

## Research Article

# Effectiveness of Gong's mobilization in cervical spondylosis: a prospective comparative study

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**Received:** 30 November 2014

**Accepted:** 10 January 2015

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### ABSTRACT

**Background:** Cervical spondylosis is a general term that refers to the degenerative changes that develop either spontaneously with age, or secondarily as the result of trauma or other pathological condition. The symptoms of cervical spondylosis include pain which might be radiating or localized in the neck, limitation of neck movements, postural abnormalities. The aim of this preliminary study was to investigate effectiveness of Gong's Mobilization in the relief of pain, improvement in range of motion and functions in individuals with cervical spondylosis.

**Methods:** Thirty subjects (19 male and 11 female) randomly allocated in two groups (Group A and B) using the coin method. Group A received Gong's mobilization along with hydro collar packs and isometric exercises, group B received Sustained Natural Apophyseal Glides (SNAGs) along with hydro collar packs and isometric exercises. The treatment period lasted 4 weeks in total. Pain on visual analogue scale, Range Of Motion (ROM) by universal goniometer and functional disability on neck disability index was assessed on day one pre and post intervention at the end of two weeks and end of 4<sup>th</sup> week.

**Results:** The findings of this study suggest that both the interventions are effective in reducing pain, improving ROM and decreasing the level of disability but particularly the Gong's mobilization is more effective ( $P < 0.01$ ) in correcting posture, reducing pain, improving ROM and decreasing the level of disability.

**Conclusions:** Gong's mobilization can be utilized in the treatment of cervical spondylosis.

**Keywords:** Cervical spondylosis, Gong's mobilization, SNAGs

### INTRODUCTION

Cervical Spondylosis (CS) is a common term that denotes degenerative changes that develop with aging, or secondarily as a result of trauma or other pathological condition.<sup>1</sup> These degenerative changes in cervical spine may remain asymptomatic or can present as pure axial neck pain, cervical radiculopathy, cervical myelopathy, or cervical myeloradiculopathy.

Radiological evidence of asymptomatic CS is seen frequently, with an incidence of 50% over the age of 40 and 85% over the age of 60, neck pain and radiculopathy

are relatively common, with about two thirds of the UK population having neck pain at some point in their lives.<sup>2</sup> A study done on Indian population reported 78% of radiological changes of CS at C5-C6 and C6-C7 levels in asymptomatic individuals.<sup>3</sup>

The earliest event is probably a biochemical change in the substance of the disc, resulting in decreased water content. This causes an alteration in the biomechanics of the spine due to loss of the shock absorber-like action of the discs. As a result, secondary changes occur in the other component tissues (facet joints and ligaments) comprising the other elements of articulation between the

vertebrae. The human body reacts to this abnormal state by producing bridging bony deposits called marginal osteophytes. If this process successfully goes to completion, it results in an auto-fusion.<sup>1</sup> Bony hypertrophy can affect all five joints of the cervical vertebral segment, i.e. the disc-vertebral body unit or joint, the two facet joints, and the two uncovertebral joints. Osteophytic hypertrophy of the uncovertebral joints is closely linked to cervical disc degeneration. The three lowest cervical motion segments are commonly involved.<sup>4</sup>

The symptoms of CS include pain which might be radiating or localized in the neck, limitation of neck movements, postural abnormalities, headache, paraesthesia, and symptoms of vertebro-basilar insufficiency may be present. These signs and symptoms may occur singly or in any combination and may affect the vertebral bodies, intervertebral discs, facet joints, longitudinal ligaments and ligamentum flavum.<sup>5</sup>

Physiotherapy management of CS includes manual therapy, exercise therapy, strength training, endurance training and stretching, massage etc., physiotherapy modalities short wave diathermy, transcutaneous electrical nerve stimulation, interferential therapy, ultra sound, infra-red radiations, hot packs etc.<sup>6</sup> Over the years several techniques of manual therapy have been proposed for the treatment of CS some of which include translatory mobilization, sustained natural apophyseal glide techniques, vertical oscillatory pressure, transverse oscillatory pressure, cervical oscillatory rotation, posterior-anterior unilateral pressure, anterior-posterior unilateral pressure.<sup>5</sup> Brian Mulligan's concept encompasses a number of mobilizing treatment techniques that can be applied to the spine; these include Natural Apophyseal Glides (NAGs), Sustained Natural Apophyseal Glides (SNAGs) and Spinal Mobilization with Limb Movements (SMWLMs). Out of the above techniques recent advances have shown that SNAGs had clinically and statistically significant sustained effect in reducing dizziness, cervical pain and disability caused by cervical dysfunction.<sup>7</sup>

Recently a study done on Korean population has shown the effectiveness of Gong's mobilization on postural deviations such as forward head posture, cervical lordosis, and decreased cervical range of motion as compared to sustained natural apophyseal glide techniques. Sustained natural apophyseal Glide has disadvantages that it requires neutral posture but most of the patients present with Forward Head Posture (FHP) so before its application the neutral position is not achieved. Secondly mobility is distributed among the non-mobilizing segments because of lack of stabilization.<sup>8</sup> However there is lack of evidence about the effectiveness of Gong's mobilization in conditions like cervical spondylosis. Hence this study aims to find out the effectiveness of this mobilizing technique in cervical spondylosis.

## METHODS

### Subjects

A total of sixty four participants from the Orthopaedic Physiotherapy Department, Pravara rural hospital (Tertiary hospital), Loni, Tal-Rahata, Dist-Ahmednagar, Maharashtra State, India-413736 from March 2013 to Dec 2013 were screened for the study and thirty participants with cervical spondylosis between 40 to 60 years of age were included in the study. Prior to the participation, an informed written consent was taken from all the participants. A total of two participants dropped out of the study since they had time constraints.

Participants were included if there was a diagnosis of cervical spondylosis and those who had postural abnormalities like forward head posture. Participants were excluded if they had any of the following: 1) Whiplash Injury 2) Trauma or tumor around the neck 3) Vestibular disorder 4) Ankylosing spondylosis 5) Vertebro basilar insufficiency syndrome 6) Cervical spondylotic myelopathy 7) Patients with associated low back ache 8) Cervical canal stenosis. 9) Facet joint arthropathy 10) Cervical radiculopathy.

### Outcome measures

The main outcome measures used in this study were visual analogue scale to measure the intensity of pain,<sup>9</sup> active cervical range of motion as a mobility assessment tool<sup>10</sup> and neck disability index to check functional disability due to cervical spondylosis.<sup>11</sup>

### Procedure

The study received approval from ethical committee of Pravara institute of medical sciences, Loni. After the screening, informed written consent was obtained from all the participants and they were allocated in two groups by coin method: Gong's mobilization group (n=15), SNAGs group (n=15). There were two drop outs from SNAGs group.

### In group A

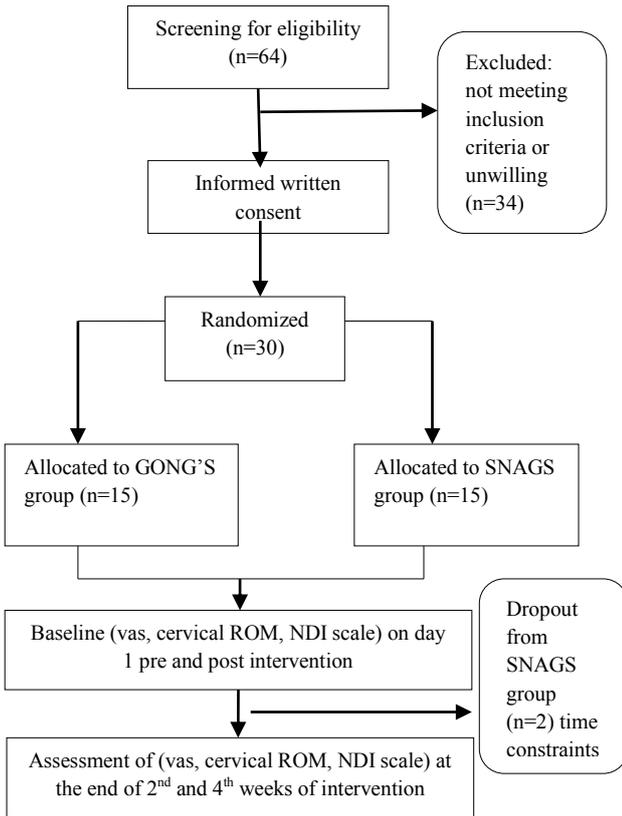
Along with Hydro collator packs and isometric exercises this group was treated with Gong's mobilization in 20 minute session 3 days/week for four weeks.

To improve flexion, extension, side flexion, rotation ROM:

- Patient position - Sitting
- Therapist position - Standing on one side of the participant.
- Hand placement - One arm wrapped around other cheek and the hand is placed on the non-mobilizing

segments for stabilization, while thumb of other hand placed on spinous process of affected vertebrae.

- Application - Concurrent application of sustained apophyseal joint gliding and end range passive physiological movement (flexion, extension, Side flexion, Rotation of cervical spine) as desired while the cervical spine passively neutral in order to induce normal cervical ROM. For side flexion and rotation to the right therapist was standing on to right side of participant and for left side flexion and rotation to the left side (Figure 2 to 8).



**Figure 1: Flow chart showing procedure used in the study.**



**Figure 2: Start position of Gong's mobilization.**



**Figure 3: Gong's mobilization for flexion.**



**Figure 4: Gong's mobilization for extension.**



**Figure 5: Gong's mobilization for right rotation.**



**Figure 6: Gong's mobilization for left rotation.**



**Figure 7: Gong’s mobilization for right side flexion.**



**Figure 8: Gong’s mobilization for left side flexion.**

**In group B**

Along with hydro collator packs and isometric exercises this group was treated with sustained natural apophyseal Glide’s in 20 minute session 3 days/week for four weeks.

To improve flexion, extension, side flexion, rotation ROM:

- Patient position - Sitting
- Therapist position - Standing behind the participant.
- Hand placement - The medial border of one thumbs distal phalanx is placed on the end of the spinous process of the vertebra above the suspected site of the lesion. The thumb nail would slope at approximately 45° in the direction of eyeball, while the other thumb reinforces this. Other fingers are comfortably placed laterally on the mandible or just below.
- Application - Give the command to the participant to perform desired motion of the cervical spine and as the participant start movement sustained glide is applied along the treatment plane (horizontal), and the glide is maintained until the neck returns to neutral position. For the side flexion and rotation the sustained glide was applied along the facet planes.

**RESULTS**

The study was conducted to find out the effectiveness of Gong’s mobilization on pain, Active Cervical Range Of Motion (ACROM) and Neck Disability Index (NDI) in participants with cervical spondylosis when compared to Sustained Natural Apophyseal Glides (SNAGS). Statistical analysis was carried out using graph pad in stat software trial version13.3. The data was entered into an excel spread sheet, tabulated and subjected to statistical analysis. Descriptive statistics for all outcome measures were expressed as mean, standard deviations and test of significance such as unpaired ‘t’ test for intergroup and paired ‘t’ test used for intragroup comparison. The results were concluded to be statistically not significant with P >0.05 and highly significant with P <0.05.

Baseline characteristics across two groups were similar and are summarized in Table 1. No significant differences were detected between the two groups in terms of age, gender, weight, height and BMI, (P >0.05).

**Table 1: Demographic and clinical data of the participants in Gong’s mobilization and SNAGS group.**

Demo-graphic Characteristics	Gong’s group	SNAGS Group	t value	P value
Age (years)	51±4.95	51.46±5.96	0.22	0.82 NS, P >0.05
Gender (M:F)	10:5	9:4	0.09	0.76 NS, P >0.05
Weight (kg)	74.76±7.63	76±9.16	0.47	0.63 NS, P >0.05
Height (cm)	169.73±8.63	171.07±9.82	0.38	0.70 NS, P >0.05
BMI (kg/m <sup>2</sup> )	25.91±2.79	26.02±2.18	0.12	0.90 NS, P >0.05

**Pain relief**

The intensity of pain was measured with the help of Visual Analogue Scale (VAS), the pre-interventional average VAS score of Gong’s mobilization and SNAGS group when compared to post 4<sup>th</sup> week intervention score showed statistically significant (P <0.001) reduction in pain. Between the group comparison showed Gong’s mobilization was better than SNAGS on post 4<sup>th</sup> weeks of intervention whereas there was no significant difference on day 1 immediately after intervention and post 2<sup>nd</sup> week.

**Active cervical range of motion (ACROM)**

Active cervical flexion, extension, side flexion and rotations were measured with help of universal goniometer. The pre-interventional average ACROM

score of Gong’s and SNAGS groups when compared to post 4<sup>th</sup> intervention score showed statistically significant (P <0.01) improvement (Table 2). Between the groups comparison showed that flexion, extension and right side flexion range of motion results were more significant on 4<sup>th</sup> week of intervention, whereas the results were not

significant on immediate day 1 and post 2<sup>nd</sup> week of intervention. Left side flexion, right side rotation and left side rotation range of motion results were more significant on 2<sup>nd</sup> and 4<sup>th</sup> weeks of intervention. The results were not significant immediately on day 1.

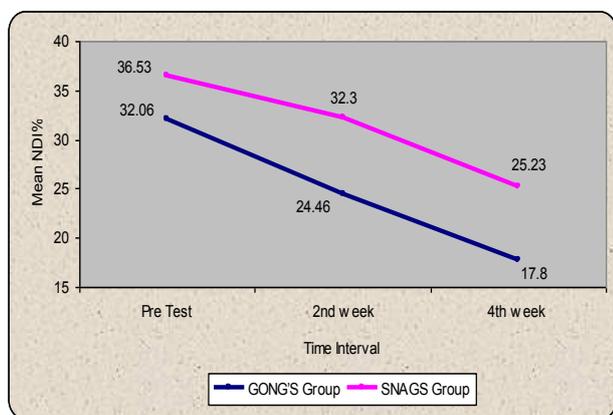
**Table 2: Improvement in active cervical range of motion in Gong’s and SNAGS group.**

ACROM	Gong’s mobilization group			SNAGS group		
	Mean ± SD			Mean ± SD		
	Immediate	2 <sup>nd</sup> week	4 <sup>th</sup> week	Immediate	2 <sup>nd</sup> week	4 <sup>th</sup> week
Flexion	32.13 ± 53	39.13 ± 2.41	43.73 ± 1.22	33.46 ± 6.2	37.53 ± 5.51	41.61 ± 3.50
Extension	27.80 ± 55	36.53 ± 5.31	45.13 ± 3.46	27.76 ± 5.6	33.84 ± 5.71	39.84 ± 3.89
Rt side flexion	33.86 ± 42	40.13 ± 3.02	44.13 ± 1.06	33.30 ± 5.0	37.84 ± 4.50	42.38 ± 2.53
Lt side flexion	34.20 ± 508	39.80 ± 2.27	43.86 ± 1.24	33.30 ± 3.88	37.15 ± 3.50	42.15 ± 2.19
Rt side rotation	53.06 ± 8.77	64.46 ± 6.66	73 ± 2.17	46.61 ± 7.74	56.38 ± 7.22	66.15 ± 5.09
Lt side rotation	52.53 ± 9.70	64 ± 7.81	72.13 ± 3.52	46.07 ± 6.70	55.92 ± 6.07	64.30 ± 5.73

° Rt - Right, ° Lt - Left

**Neck disability index (NDI)**

NDI score was taken after 2<sup>nd</sup> and 4<sup>th</sup> week of intervention showed statistically significant (P <0.001) improvement in both groups. Between the group comparison also showed statistically significant (P <0.001) improvement in both the groups (Figure 9).



**Figure 9: Intergroup comparison of level of disability on NDI (%).**

**DISCUSSION**

The findings of this study showed that all interventions in the form of Gong’s mobilization and SNAGS along with conventional physiotherapy for cervical spine were effective on pain, cervical range of motion and functional disability with cervical spondylosis. But, overall improvement was greater in Gong’s mobilization group as compared to SNAGs group.

**Pain relief**

This study found that pain intensity measured by visual analogue scale reduced significantly in participants treated with Gong’s mobilization than participants treated with SNAGS.

Passive non-thrust manipulation or ‘joint mobilizations’ of the spine, can be defined as a low-amplitude, low velocity sustained or oscillatory motion to the spinal vertebrae either with or without movement, is used routinely in clinical practice to successfully treat patients with pain and dysfunction. Theories about the mechanism by which joint mobilizations affect pain and dysfunction in patients range from physical (biomechanical) to psychological. Recently, a paradigm shift has taken place in manual therapy as an increasing number of studies support a predominantly neurophysiological mechanism of benefit with joint mobilizations.<sup>12</sup>

The reduction in pain intensity in both the groups is more likely related to a neurophysiological change. Joint Mobilization has an effect on pain reduction by neuromodulation effect. In the gate control theory, stimulation of mechanoreceptors within the joint capsule and surrounding tissues causes an inhibition of pain at the spinal cord.<sup>13,14</sup> A study done by Andrea Moulson and Tim Watson (2006) reported that joint mobilization has an effect on sympathetic nervous system that it induces a sympathoexcitatory response because of stimulation of dorsal periaqueductal matter of midbrain and produces endogenous analgesia and motor facilitation.<sup>15</sup>

Post 4<sup>th</sup> weeks of intervention, treatment effect difference when calculated, it revealed that Gong’s mobilization was

more effective for reduction in pain Compared to SNAGS.

### **Active cervical range of motion**

The collective data of the present study showed improvement in active cervical range of motion in Gong's mobilization and SNAGS groups on immediate day 1, post 2<sup>nd</sup> and 4<sup>th</sup> week of intervention but results were more significant in Gong's mobilization group.

Between the groups comparison showed that flexion, extension and right side flexion range of motion results were more significant on 4<sup>th</sup> week of intervention, whereas the results were not significant on immediate day 1 and post 2<sup>nd</sup> week of intervention. Left side flexion, right side rotation and left side rotation range of motion results were more significant on 2<sup>nd</sup> and 4<sup>th</sup> weeks of intervention whereas the results were not significant immediately on day 1.

The results of present study were more significant in Gong's mobilization group because the starting posture of Gong's Mobilization was closer to the neutral position than in SNAGS. In addition, in Gong's mobilization, the movements of joint facets, other than the fixed joint that was moved through passive movements, were well restricted and thus the mobility of the fixed joint was greatly increased. On the other hand, in the case of SNAGS, the start posture of the subject was FHP and movements occurred in joint facets other than the fixed joint resulting in distributed mobility. Another possible reason could be that Gong's mobilization was performed through full range of motion, so that weight of the head and gravity contributed in acceleration. On the other hand during SNAGS which is performed in the available range because of forward head posture, there was no contribution of weight of the head and gravity.

Mulligan's technique is based on a concept of correction of positional fault by simultaneous application of therapist and patient generated forces. Mulligan's concept of positional fault would seem more applicable in alleviating pain with movement of functional activities. In a review of literature done by Jack Miller in (1999) he summarized as Brian Mulligan's novel concept of the simultaneous application of therapist applied accessory mobilizations and patient generated active movements is described. Thus it is the fusion of therapist and patient generated forces which increased function and decreased pain immediately after the application and sustained with the application of these techniques with no pain experienced during the utilization. Mulligan assumes that a repositioning of the joint accompanied by joint motion restores the positional fault of the joint.<sup>16</sup>

However the result of present study showed less improvement in SNAGS group, because before application of mobilization the neutral posture was not achieved and secondly due to the mobility was distributed

among the non-mobilizing segment because of lack of stabilization. A similar study conducted by Wontae Gong et al. (2012) on college going students with decreased cervical range of motion, forward head posture and cervical lordosis reported that Gong's Mobilization is effective in improving cervical range of motion and in correction of forward head posture.<sup>8</sup>

### **Neck disability index**

The results reflect significant improvement in both the groups over a period of 2 weeks and 4 weeks.

The proposed reason for reduction in disability score might be due to the collective effects of reduction in pain, improvement in neck range of motion and in this concern improvement in activities of daily living.

In the present study participants of both the groups were also treated with hydro collar packs and isometric exercises prior to mobilization and it has been already reported by Gross et al. (2004) that mobilization / manipulation along with exercise intervention is more effective than exercise alone.<sup>17</sup> Bronfort et al. (2001) and Skargren et al. (1998) found 13-20% of treatment advantage on disability index while comparing manipulation/mobilization and exercise to manipulation or mobilization alone.<sup>18,19</sup> On the basis of present study, it can be concluded that Gong's mobilization can be utilized in the treatment of cervical spondylosis for the relief of pain, improvement in active cervical range of motion and to minimize functional disability.

### **Limitation of the present study**

- Small sample size.
- Relatively short term intervention.
- The present study has focused on patients with cervical spondylosis so the findings are applicable to patients within this category only.
- The response of autonomic nervous system was not assessed after the interventions.

### **ACKNOWLEDGEMENTS**

Authors would like to thank all the participants in the study who provided full cooperation to the study. Research completed as a part of a partial fulfillment of first authors degree of master of physiotherapy (Orthopedics physiotherapy), Pravara institute of medical sciences, Loni, Dist-Ahmednagar, Maharashtra State, India.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the ethics committee of Pravara institute of medical sciences, Loni*

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DOI: 10.5455/2394-6040.ijcmph20150209

**Cite this article as:** Harsulkar SG, Khatri SM, Rao K, Iyer C. Effectiveness of Gong's mobilization in cervical spondylosis: a prospective comparative study. *Int J Community Med Public Health* 2015;2:38-44.