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The Effects of Self Mobilization Technique on Pain and Headache in Patients with Cervicogenic Headache: A Four Week Randomized Clinical Trial

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Abstract

Cervicogenic headache accounts for 15-20% of all chronic and recurrent headaches and it affects 2.2-2.5% of the adult population. It is characterized by unilateral pain originating from the occipital region without side shifts and it is often related to the skeletal and muscular structures of the cervical spine. The zygapophyseal joints of the upper cervical spine are the most frequent contributors for cervicogenic headache. Manual therapy and exercises have been proposed as the initial treatment option addressing the root cause of the problem. This study aims to evaluate the effectiveness of self-mobilization among cervicogenic patients on Numeric Pain Assessment Scale and Headache Disability Index. Single blinded, randomized clinical trial was done by recruiting 33 subjects. Subjects were clinically diagnosed with chronic headache and mechanical neck pain from KPJUC groups were randomly allocated into two groups using lottery ticket randomization chosen from a concealed container. Subjects were evaluated on a weekly basis for four continuous weeks. Repeated measure ANOVA was used to analyze the effects of the self-SNAG. Significant improvement in pain and HDI scoring were established with $p<0.05$ *within* the experimental and control group. However, statistical differences *between* the control and experimental group were not established but, notable differences in mean and standard deviation were recorded in experimental group compared to control group between baseline and subsequent weeks. Estimated marginal means reveals experimental group shows better improvement compared to the control group over the four weeks. The findings suggest that Mulligans self-SNAG is effective. The intensity of pain reduced in subjects and the HDI scoring indicated improvement.

Keywords

Neck pain; cervicogenic; headache; mobilization

Introduction

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Cervicogenic headache is the most common form with a prevalence of 14% to 18% and the averages age for cervicogenic headache is 42 years, and females are 22%–25% more likely than males to develop it (Manzoor et al., 2021). As the most common type of pain disorder, impacting 66% of the world's population, headaches pose a serious health risk, impairing both quality of life and productivity at work (Hall et al., 2008). The prevalence of cervicogenic headache has been increasing gradually over the years. A study conducted in 2019, documented cervicogenic headache to affect 2.5% of adult individuals and result in 15–20% of all chronic and frequent headaches (Khalil et al., 2019). According to a recent article from 2022, the prevalence of cervicogenic headache has been estimated to be 4.1% in the general population and as high as 17.5% among individuals who suffer from severe headaches (Kanniappan et al., 2022). The quality of life is significantly reduced in cervicogenic headache patients, equivalent to those with migraine and tension-type headache, although the prevalence of cervicogenic headache is far lower than that of tension type headache and migraine (Ali & Nas, 2018). The most diagnosed and treated headaches in Malaysia are tension type headache and migraine headache. A community-based prevalence study conducted in Malaysia revealed 9% were migraine, 26.5% were tension type headache and 28.2% were classified as other types of headaches (Alders et al., 1996).

Cervicogenic headaches are usually identified through clinical or interventional diagnosis. Clinical diagnosis confines the clinical features classified by the International Headache Society. Clinical examination involves examination of the upper three spinal cervical segments' range of motion. Individuals with cervicogenic headache classically exhibit restrictions in the upper three cervical range of motions (Howard et al., 2015). A common and frequently used clinical diagnostic technique for the measurement of the upper cervical mobility involves the Flexion-Rotation Test (FRT) (Howard et al., 2015). Besides this, examination of the active cervical range of motion, Passive Accessory Intervertebral Movement (PAIVM), Passive Physiological Intervertebral Movement (PPIVM), cervical manual muscle testing, Cranio-Cervical Flexion Test (CCFT), trigger point palpation of the neck and shoulder muscles and cervical kinesthesia joint position sense are among the commonly practiced manual clinical examinations for cervicogenic headache (Howard et al., 2015).

Considering that cervicogenic headache gives rise to functional limitation/restrictions in the cervical spine, joint mobilization has been proved to improve the pain intensity, range of motion and functional outcomes. The sustained natural apophyseal glide (SNAG) technique, combined upper cervical traction using Mulligan mobilization, has been indicated to reduce joint pain and increase range of motion in the treatment of cervicogenic headache. This technique can be used specially to improve the function of zygapophysial, atlantooccipital, and atlantoaxial joints (Argali Deniz et al., 2022).

Methodology

Single blinded, randomized clinical trial was done by recruiting 33 subjects. Subjects were clinically diagnosed with cervicogenic headache by an orthopedic from KPJUC groups and were randomly allocated into two groups. The inclusion criteria were unilateral headache without side shift, headache at least once per week, precipitation of headache by neck movement, sustained

awkward head positioning or by external pressure on the upper cervical or occipital area, restricted range of motion in the cervical spine and neck pain for ≥ 3 months with numeric pain rating scale ≥ 3. The exclusion criteria were headache diagnosed as a specific disorder, headache with dizziness or visual disturbance, prolapsed intervertebral disc and/or fracture of the cervical spine, past and/or present history of head and neck trauma, past and/or present history of cervical surgery, neoplasms and presence of any cognitive disability or a history of mental illness

Subjects were evaluated on a weekly basis by experience and trained physiotherapist. The experimental group received self-mobilization along with basic stretching and strengthening exercises and the control group received stretching and strengthening exercises only. Pain was evaluated using the numeric pain rating scale and headache disability index was administered.

Statistical Package for Social Sciences (SPSS) 21.0 was used to analyze the data. Descriptive statistics were calculated and tests for normality were conducted for all the variables. P<0.05 is considered statistically significant. Mean and standard deviation of all variables were calculated to understand the central value and shape of distribution. Comparison within groups, between groups and within and between the groups for all variables (pain and HDI) were done using repeated measure ANOVA.

Results and Discussion

Experimental group consisted of nine (27.3%) male and seven (21.2%) female subjects. The age (mean ± SD) was 42.5 ± 8.2 years old. Control group consisted of seven (21.2%) male and ten (30.3%) female subjects (Table 1). The age (mean ± SD) was 39.0 ± 9.32 years old. Independent t-test and chi-square were conducted to identify the presence of any significant differences at the baseline measurement. However, no differences were found at baseline prior to the intervention.

Pain analysis revealed a clinically significant difference in pain score within and between the experimental and control group over the four weeks' intervention (p=0.01).

Table 1. Effects of the interventions on pain within, between and within-between the group.

Variable	**Experimental group (n=16) Mean ± SD**				**Control group (n=17) Mean ± SD**						
Week	1	2	3	4	1	2	3	4			
	6.35 ± 1.73	4.88 ± 1.54	4.18 ± 1.47	3.65 ± 1.84	6.47 ± 1.23	5.88 ± 0.93	5.24 ± 1.25	4.65 ± 1.17		P	Π^2p
Pain									Between Group	0.06	0.20
									Within group	0.00*	0.84
									Within-between groups	0.01*	0.21

**Significant value is when p<0.05. Statistical test repeated measure ANOVA*

Headache Disability Index (HDI) analysis (Table 2) revealed significant differences on HDI score within and between the experimental and control group over the four weeks' intervention (p=0.00).

Manzoor et al. (2021), in his study did not achieve a statistically significant difference in NPRS score between the control group which received cervicoscapular strengthening exercises, while the experimental group which received sustained natural apophyseal glides (SNAGs). Pain intensity decreased more in the SNAG group (mean value 3.25±1.13) than in the cervicoscapular strengthening group (mean 4.10±1.09). Pain relief was larger in the SNAG group, with a greater mean difference, than in the cervicoscapular strengthening group, indicating that SNAG was more effective (Manzoor et al., 2021). Similarly, our study did not establish clinically significant differences in pain score between the experimental and control group (p=0.06). However, both experimental and control groups showed improvements in the mean score of pain within the groups with greater differences in mean score within the experimental group as compared to the control group with a large effect size (Π^2p=0.842) over the period of four weeks which suggest that suggest that this finding has practical significance.

Table 2. Effects of the interventions on HDI within, between and within-between the group.

Variable	**Experimental group (n=16) Mean ± SD**				**Control group (n=17) Mean ± SD**						
Week	1	2	3	4	1	2	3	4			
	27.41 ± 11.26	24.12 ± 10.21	20.12 ± 9.04	16.94 ± 7.72	36.59 ± 8.80	33.18 ± 8.00	29.88 ± 8.30	24.00 ± 7.87		P	Π^2p
HDI									Between Group	0.00*	0.84
									Within group	0.06	0.20
									Within-between groups	0.01*	0.21

**Significant value is when p<0.05. Statistical test repeated measure ANOVA*

The results of our study could potentially be influenced by the quality of exercise administration by the subjects since the nature of treatment provided in our study is active administration of treatment by subjects themselves and they are only seen once every week for examination and evaluation of the quality of exercise practiced. The advantage that outlies in the study conducted by Manzoor et al. (2021) is the intervention was consistently applied to their patients by the professionally practicing physiotherapist. The sampling method is not conducive to generalizing the results to an entire population which our study addressed with randomization. There could be a compromise in the quality of the results as well because ultrasound therapy was provided as a baseline for their groups.

The current study employed Mulligan's self-mobilization technique, which caused no discomfort when executed, and if it did, individuals were instructed that the technique was being

performed incorrectly. This reduced the possibility of error when completing self-mobilization exercises in the absence of a physiotherapist. Research to evaluate how the Brian Mulligan concept affected those who worked at computers and experienced headaches found that applying the chosen Mulligan concept strategies caused no discomfort (Szomiski & Bacz, 2021).

Early analgesic effects were observed following the first round of therapy and lasted until the next consultation, which was planned four weeks later (Szomiski & Bacz, 2021). This demonstrates that self-mobilization exercise alone as home exercise will progressively reduce pain and the analgesic effects will last for a long time, supporting the current study's findings of significant improvement in the experimental group over a four-week intervention. A future study that extends the current approach with a longer duration of intervention could result in statistically significant variations in outcome measures between the experimental and control groups.

Conclusion

The aim of this study was to determine the effects of self-mobilization by stretching and strengthening exercises as compared to stretching and strengthening exercises only. The results of this study proposed that both the experimental and control groups showed improvements in terms of pain and quality of life within the group. The study's analysis revealed that there were no clinically significant differences in terms of the outcome measures between the experimental and control group. To conclude, self-mobilization, stretching exercises and strengthening exercises show improvements but self-mobilization showed greater mean differences within the group suggesting it may be more beneficial clinically in managing cervicogenic headache.

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