"A Comparative Study to Find the Effects of Mulligan Sustained Natural Apophyseal Glide Versus Sub-Occipital Myofascial Release Techinique for the Treatment of Cervicogenic Headache."

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ABSTRACT

Background: Headache is a common condition which physiotherapists have to deal in clinical practice. Headache which arises from the cervical spine are termed as cervicogenic headache. The upper cervical joints namely the occiput- C1 and C1-C2 segments are most common origin of pain.It causes pain, reduced range of motion of neck and altered sleep. The aim of this study was to evaluate the effects of Mulligan SNAG and Sub-Occipital MFR in patients with cervicogenic headache. Pre-test and post-test evaluation was done with HIT-6 and NPRS

Objective: To evaluate the effectiveness of Sustained Natural Apophyseal Glide and Sub- occipital Myofascial Release Technique on improving Cervicogenic Headache. And to compare the effectiveness of Sustained Natural Apophyseal Glide versus Sub-occipital Myofascial Release in Cervicogenic headache patients.

Materials And Methods: 20 subjects with cervicogenic headache who fulfilled the inclusion and exclusion criteria were selected for the study and 10 subjects were randomly assigned to each group. Group A received Mulligan SNAG with Conventional therapy and group B received Sub-Occipital MFR with conventional therapy. Treatment was given for a period of 6 weeks. Pre-test and post-test evaluation was done with HIT-6 and NPRS.

Results: The result of this study showed that interventions given to both groups showed improvement in HIT-6 and NPRS. Based on the post-test comparison between two groups it can be said that Mulligan SNAG showed significant differences in HIT-6 and NPRS than Sub-Occipital MFR group in cervicogenic headache patients

Conclusion: This study concludes that both Mulligan SNAG with Conventional therapy and Sub-Occipital MFR with Conventional therapy is effective in treating the patients with cervicogenic headache. However, Mulligan SNAG showed more improvement in pain and functions compared to Sub-Occipital MFR.

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Keywords: Mulligan SNAG, Sub-Occipital MFR, Cervicogenic Headache, Conventional therapy.

INTRODUCTION

Cervicogenic headache is a chronic, hemicranial pain syndrome in which the sensationof pain originates in the cervical spine or soft tissue of the neck and is referred to the head.[1]The International Classification of Headache Disorders defined "Headache caused by adisorder of cervical spine and its component bony, disc and soft tissue elements, usually but not invariably accompanied by neck pain is called cervicogenic headache".[2]

Headache is a common symptom for most people. According to the statistical data, 90% of the entire population have experienced headache, and 66% of men and 57% of womensuffers fromheadache at least once per year. Inconvenient details on patient suffering from neck pain and headache are mounting and an increasing ratio of headache is greater in women than in men.[3]

Headaches are also found to be the most common reasons for the use of over the counter analgesic medications. The extensive impact of headache on a patient's quality of life far exceeds that of chronic conditions such as osteoarthritis, hypertension and diabetes. A cervicogenic headache is a rare chronic headache in people who are 30-44 years old. Its prevalence among patients with headaches is 0.4 to 4%. depending on how many criteria are fulfilled based on many studies. Age at onset is thought to be early 30s, but the age the patient seeks medical attention and diagnosis is 49.4.[4]

It is most commonly seen in computer workers as musculoskeletal complaints like neck pain, shoulder pain and radiating pain are common in modern society. Office and computer workershas the highest incidence of neck disorders than other occupation.[5]

The International Headache Society published their International Classification ofHeadache Disorders, identifying 14 different types and sub classification of headaches. Thereare 2 basic categories of headaches, primary and secondary. Primary headaches include thoseof vascular origin as well as muscular origin. Secondary headaches result from another source including inflammation or head and neck injuries. Norwegian physician Dr. Ottar Sjaastadcoined the term, "cervicogenic headache" in 1983 by recognizing a sub-group of headache patients with concomitant head and neck pain therefore, cervicogenic headaches (CGHs) are considered as secondary headache.[6]

Study conducted by the International Headache Society suggest that cervicogenic headache account for approximately 15% to 20% of all recurrent benign headaches. The neurophysiological basis for cervicogenic headache is the convergence that take place in thetrigeminocervical nucleus. Structures innervated by the first 3 cervical nerves have shown a potential for causing cervicogenic headache. The actual source of pain originates not in the head but in the cervical spine joint complex. Structures innervated by cervical nerve C1-C3 have been shown to be capable of producing cervicogenic headache pain.[7]

The main role of the cervical spine is to support and promote the movement of the head and neck. Large vertebral bodies are not necessary, considering the relatively small weight- bearing load at this level. Thus, an increased range of motion takes priority over vertebral size and rigidity. However, the additional motion and flexibility may carry an increased risk for injury to the spinal cord and its associated neurovascular structures. The upper cervical regionof the cervical spine includes C1 and C2, which are more commonly referred as the atlas and the axis, respectively. The main function of the atlas is to support and cradle the base of the occiput at the atlanto-occipital articulation. As such, there are many features unique to the atlas not shared with the rest of the spine. Most notably, the atlas lacks avertebral body, pedical, lamina or spinous process and instead forms a large ring-shaped fusion of anterior and posterior arches that allows C1 to accommodate the spinal cord as it exits the foramen magnum.[7]

The atlas has large, palpable transverse processes, usually the most prominent of the cervical vertebrae. These transverse processes serve as attachment points for several small but important muscles that control fine movements of the cranium. The axis, or C2, also possessesunique anatomical features. The axis is the primary

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weight-bearing bone of the upper cervical region. The hallmark feature is its odontoid process, or dens, a bony projection extending cranially from the vertebral body. It evolved from the body of the atlas and serves as the principal attachment point for the soft tissues that stabilize the atlantoaxial junction.[8]

SNAG is a manual mobilization technique which consist of applying a direct force on the C1- C2 segment during active rotation of the neck by the patient. The effect of C1-C2 SNAG on CGH demonstrates a beneficial effect on symptoms on perceived physical function related to neck pain on headache severity and on mechanical impairment of C1-C2 segement.[9]

Myofascial Release (MFR) is defined as the facilitation of mechanical, neural and psychological adaptive potential via myofascial system.[10]

It is a therapeutic technique that uses gentle pressure and stretching (in both forms of direct and indirect approaches) with the intention of restoring decrease pain, optimizing length, and facilitating the release of fascial restrictions caused by injury, stress, repetitive use, etc.[11]

The techniques can be described as either direct or indirect. Direct MFR techniques engage the restrictive barrier, and the tissue is then loaded with a constant force until tissue release/relaxation occurs . An example of this would be the very common practice of stretching myofascial tissues during warm up or rehabilitation. Indirect MFR involves gliding the dysfunctional tissues along the path of least resistance (away from the barrier) until free movement is achieved. MFR is generally well tolerated, and most athletes have experienced some type of MFR during their careers (i.e., stretching). MFR is often used to stretch muscles before competition and during rehabilitation. Myofascial techniques can restore range of motion and decrease pain, thus allowing for the earlier return of function. The goals of myofascial treatment include the relaxation of contracted muscles, increased circulation to an area of ischemia (often accompanying muscle spasm), increased venous and lymphatic drainage and the stimulation of stretch reflexes in hypotonic muscles. Myofascial techniques are useful for interrupting the pain muscle tension pain cycle. Complications include increasedpain, muscle spasm, and headaches.[12]

Sub-occipital myofascial release is the technique that helps to release the rectus capitis posterior major and minor, obliquus capitis superior and inferior muscles which are more prone to develop tightness and trigger points. It relives the restricted fascia, reduce pain andimprove range of motion.[10]

Purpose of the Study

Mulligan Sustained Natural Apophyseal Glide is a mobilization technique commonly used inthe treatment of painful movement restrictions of the cervical spine. Mulligan mobilization is an effective manual therapy method for reducing the severity and frequency of pain and improving functional status in individuals with cervicogenic headaches.

Myofascial release is a widely employed direct manual treatment which utilizes specifically guided mechanical forces to manipulate and reduce myofascial restrictions of various somatic dysfunction. In the past years, few studies have been done to investigate the effects of Sub- occipital myofascial release technique in reducing cervicogenic headache. Hence, this study was done to compare the effectiveness of Mulligan SNAG and Sub-occipital myofascial release in subjects with Cervicogenic Headache.

Objectives of Study

To evaluate the effectiveness of Sustained Natural Apophyseal Glide with Conventionaltherapy on improving Cervicogenic Headache.

To evaluate the effectiveness of Sub-occipital Myofascial Release Technique withConventional therapy on improving Cervicogenic Headache.

To evaluate the effectiveness of Mulligan Sustained Natural Apophyseal Glide versus Sub-occipital

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Myofascial Release on improving Cervicogenic headache.

HYPOTHESIS

Null Hypothesis (H0): There will be no significant difference between Mulligan SNAG and Sub-occipital myofascial release technique in improving cervicogenic headache.

Alternate Hypothesis(H1): There will be significant difference between Mulligan SNAG and Sub-occipital myofascial release technique in improving cervicogenic headache.

MATERIAL

Paper

Pen

Chair with back support

Couch

Pillow

NPRS score sheet

HIT-6 Score Sheet

Sources of Data

For the purpose of data collection 20 subjects within the age group of 20-65 years diagnosed with cervicogenic headache in the Department of Physiotherapy or referred to the Department of Physiotherapy in Navodaya Medical College Hospital and Research Centre, Raichur were selected. Both male and female subjects were chosen.

Research Design

Comparative study.

Inclusion Criteria:

Subjects diagnosed with cervicogenic headache.

Both Genders.

Age between 20-65 years.

Subjects with limited Range of Motion of neck.

Neck pain with referring unilateral pain to sub-occipital region.

Intensifying headache by manual pressure to upper cervical muscle and joint.

Headache frequency of at least one per week for a period of the last 6 months.

Exclusion Criteria:

Bilateral headache

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Presence of autonomic system symptoms such as vertigo, dizziness and visualimpairment.

Presence of severe specific neck pain such as disc herniation, canal stenosis andcervicalspondylosis.

Any condition that might contraindicate myofascial release technique in uppercervicalregion.

Subject received physiotherapy treatment for headache in the last 6 months.

Subjects with loss of sensation

Subjects not willing to participate in the study.

Sample and Sampling Techinques

Men and women (20-65 years) with clinical diagnosis of cervicogenic headache attending the physiotherapy department will be selected for the study.

These subjects will be allocated into two groups using simple random sampling technique. $Z\alpha/2 = 2.58$ standard normal variate at 99% confidence level

$Z\beta = 1.282$ at 80% power d = mean difference= 19.3σ = pooled SD= 8.55

Sample size formula:

$$n = \frac{2[Z\alpha/2 + Z\beta]^2 [\sigma]^2}{d^2}$$

$$n = \frac{2[2.58+1.282]^2 [8.55]^2}{(19.3)^2}$$

$= 5.85 \cong 6$

n =10, the minimum sample size.

Each group will consist of 10 subjects.

Total sample consists of 20 subjects with cervicogenic headache.

Group A: Mulligan Sustained Natural Apophyseal Glide + conventional therapy Group B: Sub-Occipital Myofascial release + conventional therapy

Methods of Data Collection

Pain was assessed by Numerical Pain Rating Scale (NPRS)

6-Item Headache Impact Scale (HIT-6)

Statistical Test

After collecting data, it was entered in MS excel sheet version 10.

Quantitative data was expressed as mean and standard deviation.

Qualitative data was expressed as frequencies and percentages.

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Analysis was done by using EPI info software version 7.0.

Paired t test was used to compare pre and post-tests between intra groups.

METHODOLOGY

Ethical clearance was obtained from Ethical Committee of Navodaya Medical College Hospitaland Research Centre, Raichur.

Using simple random sampling technique 20 subjects were randomly recruited from various department of NMCH and NCP.

Subjects were randomly divided into two groups, each group consist of 10 subjects

Group A: Mulligan Sustained Natural ApophysealGlide with Conventionaltherapy.

Group B: Sub-occipital Myofascial Release Technique with conventional therapy.

PROCEDURE

Written consent was taken from each subject participating in the study who fulfilled the inclusion criteria. Subjects were explained about benefits of the programme and were instructed with demonstrations before commencing with the exercise programme.

Group A: Sustained Natural Apophyseal Glide (Snag)

Mulligan Sustained Natural Apophyseal Glide will be performed on subject in sitting position with back supported.

The cervical spine will be in vertical position (i.e., weight bearing positions) and thetherapist will stand behind the patient.

The therapist will place the thumb over the spinous process of the vertebra above the site ofthe lesion.

Then the therapist moves the spinous process upwards in the eyeball direction and will maintain the glide and ask the patient to turn the head slowly towards the restricted painfuldirection.

The therapist will sustain the glide until head returns to midline.

Four repetitions of each glide will be given and maintained for 10 seconds at end range orthe onset of pain.

Frequency – 3 days a week for 6 weeks

Group B: Sub-Occipital Myofascial Release Technique

The sub-occipital myofascial release technique will be performed in supine position with head rested on a pillow.

The therapist will sit facing the head of the treatment table.

Both the hands of the therapist will contact the base of the occiput (just caudal to the nuchalline) with the tips of the digit 2 to 5.

The tip of the digits 2 to 5 of both hands gently lifts the patients head anteriorly.

The dorsum of the hand rests on the pillow.

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With the tip of the fingers the therapist gently pulls the head cranially as the patient's sub-occipital muscles relax.

The therapist will continue with these positions and will take up free tissue with distraction as it converts accessible.

Distractions may continue for up to 3 to 5 minutes

Once relaxation of sub-occipital muscles is accomplished, the therapist will position the anterior aspect of the shoulder across the patient's forehead to create a firm vice on headapply greater sub-occipital distraction.

During the performance of this technique the force should be applied to the base of theskull and not C1

Patient relaxation is the key to the effectiveness of this technique.

Frequency – 3 days a week for 6 weeks.

Conventional Therapy: For both Group A and Group B

Stretchings for upper trapezius, Levator scapulae and sternocleidomastoid muscles.

Chin Tuck exercise

Active Range of Motion exercises

Isometrics exercises

Frequency- all the conventional therapy will be given 5 days a week for 6 weeks.

RESULTS

A comparative study was done consisting of 20 subjects randomized into two groups with 10 subjects in group A and 10 subjects in group B to study the efficacy of Mulligan Sustained Natural Apophyseal Glide and Sub-Occipital Myofascial Release Technique.

Table 1: Intra group comparison of pre-test and post-test values of Headache ImpactTest-6and NPRS in SNAG group

SNAG		Mean	N	Std. Deviation	Std. Error Mean	" t "test	P Value
HIT-6	PRE-TEST	65.10	10	2.55821	0.80898	17.881	<0.001
	POST-TEST	41.40	10	5.33750	1.68787		
NPRS	PRE-TEST	6.30	10	0.67495	0.21344	24.222	<0.001
	POST-TEST	2.60	10	0.69921	0.22111		

The above table shows pre-test mean of HIT-6 is 65.10 ±2.558 and post test is 41.40±5.3375 inMulligan SNAG group which is statistically significant i.e. p<0.001

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The above table shows pre-test mean of NPRS is 6.30±0.6749 and post test is 2.60±0.69921 inMulligan SNAG group which is statistically significant i.e. p<0.001

Table 2: Intra group comparison of pre-test and post-test values of Headache ImpactTest-6 and NPRS in Sub-Occipital MFR group

SUB-OCCIPITAL MFR		Mean	N	Std. Deviation	Std. Error Mean	"t "test	P Value
HIT – 6	PRE-TEST	61.40	10	5.29570	1.67465	20.677	<0.001
	POST-TEST	40.00	10	4.71405	1.49071		
NPRS	PRE-TEST	5.40	10	1.07497	0.33993	17.676	<0.001
	POST-TEST	2.70	10	0.82327	0.26034		

The above table shows pre-test mean of HIT-6 is 61.40±5.29570 and post-test is 40.0±1.49071 in Sub-Occipital group which is statistically significant i.e. p<0.001

The above table shows pre-test mean of NPRS is 5.40±1.07497 and post-test is 2.70±0.82327 in Sub-Occipital group which is statistically significant i.e. p<0.001

Table 3: Inter group comparison of Pre-test and post-test values of Headache ImpactTest-6

HIT - 6		N	Mean	Std. Deviation	Std. Error Mean	" t test	P Value
PRE - TEST	SNAG	10	65.10	2.55821	0.80898	1.989	0.062
	SUB-OCCIPITAL MFR	10	61.40	5.29570	1.67465		
POST-TEST	SNAG	10	41.40	5.33750	1.68787	0.622	0.542
	SUB-OCCIPITAL MFR	10	40.00	4.71405	1.49071		

The above table shows the pre-test mean of SNAG group is 65.10±2.55 with a standard errorof 0.80 and Sub-Occipital MFR group is 61.40±5.295 with a standard error of 1.67. The post-testmean of SNAG group is 41.40±5.33 with a standard error of 1.68 and Sub-Occipital MFR groupis 40.00±4.714 with a standard error of 1.49 which is found to be not statistically significant i.e. p>0.05 for HIT-6 scale between the SNAG and Sub-Occipital group.

Table 4: Inter group comparison of pre-test and post-test values of NPRS in SNAG and Sub-Occipital MFR group.

NPRS		N	Mean	Std. Deviation	Std. Error Mean	" t test	P Value
PRE-	SNAG	10	6.30	0.67495	0.21344		

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TEST	SUB-OCCIPITAL MFR	10	5.40	1.07497	0.33993	2.242	0.038
POST-TEST	SNAG	10	2.60	0.69921	0.22111	0.293	0.773
	SUB-OCCIPITAL MFR	10	2.70	0.82327	0.26034		

The above table shows the pre-test mean of SNAG group is 6.30±0.674 with a standard error of

0.213 and Sub-Occipital MFR group is 5.40±1.0749 with a standard error of 0.33. The post-test mean of SNAG group is 2.60±0.69 with a standard error of 0.221 and Sub-Occipital MFR groupis 2.70±0.823 with a standard error of 0.26 which is found to be not statistically significant i.e., $p>0.05$ for NPRS scale between the SNAG and Sub-Occipital group.

DISCUSSION

Cervicogenic headache (CHG) may present as unilateral pain that starts in the neck. It is a common chronic and recurrent headache that usually starts after neck movement. It usually accompanies a reduced range of motion (ROM) of the neck. To establish the diagnosisof cervicogenic headache several aspects must be considered, such as clinical history, physical examination, and analysis of radiographic evidence. In symptomatic cases of cervicogenic headache there is a side-locked or unilateral fixed headache characterized by a non-throbbing pain that starts in the neck and spreads to the ipsilateral oculo-fronto-temporal area. In patients with this disorder, attacks or chronic fluctuating periods of neck/head pain may be provoked or worsened by sustained neck movements or stimulation of ipsilateral tender points.

The principal aim of this study was to compare the effect of Mulligan SNAG and Sub- Occipital MFR in cervicogenic headache patients. This study was conducted on 20 subjects having cervicogenic headache which were randomly divided into 2 groups. Group A receivedMulligan SNAG + conventional therapy and group B received Sub-Occipital MFR + conventional therapy.

HIT-6 was used to measure the adverse impact of headache on social functioning, role functioning, vitality, cognitive functioning and psychological distress and NPRS scale was used to assess pain. Treatment was given 5 times a week for 6 weeks. The collected data was analyzed by means of various statistical tool via mean, standards deviation and paired ‘t’ test.

6 weeks of Mulligan SNAG and Sub-Occipital MFR led to a significant improvement in HIT-

6 and NPRS($p<0.001$).

Subjects in group A who received Mulligan SNAG showed a decrement in HIT-6

score from 65.10 to 41.40 and NPRS showed a decrement from 6.30 to 2.60. Both the resultsare found to be statistically significant.

The result of this study correlates with a prospective quasi experimental by Jean-Philippe Paquin et al (2021) was conducted to investigate the effect of sustained natural apophyseal glide (SNAG) mobilizationcombined with a self-sustained natural apophyseal glide home exercises for the treatment of cervicogenic headache. Cervicogenic Headache patient receivedeight physical therapy sessions a C1-C2 rotational SNAG technique combined with a C1-C2 self-SNAG rotation exercise for four weeks. Pain intensity, frequency and duration, active cervical range of motion and cervical flexion rotation test were taken as outcome measures.

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The result showed moderate improvement on active cervical range of motion and on fear avoidance beliefs and kinesiophobia and no link was found between pre-interventional cervical flexion rotation test, range of motion and treatment response. The study concludes that SNAG mobilization combined with a self-SNAG home exercise resulted in favorable outcomes for the treatmentof cervicogenic headache.

SNAG is a manual mobilization technique which consist of applying a direct force on the C1- C2 segment during active rotation of neck by the patient.[18]The application of SNAG influences correcting irregular position of articular elements and achieving correct biomechanics of the cervical spine. This technique causes a decrease in excessive reactivity ofcervical nuclei in trigeminal nerve and blocks A-beta fibers stimuli that may result in pain relief and also limit the headache disability.[9]

Subjects in group B who received Sub-Occipital MFR showed a decrement in HIT-6 score from 61.40 to 40.0 whereas NPRS showed a decrement from 5.40 to 2.70. The results showeda significant difference in the mean results.

The results of this study correlate with a Randomized controlled study done by Venkata Naveen Kumar V et al (2020) to evaluate the effect of sub occipital release and myofascial release with IASTM tool on cervicogenic headache. Outcome measures used were Visual Analogue Scale (VAS), Headache Disability Index, Cervical Flexion Rotation Test (CFRT) and Cervical Range of Motion. The subjects were randomly divided into two groups. Group 1received sub occipital release, MFR with IASTM and exercises and Group 2 received sub occipital release, MFR manually and exercises. Treatment was given for twelve sessions per three sessions in a week to each group. The Results showed there is a significant change in post intervention when compared between the groups The study concluded that sub occipital release and myofascial release with IASTM tool was effective on cervicogenic headache ($p<0.05$).[14]

Another prospective study was conducted by Ebrahim Ramezani et al (2017) to determine the sub-occipital myofascial release technique in subjects with cervicogenic headache. Subjects were divided randomly into Exercise group (N = 17) and Myofascial Release group (N = 17).Ten treatment sessions, six times a week were given for each group.

Outcome measures used were frequency and duration of headache, intensity of headache and pressure pain threshold of spinous and transverse process of upper cervical joints. The results (paired t-test) showed a significant improvement in headache intensity, frequency, duration and pressure pain threshold after treatment in the myofascial release and exercise groups ($p<0.05$) compared to before treatment except PPT of left C2 transverse process in Exercise group and headache duration in MFR group ($p>0.05$). The study concludes that the application

of sub-occipital myofascial release and common exercises produce a rapid and early improvement in pain intensity, frequency and Pressure Pain Threshold in subjects withcervicogenic headache.[10]

Myofascial Release is defined as the facilitation of mechanical, neural and physiological adaptive potential via myofascial system. The mechanism of sub-occipital myofascial releaseis to elongate and soften the connective tissue, making permanent three- dimensional length and width. MFR acts by relaxing contracted muscles, increasing circulation and stimulating stretch reflex of muscles and overlying fascia. This helps to increase soft tissue extensibility which reduces pain and improves range of motion.[12]

In this study the inter group comparison of pre-test and post-test values of HIT-6 and NPRS did not show statistical significance. However, when mean of both the groups are compared, SNAG was found to be more effective. These results indicate between group differences for sub-occipital MFR group and SNAG favoring the SNAG over Sub-occipital MFR for subjectswith cervicogenic headache.

Hence, the result of this study showed that interventions given to both groups showed improvement in HIT-6 and NPRS. Based on the post-test comparison between two groups it can be said that Mulligan SNAG showed significant differences in HIT-6 and NPRS than Sub-Occipital MFR group in cervicogenic headache patients.

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CONCLUSION

This study concludes that both Mulligan SNAG with conventional therapy and Sub-Occipital MFR with conventional therapy showed significant results in NPRS and HIT-6. Thus, both the treatment are effective in treating patients with cervicogenic headache. However, Mulligan SNAG showed better improvement in reducing pain and functions in patients with cervicogenic headache.

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