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EFFECT OF REVERSE HEADACHE SUSTAINED NATURAL APOPHYSEAL GLIDE ON CERVICOGENIC HEADACHE PATIENTS

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ABSTRACT

Background: Cervicogenic headache is a chronic, non-throbbing pain condition that is triggered by uncomfortable head positions and neck movements.

Objective: To determine the effect of reverse headache sustained natural apophyseal glide (SNAG) with conventional treatment versus conventional treatment to reduce pain, improve range of motion and reduced functional limitation on patients with cervicogenic headache.

Materials and Methods: A randomized controlled trial was conducted on a sample of 30 patients with cervicogenic headache, included through non- probability purposive sampling technique. They were randomly divided into two groups through lottery method. Conventional treatment (hot pack and METs) was used as baseline treatment. Group A received reverse headache SNAG with conventional treatment and group B received only conventional treatment. Total treatment protocol was of 12 treatment session with 3 sessions per week for consecutive 4 weeks. Data was collected at baseline and after 4th week by using outcome measuring tools which were numeric pain rating scale (NPRS) for pain, headache disability index (HDI) and cervical flexion and rotation test (CFRT), for functional disability and mobility respectively. Duration of study was 4 months.

Results: The result of Mann-whitney test of this study shows there was significant difference in means and S.D of the pre and post numerical pain rating scale score, and the independent T test also shows there was significant difference in means and S.D of the pre and post of HDI and CFRT. According to the p value which was (0.000) of the study which was less than 0.05 there was significant difference in both groups.

Conclusion: Reverse headache SNAG along with conventional treatment were effective to improve the cervicogenic headache. The reverse headache SNAG reduces pain; improve function and ROM more as compared to conventional treatment.

Keywords: Cervicogenic headache, Conventional treatment, Reverse headache Sustained Natural Apophyseal Glide.

INTRODUCTION

Cervicogenic headache (CGH) is included in a sub group of headache, in patient with head and neck pain. It is a secondary headache, which mean headache is due to any issue related to the cervical spine and soft tissue, its bony structure, and disc normally, yet it is not due to fracture pain of neck (1). Cervicogenic headache occur when pain is referred from the neck up toward the head. Pain is normally dull but sometimes it can be worsen feeling. It moves and upwards along the back of head, always be on one side. Pain may moves to the area around the eyes, forehead, ears and temple (2). The international headache society (HIS) classifies this condition as having decreased neck flexibility, which contributes for 15% to 20% of all recurrent and chronic headaches. Chronic CGH patients may manifest ADL performance limitations, emotional disturbance, and social circle and involvement limitations (2). CGH is more prevalent in females than males in general population (3, 4). There has always been a firm conviction that women dominate significantly in CGH. 88% of the people were female in the study of Vincent et al., and Maciel Jr et al., found 85% female in his study (5, 6).

Repetitive activities or whiplash injuries, both of which can result in cervicogenic headaches,are two examples of risk factors. Other significant risk factors for cervicogenic pain include a sedentary lifestyle, stress, dehydration, bending and shrugging forward when moving the shoulders, and slumped posture. The symptoms of CGH include a reduced range of motion, uncomfortable upper cervical joints, and tight muscles, particularly in the upper back cervical muscles (7).

Healthcare professionals can treat CGH with a range of different therapy modalities. Invasive treatment methods include surgery, dry needling, and injections (8). Physiotherapy methods such as massage, mobilization, manipulation, electrotherapies, traction, heat or cold therapy, exercise, education, and stretching are examples of dry needling. Transcutaneous electrical nerve stimulation (TENS), massage, exercise, manipulation, or mobilizations are examples of non-invasive therapy methods (9).

Mobilization and manipulation are the non-invasive techniques that are most frequently mentioned in the literature (4, 10, 11). Jull et al. contrasted the benefits of manual therapy for the cervical joints with those of particular physical exercises meant to increase the strength and stamina of the deep neck flexors in cervicogenic headache patients (2). An antero-posterior

mobilization of the second cervical vertebrae is prolonged for 10 sec depending on reaction in the reverse headache SNAG, which is essentially the mulligan manual therapy technique utilized to minimize pain response in headache SNAG. If the first treatment results in a decrease in the intensity of the headache, a maximum of six repetitions will be administered (7). A study conducted by Kashif et al., (2022) concluded that SNAGs had improvements in reduction of pain in the region of neck & disability of neck and ROM was increased in females with CGH (12).

For the treatment of soft tissue injuries and injuries to the musculoskeletal system, thermotherapy is a helpful adjuvant. Heat therapy reduces pain in soft tissues like joints and muscles, and it has the opposite effects on things like tissue metabolism, blood flow, inflammation, and connective tissue extensibility (13, 14). Another manual technique is "muscle energy technique" (MET), that claims to promote joint motion and muscular extensibility by carefully contracting the subject's muscles at order to increase a muscle's extensibility and the range of motion at the joint. MET employs repeated, submaximal, active resistant isometric contraction of a muscle followed by passive stretch. The advantages of MET include bringing hypertonic muscles back to their normal tone, bolstering weak muscles, preparing the muscle for subsequent stretching, and enhancing joint mobility. It combines reciprocal inhibition and the post-isometric relaxation approach (15).

The objective of the present study was to determine the effects of reverse headache SNAG with conventional treatment and conventional treatment only to decrease pain, and functional mobility in patients with cervicogenic headache. Effect of reverse headache SNAG on CGH is required due to the prevalence of cervicogenicheadache, the lack of definitive treatments, the potential for natural apophyseal glide to offer therapeutic benefits, and the need for evidence based non-invasive interventions in clinical practice. This study could have important implications for improving patient care and quality of life for those suffering from cervicogenic headache.

MATERIALS AND METHODS

It was randomized controlled trial. Data is collected from Allied hospital, DHQ and Physiofit IDC. Informed consent was obtained. Based on the criteria of inclusion and exclusion subjectwas screened and sample size that was used was 30 subjects. They were split in 2 groups using non probability purposive sampling technique by means of lottery method. The inclusion criteria of the study were participant of age (20-59) (1), suffered with cervicogenic headache from least 3

months of (headaches <3 months) (16). Patients with migraine headache, tension headache, having primary history of pharmacology intervention (4), history of trauma, systemic illness and trauma (3) were excluded from the study.

Interventions

Group A: This group was treated by reverse headache SNAG along with conventional treatment patient received conventional treatment for 25 minutes and reverse headache SNAG was given ten times consecutively, for a total of 20 minutes (17). Total duration of treatment was 45 min. All interventions were performed 3 times per weeks (alternative days) for consecutive 4 weeks (12 session/4weeks).

A neck roll and hot pack wrapped in four layers of towels were applied for 15 minutes to reduce muscular spasms and increase the suppleness of soft tissues (Figure 1-a).

In MET, the shortened and hypertonic muscle is positioned halfway between the stretched and relaxed states. The therapist will oppose the patient's force while instructing them to contract the agonist with their maximum effort for 5 to 10 seconds (Figure 1-c). METs were administered, each lasting 10 minutes and consisting of three repetitions per session.

The patient receiving revere headache SNAG sits in a chair with their back supported and their head and neck in a neutral position. The therapist is positioned in front and to the patient's side. The therapist fixes the C2 vertebra with their thumb and middle fingertip in front of the transverse process to stabilize the patient. The patient's occiput is cupped in the back by the therapist's other hand. The head is gently pulled anteriorly in a horizontal plane by the therapist, who maintains the tension for ten seconds (Figure 1-b). Ten consecutive times, for a total of 20 minutes, this treatment was given.

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Figure 1-a: Hot pack

Figure 1-b: Reverse Headache SNAG

Figure 1-c: Muscle energy technique

Group B: This group was treated with c onventional treatment (muscle energy techniques + hot pack). Patient received conventional treatment for 25 minutes.

A neck roll and hot pack wrapped in four layers of towels were applied for 15 minutes to reduce muscular spasms and increase the suppleness of soft tissues.

In MET, the shortened and hypertonic muscle is positioned halfway between the stretched and relaxed states. The therapist will oppose the patient's force while instructing them to contract the agonist with their maximum effort for 5 to 10 seconds. METs were administered, each lasting 10 minutes and consisting of three repetitions per session (18).

Figure 2-a: Hot pack

Figure 2-b: Muscle Energy technique

Outcome measures

Numeric pain rating scale (NPRS), headache disability index (HDI) and cervical flexion rotation test (CFRT) were the outcome measure of the study. The patient's level of pain (headache intensity) was recorded using the NPRS. An 11-point scale, from 0 (no pain) to 10 (the greatest pain imaginable), was used to gauge the amount of current pain for patients (19). In neck pain patients, the NPRS showed fair reliability (ICC = 0.67) (20). The HDI's alpha version (-HDI) had 40 items that could be answered with "yes" (four points), "sometimes" (two points), or "no" (zero points). These items were created empirically from case history replies of headache-afflicted patients. In present study a 25-item beta version of the -HDI was created from the original, with the items sub-grouped into functional and emotional subscales. Construct validity and internal consistency/reliability were both high. The total score as well as the functional and emotional subscale scores for the -HDI had acceptable test-retest reliability. Before the changes may be attributed to treatment effects, the overall score from the test-retest must change by at least 29 points (95% confidence range). The HDI is helpful in determining how headaches and their management affect daily life (21). For simplicity, relevance, and clarity, the content validity indices were 0.85, 0.99, and 0.97, respectively. For all items, the content validity ratio was determined to be 1. For the complete questionnaire as well as its functional and emotional subscales, Cronbach's alpha was 0.91, 0.82, and 0.86, respectively. Additionally, 0.97 was determined as the ICC for the entire inventory (22).

In contrast to previous manual examination methods, the cervical flexion rotation test (CFRT) is a simple clinical test that is ostensibly biased to evaluate dysfunction in the C1-C2 motion segment. In the cervical spine, the C1-C2 motion segment is responsible for half of the rotation (23). To isolate movement to C1-C2, which has a special capacity to rotate in flexion, the cervical spine is fully flexed throughout this test method. It has been demonstrated that 44° to each side is the normal range of rotation motion in end range flexion. Contrarily, those with C1-C2 impairment who experience headaches had an average rotation of 17° less (24). To assess ROM of neck goniometer was used. The flexion-rotation test has a sensitivity and specificity of 91% and 90%, respectively ($p = 0.001$), and an overall diagnostic accuracy of 91% ($p = 0.001$) (24). A goniometer is a device that gauges a joint's potential range of motion. Goniometry is the

study of the art and science of determining the joint ranges in each joint plane. Physical therapists most frequently use a goniometer to assess a patient's range of motion. The therapist can use a goniometer to measure the range of motion in a particular joint if a patientor client has decreased range of motion in that joint at the initial evaluation and to monitor the effectiveness of the intervention in subsequent sessions (25). Excellent intra-rater reliability (ICC2,1 = 0.83–0.98), between-session (ICC2,2 = 0.79–0.97), and inter-rater reliability (ICC2,2 = 0.79–0.92) (26).

Ethical Consideration

The University issued a data collection letter. Consent was obtained from Allied Hospital, Civil Hospital (DHQ) and Physiofit (Research Center). Patients were guaranteed that their data was used for research purpose only. All relative information regarding study was provided to patients before taking consent.

Statistical Analysis

Normality was assessed by the Shapiro wilks test. Only the NPRS variable violated the assumption of normality, a non-parametric test was applied. Mann-whitney U test was performed to compare results between groups, while Wilcoxon Sign test was employed for the within-group analysis of the NPRS. Parametric tests were performed since the data for the HDI and CFRT variables are normally distributed. Paired sample T test was used for within-group analysis, while Independent T test was utilized to compare means between groups.

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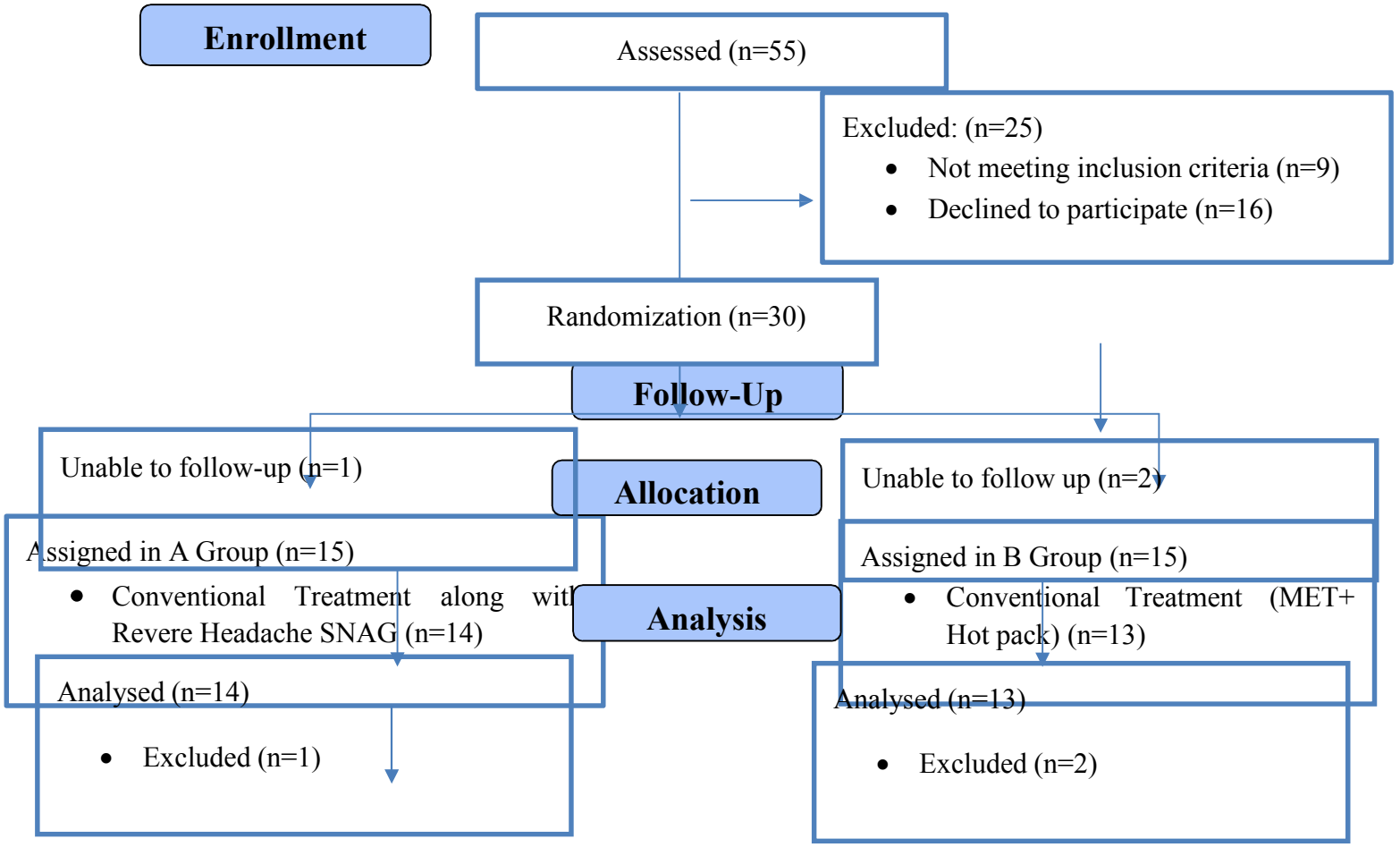
Figure 3 Consort Diagram



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RESULTS

Demographic statistics

Out of 27 participants of the study, the female patients were more frequent 19 (70.4%) as compared to the males which were 8 (29.6%). The mean ages of the participants were 36.3±7.1103 (figure 4).

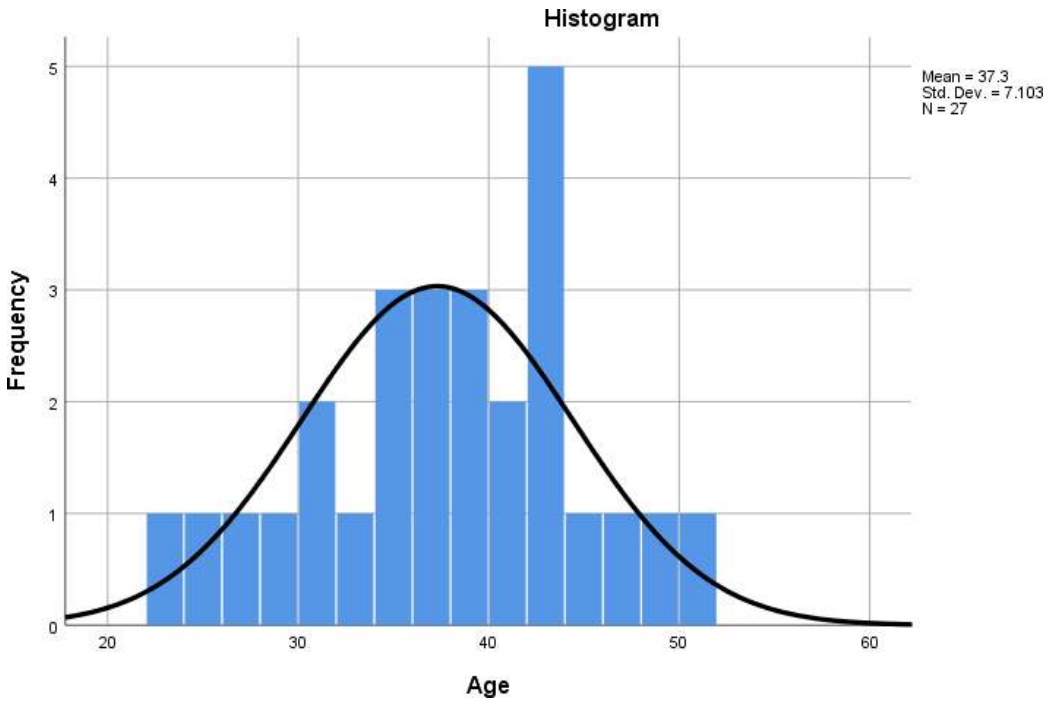

Figure 4: Age of the participants

Analysis of NPRS

The table 1 shows the Wilcoxon test statistics of the NPRS for group A & B participants, the

data table shows that the mean of NPRS in group A at baseline was 7.29±.469 whereas mean of NPRS after 4th week was 0.79 ± 0.579. The test statistics given above shows that the significance value is less than 0.05 (i.e., p=0.001), which means that the reverse headache SNAG has decreased the score of NPRS. The data table shows that the mean of NPRS in group B at baseline was 6.92 ± .760 whereas mean of numeric pain rating scale after 4th week was 2.46 ± 0.660. The test statistics given above shows that the significance value is less than 0.05 (i.e., p=0.001), which means that theconventional treatment used in group B has decreased the score of numeric pain rating scale. According to mean values of group A has decreased score of numeric pain rating scale as compared to group B.

Table 1: NPRS Within-group analysis (Wilcoxon Test)

		N	Mean	Std. Deviation	50th (Median)	Asymp. Sig.(2-tailed)
Group-A (experimental)	Pre-treatment NPRS	15	7.29	0.469	7.00	0.001
	Post-treatment NPRS (after 4th week)	14	0.79	0.579	1.00	
Group-B (control)	Pre-treatment NPRS	15	6.92	0.760	7.00	0.001
	Post-treatment NPRS (after 4th week)	13	2.46	0.660	3.00	

NPRS: Numeric Pain Rating Scale

The table 2 showed test statistics of Mann-whitney U test conducted on NPRS between group A and B. Looking at the table we see that the pre- test values at baseline for the numeric pain rating scale was not statistically significant between both groups, which means that the sample was driven from the similar population and no significant difference was present at baseline values (p=0.167). The post-treatment values of the NPRS between group A & B are having the significance value at p=0.000, which is below the level of significance, so, after looking at the descriptive statistics from the Wilcoxon test we concluded that the Reverse Headache SNAG along with conventional treatment used in group A had produced statistically significant difference in decreasing in the numeric pain rating scale values as compared to the conventional treatment used in group B.

Table 2: NPRS between-group analysis (Mann-whitney U Test)

	NPRS at baseline	NPRS at 4th week
Mann-Whitney U	66.000	8.000

Wilcoxon W	157.000	113.000
Z	-1.380	-4.202
Asymp. Sig. (2-tailed)	.167	.000
Exact Sig. [2*(1-tailed Sig.)]	.239	.000

Analysis of Headache disability index (HDI) and Cervical flexion rotation test (CFRT)

Table 3 displayed the results of paired sample t test for HDI and CFRT. A statistical significant disparity ($p<0.05$) was observed in pre and post treatment values of HDI and CFRT in group A (experimental) as well as in group B (control)

Table 3: HDI and CFRT Within-group analysis (Paired-tTest)

		N	Mean	Std. Deviation	Asymp. Sig.(2-tailed)
Group-A (experimental)	Pre-treatment HDI	15	74.21	11.233	<0.001
	Post-treatment HDI (after 4th week)	14	15.79	2.392	
Group-B (control)	Pre-treatment HDI	15	77.31	10.053	<0.001
	Post-treatment HDI (after 4th week)	13	44.08	2.178	
Group-A (experimental)	Pre-treatment CFRT	15	16.00	0.877	<0.001
	Post-treatment CFRT (after 4th week)	14	42.00	2.000	
Group-B (control)	Pre-treatment CFRT	15	16.15	1.068	<0.001
	Post-treatment CFRT (after 4th week)	13	32.23	2.833	

HDI: Headache disability index, CFRT (Cervical flexion rotation test)

Table 4 displayed the between group analysis of HDI and CFRT. The Independent sample T test show the p-value below 0.05 at 4th week of treatment which reveals that significant differences existed in mean values of HDI and CFRT between 2 groups. Treatment group was more superior to control group.

Table 4: HDI and CFRT Between-group analysis (Independent-tTest)

		N	Mean	Std. Deviation	Asymp. Sig.(2-tailed)
HDI at baseline	Group-A (experimental)	15	74.21	11.233	0.459
	Group-B (control)	15	77.31	10.053	

HDI at 4th week	Group-A (experimental)	14	15.79	2.392	<0.001
	Group-B (control)	13	44.08	2.178	
CFRT at baseline	Group-A (experimental)	15	16.00	0.877	0.685
	Group-B (control)	15	16.15	1.068	
CFRT at 4th week)	Group-A (experimental)	14	42.00	2.000	<0.001
	Group-B (control)	13	32.23	2.833	

HDI: Headache disability index, CFRT (Cervical flexion rotation test)

DISCUSSION

Results of the present study results indicated that both Reverse Headache SNAG and conventional treatment can lead to improvements in cervicogenic headache. However, it was found that the Reverse Headache SNAG along with conventional treatment had marginally better effects on pain relief, reducing disability & increasing ROM in cervicogenic headache compared to conventional treatment alone.

Rasul et al., stated that CGH is more prevalent in females than males in general population (3). According to Racicki et al., cervicogenic headache affects between 22 and 25 percent of adults, with women being four times more likely to have it than men (4). Those with cervicogenic headaches were more likely to be female (27). The present study supports that statement as this study had maximum participation of females with percentages that are 70.37% and of males that are 29.63%.

In support to the findings of the present, a RCT by Rasul et al. that was conducted for investigating the compared effects of mobilization (headache SNAG and reverse headache SNAG) in the treatment of cervicogenic headache revealed that cervicogenic headache can be effectively treated with mobilization (3). In present study reverse headache SNAG was found to be effective in pain relief, reducing disability & improving the cervical ROM in cervicogenic headache. But Rasul et al. also concluded that, when it comes to reducing pain and headache severity, the headache SNAG is more effective than the reverse headache SNAG (3).

Another research by Ahmed et al., found that using MET and the m ulligan technique has been reported to have significantly improved cervical mobility in patients of cervicogenic headache. However, the goal of that research was to see the comparative effects of METs and mulligan technique (28). But in present research the experimental group was treated with reverse headache

SNAG along with baseline treatment. Baseline treatment consists of MET and hot-pack.

Blanpied et al., stated that patients with CGH and neck pain significantly improved with the help of self-SNAG in C1-C2 for long and short periods of time. Mulligan mobilizations of SNAG, one of the most well-known manual therapy techniques, were found to be effective in the treatment of CGH (29). T. Hall et al., reported better results in the severity of HA, which includes intensity of pain, duration and frequency and physical function perceived by neck with the express intention of performing a self-SNAG exercise (16). Paquin et al., stated that in the therapy of CGH, SNAG mobilization together with a self-SNAG exercise had positive effects on patient-important, biomechanical, and pain- related cognitive-affective aspects (30). In present research reverse headache SNAG was given instead of self-SNAG. Improvements in the neck AROM with the help of SNAG manual therapy was reported in these previous studies. Increased results on CFRT with the help of self-SNAG exercises were reported by (17, 29). Improvement in pain, CFRT and reduction in disability was observed in present after the treatment of four weeks.

Racicki et al., did research in order to find a cervicogenic headache treatment strategy that is evidence-based and efficient. They incorporated research on mobilization, manipulation, strengthening, and other forms of treatment, and came to the conclusion that technique of mobilization coupled with any other techniques effective in reducing pain for those who suffer from cervicogenic headaches (4). These findings support the results of present study. In present study the treatment group receiving mobilization (reverse headache SNAG) along with baseline treatment of MET and hot pack had better results in reducing pain, disability and improving CFRT in cervicogenic headache patients as compare to the control group receiving treatment of only MET and hot pack.

Limitations: The relatively small sample size utilized in present study may affect the generalizability of findings. The results might not be applicable to a more diverse population with varying characteristics and backgrounds. While the long-term sustainability of the intervention's advantages is still unknown, the study concentrated on short-term impacts. Long-term monitoring may reveal information on how long-lasting the observed effects are.

CONCLUSION

Reverse headache SNAG along with conventional treatment was found to be effective to

improve the cervicogenic headache. The reverse headache SNAG reduces pain; improve function and ROM more as compared to conventional treatment.

Recommendations: Future studies with larger sample size are recommended. Further trials are recommended with longer follow ups to see the long term effects of these techniques.

Financial support: No funding was received for this study.

Competitive Interests: There is no competing interest.

Declaration of patient consent: Written consent was taken from all study participants.

Use of AI: None

Ethical approval: The study was approved by Research and Ethics Committee of Government College University Faisalabad.

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