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EFFECT OF UPPER CERVICAL MANIPULATION VERSUS UPPER THORACIC MANIPULATION ON PAIN AND DISABILITY IN CERVICOGENIC HEADACHE: A COMPARATIVE STUDY

Physiotherapy

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ABSTRACT

Background: The International Headache Society [1] classified 2 basic categories of headaches, primary and secondary. A cervicogenic headache is a common cause of a chronic headache that is often misdiagnosed. It is Secondary type of Headache. Cervical and thoracic mobilization and manipulation are frequently used to treat patients diagnosed with cervicogenic headache (CEH); however, there is conflicting evidence on the efficacy of these manual therapy techniques. Some researchers shown beneficial effects of these 2 techniques. Present study is done to compare efficacy of two different treatment techniques in patients with cervicogenic headache. **Methodology:** This study included 30 patients suffering from cervicogenic headache and divided into 2 groups. Group A received Upper Cervical Manipulation and Group B received Upper Thoracic Manipulation. Both groups received Strengthening exercise in the form of conservative management. Outcome measures were NPRS and NDI. **Result:** Result of this study shown that there is significant statistical difference within group results and slightly more improvement in Group A when compared with group B in Between group Analysis. **Conclusions:** Results of present study confirms that Upper cervical manipulation is more effective than upper thoracic manipulation in treatment of cervicogenic headache.

KEYWORDS

Cervicogenic Headache, Upper cervical manipulation, Upper thoracic Manipulation

INTRODUCTION:

The International Headache Society [1] classified 2 basic categories of headaches, primary and secondary. Primary headaches include those of vascular origin (cluster and migraine headaches) as well as those of muscular origin (tension-type headaches). Secondary headaches result from another source including inflammation or head and neck injuries. A cervicogenic headache is a common cause of a chronic headache that is often misdiagnosed. The presenting features can be complex and similar to many primary headache syndromes that are encountered daily. It is Secondary type of Headache. In 2004, the International Headache Society defined CGH as "pain, referred from a source in the neck and perceived in one or more regions of the head and/or face." [2]. Cervicogenic headaches may also occur due to poor posture while sitting or standing at work. (Upper cross syndrome). Sitting or standing in excessive cervical protraction position for long periods of time can put pressure or stress on the neck and base of the skull, triggering a cervicogenic e to poor headache. Falling asleep in an awkward position (such as with head too far to the front or back, or off to one side) can also cause this types of headache. A compressed or pinched nerve in or near the neck is another cause of cervicogenic headaches. The C1-C3 nerves relay pain signals to the nociceptive nucleus of the head and neck, the trigeminocervical nucleus. This connection is thought to be the cause for referred pain to the occiput and/or eyes. (Wang 2014). Aseptic inflammation and neurotransmission within the C-fibers that is caused by cervical disc pathology is thought to produce and worsen the pain in a cervicogenic headache.

Table 1: Differential diagnosis of Cervicogenic Headache

Features	Cervicogenic Headache	Migraine	Tension Headache
Side	Unilateral	Unilateral	Bilateral
Site	Occipital area, Frontoparietal and orbital area	Frontal, Periorbital and temporal area	Diffuse
Aggravating factor	Neck movements, Awkward neck postures, Pressure over C0-C3	Multiple, Neck movements not typical	Multiple, Neck movements not typical
Associated symptoms	Decreased neck ROM	Photophobia, Phonophobia	Occasionally reduced appetite

The trigeminocervical nucleus receives afferents from the trigeminal nerve as well as the upper three cervical spinal nerves. Neck trauma, whiplash, strain, or chronic spasm of the scalp, neck, or shoulder muscles can increase the sensitivity of the area which is similar to the allodynia that is seen in late chronic migraines. A lower pain threshold makes patients more susceptible to more severe pain. For this reason, early diagnosis and therapeutic intervention is very important [3]. Cervical Flexion Rotation test is commonly used to diagnose cervicogenic Headache. The patient should feel no pain at the time of the test. During this test, the neck of the patient is passively held in end range flexion. The therapist rotates the neck to each side until they feel resistance or until the patient says they are in pain. At this end point, the therapist makes a visual estimate of the rotation range and says on which side the FRT was positive or negative. The test was positive when the estimated range was reduced by more than 10° from the anticipated normal range (44°). The inverse relationship between headache severity of CGH and ROM towards the most restricted side for the Cervical Flexion-Rotation Test (FRT) was statistically significant for all patients with cervicogenic headaches (Sn = 0.91, Sp = 0.90) [4]

Treatment option available in literature for cervicogenic headache includes:

1. Cervical spine manipulation or mobilization [5] [6]
2. Strengthening exercises including deep neck flexors and scapular muscles [5] [6]
3. Thoracic spine thrust manipulation & exercise [6] [7]
4. C1-C2 Sustained Natural Apophyseal Glide (SNAG) [8]

Contraindications for manipulations:[9][10]

- Any pathology that leads to significant bone weakening
- Any neurological deficits
- Vascular: aortic aneurysm, bleeding into joints
- Lack of diagnosis
- Patient positioning cannot be achieved because of pain or resistance
- Other conditions: infantile colic, childhood asthma, hypertension, primary dysmenorrhea, and migraine.

Individuals with CH are frequently treated with spinal manipulative therapy including both mobilization and manipulation. Spinal mobilization consists of slow, rhythmical, oscillating techniques whereas manipulation consists of high-velocity low-amplitude thrust techniques. In a recent systematic review, Bronfort and colleagues

reported that spinal manipulative therapy (both mobilization and manipulation) were effective in the management of adults with CH. Cervical and thoracic mobilization and manipulation are frequently used to treat patients diagnosed with cervicogenic headache (CEH); however, there is conflicting evidence on the efficacy of these manual therapy techniques. Some researches shown beneficial effects of these 2 techniques. Present study is done to compare efficacy of two different treatment techniques in patients with cervicogenic headache.

Aim Of The Study

To compare the Effect of Upper Cervical Manipulation Versus Upper Thoracic Manipulation on pain and disability in Cervicogenic Headache..

Need Of The Study

A systematic review and randomized controlled trial done in past shown that spinal manipulative therapy (both cervical and upper thoracic) was effective in the management of people with cervicogenic headache. However, no studies have directly compared the effects of upper cervical manipulation versus upper thoracic manipulation and exercise in patients with Cervicogenic Headache. So, there is need of present study.

Objective Of The Study

1. To assess the effect of Upper Cervical Manipulation on pain and disability in Cervicogenic Headache.
2. To assess the effect of Upper Thoracic Manipulation on pain and disability in Cervicogenic Headache.
3. To compare the Upper Cervical Manipulation and Upper Thoracic Manipulation on pain and disability in Cervicogenic Headache.

Study Design And Study Setting

Study Design: A Comparative Study
Study Setting: OPD of Venus Institute of Physiotherapy, Bhoyan Rathod, Gandhinagar
Study Duration: 4 weeks
Sampling Technique: Simple Random Sampling
Sample Size: 30 subjects, calculated from following formula.
$N = 4\sigma 2 (Z\alpha + Z\beta) 2 / D2$
Where, N= Sample size
σ= Standard Deviation
Zα=Level of desired significance (1.96) Zβ=Desired Power (0.84 for 80% power) D= Effect size (Mean difference)

Population: Subjects diagnosed with Cervicogenic Headache according to medical guidelines.

Selection Criteria

Inclusion Criteria:

- Patients willing to participate
- Both Male and Female Subjects
- Patient Diagnosed with Cervicogenic Headache:

1. Headache located at Posterior neck and Occipital region and spreading over frontotemporal area
2. Triggered by poor posture and awkward neck movements
3. Tenderness at upper cervical joints
4. Positive Cervical Flexion-Rotation test (≤320)

Exclusion Criteria:

Subjects with other types of Headaches (Migraine, Tension-type)
Subjects with osteoporosis and steroid use
Subjects with Neurological signs and symptoms (Loss of sensation and weak muscle as well diminished reflexes in upper limbs)

Outcome Measures:

- Numeric Pain Rating Scale (NPRS)
- Neck Disability Index (NDI)

Methodology

1. Upper Cervical Manipulation: [13]

The manipulation targeting C1-2 will be performed with the patient in supine. For this technique, the patient's left posterior arch of the atlas will be contacted with the lateral aspect of the proximal phalanx of the therapist's left second finger using a "cradle hold". To localize the forces to the left C1-2 articulation, the patient has to positioned using extension, a posterior-anterior (PA) shift, ipsilateral side-bend and contralateral side-shift. While maintaining this position, the therapist performs a single high-velocity, low-amplitude thrust manipulation to the left atlanto-axial joint using right rotation in an arc toward the underside eye and translation toward the table. This was repeated using the same procedure but directed to the right C1-2 articulation.

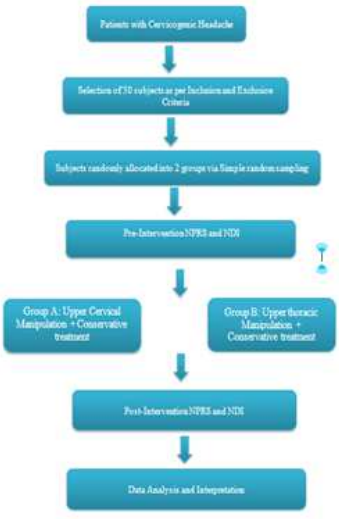

Table: 1 Flow Chart Of Procedure

2. Upper Thoracic Manipulation: [13]

- The manipulation targeting T1-2 will be performed with the patient in supine. For this technique, the patient holds her/his arms and forearms across the chest with the elbows aligned in a supero-inferior direction. The therapist contacts the transverse processes of the lower vertebrae of the target motion segment with the thenar eminence and middle phalanx of the third digit. The upper lever localizes to the target motion segment by adding rotation away and side-bend towards the therapist while the underside hand uses pronation and radial deviation to achieve rotation toward and side-bend away moments, respectively. The space inferior to the xiphoid process and costochondral margin of the therapist can be used as the contact point against the patient's elbows to deliver a manipulation in an anterior to posterior direction targeting T1-2 bilaterally.
- Manipulations targeting the right and left C1-2 articulations and bilateral T1-2 articulations will be performed on at least one of the 2 treatment sessions. On other treatment sessions, therapists either repeated the C1-2 and/or T1-2 manipulations or targeted other spinal articulations (i.e., C0- 1, C2-3, C3-7, T2-9, ribs 1–9) using manipulation.
- The clinicians should be instructed that the manipulations should likely to be accompanied by multiple audible popping sounds.

Figure 3: Upper cervical Manipulation
Figure 4: Upper Thoracic Manipulation

3. Conservative treatment for both groups: [13]

- Cranio-cervical flexion exercises with Pressure-biofeedback (3 sets of 10 repetitions with a 10 s isometric hold)
- Progressive Resistance Exercises (PRE) to shoulder girdle muscles using TheraBand. (Rhomboids, Lower trapezius and Serratus anterior)- (3 sets of 10 repetitions with a 10 s isometric hold)

RESULT

Study variable was taken before starting sessions on both groups and at the end of the study, study variable was NPRS and NDI.

Age Distribution:

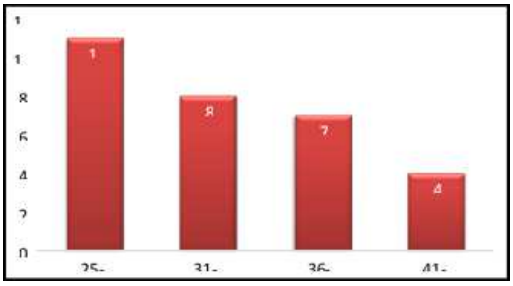

Figure 6: Age Distribution

Age group was between 25-45 years. Among a total of 30 cervicogenic headache subjects, 11 were between 25-30 years, 8 were between 31-35 years, 7 were between 36-40 years and 4 were between 41-45 years. The mean age of participants was 35±10 years.

Gender Distribution:

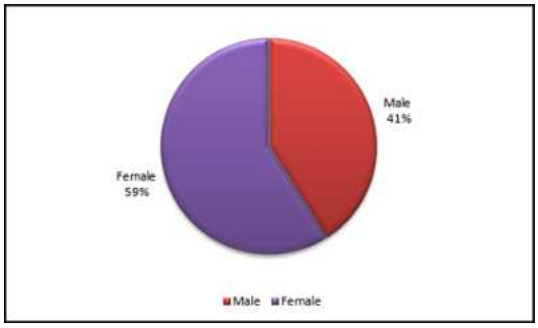

Figure 7: Gender Distribution

Among total 30 subjects with cervicogenic Headache subjects 59% were female and 41% were male.

Data Analysis:

Statistical analysis was performed on the data obtained from 30 patients. Data was analyzed using SPSS Version 25.0. Descriptive statistics for all outcome measures were expressed as mean, standard deviations and test of significance such as paired 't' test used for comparing data within each group and independent 't' test for comparing between the groups. Data was considered statistically significant with P<0.05 and highly significant at p<0.01. Pre and post mean difference of NPRS shows 1.46 in group A and 2 in group B. Pre and post mean difference of NDI shows 6.4 in group A and 7.07 in group B. As p<0.05 there is significant difference between two groups.

Table 2: Paired "t" test values for NPRS

Group	Mean Difference	Standard Deviation	"t" Value	"p" Value
Group A	1.46	0.72	6.7	P<0.05
Group B	2	0.59	10.13	P<0.05

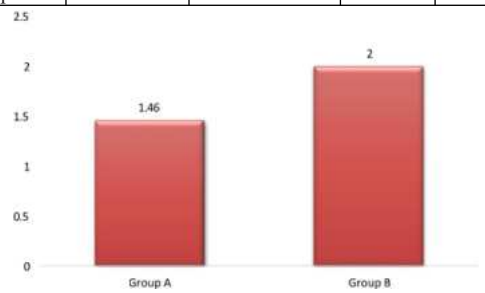

Figure 8: Mean Values of NPRS

Table 3: Paired "t" test values for NDI

Group	Mean Difference	Standard Deviation	"T" VALUE	"P" VALUE
Group A	6.4	23.32	5.13	P<0.05
Group B	7.07	22.36	5.79	P<0.05

Figure 9: Mean Values of NDI

Table 4: Independent "t" test values

OUTCOME MEASURE	"T" VALUE	"P" VALUE
NPRS	-1.66	P<0.05
NDI	0.13	P<0.05

DISCUSSION

Present study compares the Effect of Upper Cervical Manipulation Versus Upper Thoracic Manipulation on pain and disability in Cervicogenic Headache. Total 30 patients between age of 25-45 were taken. Among them 41% were male and 59% were female.

Statistical analysis of present study confirms that there is significant within group difference in Group A as well as Group B. This suggests that both Upper cervical manipulation and Upper thoracic manipulation both were effective in management of cervicogenic headache. Between group analysis of this study shown significant difference in Group A when compared Upper cervical manipulation to upper thoracic manipulation.

Several studies have investigated the effect of spinal manipulation in the management of CH. Haas et al. investigated the effectiveness of cervical manipulation in subjects with CH. Jull et al. demonstrated treatment efficacy for manipulative therapy and/or exercise in the management of CH. This all findings correlates with our present study. Many studies on the short-term effectiveness and manual therapy to the cervical spine have found it beneficial in reducing headache pain or disability, intensity, frequency, and duration.

The exact mechanism through which spinal manipulation works has not been established. One mechanism underlying the effects of spinal manipulation may, therefore, be the manipulation's ability to alter central sensory processing by removing subthreshold mechanical or chemical stimuli from paraspinal tissues. Spinal manipulation is also thought to affect reflex neural outputs to both muscle and visceral organs. Substantial evidence demonstrates that spinal manipulation evokes paraspinal muscle reflexes and alters motor neurone excitability.[18] Another effect could be the effective secondary stimulation of the dorsal periaqueductal gray (dPAG), only suggested by Wright. In addition it was suggested also a lessening of temporal summation in the dorsal horn cells secondary a HVLAT on the lumbar and thoracic spine. [19] There is more Neurophysiological effect Biomechanical effect [20]. There is 3 possible mechanisms: (1) Peripheral Mechanisms: changes in blood level of B-endorphines, endogenous cannabinoids, seroronin and substance-P after manual therapy. (2) Spinal Mechanisms: counter irritant to modulate pain. Manual therapy could also be effective in the Gate-Control of pain theory because it bombard the central nervous system with sensory input. So HVLAT could be indirectly implicate in spinal cord mediated effect on hypoalgesia and reduction in motoneuron pool activity. (3) Supraspinal Mechanisms: it had been supposed an influence on the supraspinal descending pain inhibitory system. Infact it was been demonstated MRI activation of amygdala, PAG, and anterior cingulate cortex during manual therapy. Those cortical areas are instrumental in pain experience. Increase in ROM following thrust manipulation due to a reduction in pain levels and resting tension of surrounding soft tissue [20]

Analgesic effect may be due to: (1) Decrease activity of central pain processing centers (2) reduction in dorsal horn activation rates leading to decreased pain and decreased resting tension in surrounding soft tissue. (3) Reduction in pain pressure thresholds locally and distally [21][22]

CONCLUSION

Results of present study confirms that Upper cervical manipulation is more effective than upper thoracic manipulation in treatment of cervicogenic headache.

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