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Pilates Combined with mobilization application to treat Cervicogenic headache

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Abstract

A secondary headache known as a cervicogenic headache (CGH) results from ligaments, tight tissue, or bony structures found in the cervical and atlanto-occipital joints. Non-throbbing in nature, the resulting pain is often felt unilaterally in one or more areas of the head and/or face. According to Ottar Sjaastad, a Norwegian neurologist, the pain often begins in the neck and occiput area and can spread to various parts of the head, including the forehead, orbital region, temples, and vertex. By improving the biomechanics of the cervical joints, the study hopes to prevent Cervicogenic headaches in a person. The Diagnostic Criteria for cervicogenic Headaches proposed by the Cervicogenic Headache International Society Group (CHISG) and the International Headache Society (IHS) are used as standard references for this publication. Cervical flexion rotation tests are also used as standard references for this journal. The Neck Disability Index (NDI) questionnaire and the Numerical Rating Pain Scale (PRPS) were among the outcome measures. Cervicogenic headaches are commonly treated with physiotherapy, and postural adjustment, plank exercises, and mobilization techniques play crucial roles.

Keywords: Postural correction, plank exercises, Transgeminocervical nucleus

Introduction

It is a sickness characterized by persistent hemicranial discomfort that travels from the neck's soft tissues or bony structures to the head. It is thought that sensory nerve fibers from the upper cervical roots and those in the descending tract of the trigeminal nerve interact in the trigeminocervical nucleus, a part of the upper cervical spinal cord. [1] The bidirectional referral of painful sensations between the neck and the trigeminal sensory receptive fields of the face and head is made possible by the functional convergence of upper cervical and trigeminal sensory pathways. The referral of neck discomfort to the head may also be caused by a functional convergence of sensorimotor fibers in the upper cervical nerve roots and the descending tract of the trigeminal nerve in the spinal accessory nerve (CN XI). [2]

Ottar Sjaastad first recognized this headache in the early 1980s, and the Cervicogenic Headache International Study Group was established in 1988. This headache is caused by a nociceptive source that is located in the cervical area (CHISG). [3]

Cervicogenic headache affects as many as 20% of patients with persistent headaches in pain management clinics, compared to an estimated 0.4% to 2.5% prevalence in the general population. [4] The average age of individuals with this ailment is 42.9 years, and women are four times more likely than males to experience cervicogenic headaches. When compared to control subjects, patients with cervicogenic headaches have shown significant declines in quality of life measurements that are comparable to those in patients with tension-type headaches and migraine, but they show the greatest loss in physical functioning when compared to the groups with other headache disorders. [5]

The most prevalent and typical symptoms of primary headache problems are neck discomfort and soreness in the cervical muscles. [6]

Cervicogenic headache, which is a less prevalent ailment, is caused by soft tissues or bony neck structures. If it is not identified, cervicogenic headache can be a confusing pain problem that is resistant to therapy. Although there is disagreement over the pathophysiology of the condition and the origin of the pain, it is most likely referred from one or more neck-related muscular, neurogenic, osseous, articular, or vascular structures. [7,8,9]

Further research has identified the locations of the pain that patients might experience relief from by receiving controlled diagnostic blocks to the lateral atlantoaxial joint or the zygapophysial joints at C2–3, or C3–4. [10]

There are parallels in the distribution of pain among patients who have pain in a certain joint, yet there are differences as well. Pain from the lateral atlantoaxial joint (C1-2) often refers to the vertex, orbit, and ear, and is concentrated in the occipital and suboccipital areas.

The occipital area is also affected by C2-3 zygapophysial joint pain, which then travels through the parietal region to the frontal region and orbit. Although C3-4 joint pain might relate to the head, it often affects the upper and lateral cervical regions.

Our findings demonstrate that the C1, C2, and C3 nerves innervate the tissues that might cause referred pain in the orbital region, and head (typically unilateral and non-throbbing). No experimental research has established that the lower cervical nerves' innervated regions are capable of producing headaches on their own.

Similar referral patterns have been seen in healthy volunteers after noxious, experimental activation of cervical tissues. Researchers have demonstrated that painful stimulation of more rostral structures in the cervical spine produced referred pain in the occipital area and further locations, such as the frontal region and orbit. Early investigations focused on the suboccipital and posterior cervical muscles. (11,12)

The occipital regions of the head, which may be referred to as the neck, were not too far away when more caudal tissues were stimulated, but they did cause pain in the neck. According to findings from subsequent research, unpleasant stimulation of the atlanto-occipital and lateral atlantoaxial joints, the C2-3 zygapophysial joint, the C2-3 intervertebral disc, and the atlanto-occipital and C2-3 joints can cause pain in the occipital area. (13)

Case study

While denying any trauma, a 52-year-old businessman who works full-time began experiencing upper back discomfort and mild headaches 2 years ago. He also confessed to maintaining a sedentary lifestyle. The patient went to see the doctor about it, and he began his thorough clinical examination. His neck was stiff and the non-throbbing discomfort often began in the cervical region with symptoms like nausea and vomiting but there were no other accompanying symptoms like impaired vision, dizziness, or vertigo. Vital signs revealed normal blood pressure, heart rate, and temperature before the discomfort gradually began to spread to the occipital region of the head. Stress significantly increased the frequency and severity of headaches.

The doctor conducted a comprehensive clinical investigation but was unable to determine the precise cause of the patient's symptoms. As a result, in addition to the necessary physical examination, an X-ray was performed to rule out any other probable reasons for the patient's deep, dull, non-throbbing headache. No structural abnormality was identified, yet her everyday behaviors had altered her posture functionally wrong. After some time, non-throbbing pain began to refer from the neck to the occiput area, then to the one-side temporal region of the head, and became deep, intense, and intermittent, lasting hours to days.

Later, the left side of the head and the left eye both started to experience pain. The patient went to the ophthalmologist as a result, but there was no difference in her vision, and no other warning sign for the neurological ailment was found. The patient's physician advised physiotherapy for the same. When the headaches became more frequent and more intense, the patient went to the physiotherapist for treatment.

Assessment and treatment

When the patient first came to the physiotherapist, the sagittal and frontal plane postural analysis revealed that the patient had a slumped posture, and rounded shoulders, and was shown to have an imbalance in the shoulder level when seen in the frontal plane. Specifically, the dominant shoulder (the right shoulder) was lowered in relation to the non-dominant shoulder, and there was an apical breathing pattern with minimal involvement of the diaphragmatic muscles, forward head and neck protrusion, hyperlordosis at the cervical and hyperkyphosis at the thoracic regions, as well as a modest amount of winging of the scapulae.

Table 1. Patient's Demographic Data with the scale and the tests performed on the first day of the treatment

Characteristic	Value
Age	52
Gender	Male
BMI	32
NDI	34
CFR Test	The patient had a lot of pain while performing this test and the rotational range of motion between C1-C2 came to be less than 45 i.e., 35 degrees
NRPS	7
DNFE Test	The Patient was not able to keep his occiput 2.5cm from the table for 30 seconds

(BMI: Body mass index; NDI: Neck disability index: CFRT: Cervical flexion rotation test; NRPS: Numerical rating pain scale; DNFET: Deep neck flexors endurance test)

	International Headache Study Group[47]	International Headache Society[3]
Symptoms	• Unilateral headache without side shift • Ipsilateral neck, shoulder and arm pain of a rather vague, non-radicular nature • Pain episodes of varying duration or fluctuating, continuous pain • Moderate, non-excruciating pain, usually of a non-throbbing nature • Pain starting in the neck, eventually spreading to head, where the maximum pain is often located • Pain triggered by neck movement and/or sustained awkward position • Sustained neck trauma prior to the onset • Autonomic symptoms and signs (e.g. nausea, vomiting, dizziness, photo- and phonophobia, blurred vision)	A. Any headache fulfilling criterion C
Physical examination	• Reduced cervical spine range of motion • Symptoms on palpation of the cranium or neck • Anaesthetic blockades abolish the pain transiently	B. Clinical, laboratory and/or imaging evidence of a neck disorder, known to be able to cause headache C. Evidence of causation demonstrated by at least two of the following: 1. Headache has developed in temporal relation to the onset of the neck disorder 2. Headache has significantly improved in parallel with improvement in the neck disorder 3. Cervical range of motion is reduced and headache made worse by provocative manoeuvres 4. Headache is abolished following cervical diagnostic anaesthetic blockade
Other		D. Not better accounted for by another headache diagnosis

Figure 2: The International Headache Society and Cervicogenic Headache International Society Group's suggested Diagnostic Criteria for Cervicogenic Headaches are used as standard references for this publication.

The deep cervical flexor weakness crossed ventrally with middle and lower trapezius weakness, while the pectoralis major and minor were crossed with tightness in the upper trapezius and levator scapula on the dorsal side.

In the upper trapezius muscle, there were a few trigger sites with grade 2 sensitivity. Specifically, in the atlanto-occipital joint, lower cervical spine joints (C4-5), glenohumeral joint, scapulothoracic articulation, and a few parts of the thoracic spine, this muscle imbalance leads to joint dysfunction (T4-5).

Additionally, assessed muscular strength and flexibility. The strength and flexibility of the antagonist muscle group were found to be out of balance during an examination, which is a symptom of "Proximal crossed syndrome."

A cervical flexion rotation test was conducted in the first diagnosis of cervicogenic headache and was found to be positive. The International Headache Society (IHS) and Cervicogenic Headache International Society Group's suggested Diagnostic Criteria for Cervicogenic Headaches are used as standard references for this publication (CHISG). [14]

Following the first examination, sessions were more action-oriented and centered on the traditional structural biomechanical approach with a thorough corrective and rehabilitative exercise regimen for the upper-crossed condition.

Improvement, rehabilitative, and maintenance stages, as well as a warm-up and cool-down period of 10-15 minutes each, comprise the design of the exercises that were chosen.

For eight weeks, From day 1 till 2 weeks (three days per week)

Headache sustained natural apophyseal glide with headache (during headache)
Mobilization with movement into flexion at C2-C3
Headache SNAG without the headache
Pilates Rocking exercise
Upper cross stretches (for upper trapezius and levator scapulae)

When a cervicogenic headache occurs, Headache Sustained Natural Apophyseal Glide assists in correcting the positioning issue at the C2 level and may reduce the pressure that might be put on the greater occipital nerve because of a tight fascia.To correct the pathomechanics of the joints and further excite the proprioceptors and mechanoreceptors in and around the lower cervical joints to reduce pain, mobilization with movement into flexion at C2-C3 was conducted during the time of headache. Moreover, it helps to promote joint play, which raises the range of motion in the joints. [15]

FOR THE NEXT FOUR WEEKS (THREE DAYS PER WEEK)

Mobilization with movement into flexion at C2-C3
Headache SNAG without the headache
Pilates Rocking exercise
Pilates Swan Dive exercise
Upper cross stretches (for upper trapezius and levator scapulae)
Pilates Box twist exercise

Pilates Rocking exercise

Pilates rocking exercises fortify the back and balance the forward bending movements that are frequently used in the discipline—as well as any slouching that an individual might perform on a regular basis. one can lengthen one's spine and stabilize his torso by rocking. Both of these will help the subject to maintain good posture and a strong, flexible back so he may go about his everyday activities pain-free.

Pilates Swan Dive exercise

This exercise is crucial for the patient's postural correction since it targets the arm muscles, stretches the abdominals, and lengthens the hip flexors. The Swan also strengthens the back and mobilizes the mid/upper (thoracic) spine, which helps to improve posture and lower the chance of experiencing back discomfort.

Upper cross stretches

A few manual treatments were used on the patient, mostly static stretching therapy for the upper trapezius and levator scapula muscles, to restore the abnormal length-tension relationship in the tensed and shortened muscles.

Pilates Box twist exercise

The Pilates box twist exercise aids in maintaining stability while broadening the range of motion. Spinal twists also aid with posture correction. Ultimately, this exercise enables the person to breathe in and out several times in a single motion, maintaining the body's oxygen level for improved performance without being fatigued.

FOR THE NEXT 4 WEEKS (FIVE DAYS PER WEEK)

Pilates Box twist exercise
Pilates Rocking exercise
Upper cross stretches
Swimming Pilates exercise
Pilates Hundred exercise

Pilates Box twist exercise

The patient was trained to rotate the body from the center, as opposed to the hips or shoulders, which will be beneficial for the strengthening purpose. It will make his spine extensors and oblique muscles stronger. It helps to extend the spine against the force of gravity and enhance posture when seated.

Swimming Pilates exercise

The Pilates swimming exercise strengthens an individual's butt and thighs as well as the extensor muscles of one's back. The patient was instructed to continue using their head and neck as extensions of their spine and not to budge the spine's natural curve at the neck. The entire time, the shoulders are relaxed, and the abdominals are contracted and elevated off the mat.

Pilates Hundred exercise

Subjects entire body is aligned, from the head to the tips of the toes. It covers breathing exercises, midline zipping, and proper pelvic alignment. This workout increases endurance, stability, and strength while also toning the abdominal muscles and enhancing circulation. It promotes good alignment, muscular balance, and stability, and places a strong emphasis on the core.

RESULT

The physical examination has changed:

Neck disability index (NDI)

With the help of this questionnaire, the patient can tell the investigator, how his neck discomfort has affected his ability to function normally.

After the intervention, the neck disability index score in the 11th week was 22 out of 50, which indicates a minor handicap. This demonstrates that the treatment plan followed was appropriate and helpful for improving the problem being treated.

Scale for rating pain numerically i.e., Numerically rating pain scale (NRPS)

Numerical pain measures are used to make an accurate diagnosis, choose a course of therapy, and assess the success of that treatment. They also assist identify the degree of the pain.

The Numerical Rating Pain Scale result for the eleventh week was 3 out of 10, which indicated very little discomfort and shows that the treatment protocol followed was accurate and beneficial for the betterment of the condition that is being treated.

Test of cervical flexion and rotation i.e., cervical flexion rotation test (CFRT)

it is allegedly skewed to evaluate impairment in the C1-C2 motion segment, and it is a simple clinical exam. 50% of the rotation in the cervical spine is accounted for by the C1-C2 motion segment. In patients with neck discomfort and headaches, manual examination offers high sensitivity and specificity to determine the existence of cervical joint dysfunction.

Following the tenth week, the patient had some little discomfort when rotating with the neck passively flexed, but the rotational range of motion from C1 to C2 increased from 35 degrees to 45 degrees in the first week.

Endurance test for the deep neck flexors i.e., Deep neck flexor endurance test (DNFET)

In a group of 126 asymptomatic people between the ages of 20 and 80, Domenech et al. (2015) report means hold periods of 39 seconds for men and 29 seconds for women, and the inter-rater reliability of this test is reported at 66%. Earlier in the first-week patient was not able to maintain his occiput 2.5cm from the table for 30 seconds but in the 11^{th} week, the patient could maintain 2.5 cm of her occiput off the table for 30 seconds.

Patient's self-report

The patient gave encouraging comments as well as confirmed the severity of the upper trapezius trigger sites.

CONCLUSION

Despite the fact that cervicogenic headache is frequently misdiagnosed or undetected, it is possible to identify this headache by using the diagnostic criteria of the International Headache Society. His changed length-tension relationship of the scapular muscles, excessive postural muscular use without enough relaxation, and ignorance of his discomfort in the thoracic and cervical areas were the root causes of his cervicogenic headache. The patient in question received physiotherapy as their main course of treatment.

In order to maintain and develop weak muscles and to calm tense ones, plank exercises for posture correction with mobilization application were essential. Mobilization was combined with Mulligan procedures (unilateral SNAG in the patient's lower cervical area and central SNAG at C1 and C2 joints) to correct the altered biomechanics of the cervical region in order to relieve pressure from the nerves which were the main cause of pain generation. [16] Because inactive individuals frequently have postural dysfunction, it would be advantageous for future research to focus on cervicogenic headache associated with the upper crossed syndrome.

DISCUSSION

A common misdiagnosis or underdiagnosis of persistent headache is cervicogenic headache. Its presenting symptom complex may resemble those of primary headache diseases like migraine or tension-type headache, which are more frequently seen. The prolonged course of expensive therapy and impairment that are frequently associated with cervicogenic headache might be considerably reduced by early identification and management by the primary care physician. Because of their expertise in manual diagnostic techniques and mobilization therapy using plank exercises, they are qualified to recognize and treat this difficult pain disease.

Contribution of Paper

- It is crucial to treat the individual as a whole when treating cervicogenic headache rather than simply focusing on the standard structural biomechanical approach a whole rehabilitative exercise program should be targeted.
- Dysfunctional muscle imbalance necessitates a holistic and multidimensional therapy of the problem.

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