International Journal for Multidisciplinary Research (IJFMR)

E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Correlation between Static Head Position and Deep Neck Flexors Endurance in Patient with Cervicogenic Headache

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ABSTRACT

Background & Objective: Secondary headaches caused by problems with the cervical spine and the muscles and joints that attach to it are known as cervicogenic headaches (CGHs). The onset and maintenance of cervicogenic headache may be influenced by changes in cervical position, specifically a forward head posture. Although impaired posture and reduced deep neck flexor endurance have independently been associated with cervicogenic headache, limited evidence exists regarding the relationship between these two variables.

Methodology: Fifteen patients, ranging in age from 26 to 40, were included in a cross-sectional observational research that was related to cervicogenic headaches. Using standardized lateral photos, the CVA was used to quantify static head position. DNF was assessed using the Pressure Biofeedback Unit during the Deep Neck Flexor Endurance Test. Cervicogenic headache severity was assessed using the CHSQ. Statistical analysis was performed using IBM SPSS Statistics Version 29. Karl Pearson's correlation coefficient was used to ascertain the association between CVA and Deep Neck Flexor Endurance, It was deemed statistically significant if the p-value was less than 0.05.

Results: Pearson's correlation analysis demonstrated a very weak positive correlation between CVA and Deep Neck Flexor Endurance ($r = 0.148$), which was not statistically significant ($p = 0.599$).

Conclusion: The present study demonstrated no statistically significant correlation between static head position and deep neck flexor endurance among patients with CGH. This research adds to the growing body of evidence that suggests cervicogenic headache sufferers' muscle function is influenced by a complex interplay of biomechanical and neuromuscular variables, rather than just their posture.

Keywords: cervical posture, deep cervical flexor muscles, pressure biofeedback unit, neck muscle endurance.

INTRODUCTION

Secondary headaches may develop from problems with the cervical spine's musculoskeletal system, most often in the upper cervical muscles, ligaments, joints, and neural structures; this condition is known as CGH.

It is typified by unilateral or bilateral headache with neck pain, limited cervical range of motion and worsening of symptoms with prolonged neck positions or cervical motions. The International Classification of Headache Disorders has classified cervicogenic headache as a separate clinical entity due to its cervical origin and typical clinical appearance. Patients often complain of pain in the upper cervical or occipital area that extends to the frontal, temporal or orbital areas.(1)

CGH is prevalent in the general population between about 1% and 4% however, individuals who are exposed to prolonged periods of computer work have a higher prevalence of CGH, which is maintained sitting postures, repetitive cervical loading, and sedentary occupations. As the use of computers, smart phones and other digital tools has risen, improper cervical posture has become more prevalent, leading to mechanical stress on cervical structures and consequent headache disorders.(2)

"The position of the head in reference to the cervical spine in relaxed standing or sitting is called the static head position. FHP is one of the most common postural abnormalities that are observed in patients with neck pain. The altered static head posture can also increase pain and functional impairment and place additional stress on the cervical extensor muscles, compress the joints of the neck and change the normal biomechanics of the neck.(3)

Deep neck flexor muscles, longus colli and longus capitis are vital in ensuring cervical stability, postural control, proprioception, and normal cervical lordosis. These muscles, together with the superficial cervical muscles, assist in maintaining the best possible position of the head, as local cervical stabilizers. The reduced endurance and inadequate activation of the deep neck flexors are typical of individuals with CGH. In the absence of the proper functioning of these muscles, the stimulation of superficial muscles like the sternocleidomastoid and anterior scalene muscles was caused by muscular exhaustion, abnormal movement patterns and persistent neck discomfort.(4)

Shortened endurance times have invariably been noted in people with chronic neck pain and cervicogenic headache, which suggests that there are impaired cervical muscular performance and decreased postural endurance. Deep neck flexor endurance evaluation has thus emerged as a significant part of physiotherapy evaluation and rehabilitation.(5)

FHP is objectively assessed using the CVA, which is considered a reliable, valid, and non-invasive clinical measure of cervical posture. A smaller CVA indicates greater anterior displacement of the head and increased severity of FHP. DNF endurance can be clinically assessed using the Deep Neck Flexor Endurance Test with a Pressure Biofeedback Unit, which has demonstrated excellent reliability in patients with cervical disorders.

Patients experiencing cervical discomfort have been the subject of several investigations on the effects of FHP and deep neck flexor endurance. Reduced deep neck flexor endurance, higher pain intensity, and worse functional impairment are typical among patients with FHP, according to many authors. However, evidence regarding the direct relationship between static head position and DNF endurance specifically among patients with CGH remains limited and inconsistent. While some studies suggest that poor posture contributes to impaired muscular endurance, others indicate that muscle performance may also be influenced by pain intensity, neuromuscular control, psychological factors, and duration of symptoms.(6)

Thus, the current research was carried out to identify the relationship between the static head position and the DNF endurance in patients with CGH. The knowledge of this relationship can be of great help to the physiotherapists in designing evidence-based assessment and rehabilitation plans to enhance cervical posture, increase muscular endurance, and decrease disability associated with headaches."

RESULT

Table 1: Demographic and descriptive charcteristics of Patients with Cervicogenic Headache(n=15)

		Frequency	Percent	
Age	26- 30 years	7	46.7	
	31- 35 years	5	33.3	
	> 35 years	3	20.0	
Gender	Female	6	40.0	
	Male	9	60.0	
	Minimum	Maximum	Mean	SD
Craniovertebral Angle	38.00	47.00	42.600	2.772
DNF Endurance test score	12.00	36.00	24.000	8.194
CHSQ Score	16.00	46.00	28.333	9.983

Table 1 shown Fifteen individuals suffering from CGH were investigated. Participants' average age was 32.13 years with a standard deviation of 4.53. Of this group, 46.7% (n = 7) were in the 26–30 age bracket, while 33.3% (n = 5) were in the 31–35 age bracket and 20.0% (n = 3) were aged more than 35 years. Regarding gender distribution, 60.0% (n = 9) were males and 40.0% (n = 6) were females.
“The descriptive statistics showed that the CVA ranged from 38.00° to 47.00°, with a mean of 42.60 ± 2.77°. The DNF Endurance Test Score ranged from 12.00 to 36.00 seconds, with a mean of 24.00 ± 8.19 seconds. The CHSQ score ranged from 16.00 to 46.00, with a mean of 28.33 ± 9.98, indicating that the participants had mild to moderate cervicogenic headache severity.

Table 2: Correlation between CVA and DNF Endurance Test Score among Patients with CGH (n=15)

		DNF Endurance test score
Craniovertebral Angle	r value	.148
	p value	.599
	N	15

Table 2 showed correlation between CVA and DNF Endurance Test Score among Patients with CGH. The correlation analysis showed that the CVA had a very weak positive correlation with the DNF Endurance Test Score (r = 0.148). However, the association was not statistically significant (p = 0.599, N = 15), indicating that there was no significant relationship between CVA and DNF endurance among patients with CGH.”

DISCUSSION

“The present study aimed to determine the correlation between static head position and DNF endurance in patients with CGH. The findings demonstrated a very weak positive correlation (r = 0.148) between CVA and DNF endurance, which was not statistically significant (p = 0.599). These findings suggest that static head position alone may not be a predictor of deep neck flexor endurance in individuals with cervicogenic headache.

The mean CVA observed in the present study was 42.60 ± 2.77°, indicating mild to moderate forward head posture. This finding is consistent with previous studies reporting that reduced CVA is associated with altered cervical posture and biomechanical changes. [7,8,9]

The mean DNF endurance was 24.00 ± 8.19 seconds, indicating reduced endurance of the cervical stabilizing muscles. This finding agrees with the work of Jull et al. who reported dysfunction of the deep cervical flexor muscles in patients with cervicogenic headache. [1]

Similarly, Falla et al. demonstrated reduced activation of the deep cervical flexors in patients with neck pain [2]. O'Leary et al. also reported impairment of the cranio-cervical flexor muscles in individuals with chronic neck pain [10], while Falla et al. found that greater pain intensity was associated with greater deep cervical flexor impairment [11].

Although previous studies have shown that individuals with forward head posture often demonstrate reduced deep neck flexor performance, the present study did not identify a statistically significant relationship between static head position and DNF endurance. This suggests that deep neck flexor endurance is influenced by factors beyond static posture alone. Fernández-de-las-Peñas et al. described cervicogenic headache as a multifactorial condition involving musculoskeletal, neuromuscular, and sensorimotor impairments [6].

The absence of a significant correlation may also be explained by the complex neuromuscular mechanisms involved in cervical muscle function. Deep neck flexor endurance depends on motor control, proprioception, muscle recruitment patterns, pain inhibition, and cervical stability rather than posture alone. Jull et al. emphasized the importance of cervical joint position sense and sensorimotor control [3], while Falla et al. reported that cervical muscle training does not necessarily alter muscle activation during functional activities [4].

Furthermore, Cagnie et al. demonstrated that patients with chronic neck pain exhibit reduced isometric neck muscle strength [12]. Lee et al. also reported that cervical range of motion is associated with neck pain and functional impairment [14]. These findings indicate that cervical muscle performance is influenced by multiple biomechanical and neuromuscular factors."

The lack of statistical significance in the present study may also be attributed to the relatively small sample size (n = 15), which limits statistical power. Individual differences in pain intensity, duration of symptoms, occupational activities, physical activity level, and neuromuscular control may have influenced DNF endurance independently of static head posture.

"Overall, the present study supports the view that cervicogenic headache is a multifactorial disorder. Although altered head posture and reduced deep neck flexor endurance are commonly observed, the absence of a significant correlation indicates that posture correction alone may not improve cervical muscle endurance."

CONCLUSION

"This research found that among cervicogenic headache patients, there was a slight positive connection between static head position and deep neck flexor endurance. Nevertheless, this correlation was not found to be significant. These results suggest that craniovertebral angle might not be a reliable predictor of deep neck flexor endurance in this group. A thorough physiotherapy examination must thus involve an examination of both cervical posture and cervical muscle performance. It is suggested that further studies with more significant sample sizes are necessary to elucidate the connection between these variables and help to justify evidence-based rehabilitation strategies.

Acknowledgement:
The authors are very grateful to everyone at Laxmi Memorial College of Physiotherapy who helped them with this study."

Abbreviations:
CGH – Cervicogenic Headache
CVA – Craniovertebral Angle
DNF – Deep Neck Flexor
CHSQ – Cervicogenic Headache Severity Questionnaire
PBU – Pressure Biofeedback Unit
SPSS – Statistical Package for the Social Sciences
ROM – Range of Motion
SD – Standard Deviation
OPD – Outpatient Department

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