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Comparative Effectiveness of Intermittent Neuromuscular Versus Dietary Intervention (Fruits and Vegetables) as Complementary Interventions in a Patient with Cervicogenic Headache: A Case Study

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Abstract

Background: Cervicogenic Headache (CGH) is a symptomatic headache disorder originating from cervical spine musculoskeletal impairment in functional capacity. Complementary investigations, such as Intermittent Neuromuscular Technique (INMT) and nutrition-based interventions, may provide additional clinical benefits.

Objective: To assess and contrast the clinical effectiveness of INMT vs nutritional impairments prioritising nutrient consumption of fruits and vegetables, together with standard non-invasive management, in alleviating pain, enhancing functional capacity, and reducing headache incidence in a patient with CGH.

Methods: A 32-year-old male with prolonged both-sided CGH received an eight-week treatment program combining INMT integrated with non-invasive management and a simultaneous nutritional treatment strategy intended to increase fruit and vegetable intake. Evaluation criteria included the Visual Analogue Scale (VAS), headache frequency, Neck Disability Index (NDI), and the short form-36 (SF-36) quality-of-life questionnaire.

Results: After INMT, the VAS score decreased from 7/10 to 3/10, headache frequency decreased from 5 to 1 episode per week, and the NDI improved from 18/50 to 8/50. Dietary intervention resulted in a VAS decrement to 4/10, a headache frequency of 2 episodes per week and an NDI of 18/50 to 10/50, indicating a cumulative therapeutic effect.

Conclusion: INMT facilitates focused reduction in neuromuscular discomfort, modifications improve overall health, and interactively enhance symptom relief in CGH. Multifaceted approaches present extreme effectiveness and require additional verification via comparison with increased sample sizes.

Keywords: Cervicogenic Headache; Intermittent Neuromuscular Technique; Nutritional Intervention; Fruits and Vegetables; Visual Analogue Scale (VAS); Neck Disability Index (NDI); Quality of Life

Introduction

Cervicogenic headache is a disorder defined by referred pain from cervical spine structures such as cervical discs, zygapophyseal joints, and connective tissues, commonly associated with limitation of cervical range of motion and associated functional deficits. While non-invasive therapies, comprising physiotherapy and pharmacotherapy, represent primary treatment strategies, developing research supports probable benefits of complementary therapies such as Intermittent Neuromuscular Techniques (INMT) and nutritional intervention, significant by enhanced consumption of antioxidative-dense fruits and vegetables. These complementary approaches may reduce inflammation and oxidative stress involved in CGH pathophysiology, thus improving overall therapeutic effect.

Corticospinal headache is a symptomatic headache that originates from musculoskeletal dysfunction in the cervical vertebrae and associated structures. Differing from migraine and tension-type headache, which are mainly neurological in origin, CGH is based on cervical

impairments. Determined in the global classification by pain arising in the cervical region and designated to one side of the head, generally exhibiting as ipsilateral, constant, and steady pain. This pain is generally exacerbated by neck mobility, static postures (or) applied pressure exerted to cervical muscle. While it's frequency in the overall population has been approximated between 0.4% and 4.1% this figure is considerably elevated among patients visiting clinician cranial pain clinics, where the occurrence can extent from 15% to 20% CGH is more frequently noted in middle aged- adults, specifically between the 3rd and 5th decennial periods and the disorders indicates a female majority creating it a considerable health problem for adult workforce.

In contemporary societies, the shifting lifestyle produced by digital adoption, desk-based occupations and chronic participation with portable devices has enhanced the risk of musculoskeletal impairments, specifically those impacting the cervical vertebrae.

Prolonged hours utilised in prolonged sitting positions, laptop (or) desktop use in deficient setups, and the common "anterior cervical displacement" connected with smartphone use together place overly tension on the cervical vertebrae and adjacent muscle structure.

Pain- transmitting sensory signals from the upper spinal nerves of the cervical region (C1, C2 and C3) with trigeminal nerve signals at the trigeminocervical nucleus in the brainstem. This integration is of paramount importance as it presents a physiological description for projected pain: impairment arising in cervical tissue structure, such as the zygapophyseal joints, spinal discs, muscles, ligaments, and dura mater, can be observed in a headache. Therefore, patients may demonstrate pain in the occipital, temporal, orbital, or anterior cranial region, even though the pain producer is situated in the vertebral column. This morphological disorder is prepared by peripheral nociceptor sensitisation, where pain receptors develop into highly responsive, and spinal cord sensitisation, where the brain-spinal cord system enhances pain neural transmission. Such functional changes generate a self-perpetuating cycle in which pain, involuntary muscle contraction, limitation of motion, and dysfunctional activity each other gradually producing a prolonged dysfunction that reduces the patient's- being.

Although pharmacotherapy persists as one of the conventional intervention choices for CGH, its restrictions are pronounced. Non-Steroidal Anti-Inflammatory Drugs (NSAIDs), muscle-relaxing medications and neural modulators may confer short-term relief, but their prolonged use is correlated with substantial risks, including digestive system complications, medication dependence, and declining effect. These inhibitions have transferred orientation regarding non- invasive treatment methods, where physiotherapy and lifestyle-based treatment now play focal role.

Physiotherapy ensures an effective option to pharmacotherapy and intervention-based treatments by specifically treating the musculoskeletal impairments that contribute to CGH. It seeks to control pain, correct cervical alignment and mobility, and improve functional movement through interventions such as physical manipulation, exercise therapy and posture correction. Physical manipulation techniques, including manual mobilisation and manipulation, focus to regain joint movement and postural equilibrium, while myofascial techniques aim to reduce involuntary muscle contraction, increase flexibility and improve local blood circulation.

Exercise therapy promotes the functional recovery of deep cervical flexor muscle strength functional postural retrains and neuromuscular re- education integral for controlled neck motion. Muscle Energy Techniques (MET), Proprioceptive Neuromuscular Facilitation (PNF), and intermittent neuromuscular techniques (INMT) report a common principle of including muscle tightening and muscle relaxation phases to restore functional muscle tone. Improve flexibility and facilitate motor control. Among these, INMT has been diagnosed as particularly suitable for cervicogenic headache treatment.

This functional load cycling improves blood circulation, improves nutrient flow, extends shortened muscle tissue and promotes neuromuscular sensory feedback. By focusing on both biomechanical and motor control problems, INMT has indicated effective outcomes in symptom relief for headache, enhanced neck flexibility and improve overall functional rehabilitation outcomes. Its cost-efficiency protection, and continuity also make it especially useful for prolonged period rehabilitation techniques in a public gradually more affected by postural imbalance conditions.

Concurrent to physical therapy, nutritional strategies and nutritional therapy have acquired increasing importance in pain mechanisms. Nutritional plan plays both a protective and therapeutic contribution, supporting to best motor activity and decrease widespread inflammation. Fruits and vegetables structure the foundation of such strategies due to their nutrient-rich profile of vitamins, minerals, antioxidants and phytochemicals. Magnesium, for example, is important for muscle relaxation and fixed motor transfer, and its inadequacy is firmly connected to spasm, overactivity, and higher occurrence of headache. Foods such as bananas, nuts, seeds, and avacados facilitate a organic source of magnesium.

Similarly, potassium, routinely acquired from Green Leafy Vegetables (GLVs), citrus fruits and sweet potatoes, presence electrolyte homeostasis and avert muscle spasm.

Calcium facilitates to the contraction- relaxation sequence of myofibers, while vitamin C and E perform as antioxidates, decreasing oxidative damage and generating motor unit tissues.

Polyphenols and flavonoids, plentiful in fruits like berries and grapes, provide inflammation- reducing and vascular protective advantages, facilitating, to both neuromuscular well- being and alleviation of headache.

Importantly, nutritional modification has already been examined in main cephalgia people, with research emphasizing advantages from restricted diet, fluid management, vitamin and mineral supplementation. These approaches have been related with decreased pain intensity and diminished occurrence of attacks, particularly in primary headache and muscle contraction headache. Yet, the nutritional role- especially plant- based foods derived measure-persists primarily insufficiently studied in cervical headache people.

Given the involuntary muscle contraction, tissue reaction and increased nerve responsiveness related with CGH, dietary intake has the possibility to provide not only as a encouraging supplement but also as an engaged medical management. In fact, dietary management may reduce the requirement for drug- based antispasmodic such as diazepam, which in spite of efficiency, hold hazards of relaxation and reliance. Thus, nutrition intake maintains possibility as a organic, secure, and prolonged intervention in CGH control. Given the Myo skeletal basis of CGH and the generalized participation of dietary

Table 1:

Parameter	Details
Age	32 Years
Sex	Male
Occupation	Bank worker
Present complaint	Right sided cervicogenic headache but moderate pain aggravated left side of head, limitation of cervical ROM, duration past 1 year.
Medical history	No significant comorbidities
Life style	Physical inactive, low fruit and vegetables intake and excessive caffein intake

Table 2:

Outcome measure	Baseline	Post-INMT (week 8)	Post nutritional
Intervention (week 8) VAS pain score	7/10	3/10	4/10
Headache frequency	5/week	1/week	2/week
NDI score	18/50	8/50	10/50
SF-36 physical score	60/100	80/100	75/100
SF-36 mental score	62/100	85/100	80/100

intake to nervous and muscular system health, a solid justification occurs for comprehensive therapeutic strategy. Physical therapy immediately deals with anatomical dysfunction of the cervical vertebral column, which dietary intake supplies a whole- body anti- edematous and oxidative stress reduces surrounding that help restore, neuro- motor coordination, and cardiovascular wellness. Together, that method may decreased the need on medications and surgical intervention, permitting for a more secure and more affordable method to prolonged clinical management of headache. The current research, yet indicates a major deficiency: minimal analysis has measured against the immediate therapeutic effect of neuro- muscular therapy methods such as integrative neuromuscular therapy with plant- based foods nutritional treatment in cervical headache. Most research to information either concentrates on physical therapy management in quarantine or investigate dietary management in non- CGH head pain people.

Patient information

See table 1.

Physical assessment

Cervical ROM: flexion 35 degrees, extension 40 degrees, lateral flexion 15 degrees, rotation 40 degrees

Palpation: Tenderness and active myofascial trigger points are recognised in the upper trapezius and suboccipital muscles.

Pain intensity: 7/10 (VAS)

Headache frequency: 4 to 5 episodes per week.

Neck disability index: 18/50 (moderate disability)

Diagnostic evaluation: Diagnosed based on to International Classification of Headache Disorders, 3rd edition (ICHD-3) Cervical x-rays showed no notable structural abnormalities.

Provocation of symptoms with prolonged cervical posture and palpation of cervical spinal segments verified the medical diagnosis.

Clinical assessment

Physical assessment:

Cervical ROM: Flexion 35degree, extension 40 degree, lateral flexion 15 degree, rotation 40 degree

Palpation: Tenderness and active myofascial trigger points are recognised in the upper trapezius and suboccipital muscles.

Pain intensity: 7/10(VAS)

Headache frequency: 4-5 episodes per week.

Neck disability index: 18/50 (moderate disability)

Diagnostic evaluation: Diagnosed based on to International Classification of Headache Disorders, 3rd edition (ICHD-3).

Cervical x-rays showed no notable structural abnormalities.

Provocation of symptoms with prolonged cervical posture and palpation of cervical spinal segments verified the medical diagnosis.

Interventional protocol

Duration: 8 weeks.

Frequency: Three sessions per week

A. Intermittent neuromuscular technique (INMT) with conservative treatment:

Cervical vertebral mobilisation focusing on upper (C0-C3) and lower (C4-C7) cervical spinal segments.

Upper thoracic vertebral mobilisation (T1-T2) thoracic spinal segments.

Myofascial Trigger Point (MTrP) mobilisation therapy is aimed at the trapezius, levator scapulae, and suboccipital muscles.

Postural modification strategies, cervical stabilisation exercise and stretching protocols.

Ergonomic evaluation and manual corrections to work station configuration.

B. Nutritional intervention with conservative treatment:

Nutrition-focused behavioural counselling facilitating enhanced nutrient intake of fruits and vegetables to >5 daily portions. Therapeutic focus on foods increased in antioxidants such as leafy greens, berries and citrus fruits.

Hydration support strategies and instruction on reducing consumption of processed foods.

Outcome measures

Visual Analogue Scale (VAS) for pain severity.

Headache frequency (episodes per week).

Neck Disability Index (NDI).

Short Form-36 (SF-36) well-being evaluation instrument.

See table 2.

Observation: The patient observed significant and prompt system alleviation INMT, exhibited by significant reductions in pain, enhanced cervical mobility, and function. Dietary modification facilitation whole–body health advantages, allegedly through an inflammation-reducing physiological mechanism, promoting subsequent enhancement in function and overall well-being. Both treatment approaches are clinically well-tolerated well tolerated complications.

Conclusion

The clinical incorporation of INMT integrated with systematic nutrition-based strategies combined with control non-invasive management represents an evidence-supported multimodal therapy for reduction in pain severity, enhancing function, and improving quality of life in patients with cervicogenic headache. These preliminary analyses emphasise the importance of expanded cohort studies to confirm these findings and validate controlled intervention frameworks.

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