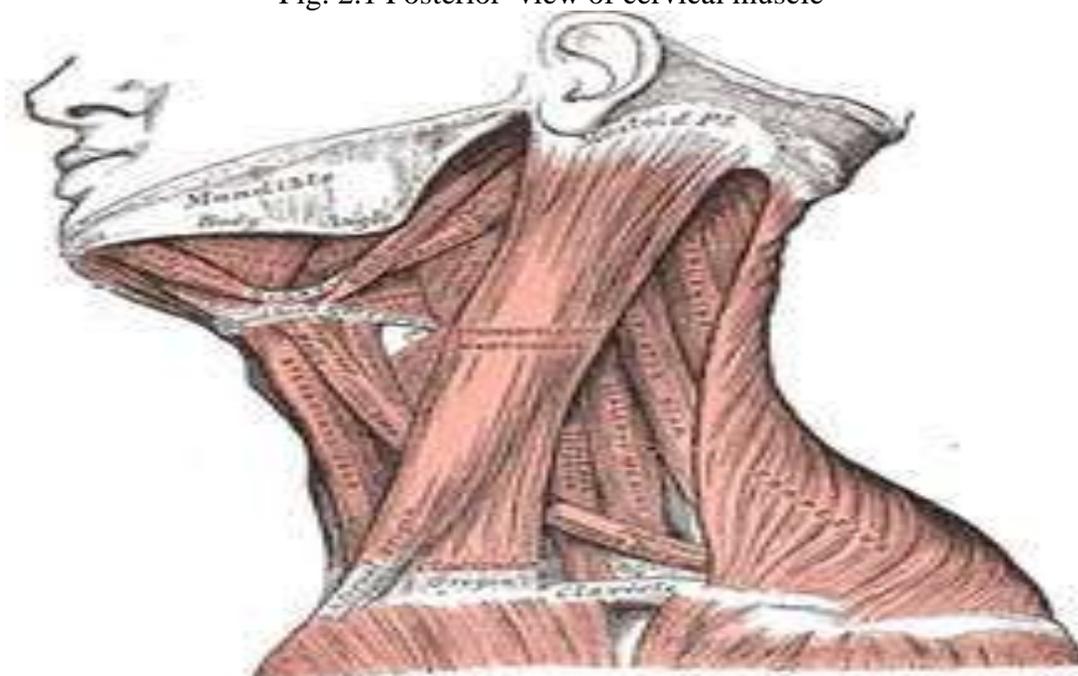


Fig. 2.2 Lateral view of cervical muscle

BIOMECHANICS OF CERVICAL SPINE

The cervical spine is a miracle in design and structure as if moves in various planes. It supports the head and provides musculoskeletal stability. The line of gravity fall anterior to these articulations, a force must be the posterior neck Muscles to hold the head erect.⁴³

The cervical spine is best considered in three sections: upper cervical spine (Occiput-C3), mid cervical spine (C3-C5) and lower cervical spine (C5-C7). Disorder of the upper cervical spine

frequently results in headache. Disorders of the mid- cervical spine are most commonly synovial type disorders and pain from these level may be referred upward or downward. The lower cervical spine involves synovial joint structures and inter-vertebral disc. Cervical discogenic disorders occur most frequently in the lower cervical spine.⁴²

All movements in cervical spine are relatively free because of the saddle like joint. The motion of flexion and extension, lateral flexion and rotation are permitted in the cervical region. The cervical spine is most freely in the upper cervical area and is progressively restricted downward.⁴⁴

The cervical region differs from the thoracic and lumbar regions and bears less weight and is generally more mobile and flexibility of any of the regions of vertebral column. The muscles responsible for providing stability are multifidus, interspinals, semispinalis, capitis and semispinalis cervicis. If these muscle torn during injury, the stability of the complex will be severely compromised.⁴⁴

No discs are present at either the atlanto-occipital and atlanto axial articulations. Therefore, weight of the head must be transverse directly through the atlanto-occipital joint to the articular facet of the axis. These forces are then transferred through the pedicles and lamina of the axis to the inferior surface of body and two-zygophyseal articular process. The joint capsules in the cervical region are lax and therefore provide less motion than in the thoracic and lumbar region.⁴⁴

The site of maximum motion in flexion and extension occurs between C4 & C6. Generally, motion is limited by tension in ligament and annulus fibrosus and by zygapophyseal facet orientation. Lateral flexion is limited by uncinat processes where as hyperextension is limited by bony contact of the spinous process. The disk at C5-C6 may be subject to a greater amount of stress than other disks because C5-C6 is the area which has the greater range of flexion – extension and where the mechanical strain is greatest^{44,6}.

The deep neck flexor (DNF) muscles are small stabilizing muscles located on then anterior and antero-lateral surfaces of the cervical spine deep to Sternocleidomastod muscle. The DNF muscles are longus capitis, longus colli, rectus capitis anterior and rectus capitis anterior and recuts capitis lateralis. These muscles play an important role in stabilizing the cervical spine. Mayouk Benhamaei reported that the longs colli and dorsal neck muscles from a sleeve that stabilizes the cervical spine in all position against the effects of gravity. When muscles performances id impaired the balance between the stabilizers on the posterior aspect of the neck and DNF will be disturbed, resulting in loss of proper alignment and posture, which is then likely to contribute to cervical impairment.¹⁶

Punjabi quantitatively determined three dimensional movements of the cervical spine. Bhalla & Simmons in their study of vertebral movement C2 through T1 found that the greatest range of movement occurred at C4-C5. Likewise found greater ROM at mid cervical than at than seventh cervical spine. Lind et al showed largest intersegmental range of flexion and extension motion occurs between C4 to C5 and C5 to C6.³⁰

PATHOMECHSNICS OF NECK PAIN

The cervical structure can be affected by specific causes such degenerative disease, trauma and /or inflammatory disorders and that neck pain can result. The neck pain also causes due to mechanical disorders including those arises from habitual postures and degenerative involvement, have been referred as nonspecific neck pain. These non-specific neck pain problem result from poor posture in termed of sustained, long term abnormal physiological loads on neck. Both Haughie & Mckenzie have suggested that these load compromise pain-sensitive and imbalance in the upper quarter of the body.¹⁹

The most common cervical pathology seen by manual therapists is vertebral motion restriction or somatic dysfunction. The term somatic dysfunction is used by the osteopathic profession and refer to altered function of the components of the musculoskeletal system. Many terms such as of joint play. Joint dysfunction, joint blockage and acute facet lock desire restriction of vertebral motion. Many theories attempt to explain vertebral motion restriction.⁴³

Moderately strong soft tissue connection exit within the occiput atlas axis complex. Osseous, muscle, tendon, ligament and lymph node abnormalities, tends to restrict motion, while tissues tears & lax ligaments without associated muscle spasm allow too much motion.⁴³

Studies by Kellgren identified specific reproducible pattern of pain activated when selected connected tissues and muscle structure were irritated.⁴³

Neck pain and spasm of the upper Trapezius muscle after assume a forward head position.

In this position the neck is thrust forward and upward so that the effective length of the posterior neck muscle is reduced while that of the anterior neck muscles is increased.⁶

Patient with neck pain usually exhibit poor body alignment with a forward head posture, accompanied by upper quarter muscle imbalance. The poor posture is characterized by tightness and increased activation of the sub occipital muscle, sternocleidomastoid, upper trapezius, latver scapulae and pectoralis muscles and by weakness of the deep neck flexor (DNF) and lower stabilizers of the scapulae (Serratus anterior, Rhomboids, Middle trapezius, and lower trapezius).³⁴

Forward head posture produces compensatory motions in the cervical and upper thoracic spine, as well as in the atlantoaxial joint. The forward head posture results in increased flexion in the upper thoracic spine and extension in the upper cervical spine.³⁵

Cervical sprain and disk rupture are often associated with severe pain muscle spasm and are more common in adults because of reduced elasticity of supporting tissue. Cervical stiffness, muscles spasm, spinous process, tenderness and restricted motion are common. When pain is present, it is often poorly localized and referred to occiput, shoulder between the scapula, arm of forearm.⁴³

Cervical radiculopathy is a common disorder of a nerve root and most often, it is the result of compressive or inflammatory pathology from a space occupying lesion such as a disc herniation, Spondylitis spur or cervical osteophytes. Patient may have neck pain, arm pain, numbness, tingling and weakness in the upper extremity, which often result in significant functional limitation and disability.³³

Degeneration of the intervertebral disc leads to reabsorption and approximation of the related.

Osteophytes spur may develop in the uncovertebral joints as well as posterior facet joints, the result during repetitive extension and rotation of the degenerated mild cervical spine is friction of the nerve roots by osseofibrous irregularities in the intervertebral foramen or traction on nerve, producing pain and dysfunction. According to Gunn, deep muscle tenderness may be secondary to denervation sensitivity of nociceptors at the neurovascular hilus.⁴³

ISOMETRIC STRENGTHENING EXERCISE

Isometric exercise is a state form of exercise that occurs when a muscle contracts without an appreciable change in the length of the muscle's or without visible joint motion. Although great amount of tension and forced output are produced by the muscle without involvement of joint. These forms of exercise include muscle setting exercise, resisted isometric exercise and stabilizations exercise performed against little to no resistance. These are used to promote muscle relaxation and circulation and to decrease muscles pain and spasm. Resistance isometric exercises, performed against manual or mechanical resistance are used to develop muscle strength. In stabilization exercise the joint or postural stability can be develop through the application of isometric exercise, stability is achieved by activation co-contracting, that is contraction of antagonist muscles that surround proximal joint. Stabilization exercise are usually performed in weight-bearing postures in a closed Kinematic chain.⁴

Headache and neck pain are complaints that affect 2/3 of population because the cervical muscles supports the weight of the head and neck often originate as a result of muscular weakness or from fatigue resulting from sustained muscular contraction. Neck muscles are classified as postural muscles and they continuously work isometrically to stabilize the position of the head during bodily moments.^{7,36}

Muscles function is an important factor in understanding neck pain several studies have found weakness in the cervical flexor and extensor muscles in patient with chronic neck pain compared with health control's but did not find any one to report weakness in the rotator muscles.²⁶

Gogra et al³⁶ reported a significantly lower muscle torque in both anterior and posterior neck muscles in patients with osteoarthritis of cervical spine when compared with normal subjects.

Thomas et al⁵⁶ state that there is significant decreased of muscles strength in patient with degenerative disc, herniated disc and cervical strains.

Graves et al⁷ have done study isometric lumbar extension exercise in low back pain. They found

that there is significant gain in strength, range of motion and decrease pain.

Ylinen et al²⁶ showed that isometric neck muscles training increase neck strength, which was associated with decrease in neck pain and associated symptoms.

Thomas R.Highland and Dreisinger et al⁵⁵ they have done study on changes in isometric strength and range of motion of the motion of the isolated cervical spine after eight weeks of clinical rehabilitation. They found that all groups showed significant gain in average strength, range of motion and decreased pain. The test and training of the isolated cervical spine muscles is a safe and viable method of clinical assessment and treatment of a variety of cervical spine disorder.

Hans.E.Berg et al²³ they done the study on Dynamic Neck Strength training to see the effect on pain function, their result showed that there was a increase in muscle in muscle strength and also decrease in neck pain.

Peter D Aker.et al¹³ they develop the conservative management for mechanical neck pain and concluded that conservative method have not been studied in enough detail to assess effectiveness adequately.

POSTURAL CORRECTION

Posture is a attitude of the body. The relative arrangement of body parts for a specific activity. Gravity place stress on the structures responsible for maintaining the body upright in a posture. The center of gravity of head falls anterior to atlanto-occipital joints. The posterior cervical muscles controls to keep the head balanced.⁴⁻⁵

Neck pain and spasm of the upper fibers of trapezius muscle often assume a forward head position. In this position, the neck is thrust forward and upward so that the effective length of the posterior neck muscles id reduced while that of the anterior neck muscles are increased.⁶

Two necks position and for postural correction includes axial extension or maintaining a neutral neck position are advocated by many authorities.

Axial extension refers to the comnined movement of flexion of the occiput at atlanto-occipital joint and extrnsion of the low cervical spine so that the cervical lordosis is reduced. In this position a “flat neck attitude” is maintained with “chin in, head up and head back”.⁵⁶

Chukuka S.Enwemeka et al⁶ they have observed that patient with neck pain and spasm of the upper fibers of the trapeziue muscle often assume a forward head position. Neck pain is often accompanied by protective muscle spasms, which develop pressure within the homonymous muscle, thus producing ischemia, more pain and abnormal neck posture. He concluded that posture correction is most effective in reducing pain and muscle spasm.\

SimoTaimela at el¹⁸ they compare the effective of a multimodal treatment emphasizing Proprioception treating (active) with activated home exercise and recommendation of exercise in patient with nonspecific chronic neck pain. He concluded that the application of active treatment (active & home) was related to reducing of pain.

HOT PACK (HYDROCOLLATOR PACK)

Hot Packs are usually a concave cover filled with a hydrophilic substance such as betonite. The thermostat maintains the high temperature (170⁰F) and helps prevent burns. Hot Packs come in three size (1) cervical is 6x18 inches for the cervical spine (2) Double size is 24x24 inches for most body segments packs are removed by scissor handles.⁶⁰

Hot Packs are kept is a commercial water filled container that maintaining a temperature of approximately 71⁰C. the packs are wrapped in six to eight layers of dry towel to protect the patient from burn. Treatment time should be 15 to 20 minutes^{52, 60}.

Willium et al⁶⁰ Hot Packs provide only superficial heeling is only about 1cm,and occurs within 10 minutes of application.

Draper and Harries et al⁵⁹ a couple of studies have shown that a 15 minutes hot pack application prior to ultrasound had an additive heating effect. It was suggested that the ultrasound treatment duration can be decreased 30 to 5 minutes when tissues are preheated with hot pack.

Alan Jordan et al¹¹ treated the neck pain with combination of active and passive elements, included in the passive elements were hot packs for duration of 20 minutes, massage, continues ultrasound (3 W/cm² for 5 minutes) and manual traction. Active therapy included instruction in the same

home exercise program. They showed approximately 50% reduction of neck pain in all groups.

METHODOLOGY

Sample Design

Study Design

It is an experimental study design. A convenience sample of 45 subjects with neck pain was solicited from the physiotherapy department of DIBNS. The total subject divided into two groups A and B, in which each groups have 15 subjects. The Group A subject received Isometric Strengthening Exercise and Hot Pack. The Group B subject received Postural Correction, Hot Pack. All two groups were treated for four week. In group A subjects with mean and standard deviation of age, height and weight were 30.7. The patients were selected according to inclusion and exclusion criteria. Inclusion Criteria:- Patient with neck pain (duration two month or more) with or without radiation., Age Group - 25-50 years, Weight -50to 80 kg., Atraumatic origin, VAS : 4-7, FRI : 40-70% and Exclusion Criteria- Subjects with a history of severe trauma such as fracture, Congenital disorder of cervical spine, Patient with neurological deficit, Spondylolisthesis, Tumour, Spinal surgery, Pott's spine, Rheumatoid Arthritis Disorder, Ankylosing Spondylosis, Vertebro- Basilar Insufficiency and Cardiac Problem. Instrumentation for Data Collection- VAS and Functional Rating index (FRI)

Protocol

They study made of 30 subjects who were randomly divided into two groups A & B prior to participation all subjects were informed about the study and an informed consent was taken. VAS and FRI were taken for all the subjects before starting the study. The Group A subject were received Isometric Strengthening Exercise and Hot Pack. The Group B subject received Postural Correction, Hot Pack. All two groups were treated for four week.

Procedure

Isometric Strengthening Exercise

The patient was in sitting position. These were initially done with the neck in neutral postures and with a therapist resisting flexion, extension, lateral flexion and rotation by the therapist. Contraction were held for 5 seconds/repetitions and repeated 10 times, with 3 seconds rest in between them. These exercises were done for 2 sets with 1 to 2 minutes rest in between each set. Placement of therapist hand for each movement is as follows:-

1. Flexion: - The therapist placed his hand on the forehead of patient and the patient was asked to press the forehead in to the palms of the therapist in a nodding fashion.
2. Side Flexion: - The therapist placed his one hand on the side of the patient's head and the patient was asked to press the therapist hand in a side flexion fashion.
3. Extension: - The therapist placed his one hand on the back of the patient's head, near the top of the head. The patient was asked to press the head on the therapist hand.
4. Rotation:- The therapist placed one hand against the region just superior and lateral to the eye. The patient was asked to turn the head to look one's own shoulder.

Fig. 3.5: Isometric Exercise For Rotation In Sitting Position



Fig. 3.6: Isometric Exercise For Extension In Sitting Position



Fig. 3.7: Isometric Exercise for Flexion In Sitting Position



Fig. 3.8: Application of Hot pack in neck region



Hot Pack

The position of the patient was supine lying the hot pack was wrapped in towel with thickness of about 6-8 layers before being applied it the neck area. The hot packs were stored in hot water kept at about 72-75⁰ C (158⁰-167⁰ F) inside a thermostatically controlled hot pack containers. The hot pack was initially heated for two hours and 30 minutes reheated between each use. Lahmann et al (1996) state that after 8 minutes application of hot pack the skin temperature was reached its maximum. The pack was left in place for 20 minutes.^{14, 15}

Postural Correction

The patients in all groups were given postural correction and postural awareness as home program. The postural correction was recommended as axial extension or neutral neck position. These were done to correct neck position for patient with neck pain and spasm of upper trapizius. The postural awareness program consists of the following points

Reading Posture

1. Neck should not be kept in one position for prolong time.
2. Adjust the height of reading table such that the books are at the level of eyes and arms are comfortably place. Avoid slouching lower back and shoulders. Sit tall with whole back against chair back and head erect.
3. Computer and TV screen should be at proper height and distance.
Position & height of monitor should be within 20⁰.

Sleeping Posture

1. Avoid big pillows: they make neck rest higher than body causes it to bend forward.
2. Use pillows of adequate height that aligns the head and neck at the same level of body. The pillows should support the head and neck fully and should extend up to shoulders.

DATA ANALYSIS

Data was analyzed using SPSS software 12.0 version. Variable i.e. age weight and height of group A and B were analyzed by using one way ANOVA. One way ANOVA was used to analyze the variable i.e VAS and FRI at 0,1,2,3 and 4 week between the 2 groups. Post hoc analysis using Tukey HSD was used for pair wise comparison of VAS and FRI at 0,1,2,3 and 4 weeks between the 2 groups. The significant level of this study was 0.05.

RESULTS

The age, weight and height of subjects in groups A and B were compared by using analysis of variance. There was no significant difference found in age, weight and height in all 2 groups (P>0.05) (Table 5.1)

Comparison of VSA between groups was done by using ANOVA. No significant difference was found from 0 to 1 week (P>0.05). But significant difference found at 2 to 4 weeks in all 2 groups. (P<0.05) (Table 5.2)

Comparison of FRI between groups was done by using ANOVA. There was no significant difference found at 0 and 1 weeks ($P < 0.05$). But significant difference was found at 2 to 4 weeks in all 2 groups. ($P < 0.05$) (Table 5.2)

Comparison of VAS between the 2 groups i. e. groups A and B was done by Post Hoc test using Tukey HSD at 0 to 1st week. There was significant difference was found at 2 and 4 weeks between A & B ($P > 0.05$) (Table 5.3)

Comparison of FRI between the 2 groups i.e groups A and B was done by using Post Hoc test (Tukey HSD) at 0 to 1 week. No significant difference was found between the groups ($P > 0.05$). But there was significant difference was found at 2 to 4 week between A & B. ($P > 0.05$) (Table 5.4).

Table 5.1 Demographic data

Variable	f- value	p-value
Age	1.776	0.491
Weight	1.165	0.322
Height	2.687	0.080

Table 5.2 Comparison of VAS and FRI between groups 0 to 4 weeks.

Variable	Week	f- value	p-value
VAS	0	0.024	0.976
	1	0.160	0.853
	2	5.615	0.007
	3	10.635	0.000
	4	12.860	0.000
FRI	0	0.209	0.812
	1	0.929	0.403
	2	9.086	0.001
	3	13.899	0.000
	4	12.293	0.000

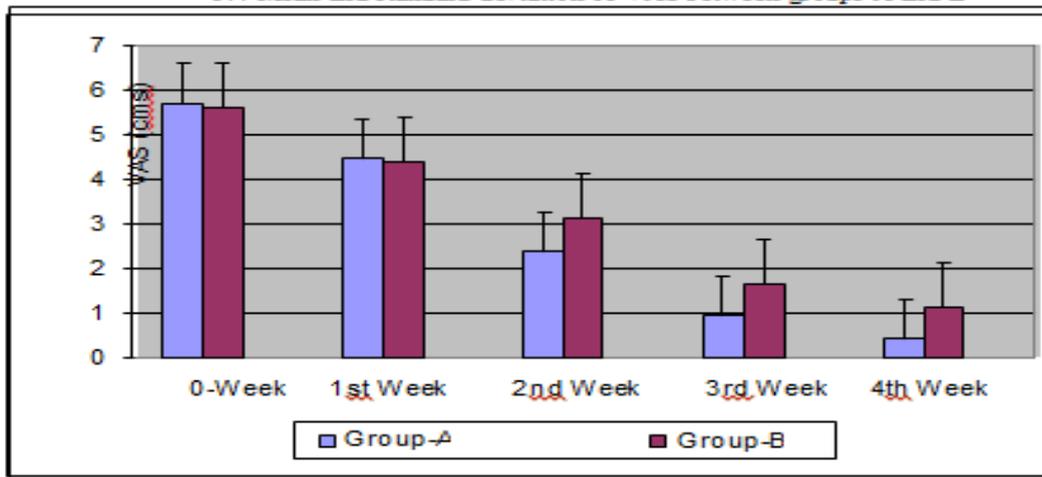
Table-5.3 post Hoc Tests for VAS between groups A and B from 0 to 4 weeks.

Variable	Group (i)	Group (j)	Mean Difference (i-j)	Std. Error	Signification (p-value)
VAS 0 week	1	2	0.06667	0.34975	0.980
	1	3	0.06667	0.34975	0.980
VAS 1 week	1	2	0.06667	0.36048	0.981
	1	3	-0.13333	0.36048	0.927
VAS 2 week	1	2	-0.73333	0.34303	0.094
	1	3	-0.13333	0.34303	0.005
VAS 3 week	1	2	-0.73333	0.34733	0.100
	1	3	-1.60000	0.34733	0.000
VAS 4 week	1	2	-0.73333	0.38490	0.150
	1	3	-1.93333	0.38490	0.000

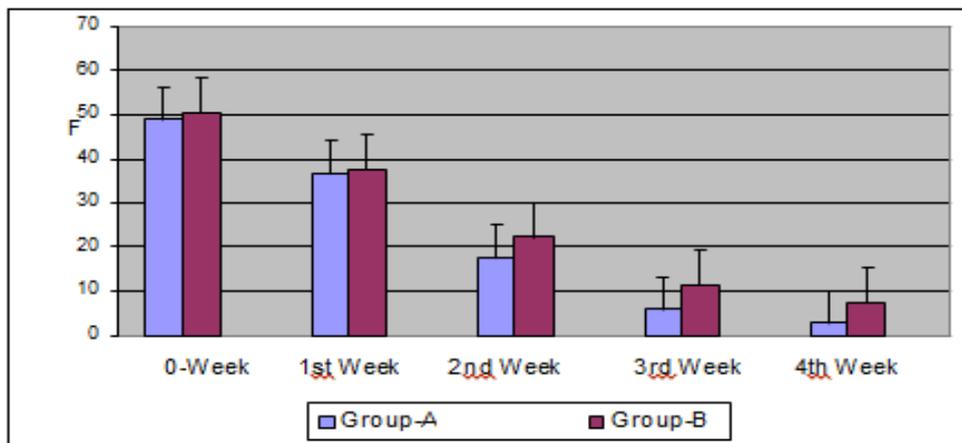
Table-5.4 Post Hoc Tests for FRI between groups A and B from 0 to 4 weeks.

Variable	Group (i)	Group (j)	Mean Difference (i-j)	Std. Error	Signification (p-value)
FRI 0 week	1	2	-1.73333	2.80461	0.811
	1	3	-1.33333	2.80461	0.883
FRI 1 week	1	2	-0.86667	2.59197	0.940
	1	3	-3.40000	2.59197	0.379
FRI 2 week	1	2	-4.66667	3.14052	0.308
	1	3	-13.20000	3.14052	0.000
FRI 3 week	1	2	-5.66667	2.94104	0.144
	1	3	-15.33333	2.94104	0.000
FRI 4 week	1	2	-4.73333	3.12254	0.294
	1	3	-15.13333	3.12254	0.000

5.4 Mean and standard deviation of VAS between groups A and B



5.5 Mean and standard deviation of FRI between groups A and B



DISCUSSION

The Isometric strengthening exercise was more effective or successful than Postural Correction and hot pack with a more rapid improvement in pain intensity during third and fourth week. The purpose of this study was to find-out whether any clinically observable improvement in neck pain, occurs after performance of Isometric strengthening exercise in comparison to other Postural Correction and hot pack.

The present study showed that the Isometric strengthening exercise is effective in improvement of neck pain after a rehabilitation protocol of four sets 10-15 repetitions per day four weeks in comparison to other groups, which had followed the other protocol.

Chukuka S. Enweneka et al⁶- neck pain is often accompanied by protective muscle spasm which developed pressure within the homonymous muscle, thus producing ischemia, more pain and abnormal neck posture. They showed that postural correction was effective in reducing neck pain and muscle spasm other studies have showed that spasm of the sternocleidomastoid and perhaps temporomandibular pain may be reduced by postural correction.

Thomas R, Highland and Dreisinger et al⁵⁵ studied the changes in isometric strength and range of motion of the isolated cervical spine after 8 weeks of clinical rehabilitation. They found that all group showed significant gain in average strength, range of motion and decreased pain.

Alan Jordan et al¹¹- treated the neck pain with combination of active and passive elements, included in the passive elements were hot packs for duration of 20 minutes, massage, continues ultrasound (3 W/cm² for 5 minutes) and manual traction. Active therapy approximate 50% reduction of neck pain in all groups.

In my study there was significant reduction of neck pain through Isometric strengthening exercise within the groups. The group A showed more improvement that other group B.

Future Research

¹. Future research can be carried out with increased number of patients to analyze the effectiveness of Isometric strengthening exercise.

². The future research can also be carried out with increased duration of treatment protocol and increased VAS (visual analogous scale) and FRI (functional rating index)

Relevance to Clinical Practice

The present study proved that the Isometric strengthening exercise is more successful than postural correction. So we can apply the Isometric strengthening exercise to the patient having neck pain in clinical practice. Isometric strengthening exercise that increase the strength and tone of the muscle and reduction of neck pain.

LIMITATIONS

If the number of subjects had been more, results would have been better enhanced.

CONCLUSION

In the present study, there was significant difference between the Isometric strengthening exercise, postural correction and Hot Pack treatment for neck pain. The Isometric strengthening exercise has been found to be more beneficial that the postural correction and Hot Pack.