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Therapeutic Effect of Cervical Muscles Retraining Exercises with Medication Versus Only Medication for the Management of Unilateral Cervicogenic Headache

Research Article

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Abstract

Background: Headache is pain in any region of the head. Headaches may occur on one or both sides of the head, be isolated to a certain location, radiate across the head from one point, or have a viselike quality. A headache may appear as a sharp pain, a throbbing sensation or a dull ache.

Objective: To compare the effect of cervical muscles coordination retraining exercises along with medication and medication alone on pain reduction, improving the cervical muscle strength and postural correction in patients with cervicogenic headache.

Study design: Quasi experimental study design.

Method: 30 subjects with cervicogenic headache were included in the study with 15 in each group. Subjects were from 20 – 45 years. One group received cervical muscle coordination retraining exercises along with medication and the other group received only medication.

Outcome measures: The pretest and posttest values were taken for verbally administered numeric rating scale, frequency of headache, craniovertebral angle and craniocervical flexion test.

Results: Statistical analysis were done using paired ‘t’ test for comparing within the group and independent ‘t’ test for comparing between the groups. Both groups show significant differences before and after the treatment. This was done to find out the effect of exercises on cervicogenic headache.

Conclusion: It was concluded that, the exercises with medication group was more effective than the medication group for patients with cervicogenic headache in reducing intensity and frequency of pain, improving craniovertebral angle and craniocervical flexion test. Henceforth these exercises can be used along with the medication as effective intervention.

Key words: Craniovertebral angle, craniocervical flexion test, cervicogenic headache.

Introduction

Headache is pain in any region of the head. Headaches may occur on one or both sides of the head, be isolated to a certain location, radiate across the head from one point, or have a viselike quality. A headache may appear as a sharp pain, a throbbing sensation or a dull ache. Headaches are a common disorder and often incapacitating condition. In the general population, at least 90% of individuals experience headache at some stages of their life. The headache classification committee of the international headache society has classified headache into primary and secondary types. Cervicogenic headaches been classified as secondary headache and defined as "headache caused by a disorder of cervical spine and its component body, disc and/or soft tissue elements, usually but not invariably accompanied by neck pain." Recent population based studies found the incidence of cervicogenic headache has been estimated to be 14 to 18 % from all chronic headache [1-4]. It is more prevalent in women. However 70% of persons who are having cervicogenic headache have neck symptoms associated with their headache [5].

The features of cervicogenic headache include precipitation of head pain by neck movement and/or sustained awkward head position and/or by external pressure over the upper cervical or occipital region on the symptomatic side; ipsilateral neck, shoulder or arm pain of a rather vague nonradicular nature or occasionally arm pain of a radicular nature; unilaterality of the head pain without side shift [6]. The head pain in cervicogenic headache is characterized by moderate-severe, nonthrobbing and nonlancinating pain usually starting in the neck with duration from few hours to few days or a couple of weeks of fluctuating or in a continuous pattern [2].

Some of the studies documented the disturbance in the neck flexor synergy in patients with cervicogenic headache. The cervical neuromuscular control is provided by the combined activity of deep and superficial muscles of cervical spine [7]. The altered strategies of this neuromuscular control in the cervical region is mainly occur due to pain, pathology and abnormal posture and it may compromise the active support of cervical spine segments. The uncoordinated patterns of muscles activity andneuromuscular control thus reduce the stability of cervical segments and the functional movements [3].

The deep neck flexor muscles have a vital role in supporting the cervical segments and cervical curve. The weakness of this muscle contributes the increased cervical lordosis. And this sustained posture expected as an aggravating factor when a headache is arising from the neck.

The conservative treatment of Cervicogenic headache includes pharmaceutical agents (simple analgesics and NSAIDS) and a variety of physical therapies [8]. Physical therapy include manipulative therapy, traction, trigger point therapy, muscle stretching, cold packs, hot packs and TENS. Cognitive behavioral programs have also been tested. In addition to that, various medical and surgical procedures have been used. The efficacy of physical therapy management is being evaluated within the framework of evidence based healthcare [9]. But for a successful outcome, the first criterion is to treat the patient for whom the intervention is appropriate [4].

Aim and Objectives

Objectives

To find out Therapeutic effect of cervical muscles retraining exercises with medication versus only medication for the management of cervicogenic headache

Methodology

Research design: Quasi experimental study design.

Study population: Patients with cervicogenic headache.

SAMPLING TECHNIQUE: Non probability purposive sampling.

SAMPLE SIZE: 30 samples: 15 in each group.

Experimental group [group A] - 15 patients

Control group [group B] - 15 patients.

STUDY DURATION: 1½ years.

STUDY SETTING: Physiotherapy Center, NIMHANS Hospital, Bangalore.

STUDY CRITERIA:

Inclusion criteria:

1. Patients with cervicogenic headache, confirmed by "the cervicogenic headache international study group diagnostic criteria".
2. Age limit: 20-45 years.
3. Both genders are involved.
4. Frequency of cervicogenic headache – at least once per week over period of 2 months or more.
5. Unilateral headache'
6. Poor performance in craniocervical flexion test – unable to control more than 2nd stage.
7. Patients who have craniovertebral angle <420.

Exclusion criteria:

1. Features suggesting migraine & tension type headache.

2. Bilateral headache.
3. Hemicrania Continua.
4. Cluster headache.
5. Chronic paroxysmal hemicranias.
6. Headache attributed to trauma or injury to the head and/or neck.
7. Headache attributed to cranial or cervical vascular disorder.
8. Headache attributed to non-vascular intracranial disorder.
9. Headache attributed to a substance or its withdrawal.
10. Headache attributed to infection.
11. Headache attributed to psychiatric disorder.
12. Painful cranial neuropathies and other facial pains.
13. Headache or facial pain attributed to disorder of the cranium, eyes, ears, nose, sinuses, teeth, mouth or other facial structure.
14. Good performance in craniocervical flexion test.
15. Previous cervical spine surgery.
16. Degenerative cervical pathologies.
17. Other concomitant illness.
18. Those who underwent previous physical therapy during last 6 months for cervical pain.

OUTCOME MEASURES:

1. Verbally administered numerical rating scale.
2. Frequency of cervicogenic headache during a month.
3. Craniovertebral angle.
4. Craniocervical flexion test.

MATERIALS USED:

1. Air filled sensor.
2. Image tool version 3. Towel.
3. Frequency of cervicogenic headache chart.

PROCEDURE

The patients who meet the study criteria and showed willingness to participate in this study were signed the informed consent form were included for this study. And they were assigned to either experimental group [group A] or the control group [group B] using purposive sampling technique.

Anesthetic blockades were not used as a criterion for cervicogenic headache as the procedure considered too invasive and costly for this study and is not readily assessable to most clinicians in outpatient department setups. Usual medications were not withheld from any participants for this study.

Pretest measured of verbally administered numerical rating scale, frequency of cervicogenic headache for a month, craniovertebral angle, craniocervical flexion test were taken prior to intervention. For measuring craniovertbral angle the photographs were taken and then fed into the image tool version 3 proposed by University of Texas Health Science Center at San Antonio [10] and the images were saved.

Experimental groups were received exercises to retrain the coordination of cervical muscles and postural re-education along with medication.. The participants in this were taught exercises on day 1 and they were asked to continue the same at home ashome exercise program. Intervention pamphlets were provided in their language with illustrations to carry out the exercises effectively. They were also asked to document the exercise sessions in the tabular column provided to monitor their commitment to exercise. Patients were contacted once a week through phone to make sure they were continuing the exercises [11].

Control group was not provided with any treatment other than the medications. Posttest measures were taken after 4 weeks on their next visit to hospital or by arranging a meeting through phone call. The data that collected were statistically analyzed and conclusions are recorded.

INTERVENTION

Cervical muscle coordination retraining exercise protocol.

Training the holding capacity of deep neck flexors:

1. This was done by using air filled sensor initially by placing it at the level of craniocervical junction in supine lying.
2. Training was initiated at lowest levels of test. [20 or 22 mmhg]
3. Patient attempts to node their head to reach the desired value of feedback.

4. Patient was asked to hold steadily this position for 10 seconds without the obvious use of superficial neck flexors or any jerky craniocervical movements and then relax.
5. When the patient masters in this exercise, the feedback is removed and a rolled towel is used at home as home exercise program.
6. This was done by asking the patient to place a towel roll on back of neck and try to look at your great toe.
7. Asked to hold this position for 10 seconds and then relax.
8. Repeat this exercise for 7-10 times.

Retraining cervical spine extension in upright posture:

1. Ask the patient to sit on a chair with back straight.
2. The patient initiate cervical extension with chin lift slowly and within a range that is pain free which is able to be controlled.
3. This was done by asking the patient to slowly lift your chin up and try looking at the celling until you feel a discomfort.
4. This encourage patient to allow weight of the head to move backward and accept the challenge of gravity.
5. And then return to the upright posture by bringing chin down first. [initiated by craniocervical flexion than the sternocleidomastoid muscle and other superficial muscles]
6. Repeat this exercise for 7-10 times.

Extensors of craniocervical spine:

1. Sit on a chair with back straight.
2. Patients were instructed to flex the head and neck slowly, controlling the speed against gravity.
3. And return to the neutral position without excessive chin poke to avoid excessive craniocervical extension.
4. The aim of this exercise is to encourage the obliquely oriented sub occipital and craniocervical extensor muscles to contribute to the motion rather than the dominant pattern of large muscles such as splenius capitis and cervicis.
5. Repeat this exercise for 7-10 times.

Co-ordination of the neck flexors and extensors:

1. Sit on a chair with back straight.
2. This exercise was performed by the patient using self-resisted isometric rotation.
3. Ensure that the patient performs the occipital lift in correct postural position to pre-facilitate the activation of the longus colli before adding the gentle resistance.
4. For this ask the patient to do a stable nodding movement.
5. Then instruct the patient to place the palm on the side of face and try to look in to the palm providing the resistance as a facilitating procedure for 10 seconds and then relax.
6. The patient performs the alternating rhythmic stabilization exercise with an emphasis on slow onset and slow release holding contraction, using resistance of 10-20% effort.
7. Repeat this exercise for 7-10 times.

Retraining scapular orientation in posture:

1. The aim of this exercise was to facilitate the co-ordinated action of all part of the trapezius and serratus anterior by allowing lower trapezius to slightly depress the medial border of scapula, consequently lengthening the levater scapulae.
2. Sit on a chair with back straight and placing both hands on your thigh.
3. Ask the patient to pull their shoulders backward and hold this position.
4. To encourage the contribution of serratus anterior, instruct the patient to gently press down on their thighs with their hands.
5. Hold this position for 10 seconds and then relax.
6. Repeat this exercise for 7-10 times.

Training the endurance capacity of the scapular stabilizers:

1. Perform this exercise in prone lying against the effect of gravity.
2. Now pull your shoulders backwards.
3. Hold it for 10 seconds and then relax.
4. Repeat this exercise for 7-10 times.

Re-education in posture:

1. Postural position was trained in sitting with close to a wall while supporting back on the wall and is corrected from the pelvis.
2. First patients want to draw their pelvis up to an upright neutral position by asking to press on the wall with back such that there are fewer gaps between the back and wall and hold it. [Formation of low lumbar lordosis and activation of lumbar multifidus.]
3. Ensure the correct position of the lumbopelvic region not with thoracolumbar extension.
4. Now pull both shoulders backwards such that there are fewer gaps between the shoulder and wall and hold it.
5. Then perform a gentle nodding movement of the head.
6. Hold this position for 10 seconds and then relax.
7. Repeat this exercise for 7-10 times.

Note:

Perform one session of exercise every day, for 4 weeks.

Should not hold breath while doing any of these exercises. Because it will build up tension in the body and inhibit the supply of oxygen to the muscles, thus it reduces the performance of the muscles.

If you feel any discomfort during the exercise, stop the exercise.

INTERVENTION DURATION:

The intervention duration was 4 weeks in which the patient perform the exercises.

PHOTOGRAPHIC PRESENTATION (Figure 1-7):

FIGURE 1: CERVICAL MUSCLE RETRAINING EXERCISE

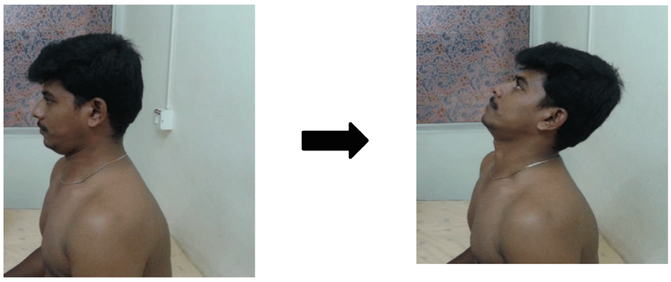

FIGURE 2: RETRAINING CERVICAL SPINE EXTENSION IN UPRIGHT POSTURE

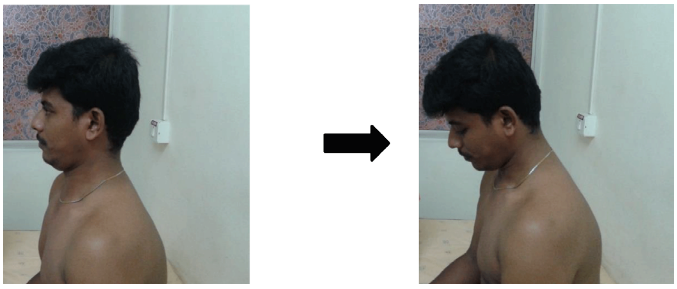

FIGURE 3: EXTENSORS OF CRANIOCERVICAL SPINE

FIGURE 4: CO-CONTRACTION OF THE NECK

FIGURE 5: RETRAINING SCAPULAR MUSCLES

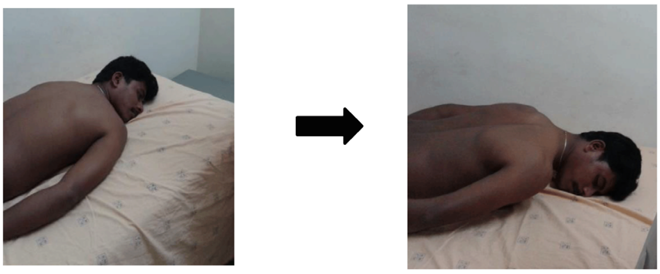

FIGURE 6: TRAINING ENDURANCE CAPACITY OF SCAPULAR STABILIZATION

FIGURE 7: RE-EDUCATION OF POSTURE

Results

Thirty subjects completed the study; fifteen in each group and the parameters are verbally administered numeric rating scale for pain, frequency of headache to find out the cervicogenic headache frequency before and after the treatment, craniovertebral angle for measuring the forward head posture and craniocervical flexion test to find out the level of deep cervical muscle strength were assessed and analyzed. The statistical analysis were done using paired 't' test and independent 't' test with 5% of level of significance (Figure 8-15) (Table 1 and 2).

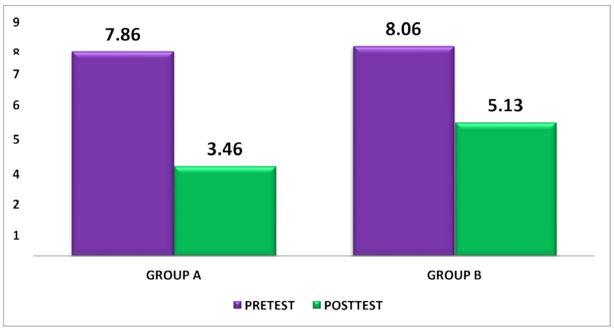

Figure 8: Pre test & Post test mean values of verbally administered numeric rating scale in Group A & Group B

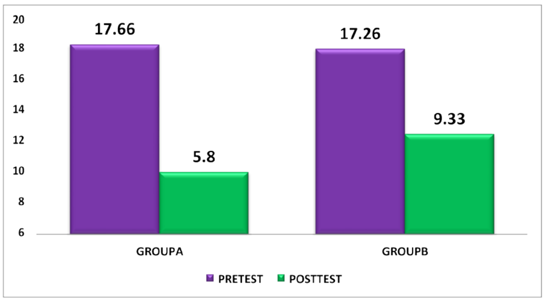

Figure 9: Pre test & Post test mean values of frequency of headache in GROUP A & GROUP B

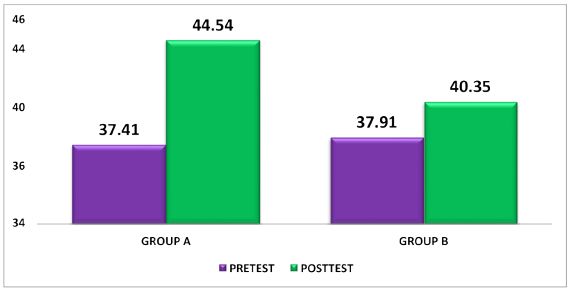

Figure 10: Pre test & Post test mean values of craniovertebral angle in Group A & Group B

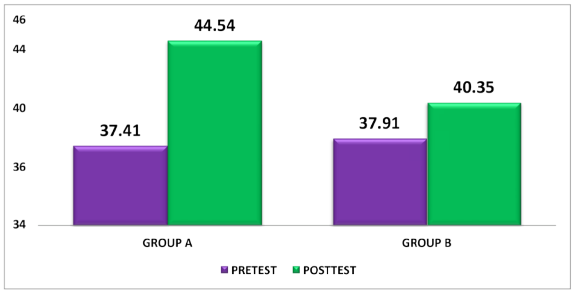

Figure 10: Pre test & Post test mean values of craniovertebral angle in Group A & Group B

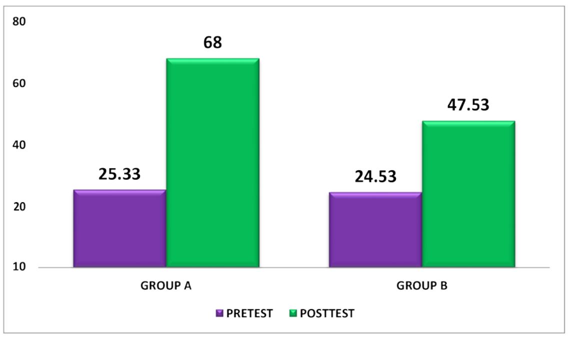

Figure 11: Pre test & Post test mean values of craniocervical flexion test in Group A & Group B

Table 1: TABULAR PRESENTATION PAIRED 't' TEST

OUTCOME MEASURES		MEAN VALUE		CALCULATE D 't' VALUE	TABLE 't' VALUE	LEVEL OF SIGNIFICANCE
		PRE TEST	POST TEST			
Verbally administered numeric rating scale	Group A	7.86	3.46	17.30	2.14	P<0.05 Significant
	Group B	8.06	5.13	12.86	2.14	P<0.05 Significant
Frequency of headache	Group A	17.66	5.8	22.99	2.14	P<0.05 Significant
	Group B	17.26	9.33	17.13	2.14	P<0.05 Significant
Craniover- tebral angle	Group A	37.41	44.54	14.32	2.14	P<0.05 Significant
	Group B	37.91	40.35	11.02	2.14	P<0.05 Significant
Craniocer- vical flexion test	Group A	25.33	68	19.49	2.14	P<0.05 Significant
	Group B	24.53	47.73	9.84	2.14	P<0.05 Significant

Table 2: INDEPENDENT 't' TEST

OUTCOME MEASURES		MEAN VALUE		CALCULATED 't' VALUE	TABLE 't' VALUE	LEVEL OF SIGNIFICANCE
		GROUP A	GROUP B			
Verbally administered numeric rating scale	Pre test	7.86	8.06	0.63	2.048	P>0.05 not significant
	Post test	3.46	5.13	7.187	2.048	P<0.05 Significant
Frequency of headache	Pre test	17.66	17.26	0.65	2.048	P>0.05 not significant
	Post test	5.8	9.33	8.23	2.048	P<0.05 Significant
Craniovertebral angle	Pre test	37.42	37.91	0.15	2.048	P>0.05 not significant
	Post test	44.5	40.35	4.119	2.048	P<0.05 Significant
Craniocervical flexion test	Pre test	25.33	24.53	0.433	2.048	P>0.05 not significant
	Post test	68	47.73	7.36	2.048	P<0.05 Significant

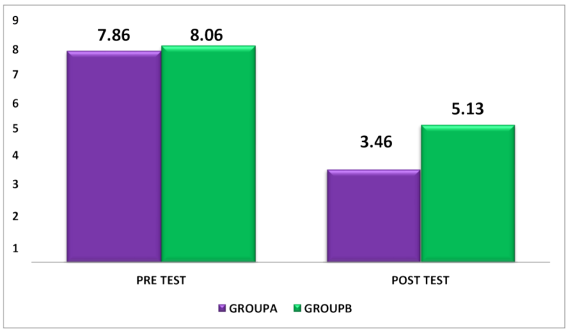

Figure 12: Pre test&Post test mean values of verbally administered numeric rating scale for Group A & Group B

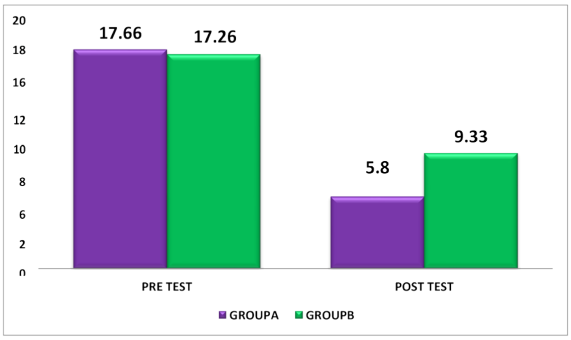

Figure 13: Pre test & Post test mean values of frequency of headache for Group A & Group B

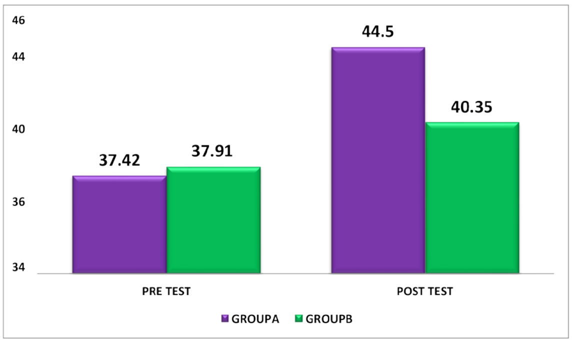

Figure 14: Pre test & Post test mean values of craniovertabral angle for both Group A & Group B

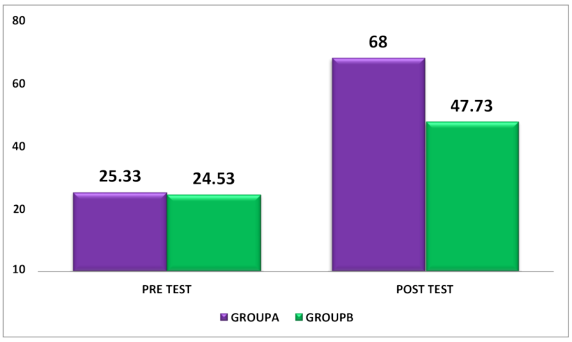

Figure 15: Pre test & Post test mean values of craniocervical flexion test for both Group A & Group B

PAIRED 't' TEST:

VERBALLY ADMINISTERED NUMERIC RATING SCALE.

Group A [cervical muscle coordination retraining exercises with medication]

The pre-test and post-test values of verbally assisted numeric rating scale was analyzed using paired't' test. For 14 degrees of freedom at 5% level of significance the table't' value was 2.145 and the calculated 't' value was 17.30. Since the calculated 't' value was greater than the table't' value, null hypothesis was rejected. Hence, there was significant reduction in verbally administered numeric rating scale in group A.

Group B [medication alone]

The pre-test and post-test values of verbally assisted numeric rating scale was analyzed using paired't' test. For 14 degrees of freedom at 5% level of significance the table 't' value was 2.145 and the calculated 't' value was 12.865. Since the calculated 't' value was greater than the table't' value, null hypothesis was rejected. Hence, there was significant reduction in verbally administered numeric rating scale in group B.

FREQUENCY OF HEADACHE.

Group A

The pre-test and post-test values of frequency of headache was analyzed using paired't' test. For 14 degrees of freedom at 5% level of significance the table 't' value was 2.145 and the calculated 't' value was 22.99. Since the calculated 't' value was greater than the table't' value, null hypothesis was rejected. Hence, there was significant reduction in frequency of headache in group A.

Group B

The pre-test and post-test values of frequency of headache was analyzed using paired't' test. For 14 degrees of freedom at 5% level of significance the table 't' value was 2.145 and the calculated 't' value was 17.13. Since the calculated 't' value was greater than the table't' value, null hypothesis was rejected. Hence, there was significant reduction in frequency of headache in group B.

CRANIOVERTEBRAL ANGLE.

Group A

The pre-test and post-test values of craniovertebral angle was analyzed using paired't' test. For 14 degrees of freedom at 5% level of significance the table 't' value was 2.145 and the calculated 't' value was 14.322. Since the calculated 't' value was greater than the table't' value, null hypothesis was rejected. Hence, there was significant improvement in craniovertebral angle in group A.

Group B

The pre-test and post-test values of craniovertebral angle was analyzed using paired't' test. For 14 degrees of freedom at 5% level of significance the table 't' value was 2.145 and the calculated 't' value was 11.02. Since the calculated 't' value was greater than the table 't' value, null hypothesis was rejected. Hence, there was significant improvement in craniovertebral angle in group B.

CRANIOCERVICAL FLEXION TEST.

Group A

The pre-test and posttest values of craniocervical flexion test was analyzed using paired 't' test. For 14 degrees of freedom at 5% level of significance the table 't' value was 2.145 and the calculated 't' value was 19.493. Since the calculated 't' value was greater than the table 't' value, null hypothesis was rejected. Hence, there was significant improvement in craniocervical flexion test in group A.

Group B

The pre-test and post-test values of craniocervical flexion test was analyzed using paired 't' test. For 14 degrees of freedom at 5% level of significance the table 't' value was 2.145 and the calculated 't' value was 9.844. Since the calculated 't' value was greater than the table 't' value, null hypothesis was rejected. Hence, there was significant improvement in craniocervical flexion test in group B.

INDEPENDENT 't' TEST:

VERBALLY ADMINISTERED NUMERIC RATING SCALE.

Pre test values

The pre-test values of group A and group B was analyzed using independent't' test. For 28 degrees of freedom at 5% level of significance, the table 't' value was

2.048 and the calculated 't' value was 0.63. Since the calculated 't' value was less than the table't' value . Hence, there was no significant reduction in verbally administered numeric rating scale in both group A and B.

Post test values

The post-test values of group A and group B was analyzed using independent't' test. For 28 degrees of freedom at 5% level of significance, the table 't' value was 2.048 and the calculated 't' value was 7.187. Since the calculated 't' value was greater than the table't' value null hypothesis was rejected. Hence, there was

Significant reduction in verbally administered numeric rating scale in both group A and B.

FREQUECY OF HEADACHE.

Pre test values

The pre-test values of group A and group B was analyzed using independent

't' test. For 28 degrees of freedom at 5% level of significance, the table 't' value was

2.048 and the calculated 't' value was 0.65. Since the calculated 't' value was less than the table't' value null hypothesis was accepted. Hence, there was no significant reduction in frequency of headache in both group A and B.

Post test values

The post-test values of group A and group B was analyzed using independent't' test. For 28 degrees of freedom at 5% level of significance, the table 't' value was 2.048 and the calculated 't' value was 8.23. Since the calculated 't' value was greater than the table't' value null hypothesis was rejected. Hence, there was significant reduction in frequency of headache in both group A and B.

CRANIOVERTEBRAL ANGLE.

Pre test values

The pre-test values of group A and group B was analyzed using independent't' test. For 28 degrees of freedom at 5% level of significance, the table 't' value was

2.048 and the calculated 't' value was 0.15. Since the calculated 't' value was less than the table't' value null hypothesis was accepted. Hence, there was no significant improvement in craniovertebral angle in both group A and B.

Post test values

The post-test values of group A and group B was analyzed using independent

't' test. For 28 degrees of freedom at 5% level of significance, the table 't' value was

2.048 and the calculated 't' value was 4.119. Since the calculated 't' value was greater than the table't' value null hypothesis was rejected. Hence, there was significant improvement in craniovertebral angle in both group A and B.

CRANIOCERVICAL FLEXION TEST.

Pre test values

The pre-test values of group A and group B was analyzed using independent't' test. For 28 degrees of freedom at 5% level of significance, the table 't' value was 2.048 and the calculated 't' value was 0.433. Since the calculated 't' value was less than the table't' value null hypothesis was accepted. Hence, there was no significant improvement in craniocervical flexion test in both group A and B.

Post test values

The post-test values of group A and group B was analyzed using independent't' test. For 28 degrees of freedom at 5% level of significance, the table 't' value was 2.048 and the calculated 't' value was 7.368. Since the calculated 't' value was greater than the table't' value null hypothesis was rejected. Hence, there was significant improvement in craniocervical flexion test in both group A and B.

Discussion

Cervicogenic headache with musculoskeletal causes are classified as secondary type headache by international headache society [11]. It is more prevalent type of headache where patient is affected physically, economically and recreationally. Cervicogenic headache refers to headache caused by a disorder of cervical spine and its component bony, disc and/or soft tissue elements, usually but not invariably accompanied by neck pain [12].

The forward head posture in cervicogenic headache patients causes more strain over neck, muscle damage [especially cervical muscles] and pain [13]. For every inch that the head moves forward it has the effects of adding 10 pounds of perceived weight. So if head weighs 12 pounds and it moves forward 2 inches, it's as if your head now weighs 32 pounds. The muscles of cervical area will have a constant added strain [14].

The forward head posture leads to alter the values of craniocervical flexion test and craniovertebral angle from normal range. This also indicates the presence of deep cervical muscle weakness and pain. This has been show in various literature that there is a relationship exist between deep cervical muscle coordination and forward head posture in cervicogenic headache patients.

This study emphasized on the three impairments in cervicogenic headache: forward head posture, deep cervical muscle weakness and pain. Through medications we can reduce the pain and relaxing the muscles. So along with the medication, cervical muscle coordination retraining exercise programs with the existing literature support got a significant improvement in outcome results.

Patients from both the interventional groups showed reduction in intensity and frequency of pain. This result was not much of statistical differences. Since that both the groups had significant pain relief following the treatment.

The goals of cervical muscle coordination training exercises, is improving the cervical muscle strength and correcting the forward head posture. In this study, the patients who received this intervention were instructed to do the exercises with

Concentration over the movements without holding the breath. Holding the breath will build up tension in the body and inhibit the supply of oxygen to the muscles and thus reduces the performances of the muscles. From the result that obtained from this study, exercises along with medication group showed greater improvement in craniovertebral angle and craniocervical flexion test than the patient in medication group.

From the results of this 4 weeks treatment study, it is recommended that cervical muscle coordination retraining exercises along with medication as a superior intervention for correcting the head posture, reducing intensity and frequency of pain and improving cervical muscle strength in cervicogenic headache patients and therefore reduces the musculoskeletal discomfort.

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