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Original Research Article

Effect of Spinal Mobilization with Arm Movement and Sustained Natural Apophyseal Glides in Cervical Hypomobility

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ABSTRACT

Background: Cervical hypomobility characterized by reduction in range of motion, passive intervertebral movements and neck pain is an identified cause of disability in the world. This study has been done to find out and compare the effects of Sustained Natural Apophyseal Glides (SNAGs) and Spinal Mobilization with arm movements (SMWAM) on cervical hypomobility.
Methods: Ethical clearance was obtained from Institutional Ethical Committee, KIMSDU, Karad. An experimental study was conducted with 68 subjects which were divided into two groups using consecutive sampling with random allocation was done. Group A was treated with Hot Moist Pack (HMP), Sustained Natural Apophyseal Glides (SNAGs) and exercises and Group B was treated with HMP, Spinal Mobilization With Arm Movement and exercises. The outcome measures used were Visual Analogue Scale (VAS), Range of Motion(ROM) and Neck Disability Index(NDI).
Results: Pre-interventional analysis done for VAS showed no significant difference with p values 0.0704, for ROM of flexion p=0.3661, extension p=0.8601, side flexion (right p=0.1530, left p=0.03004), rotation (right p=0.7361, left p=0.7870), and for NDI p=0.9861. Post-interventional analysis done for VAS showed no significant difference, p=0.2195, for ROM no significant difference in flexion, p=0.5636, significant difference in extension, p=0.0421, very significant difference in side flexion (right p=0.0007, left =3.141), significant difference in rotation (right p=0.0179, left p=0.0068) and for NDI significant difference was seen (p=0.0347)
Conclusion: The study concludes that there is significant effect of SMWAM and SNAGs in cervical hypomobility.

Keywords: hypomobility, SNAGs, SMWAM, disability, pain, ROM, HMP.

INTRODUCTION

Cervical hypomobility is characterized by stiffness in cervical spine as noted with active range of motion, passive range of motion and passive intervertebral motion testing, with absence of any arm symptoms. Assessment is based on various factors like joint mobility, end feel assessment, tissue reaction, nature of symptoms, onset of symptoms.

Due to postural insignificance various degree of joint hypomobility is throughout the spine, which further contributes in malalignment in segments of spine. Cervical hypomobility is characterized by neck pain and no symptoms beyond the shoulder. [1]

General prevalence of neck pain is between 0.4% to 86.8%. [2] A study done in Bangalore states that incidence of neck pain is 35% with range of age group being 18 to 52 years and median age of 27 years. [3] It is more prevalent in females, high income countries and urban population. Literature states that the age group most prevalent to developing neck pain is 35-49 years. [2]

Sustained Natural Apophyseal Glides:

The application of movement with mobilization in spine is known as SNAG, in which passive accessory glide is applied to a segment and the patient performs active movement along with it. A thorough clinical examination is performed and appropriate level is identified, the glide is then performed parallel to the perceived facet plane and the degree of glide is determined by patient's active movement response. [4,5]

Spinal Mobilization With Arm Movement:

In SMWAM a transverse glide is applied to the affected segment which rotates the vertebra to the same side which further opens the foramina on affected side. Adding arm movement further will result in mobilization of neural tissues. [5,6]

There have been several studies which focus on effect of manual therapy technique on neck pain; however there is little literature which studies the effect of such manual therapy techniques in cervical hypomobility. Early intervention in cervical hypomobility may be beneficial in preventing further dysfunction in cervical spine, considering cervical hypomobility as an important assessment parameter just like pain and disability.

MATERIALS AND METHODS

The study protocol was started after being approved by Institutional Ethical Committee of Krishna Institute of Medical Sciences Deemed to be University, Karad for using human subjects in research. Informed consent was taken from all subjects before commencement of protocol. Subjects referred to the physiotherapy OPD and diagnosed with cervical hypomobility were assessed for recruitment in the study. Subjects who fulfilled the inclusion and exclusion criteria were selected. Written informed consent was taken from each of the subject prior to participation. Instructions were given to the subjects about techniques to be performed. Subjects were divided equally into two Groups by convenient sampling technique with random allocation (Group A and B). Outcome measures used were VAS for pain, Inclinometer for ROM and Neck Disability index for disability.

Group A-Treatment protocol included Sustained Natural Apophyseal Glides (10 movements in one glide, 3 sets per session)

Group B-Treatment protocol included Spinal Mobilization with arm movement (10 MWM in one set, 3 sets in one session).

Treatment was given for 2 weeks, 5 days/week.

Baseline treatment for both groups:

Hot Moist Pack: 15 minutes

Isometric Exercises, 3 sets with 10 repetitions were given.

STATISTICAL ANALYSIS:

Statistical Analysis was done using Instat Software.

- Paired 't' test was used for statistical analysis of pre and post intervention within group.
- Unpaired 't' test was used for between group statistical analysis of Group A and Group B.

RESULTS

In the present study pre-interventional mean of VAS was 8.8058±0.8811 cm in Group A and 8.2705±1.450 cm in Group B whereas post-interventionally mean of VAS was 2.2970±0.8335 cm in Group A and 2.6±1.155 cm in Group B respectively

Pre-interventional analysis showed no significant difference between Group A and Group B (p=0.0704) Post-interventional analysis showed no significant difference between Group A and Group B(p=0.2195).

Intra group analysis revealed extremely significant increase in VAS in both the groups. Group A($p<0.0001$, $t=34.538$) Group B($p<0.0001$, $t=21.928$)

Pre-interventional mean of cervical flexion was 43.9166±19.957 º in Group A and 48.1176±18.109º in Group B whereas post-interventionally mean of cervical flexion was 68.1176±5.762º in Group A and 66.9411±10.319º in Group B respectively. Pre-interventional analysis showed no significant difference between Group A and Group B ($p=0.3661$). Post-interventional analysis also showed no significant difference between Group A and Group B. ($p=0.5636$)

Intra group statistical analysis revealed statistically extremely significant for both the groups. This was done using paired 't' test . Group A($p<0.0001$, $t= 7.708$) and Group B ($p<0.0001$,$t=8.777$)

Pre-interventional mean of cervical extension 45.2058±18.835º in Group A and 44.3823±19.548º in Group B whereas post-interventionally mean of cervical extension was 57.9705±7.837º in Group A and 62.0294±8.303º in Group B respectively. Pre-interventional analysis showed no significant difference between Group A and Group B ($p=0.8601$). Post-interventional analysis showed significant difference between Group A and Group B($p=0.0421$)

Intra group statistical analysis revealed extremely significant increase in cervical extension in both the groups. Group A ($p<0.0001$,$t=4.487$) , Group B ($p<0.0001$, $t=6.715$)

Pre-interventional mean of right cervical side flexion was 19.3235±8.134º in Group A and 22.2352±8.471º in Group B whereas post-interventionally mean of cervical side flexion was 29.0882±3.423º in Group A and 32.6176±4.691º in Group B respectively. Pre-interventional analysis showed no significant difference between Group A and Group B($p=0.1530$). Post-interventional analysis showed extremely significant difference between Group A and Group B ($p=0.0007$)

Intra group analysis revealed extremely significant increase in side flexion in both the groups. Group A ($p<0.0001$,$t=7.395$) Group B ($p<0.0001$, $t=8.224$)

Pre-interventional mean of left cervical side flexion was 19.5588±8.162º in Group A and 21.4411±6.630º in Group B whereas post-interventionally mean of side flexion was 28.7941±2.931º in Group A and 32.3235±5.861º in Group B respectively. Pre-interventional analysis showed no significant difference between Group A and Group B ($p=0.3004$). Post-interventional analysis showed very significant difference between Group A and Group B ($p=3.141$)

Intra group analysis revealed extremely significant increase in side flexion in both the groups. Group A ($p<0.0001$,$t=7.395$) Group B ($p<0.0001$, $t=8.234$)

Pre-interventional mean of right side rotation was right side rotation was 42.6764±25.044º in Group A and 40.7352±22.160º in Group B whereas post-interventionally mean of right side rotation was 85.3529±5.297º in Group A and 80.0294±11.640º in Group B respectively. Pre-interventional analysis showed no significant difference between Group A and Group B. ($p=0.7361$). Post-interventional analysis showed significant difference between Group A and Group B($p=0.0179$)

Intra group analysis revealed extremely significant increase in side rotation in both the groups. Group A ($p<0.0001$, $t=9.939$), Group B ($p<0.0001$,$t= 11.351$)

Pre-interventional mean of left side rotation was left side rotation was 38.0882±21.401º in Group A and 39.4117±18.746º in Group B where as post-interventionally mean of left side rotation was 86.6470±4.911 in Group A and 81.3823±9.820º in Group B respectively. Pre-interventional analysis showed no significant difference between Group A and Group B ($p=0.7870$). Post-interventional analysis showed very significant difference between Group A and Group B($p=0.0068$)

Intra group analysis revealed extremely significant increase in side rotation in both the groups. Group A(p<0.0001, t=13.348), Group B(p<0.0001,t=12.579)

Pre-interventional mean of NDI was 39.6470±5.245 in Group A and 39.6764±5.203 in Group B whereas post-interventionally mean of NDI was 15.4117±5.560 in Group A and 18.4411±6.016 in Group B respectively. Pre-interventional analysis showed no significant difference between Group A and Group B(p=0.9861). Post-interventional analysis showed significant difference between Group A and Group B(p=0.0347)
Intra group analysis revealed extremely significant increase in NDI in both the groups. Group A(p<0.0001, t=22.242) Group B(p<0.0001,t=17.131)

1. VISUAL ANALOUGE SCALE

TABLE NO 1: INTER GROUP ANALYSIS-VAS

	Mean±SD(cm)	Median(cm)	'p'	Inference
GROUP A	2.2970±0.8335	2.1	0.2195	Not significant
GROUP B	2.6±1.555	2.1		

2. RANGE OF MOTION

TABLE NO 2: POST-INTERVENTIONAL INTER GROUP ANALYSIS-ROM:

	FLEXION (º)		EXTENSION (º)		RT SIDE FLEXION (º)		LT SIDE FLEXION (º)		RT ROTATION (º)		LT ROTATION (º)	
	Grp A	Grp B	Grp A	Grp B	Grp A	Grp B	Grp A	Grp B	Grp A	Grp B	Grp A	Grp B
Mean±SD	68.1176± 5.762	66.9411± 10.319	57.9705± 7.837	62.0284± 8.303	29.0882± 3.423	32.6176± 4.691	28.7941± 2.931	32.3235± 5.861	85.3529± 5.297	80.0294± 11.640	86.6470± 4.911	81.3823± 9.820
Median	70.00	70.00	60.000	61.000	29.00	30.00	30.00	30.00	70.00	50.00	89.500	84.500
'p'	0.5636		0.0421		0.0007		0.0025		0.0179		0.068	
Inference	No sig		Sig		Ext Sig		Very sig		Sig		Very sig	

3. NECK DISABILITY INDEX

TABLE NO 3: INTER GROUP ANALYSIS-NDI

	Mean±SD	Median	'p'	Inference
GROUP A	15.4117±5.560	14	0.0347	Sig
GROUP B	18.4411±6.061	17		

DISCUSSION

The present study has been done to analyze and compare the effect of SNAGs and SMWAM in cervical hypomobility. Hypomobility is seen and associated with various conditions of spine and is associated with pain and disability.

68 patients between the age group of 20-50 years were assessed and diagnosed clinically with cervical hypomobility were included in the study. They were allocated into two groups, in Group A SNAGs was applied along with baseline treatment and in Group B SMWAM was used along with the baseline treatment.

The mean age of participants was in between 34 and 37.2352 years. This study correlates with previous study of D.G Hoy in which he studies the epidemiology of neck pain and stated that the prevalent age of neck pain is between 35-49 years. [2]

The total numbers of participants were 68 out of which 40 were females and 28 were males. Group A included 12 male and 22 females and Group B included 16 males and 18 females. The findings of present study correlate with findings of D.G Hoy which state that neck pain is more prevalent in, also this study suggests that neck pain due to cervical hypomobility is also more prevalent with females. [2]

The intra group analysis states that both the groups were effective in improving range of motion, and reducing pain and disability associated with it. Findings of this study co-relates with findings of previous literature. [7-10]

Inter group analysis revealed that there is no significant difference in reduction of pain in both the groups which states that both the groups are effective in reduction of pain in cervical hypomobility.

SNAGs and SMWAM both the technique work on the concept of mobilization with movement, and have been proven equally effective in pain reduction in

the present study. Manual contact during the mobilization has a sympathoexcitatory effect on the neurons of spinal cord, which helps in inhibition of nociceptive stimulus. Also, literature states that spinal mobilization causes the capsule to stretch which in turn stimulates mechanoreceptors leading to pain reduction. The active movements which take place along with the glide further contribute in inhibition of noxious stimulus which can possibly explain pain reduction after application of the above techniques. [11-14] The findings of this study co-relates with the findings of Wadida Sayed which states that SNAGs has a significant effect in reducing pain. [15] The findings also co-relate with findings Ajit Dabholkar which state that SMWAM has significant effect in pain reduction. [7]

Both the groups have shown significant reduction in disability; however the subjects treated with SMWAM have shown better results. SMWAM allows movement of shoulder along with the glide in the cervical spine. Any adherent tissue or nerve if present, SMWAM helps in reduction of the mechanical forces on the tissue as well as nerves. Along with this, it works in accordance with pain gate theory as well as descending pain-inhibitory system which releases chemicals like serotonin and nor-adrenaline. These substances relieve muscle spasm, reduce pain and contribute in reduction disability. [16-18] The results co-relate with findings of Dhruv Taneja who studied effect of SMWAM in cervicobrachial pain and stated it is an effective technique to reduce disability. [16]

The statistical analysis revealed that there was no significant difference in flexion range in both the groups. So both the groups are equally effective in improving flexion range of motion which correlates with previous studies. [8,9]

The statistical analysis for extension and side flexion states that Group B is more effective in improving the ranges as compared to Group A.

This result implies that SMWAM is more effective in improving extension and side-flexion as compared to SNAGs. This can be probably due to changes caused by SMWAM in the axonal transport and micro-circulation, helping in reduction of positional faults, dysfunctions and thus improving the range. The shoulder girdle muscles are attached to the cervical vertebra, hence when the arm movements are performed along with the application of glide to the vertebra, it has an additional effect on the spine and thus more effective in improving extension and side-flexion ranges. The findings correlate with findings of Jasmita Kaur and Ajit Dabholkar which proved effectiveness of SMWAM in improvement of range of motion in subjects with mechanical neck pain. [5,16,19]

The statistical analysis for rotation revealed Group A being more effective than Group B. This implies that SNAGs is more effective in improving rotations when compared to SMWAM. SNAGs involves passive accessory joint play movement along with active physiological neck movement, this results in inhibition of nociceptive stimulus thus pain reduction. SNAGs involve end range over pressure which stimulates mechanoreceptors in ligaments as well as muscles and help in achieving the range of motion, while in application of SMWAM there is no effectiveness of overpressure. The results of this study are in relation with a pilot study performed by Wadida Sayed which revealed that SNAGs rotation is better as compared to SNAGs flexion, extension and side flexion. [15]

CONCLUSION

The study provides the evidence to support that SNAGs and SMWAM can be used in treatment of pain and disability associated with cervical hypomobility.

The study also concludes that SMWAM technique is better in improving extension, side flexion and disability score, whereas SNAGs technique is better in improving rotation ranges. Both the techniques are

equally effective in reducing pain ranges, and improving flexion ranges.

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