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Craniosacral therapy and Maitlands mobilisation in cervicogenic headache

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Abstract
Background: The global estimate of the adult population for headache in general is 46%, 11% for migraine, 42% for tension-type headache, 3% for chronic daily headache and for Cervicogenic headache it is 2.5 –4.1%. Inspite of the prevalence being relatively low as compared to other headache types, the associated disability is alarming and high. Craniosacral therapy is a fairly safe, non- invasive and non-pharmacological mode of treatment which are known to reduce headaches especially migraine but which has limited evidence of effectiveness in other headache types and rarely so in Cervicogenic Headache. Hence this study aimed at assessing the effectiveness of Craniosacral therapy as a treatment modality in the management in Cervicogenic headache.
Methods: This study hypothesis aimed that as compared to those treated with Maitlands Mobilization in the control group, subjects receiving Craniosacral Therapy in the experimental group will demonstrate better improvement in all sub-sections of the Headache Impact Test (HIT-6) which measures the quality of life: and reduced frequency and duration of Cervicogenic headache. Selection criteria for inclusion in the study were subjects of both gender, age 18 and above and meeting the Cervicogenic Headache International Study Group diagnostic criteria for Cervicogenic Headache. Eligible subjects were randomized to either Craniosacral (CST) or Maitlands (MM) intervention.
Results: 109 individuals were screened for eligibility of which 69 met the selection criteria for the study. They were allocated to either of the treatment groups after their HIT-6 score was measured by sealed allocation protocol. Headache-related disability was present on 2.7±2.5 days in CST group and 3.9±4.4 in MM group during the 3 week period. The average of the HIT-6 score pre- treatment was 63.9±8.8 points and post- treatment was 43.6±4.6 in CST group and 61.3±8.1 and 58.1±7.6 respectively for the MM group. The Correlation analysis of the frequency of headache attacks and duration of disability according to the headache diary significantly correlated with the severity of headache-related disability at each attack.
Conclusion: Craniosacral therapy can be an effective treatment strategy for patients of Cervicogenic Headache as compared to Maitlands mobilization on HIT-6.

Keywords: Cervicogenic headache, Craniosacral therapy, Maitlands Mobilisation, HIT-6, Headache diary.

Introduction
The global estimate of the adult population for headache in general is 46%, 11% for migraine, 42% for tension-type headache, 3% for chronic daily headache [1] and for Cervicogenic headache it is 2.5 –4.1% [2]. This prevalence may appear low but its associated disability is far higher. CGH arises mainly from dysfunction in the first three upper cervical segments [3]. The probable pathway by which pain initiating in the neck can be referred as a headache is the trigemino cervical nucleus which descends in the spinal cord to the area of C3 or sometimes C4. These structures are further in anatomical continuity with the dorsal gray columns of the same spinal segments [4]. Therefore, input from sensory afferents primarily from any of the upper three cervical nerve roots can be mistaken to be perceived as pain in the head[3] through a process called as convergence. Although the pathophysiology is not totally clear there are definite articular, muscular and neural mechanisms which are at play [5]. The average age of onset has been marked as 33–43 years and the mean of the duration of presence of symptoms at 7–17 years [1, 2]. The chronicity seems to develop through increase in frequency of headache which are short lasting and not continuous or unrelenting.

Various management strategies start with pharmacological medications but they have little role [6] in the long course of such headaches so other strategies like manual and manipulative therapy [7-12], Low Level Laser Therapy [13-15], recommendations for sleep, exercise, stress reduction through behavioral interventions are found to be effective for treatment of CGH. The effectiveness of non-pharmacological interventions for the treatment of CGH is warranted to reduce the side effects of medications.

Craniosacral therapy (CST) is a fairly safe, non- invasive and non-pharmacological method which is applied as a gentle manual force to address somatic dysfunctions of the head and the remainder of the body. This treatment is aimed at mobilizing the cranial sutures which are restricted leading to a loss of normal physiologic motion. Restrictions in the craniosacral system are manually identified which include the bones, membranes and cerebrospinal fluid (CSF) that surround the brain and spinal cord [16] using soft, gentle hands-on techniques to both normalize the CST fluid rhythm and correct restrictions in peri-spinal tissues and fascia for the treatment and prevention of CGH for which there is limited evidence of safety and efficacy. Manual palpation and manipulation of this system theoretically affects sensory, motor, cognitive and emotional processes in the nervous system [16-18]. Several studies report benefit of CST in various types of headache but these studies have not been done specifically on CGH and also lack proper documentation on how CST is beneficial with respect to the criteria for diagnosis, number of treatment sessions and changes in quality-of-life. Hence this study aims at evaluating the effectiveness of CST in CGH.

Materials and Methods

Selection criteria for inclusion were: Indian subjects both male and female, age 18 years and above, symptoms for more than 3 years of duration, taking medications like NSAIDS, antidepressants or muscle relaxants and meeting the Cervicogenic Headache International Study Group diagnostic criteria [19] for CGH. Exclusion criteria were sudden onset of a new severe headache, a worsening pattern of a pre-existing headache in the absence of obvious predisposing factors, headache associated with fever, neck stiff ness, skin rash, and with a history of cancer, HIV, or other systemic illness, headache associated with focal neurologic signs other than typical aura, moderate or severe headache triggered by cough, exertion, new onset of a headache during or following pregnancy [20], cranial tumors, meningitis, giant cell arteritis, sub-arachnoid hemorrhage and carotid artery or vertebral artery dissection [21].

The subjects were referred to Orthopedic Physiotherapy Department after thorough medical assessment from the Medicine, Surgery and Orthopedic Departments. Those meeting the selection criteria were informed about the study procedure and a written consent was obtained from them. Excluded subjects were referred back to their physicians for further medical management. Enrolled subjects were asked to avoid changes in medications for headache during the course of the study. All subjects were assessed for Headache Impact Test- 6 and asked to maintain a headache diary for 3 consecutive weeks.

A sealed allocation protocol was used to randomize the subjects into either treatment group. The primary investigator asked the subject to choose and open a sequentially numbered envelope which was opaque, to determine the treatment group to which the subject was randomly allocated to for treatment at the first visit for therapy. The randomization process uses block method to generate the intervention assignment sequence to be implemented to ensure that the randomization balance is maintained throughout the enrollment process [22]

The Intervention Group – CST

Subjects in the intervention group received three CST sessions on alternate days in a week for 3 weeks amounting to a total of 9 sessions. Since there were no published studies reporting evidence-based treatment schedules for CST, the number of treatments was based on data from a pilot study which was undertaken by the principal investigator prior to this study and opinion of qualified CST practioners who had more than 10 years of experience in this field.

The subject lies supine on a couch and is completely clothed in comfortable attire but accessories like belts, shoes, jewellery, hairbands and watches are removed while the therapist evaluates the craniosacral system. The CST protocol for each subject follows the 10 step protocol Version 1 as suggested by Upledger Institute shown in table below. The entire process to complete this protocol took 30-45 minutes per session for each patient.

S. No	Contents
1.	Still point
2.	Diaphragm releases
3.	Frontal lift
4.	Parietal lift
5.	Spheno basilar compression- decompression
6.	Temporal bone techniques
7.	Temporal decompression
8.	Tempero mandibular compression decompression
9.	Dural tube evaluation
10.	CV-4/ Still point

The Control Group – Maitlands Mobilization

Maitlands Mobilization was the control intervention on the basis that it was a recognized and validated alternative treatment for headache and had a valid biological rationale affecting the gamma motoneurons, increasing tissue oxygenation and removal of metabolites. The protocol required the subject to lie prone on a plinth with a face opening, and the arms lying comfortably by the sides of the subject. Subjects received grade I and II pressure applied antero-posteriorly over the spinous processes of C2 and C3 in a manner described by Maitland [23]. Unilateral antero-posterior pressures were applied alternatively over both the zygoapophyseal joints of C1, C2 and C3. The procedure was performed on alternate days, 3 sessions per week for 3 weeks amounting to a total of 9 sessions.

Results and Discussion

The HIT-6 consists of six items: pain, social functioning, role functioning, vitality, cognitive functioning and psychological distress [7]. The patient answers each of the six related questions using one of the following five responses: "never", "rarely", "sometimes", "very often", or "always". These responses are summed to produce a total HIT-6 score that ranges from 36 to 78, where a higher score indicates a greater impact of headache on the daily life of the respondent [24-26].

The subjects were requested to maintain a headache diary from the first visit for 3 weeks till the study intervention was carried out, along with sufficient information about the required contents. The subjects were further instructed to complete the diary every night and specifically on days on which they experienced a headache. Each diary was maintained for a 3-week duration and it contained questions on headache characteristics and other associated symptoms during the attack. The headache pain intensity was quantified using a visual analog scale measuring from 0 to 10 where 0 meant no pain and 10 meant worse imaginable pain.

SPSS statistical software (version 10.0) was used for all the analyses. Correlation analysis was used to verify the relationships of the HIT-6 score with headache features and disability from the headache diary. The differences between CST and MM groups with different HIT-6 scores were evaluated using analysis of variance. Prior to this, it was confirmed that the data conformed to a normal distribution. A probability value of <0.01 was considered statistically significant.

During the diary recording period of 3 weeks, 69 subjects of the study contributed 112 diary records of headache. The demographic data shows that females comprised 71% of the participants in CST group and 69% in the MM group. Headache-related disability was present on 2.7±2.5 days in CST group and 3.9±4.4 in MM group during the 3 week period. The range of the HIT-6 score pre-treatment was 63.9±8.8 points and post treatment was 43.6±4.6 in CST group and 61.3±8.1 and 58.1±7.6 respectively for the MM group. The Correlation analysis of the frequency of headache attacks and duration of disability according to the headache diary significantly correlated with the severity of headache-related disability at each attack.

CGH is fairly debilitating to the sufferer during each attack and the medications usually recommended like NSAIDS, antidepressants or muscle relaxants give temporary relief and have numerous side effects like retention of fluid, swelling of arms and legs, ulcers, nausea, weight gain, loss of sexual drive, insomnia, constipation, dry mouth and more importantly addiction or dependence. In this study, we evaluated the effectiveness of CST and MM and found both to be effective in subjects but the results are more in favour of CST. The probable causes can be that the craniosacral system operates like a semiclosed hydraulic system. There is a rhythmic rise and fall of cerebrospinal fluid volume and pressure within the boundaries formed by the dura mater. According to research performed at Michigan State University [27-34] the cranial bones with their dural linings are in continual, minute motion to accommodate the constant fluid pressure changes within the membrane compartment. The cerebrospinal fluid within the craniosacral system acts as a shock absorber for the brain. In addition to delivering nutrients to the nerves, brain, and spinal cord tissue, the fluid washes away waste products emanating from metabolic processes and thus reduces pain.

Research has shown that the meningeal membranes and the perivascular fascia are the only pain-sensitive tissues in the brain. Therefore, any abnormal meningeal tension can cause pain, as can any pressure on blood vessels. Abnormal meningeal tension or aberrant pressures on the brain stem from surrounding fascia can also potentially cause postsynaptic sensory neurons to relay their messages to higher brain centers. This relates to another theory that pain receptors in upper cervical segments actually cause the Cervicogenic headache and Cranio Sacral Therapy helps prevent and abort headaches primarily by releasing tensions throughout the meninges. By removing restrictions from meningeal and cranial bone structures, pressure is taken off the nervous system and the entire craniosacral system can open up. This also allows fluid to drain so back pressure does not build -up. The dura covers the inside of the cranial bones and surrounds the foramen magnum. It exits the cranium and attaches to C2 and C3, continuing down to where it attaches at S2 and the coccyx. Thus, it forms the dural tube that surrounds the spinal cord.

When nerve roots refer increased levels of impulse activity into the spinal cord from their peripheral domains, a facilitated condition of the related spinal cord segments occurs. A condition of hyperactivity in the facilitated spinal cord segments sends out impulses to the related dural tube and dural sleeves. This causes a tightening and loss of mobility of the dural tube related to the facilitated segments with increased nerve pressure from a contracted dural tube sleeve resulting in continual neuronal firing.

Also, the nerves in the area go to the intervertebral muscle, causing them to contract and cause fixation and subluxation. If a peripheral restriction is released but the dural tube restriction and facilitated spinal cord segments are not, the peripheral problem usually reoccurs. So a peripheral problem can translate through the facilitated segments up into the cranium and cause the meninges to contract in the same way an intracranial meningeal problem can translate down the dural tube and cause facilitation. Either one can result in a Cervicogenic headache. CranioSacral Therapy has effectively helped release such dural tube restrictions to normalize the activity of facilitated spinal cord segments[35].

Conclusion

This study revealed that Craniosacral therapy can be an effective treatment strategy for patients of Cervicogenic Headache as compared to Maitlands mobilization on HIT-6.

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