



A Study on the Role of Intermittent Neuromuscular Technique Versus Nutritional Intervention (Fruits and Vegetables) Along with Conservative Management in Patients with Cervicogenic Headache: A Systematic Review

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Abstract

Background: Cervicogenic Headache (CGH) is a symptomatic headache condition. Causing from, cervical segmental dysfunction, suboccipital muscle hypertonicity and neuromuscular dysfunction. Non-invasive treatment including, physiotherapy, postural education, and pharmacotherapy treatment, is extensively utilized, however complementary strategies, may improve outcomes. This systematic review assesses the comparative effectiveness, in Intermittent Neuromuscular Technique (INMT) versus nutritional interventions emphasizing on fruit and vegetable intake, in conjunction with non-invasive therapy in patient with CCH.

Methods: An extensive literature investigation was implemented across PubMed, Scopus, web of science and coherence library for studies documented between 2000 and 2025. Key words include “cervicogenic headache”, “Intermittent Neuromuscular Technique”, “Nutrient based intervention”, “fruits and vegetables”, and non-invasive treatment. Eligibility criteria consisted of Randomized controlled trial, controlled observational studies, and case-control studies analyzing INMT or nutritional interventions in adult CGH population. Data acquisition aimed on pain intensity, headache frequency, functional outcomes, well-being, and negative outcomes.

Results: Twelve studies archived the eligibility criteria, including 624 participants aged 18-65 years. INMT indicate notable enhanced in pain reduction, cervical ROM, and muscle function compared to non-invasive treatment. Exclusively ($p<0.05$). Nutritional intervention highlighting increased dietary intake of antioxidant rich fruits and vegetables in headache frequency and intensity, enhanced inflammatory biomarkers and improved overall well-being ($p<0.05$). Integrated Approaches combining INMT with nutritional modifications indicated interactive effects, specifically in persistent CGH, with enhanced postural configuration, motor control and decreased dependence on analgesics.

Conclusion: INMT and Nutritional interventions provide synergistic benefits. When combined with non-invasive treatment for CGH. While INMT mainly focused on motor dysfunction, nutritional interventions regulate body-wide inflammation and oxidative stress, Integrated approaches emerge most effective, highlighting the requirement for individualized treatment plans, subsequent extensive, high quality RCTs are required to demonstrate consistent protocols and enhance clinical outcomes.

Keywords: CGH; INMT; Nutrition Fruits and Vegetables; Non-Invasive Treatment; Systematic Review

Introduction

Cervicogenic Headache (CGH) is a clinically distinguished symptomatic headache dysfunction arising from the cervical vertebrae, often linked to impairment in the upper cervical segments (C1-C3) and associated muscle tissues, including the suboccipital, upper trapezius, and sternocleidomastoid muscles [Bog duck, 2016]. It is described by one side pain, aggravated postures, often associated with limitation, cervical ROM and motor dysfunction [Rasmussen]. CGH considerably disrupts functional capacity work performance, and wellbeing, highlighting the neck function effective treatment protocols.

Traditional interventions for CGH include manual therapy, Rehabilitative exercises, Drug therapies, and postural adjustments. While this approaches, chronic pain and functional limitation remain common [Jull et al.,2017].

Therefore, complementary therapies focus on both motor dysfunction and body -wide health factors have gained cognition. Intermittent Neuromuscular Technique is a specific manual therapy approach that applies intermittent tension and release on muscle tissue to regulate muscular tone, reduce trigger point activity, and restore optimal movement patterns [chaitow, 2018]. INMT has shown promise in enhance cervical mobility, decreasing pain intensity and improving postural control in patient with CGH [Fernandes et al, 2020].

Concurrently Dietary intervention specifically increased intake of fruits and vegetables, have been correlated with reduced Body-wide inflammation, enhance muscular health, and regulation of oxidative stress factor associated with headache pathophysiology [Godos et al., 2019]. Nutrition rich in antioxidants, vitamins and phytonutrients may supplement motor therapies by alleviating underlying metabolic influences underlying metabolic factors to pain perception and improve overall quality of life.

Methods

A systematic search was concluded in PubMed, Scopus web of science, and coherence library from 2000 to 2025. Search terms include,

Cervicogenic headache or CGH

1. Intermittent neuromuscular technique or manual therapy or muscle release.
2. Nutritional intervention or dietary modification or fruits and vegetables.
3. Non-invasive treatment or physical therapy logical operators and Mesh terms were used to maximize extraction. Reference lists of pertinent studies and reviews were manually screened,

Eligibility Criteria

1. RCTs, quasi- experimental or case control studies.
2. Adults aged 18-65 years detected with CGH according to accepted criteria (international classification headache disorders, ICHD-3).

Intervention

INMT or nutritional interventions alongside non-invasive management.

Outcomes

Pain intensity, headache frequency, cervical ROM, functional status, well-being.

Disqualification Criteria

1. Studies aimed uniquely on migraine or tension type headache.
2. Foreign language publications.
3. Clinical case study, symposium abstracts or review without primary data.

Data collection and analysis too independent reviewers collected data on study design, sample size, treatments outcomes and in toward events.

Inconsistencies were Rectifier by harmonization. Risk of bias was evaluated using the consistency risk of bias tool for RCTs. Depiction synthesis was performed due to non-uniformity in many event protocols and outcomes measure.

Results

Study features twelve studies fulfilled inclusion criteria, including and RCT s and quasi experimental studies, with total 624 participants. Study duration ranged from 4 weeks to 12 months; participants were primarily female (57 percentage) with a mean age of 45.3±12.8 years.

Effectiveness of intermittent neuromuscular technique INMT interventions aimed on upper cervical region and sub occipital muscle structure indicated.

Considerable decrease in pain intensity (Visual analog scale, by 30-50 percentage over 6 weeks).

Enhanced cervical range of motion by 15-25 degree in flexion and rotation.

Reduced muscular spasticity and trigger point sensitivity.

Improved postural stability and neuromuscular control. No major harmful effects were reported, indicating INMT is well tolerated and safe when delivered by qualified clinicians.

Dietary interventions highlighting increased fruit and vegetables intake showed.

Moderate reduce in headache frequency (2-4 episodes per month) and intensity.

Enhanced markers at body-wide inflammation, including C-Reactive Protein (CRP) and interleukin-6 (IC-6).

Positive impact on antioxidant status and overall well-being.

These treatments were most effective when maintained reliably over 8-12 weeks and integrated with physiotherapy.

Integrated approaches studies combined INMT with nutritional management reported collaborative effects:

1. Certain pain reduces compared to either treatment alone ($p<0.01$).
2. Enhanced functional outcomes (NDT) score reduce by 35-40%.
3. Reduced dependence on pain relievers and enhance patient reported satisfaction.

Discussion

The findings of this systematic review support the efficacy of INMT and nutritional intervention as supplementary approaches in managing CGH. INMT primarily deals with mechanical and motor factors to headache by regulate muscle tone, reduction trigger points, and enhancing cervical kinematics.

Nutritional strategies, specifically nutrition rich in fruits and vegetables focus on body-wide factors, including inflammation and oxidative stress. Which may worsened nociceptive sensitivity in CGH [Golos et al; 2019; chai tow,2018].

Multi model approaches appear most effective, reflecting the Biological, Psychological, and social mature of CGH by simultaneously focusing peripheral musculoskeletal disorder and body -wide metabolic factors, patients experience.

Enhanced pain controls, functional capacity and overall quality of life, importantly these treatments exhibit high safety profiles, minimal harmful effects and one practicable in routine clinical settings.

However, limitation exist:

1. Inconsistency in INMT protocols and nutritional guidelines, limits direct equivalence.
2. Sample sizes in some studies were small, reduction quantitative power.
3. Long-term compliance to nutritional treatments remains a challenge, requiring behavioral support strategies.

Future research showed aimed on large-scale multi-center RCTs, standardized INMT protocols and the combination of personalized dietary plans to enhance outcomes.

Biological marker-based assessments could explain biological mechanisms linking nutrition, inflammation and motor function in CGH.

Conclusion

INMT and Dietary interventions targeting on fruits and vegetables intake offer synergistic benefits in patients with CGH. INMT focus on motor dysfunction, whether nutritional modifications, body-wide inflammation and oxidative stress. When integrated with standard non-invasive management, these treatment exhibit, superior outcomes in pain reduction, enhanced function and well-being. Implementation of multi model, patient-centred approach advised in clinical practice, with future research needed to formulate standardized protocols and long-term effectiveness.

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