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Research Article

Short-Term Efficacy of Static Isometric Neck Exercise and Cervical Muscle Stretch among College Students with Cervicogenic Headache

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A B S T R A C T

Introduction: Cervicogenic headache, distinct from migraine or tension headache, is characterised by pain localised in any cranial region, arising from a nociceptive originmusculoskeletal tissue innervated by cranial nerves.

Objective: The objective was to compare the effectiveness of cervical muscle stretch and isometric exercise on pain and neck Range of motion among subjects with cervicogenic headache. This can optimise rehabilitation strategies, so patient outcomes can be improved, and protocols can be made more efficient.

Methodology: A total of 60 participants were included in the study based on the inclusion criteria and were divided into 2 groups, A and B. Then static isometric exercise and cervical muscle stretch were applied on the subjects and reassessment values were noted. They were assessed for pain and neck ROM using the Numerical Rating Scale and goniometric measurement. The duration of the study was 12 weeks.

Results: The results obtained for Group B who underwent cervical muscle stretch showed a greater mean difference than Group A (static isometric exercise). Pain levels in Group B decreased by a mean difference of 4.06 points on the NRS ($p < 0.05$). Neck extension and lateral flexion improvement in Group B was observed to be significant with mean differences of -28.76 and -26.66 in goniometric scores ($p < 0.05$) than in Group A (static isometric exercise).

Conclusion: It is concluded that cervical muscle stretching ismore effective in improving pain and neck range of motion among subjects with cervicogenic headaches.

Keywords: Cervicogenic Headache, Cervical Muscle Stretch, Neck Range of Motion, Neck Strengthening Exercise, Young, Pain

Introduction

Cervicogenic headache, distinct from migraine or tension headache, is characterised bypain localised in any cranial region, arising from a nociceptive origin musculoskeletal tissues innervated by cranial nerves. Cervicogenic headaches result from neck abnormalities or dysfunction, unlike cerebral or peri-cranial aetiologies. Cervicogenic headaches usually begin in the neck and move to the forehead, temples, back of the head, or behind the eyes.[1]

Cervicogenic Headache (CGH) originates from the structure in the cervical spine but is felt as pain in the head. The muscles involved in cervicogenic headache includethe upper trapezius, scalene, levator scapulae, sternocleidomastoid, pectoralis major and minor. This can result in the symptoms of CGH, such as pain on one side or both sides often described as dull or throbbing and possibly accompanied by discomfort, stiffness, and limited neck movement.[2,3] CEH may be one of the three large, recurrent headaches. Nuchal onset of pain is a characteristic trait.[4]

The Cervicogenic Headache International Study Group (CHISG) proposed criteria forrecognising cervicogenic headaches. A cervicogenic headache is a headache that originates in the neck and radiates pain to the head, typically on one side. Specific neck movements or postures often bring on pain because of issues in the cervical spine, such as limited neck mobility, muscle tightness,and tenderness in the neck joints.[5]

The incidence of cervicogenic headache within the populace is documented to range from 2.2% to 4.1%, exhibiting a distinct predominance in females, presenting a fourfold higher occurrence compared to males.[6,7] It is typical for both genders to encounter diverse forms of nociception, yet a greater proportion of males (66%) endure this form of nociceptive experience compared to females (57%).[8] CGH prevalence ranges from 4.6% to 18.9%.[9]

This headache may be caused by the merging of sensory inputs from the trigeminal nerve and the upper cervical spinal nerves within the trigeminal cervical caudalis nucleus.[10] The diagnostic criteria for cervicogenic headache require radiological evidence of a disorder or lesion in the cervical spine or neck soft tissues known to causeheadaches.[11] To confirm causation, there must be supporting evidence from at least two criteria: the headache started with the cervical disorder or lesion, it significantly improved as the cervical issue improved, neck movement is limited and worsens the headache, or the headache is relieved by blocking the cervical structure or nerve.[12]

Physical therapy interventions for CGH normally goal to address underlying musculoskeletal dysfunctions, enhance posture, enhance neck mobility, give a boost tosusceptible muscle mass, and sell right motion styles. Patients with CGHs often have tightness of the SCM, upper trapezius, levator, scalenes, and suboccipital muscles. As many studies rely on joint manipulation techniques, the resources for soft tissue stretching on ROM are very scarce. Hence the study aimed to investigate the short-term efficacy of two physiotherapy techniques, Static isometric exercise and cervical muscle stretch on improving neck range of motion and reducing pain among university students. The study's findings might help treat cervicogenic headaches in patients as well as physicians seeking alternate treatments.

There is little evidence on the effects of static isometric neck exercise and cervical muscle stretch regarding pain management and range of motion (ROM) improvement in people with cervicogenic headaches. By identifying the approach that produces the best results, rehabilitation programs may be tailored to the needs of the particular group being treated. Furthermore, determining an effective strategy may improve patient results and perhaps shorten the healing period, resulting in more successful rehabilitation treatments. A few pieces of research have particularly addressed this difference with CGH.

Methodology

The study design was an experimental one and a comparative type. The research was carried out with proper ethical standards after getting approval from the Institutional Ethical Clearance Committee (CARE IHEC- I/2378/23.). The study was done during the month of march -april. Participants gave informed consent before their inclusion as subjects for the study. 60 subjects from both genders,, between 18 and 25 years of age, , diagnosed with cervicogenic headache, experiencingpain during neck movementsfollowing sustained posture, unilateral head pain, to, with more pain on the dominant side, . Fractures in the cervical spine, previous surgery. cervical disc prolapse, TMJ malfunction, congenital disorders of the cervical spine include spina bifida, torticollis, and scoliosis, Women undergoing menstrual migraine during the assessment, Subjects with diabetes/ hypertension, and Subjects with other types of headaches were excluded from the study. The study setting was Chettinad Academy of Research and Education. NRS and goniometric measurements for neck range of motion were used as outcome measures. The participants were divided into two groups, Groups A and B. Group A (N = 30) received static isometric neck exercises and Group B (N = 30) received cervical stretching exercises (3 sessions in a week) for a total of 12 weeks. Neck isometric exercises were given

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10–15 times with 15 seconds of holding time. The stretching exercises were given 5 times in three sets with 15 seconds of holding. The duration of the session was 30 minutes. All the exercises were administered under the supervision of a physical therapist. The results were documented and analysed statistically.

Procedure

Group A (Isometric Neck Exercise)

A neck isometric exercise is a method of strengthening the muscles in the neck by exerting force against resistance without actually moving the head. It involves maintaining a static position while engaging the neck muscles, promoting stability and strength. Each subject received repetitions of 10–15 times with 15 seconds of holding period. The duration of the session was 15–20 minutes.

Group B (Cervical Muscle Stretch)

Stretching exercises for suboccipital muscles, trapezius were given as three sets with 5 repetions.

Outcome Measures

In this study, two outcome measures were implemented. These are the Numerical Rating Scale for pain and the Universal Goniometer for range of motion which had good inter- and intra-rater reliability.[13]

Statistical Analysis

Both descriptive and inferential statistics were utilised, with mean and standard deviation used for all data. To assess the significant differences between pre-test and post-test measurements, a paired t test was conducted, while an independent samples t test (sometimes referred to as an unpaired t test) was used to look for significant variations between groups based on post-test scores as well as changes among pre and post-test scores.

Results

Table 1.Genderwise Distribution of Participants in Groups A and B

Gender	Isometric Neck Exercise (Group A)		Cervical Muscle Stretch (Group A)	
	Frequency	Percentage	Frequency	Percentage
Male	2	13.3	8	53.3
Female	13	86.7	7	46.7
Total	15	100.0	15	100.0

Table 1 shows the distribution of participants in both groups on the basis of their gender.

Table 2.Mean Values of Age in Both Groups

Group		N	Mini-mum	Maxi-mum	Mean	Std Deviation
Isometric neck exercise	Age (years)	15	18	22	19.40	1.183
	Valid N (listwise)	15	-	-	-	-
Cervical muscle stretch	Age (years)	15	18	22	20.00	1.069
	Valid N (listwise)	15	-	-	-	-

Table 2 shows that in the isometric neck exercise group, the mean value of age was 19.40 years and the standard deviation was 1.183, whereas in the cervical muscle stretch group, the mean value was 20.00 years and the standard deviation was 1.069.

Table 3.NRS Pre-Test and Post-Test Scores of Both Groups

Test	Group	N	Mean	Std Deviation	Std Error Mean	t Value	Sig. (2-Tailed)
NRS pre-test	Isometric neck exercise	15	6.53	0.640	0.165	-1.420	0.167
	Cervical muscle stretch	15	6.93	0.884	0.228		
NRS post-test	Isometric neck exercise	15	3.13	0.915	0.236	0.834	0.411
	Cervical muscle stretch	15	2.87	0.834	0.215		

At 95% confidence interval, the p value, after comparing NRS pre-test scores in both groups and NRS post-test scores in both groups, was found to be higherthan 0.05 (Table 3). Consequently, no discernible correlation existed between the NRS pre-test values and NRS post-test values in both groups.

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Table 4 shows the pre-test and post-test scores of extension ROM in both groups. At 95% confidence interval, p value was higher than 0.05, indicating no significant relationship between both parameters.

Table 5 shows the pre-test and post-test scores of lateral flexion ROM in both groups. At 95% confidence interval, p value was higher than 0.05, indicating no significant relationship between both parameters.

Table 6 shows a paired analysis of NRS pre- and post-test scores in each group. As seen, the p value obtained was less than 0.05 at the 95% confidence interval. Consequently, a strong association has been observed between NRS pre-test and NRS post-test values in both groups.

Table 7 shows the analysis of pre- and post-test scores of extension ROM in each group. As seen, the obtained p value was less than 0.05 at the 95% confidence interval. Consequently, a strong association was observed between extension ROM pre-test and post-test values in both groups.

Table 8 shows the analysis of pre- and post-test scores of lateral flexion ROM in each group. As seen, the p value was less than 0.05 at the 95% confidence interval. Consequently, a strong association was observed between lateral flexion ROM pre-test and post-test values in both groups.

Thus, the analysis using paired sample statistics revealed a significant difference between Group A (isometric neck exercise) and Group B (cervical muscle stretch) on Numerical Rating Scale scores with p value < 0.05 at 95% confidence interval. The results obtained for Group B who underwent cervical muscle stretch showed a greater mean difference of 4.06 than in Group A (isometric neck exercise) which showed a mean difference of 3.4. Statistical analysis for the measurement of range of motion revealed a significant difference in neck extension ROM in Group B who underwent cervical muscle stretch showed and greater meandifference of -28.67 than in Group A (isometric neck exercise) which showed a mean difference of -24.0. The results obtained in the case of lateral flexion showed a greater mean difference of -26.66 in Group B who underwent cervical muscle stretch than in Group A (isometric neck exercise) which showed a mean difference of -24.66.

Table 4.Extension Pre- and Post-Test Scores of Both Groups

Test	Group	N	Mean	Std Deviation	Std Error Mean	t Value	Sig. (2-Tailed)
Extension pre-test	Isometric neck exercise	15	26.67	8.591	2.218	0.627	0.536
	Cervical muscle stretch	15	25.00	5.669	1.464		
Extension post-test	Isometric neck exercise	15	50.67	7.287	1.881	-1.098	0.281
	Cervical muscle stretch	15	53.67	7.669	1.980		

Table 5.Lateral Flexion Pre- and Post-Test Scores of Both Groups

Group Statistics							
Test	Group	N	Mean	Std Deviation	Std Error Mean	t Value	Sig. (2-Tailed)
Lateral flexion pre-test	Isometricneck Exercise	15	26.67	5.876	1.517	0.476	0.638
	Cervicalmuscle Stretch	15	25.67	5.627	1.453		
Lateral flexion post-test	Isometricneck Exercise	15	51.33	6.673	1.723	-0.360	0.721
	Cervical muscle stretch	15	52.33	8.423	2.175		

Table 6.Comparison of Two Treatment Groups (A and B) in terms of NRS Pre-Test and Post-Test Scores

Group			Mean	N	Std Deviation	Mean Difference	t Value	Sig. (2-Tailed)
Isometric neck exercise	Pair 1	NRS pre-test	6.53	15	0.640	3.40	10.601	0.000
		NRS post-test	3.13	15	0.915			
Cervical muscle stretch	Pair 1PAIR II	NRS pre-test	6.93	15	0.884	4.06	12.880	0.000
		NRS post-test	2.87	15	0.834			

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Table 7.Comparison of Two Treatment Groups (A and B) in terms of Extension Pre-Test and Post-Test Scores

Group			Mean	N	Std Deviation	Mean Difference	t Value	Sig. (2-Tailed)
Isometric neck exercise	Pair1	Extension pre-test	26.67	15	8.591	-24.00	-9.998	0.000
		Extensionpost-test	50.67	15	7.287			
Cervical muscle stretch	Pair1PAIR II	Extension pre-test	25.00	15	5.669	-28.67	-11.011	0.000
		Extension post-test	53.67	15	7.669			

Table 8.Comparison of Two Treatment Groups (A and B) in terms of Lateral Flexion Pre-Test and Post-Test Scores

Group			Mean	N	Std Deviation	Mean Difference	T	Sig. (2-Tailed)
Isometric neck exercise	Pair 1	Lateral flexion pre-test	26.67	15	5.876	-24.66	-9.012	0.000
		Lateralflexion post-test	51.33	15	6.673			
Cervical al muscle stretch	Pair 1PAIR II	Lateralflexion pre-test	25.67	15	5.627	-26.66	-13.387	0.000
		Lateralflexion post-test	52.33	15	8.423			

Discussion

The current study sought how well individuals with CGH respondedto isometrics and stretching treatments for pain management and range of motion enhancement. Among the 60 participants, a comparison of both pre-test and post-test results taken after 12 weeks between the groups showed a statistically significant difference indicating both neck isometric and cervical stretching showed better results among students with CGH. However, the findings in Group B (cervical muscle stretch) showed a greater mean difference than Group A (isometric neck exercise) on the Numerical Rating Scale scores, extension and lateral flexion range of motion.

A study done on the CGH population highlights the importance of tailoring training methods for patients with severe cervicogenic headaches, suggesting that combining stretching with muscle endurance and strength training could be more beneficial thanstretching alone. Upper trapezius and suboccipital muscle stiffness decreased after exercise intervention in Group B. The results paralleled those found in Hamilton's study, indicating that pain reduction resulted from reduced muscle tone around the cervical vertebrae following cervical stretching and cranio-cervical exercise.[13]

Finally, the results of this study show that CGH patients may effectively reduce painand improve their range of motion by implementing both neck isometrics and cervical stretching techniques. These treatments provide conservative, non-invasive treatment options for CGH that may be included in the care of physiotherapists.

Finally, the findings of the study indicate that cervical stretching helps CGH patientsfeel less discomfort and increases their range of motion. The limitations of the study were a smaller sample size, short duration study and effects were used only for the student population. Future studies can be done using a larger sample, comparison with different age groups and various interventions can be compared.

Conclusion

Thus, it can be concluded that cervical muscle stretching is more beneficial for patientswith cervicogenic headaches in terms of pain relief and improvement in neck range of motion. The findings from the study can be useful in the inclusion of interventions during the management of subjects with cervicogenic headaches.

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References

1. Bir SC, Nanda A, Patra DP, Maiti TK, Liendo C, Minagar A, Chernyshev OY. Atypical presentation and outcome of cervicogenic headache in patients with cervical degenerative disease: a single-center experience. Clin Neurol Neurosurg. 2017 Aug 1;159:62-9. [PubMed] [Google Scholar]
2. Al Khalili Y, Ly N, Murphy PB. Cervicogenic headache [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan [cited 2024 Apr 30]. Available from: https://europepmc.org/article/nbk/nbk507862 [PubMed] [Google Scholar]
3. Arnold M. Headache classification committee of the International Headache Society (IHS) The International Classification of Headache Disorders, 3rd edition. Cephalalgia. 2018;38(1):1-211. [PubMed] [Google Scholar]
4. Sjaastad O, Bakketeig LS. Prevalence of cervicogenic headache: Vågå study ofheadache epidemiology. Acta Neurol Scand. 2008 Mar;117(3):173-80. [PubMed] [Google Scholar]
5. Knackstedt H, Bansevicius D, Aaseth K, Grande RB, Lundqvist C, Russell MB. Cervicogenic headache in the general population: the Akershus study of chronic headache. Cephalalgia. 2010 Dec;30(12):1468-76. [PubMed] [Google Scholar]
6. Boardman HF, Thomas E, Croft PR, Millson DS. Epidemiology of headache in an English district. Cephalalgia. 2003 Mar;23(2):129-37. [PubMed] [Google Scholar]
7. Haldeman S, Dagenais S. Cervicogenic headaches: a critical review. Spine J. 2001 Jan 1;1(1):31-46. [PubMed] [Google Scholar]
8. Sedighi A, Ansari NN, Naghdi S. Comparison of acute effects of superficial anddeep dry needling into trigger points of suboccipital and upper trapezius musclesin patients with cervicogenic headache
9. Parisi P, Belcastro V, Verrotti A, Striano P, Trenitè DG. "Ictal epileptic headache" and the revised International Headache Classification (ICHD-3) published in Cephalalgia 2018, vol. 38(1) 1–211: not just a matter of definition! Epilepsy Behav. 2018 Oct;87:243-5. [PubMed] [Google Scholar]
10. Ylinen J, Nikander R, Nykänen M, Kautiainen H, Häkkinen A. Effect of neck exercises on cervicogenic headache: a randomized controlled trial. J Rehabil Med. 2010;42(4):344-9. [PubMed] [Google Scholar]
11. Hamilton L, Boswell C, Fryer G. The effects of high-velocity, low-amplitude manipulation and muscle energy technique on suboccipital tenderness. Int J Osteopath Med. 2007 Jun 1;10(2-3):42-9. [Google Scholar]
12. Wolan-Nieroda A, Guzik A, Mocur P, Drużbicki M, Maciejczak A. Assessment of Interrater and Intrarater Reliability of Cervical Range of Motion (CROM) goniometer. Biomed Res Int. 2020;2020:8908035. [PubMed] [Google Scholar]
13. Häkkinen A, Kautiainen H, Hannonen P, Ylinen J. Strength training and stretching versus stretching only in the treatment of patients with chronic neck pain: a randomized one-year follow-up study. Clin Rehabil. 2008;22(7):592-600. [PubMed] [Google Scholar]

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