International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Effect of Combined Cervical Stabilization and Sensorimotor Training in Cervicogenic Dizziness: A Case Report

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ABSTRACT

Background: Cervicogenic dizziness (CGD) is characterized by non-vertiginous dizziness associated with cervical spine dysfunction and altered sensorimotor integration. Disruption of cervical proprioceptive input can impair postural control and spatial orientation.

Case Presentation: A 27-year-old male desk-based worker presented with a six-month history of chronic neck pain and intermittent dizziness. Symptoms were aggravated by prolonged sitting, sustained visual tasks, and repetitive cervical movements. Clinical findings included forward head posture, restricted cervical range of motion, impaired proprioception (Joint Position Error: 5-7°), and moderate disability (NDI: 22/50).

Intervention: A structured four-week physiotherapy program including cervical stabilization, sensorimotor training, gaze stability exercises, and ergonomic correction was implemented.

Results: Post-intervention, significant improvements were observed in pain (NPRS: 8/10 to 2/10), dizziness (7/10 to 2/10), proprioception (JPE: 1-2°), and disability (NDI: 8/50).

Conclusion: Combined cervical stabilization and sensorimotor training is effective in improving symptoms and functional outcomes in cervicogenic dizziness.

Categories: Therapeutics, Physical Medicine & Rehabilitation, Pain Management

Keywords: cervical stabilization, cervicogenic dizziness, neck pain, physiotherapy, proprioception, sensorimotor training

Introduction

Cervicogenic dizziness (CGD) is recognized as a clinical entity characterized by non-vertiginous dizziness associated with dysfunction of the cervical spine, often accompanied by neck pain and restricted mobility. The underlying mechanism is widely considered to involve altered cervical proprioceptive input and disrupted integration between cervical, visual, and vestibular systems, resulting in a sensorimotor mismatch and impaired postural control [1,2].

Emerging evidence suggests that dysfunction of the upper cervical segments may interfere with afferent input from mechanoreceptors, thereby affecting spatial orientation and balance regulation [2,3]. As a result, patients frequently report a sensation of imbalance rather than true spinning vertigo.

In recent years, the prevalence of CGD has increased, particularly among individuals engaged in desk-based occupations. Prolonged static postures, repetitive cervical movements, and suboptimal ergonomic setupssuch as dual-screen workstations-have been identified as contributing factors. These conditions may

lead to muscle imbalance, reduced activation of deep cervical stabilizers, and altered neuromuscular control [3,4].

Physiotherapy plays a central role in the management of CGD. Current evidence supports interventions that address both cervical musculoskeletal dysfunction and sensorimotor impairment. Cervical stabilization exercises aim to improve deep neck flexor function and postural control, whereas sensorimotor training focuses on enhancing proprioception, gaze stability, and coordination among sensory systems [4,5].

Recent randomized controlled trials have demonstrated that structured cervical interventions can significantly reduce dizziness intensity, improve functional outcomes, and restore cervical mobility [5]. Furthermore, there is growing support for combined rehabilitation strategies, which appear to produce superior results compared to isolated treatment approaches [5,6].

Therefore, this case study aims to evaluate the clinical effectiveness of a structured rehabilitation program integrating cervical stabilization and sensorimotor training in a patient presenting with cervicogenic dizziness associated with occupational postural dysfunction.

Case Presentation

A 27-year-old male desk-based worker presented with a 6-month history of chronic neck pain associated with intermittent non-vertiginous dizziness and a subjective feeling of imbalance. The symptoms were exacerbated by prolonged sitting, sustained visual tasks, and repetitive cervical movements, particularly rotation.

The patient reported difficulty maintaining a comfortable head position during work and described early onset of cervical fatigue during daily activities. There was no history of trauma, vestibular pathology, or neurological impairment.

Occupational history revealed prolonged exposure to a dual-screen workstation, requiring repetitive unilateral cervical rotation. This was combined with poor ergonomic positioning and inadequate postural awareness, which appeared to contribute to symptom persistence.

On physical observation, forward head posture and rounded shoulders were evident. Cervical range of motion was restricted and associated with discomfort, particularly during extension and rotation. Palpation revealed localized tenderness in the suboccipital region along with increased muscle tone in the upper trapezius, sternocleidomastoid, and levator scapulae muscles.

Outcome measures were recorded as follows:

NPRS: 8/10
Dizziness intensity: 7/10
Neck Disability Index: 22/50
Joint Position Error: 5-7°
Manual Muscle Testing: 4/5

Neurological examination was within normal limits, and vestibular causes were clinically excluded.

Radiological investigations did not reveal any structural abnormalities.

Based on the clinical findings and exclusion of alternative diagnoses, a diagnosis of cervicogenic dizziness associated with postural dysfunction and sensorimotor impairment was established.

INTERVENTION

A structured 4-week physiotherapy rehabilitation program was implemented, focusing on a progressive combination of cervical stabilization, sensorimotor training, and ergonomic correction.

Week 1: Emphasis was placed on pain modulation and initial muscle activation through thermotherapy, soft tissue mobilization, gentle cervical mobility exercises, and activation of deep cervical flexors.

Week 2: The program progressed to include enhanced deep cervical flexor training, scapular stabilization exercises, and initial joint position sense retraining.

Week 3: Advanced sensorimotor interventions were introduced, including dynamic proprioceptive exercises and gaze stability training.

Week 4: Functional integration was emphasized through dynamic cervical stabilization, dual-task activities, and ergonomic correction tailored to the patient's workstation.

This progression was guided by patient response and supported by evidence advocating multimodal rehabilitation approaches in CGD management [4,5].

Discussion

The findings from this case suggest that a combined rehabilitation approach incorporating cervical stabilization and sensorimotor training can be effective in managing cervicogenic dizziness. The patient demonstrated marked improvements in pain intensity, dizziness severity, proprioceptive accuracy, and functional disability following a structured four-week intervention program, supporting the clinical relevance of a multimodal physiotherapy approach.

The reduction in dizziness and disability observed in this case is consistent with previously reported findings in the literature, where cervical interventions and rehabilitation strategies have been shown to improve postural control and reduce symptom severity in individuals with cervicogenic dizziness [2,4]. These improvements may be attributed to enhanced integration of sensory inputs from cervical, visual, and vestibular systems, which are often disrupted in this condition [1,3].

Improvement in Joint Position Error (JPE) in this case indicates enhanced cervical proprioceptive function, suggesting better afferent input from cervical mechanoreceptors and improved sensorimotor control. Previous studies have emphasized the role of impaired cervical proprioception in the pathogenesis of cervicogenic dizziness and have highlighted the importance of targeted sensorimotor training in restoring postural stability and coordination [3,4].

Cervical stabilization exercises likely contributed to improved neuromuscular control by facilitating activation of deep cervical flexor muscles, which play a key role in maintaining segmental stability and postural alignment. Dysfunction of these muscles has been associated with neck pain and altered movement patterns, and their retraining is essential for restoring normal cervical biomechanics [1,6].

Furthermore, the inclusion of ergonomic correction addressed the underlying occupational risk factors in this case, particularly prolonged dual-screen usage and sustained forward head posture. Addressing these contributing factors is crucial, as persistent mechanical stress can perpetuate abnormal afferent input and delay recovery. This highlights the importance of a comprehensive and individualized approach that integrates therapeutic exercise with workplace modification [4,5].

Overall, the findings of this case support the growing body of evidence suggesting that combined rehabilitation strategies are more effective than isolated interventions in the management of cervicogenic dizziness. However, as this is a single case report, the generalizability of the results is limited, and further

research with larger sample sizes and controlled study designs is required to establish definitive clinical guidelines [2,6].

Conclusions

A structured physiotherapy program integrating cervical stabilization, sensorimotor training, and ergonomic correction resulted in significant improvement in symptoms and functional outcomes.
This case reinforces the importance of a multimodal rehabilitation strategy targeting both mechanical and sensorimotor components in cervicogenic dizziness.

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