



**“EFFECT OF FORCED INSPIRATORY AND EXPIRATORY MANUEVER
IN PATIENTS WITH CERVICAL SPONDYLOSIS”**

JESSE MAGH^{1*} AND R.ARUNACHALAM²

^{1*} *Department of Neurophysiotherapy, Saveetha Physiotherapy college.*
² *Saveetha physiotherapy college, Chennai*

ABSTRACT

Neck pain is a common problem that one encounter at some point in their lives. Progressive neck pain is a key indication of cervical spondylosis. Some of the muscles which help in improving the stability of the cervical spine also serve as an accessory muscle for force expiration and inspiration. This additional function of neck stabilizing muscles is utilized in strengthening our program. Thirty subjects from OPD (Out Patient Department) of Saveetha physiotherapy Chennai were randomly allocated to Group A & B. Group A receives conventional physiotherapy with Maneuver technique. Group B received conventional physiotherapy only. Pain, cervical range of motion and cervical muscle power was assessed using visual analog scale, Range of Motion of cervical rotation and isometric hold time. Statistical analysis showed significant difference ($p < 0.001$) between pre and post test values of Group A and B for the outcome measure of VAS. ($p < 0.001$) to isometric hold time and ($p < 0.005$) for cervical range of motion.

KEY WORD: Cervical Spondylosis, Force Inspiratory and Expiratory, Incentive Spirometer, Peak Flow Meter.



JESSE MAGH

Department of neurophysiotherapy, Saveetha Physiotherapy college.

*Corresponding author

INTRODUCTION

Cervical spondylosis is a “wear and tear” of the vertebrae and discs in the neck. In cervical spondylosis, degenerative changes start in the intervertebral discs with osteophyte formation and involvement of adjacent soft tissue structures. Many people over 30 show similar abnormalities on plain radiographs of the cervical spine, however, so the boundary between normal ageing and disease is difficult to define.¹ Even severe degenerative changes are often asymptomatic, but can lead to neck pain, stiffness, or neurological complications. Neck pain is a common problem; with two-thirds of the population having neck pain at some point in their lives. Progressive neck pain is a key indication of cervical spondylosis. It is probably as common as cold. Cervical spondylosis may be gradual or sudden onset.^{2, 13} There are several theories about why many people suffer neck pain; for most people, no specific reason for cervical spondylosis can be found.² Cervical spondylosis can be caused by a number of disorders and disease that affects the structures in and around the neck. It can be caused by injury, muscular problem or by degenerative and inflammatory changes in articulating facets. Inappropriate working or sleeping postures may also cause cervical spondylosis.^{1, 3} In the initial stage of cervical spondylosis, pain increases dramatically and people avoid too much of a movement in the neck due to pain. Those types of activities which are done trickily in order to avoid pain are called apprehensive activities. Thus, there is no proper use of muscles as it should be leading to weakness of cervical stabilizing muscles.⁴ The rehabilitation focuses on to reduce the level of pain and then restore the normal function of neck. In order to restore function and to prevent the recurrence of neck pain, the cervical muscles have to be trained and strengthened. Most of the patients find it difficult to exercise with pain so, exercise regimens begins only after the level of pain is reduced. Some of the muscles which help in improving the stability of the cervical spine also serve as an accessory muscle for force expiration and inspiration.⁵ This additional function of neck stabilizing muscles is being utilized in strengthening our program. That's the tip of the iceberg, but it gives a good sense of the complex interconnections and the potential to avoid totally exhausted neck muscles to wreak havoc. Thus, we use force Inspiratory and expiratory activities to strengthen the neck muscles. The main aim of our study is to find out the effectiveness of forced Inspiratory and expiratory maneuver in rehabilitation of patients with cervical spondylosis.

MATERIALS AND METHODS

Thirty patients diagnosed as cervical spondylosis from OPD of Saveetha physiotherapy department Chennai. Patients were randomized into Group A & group B. All the subjects signed an informed consent form before participation. The study was approved by scientific and ethical committee of Saveetha University, Chennai. The subjects were included in the study if they fulfill the

following criteria. Both genders between 35 to 60 yrs, Patients diagnosed with cervical spondylosis, Neck pain as primary chief complaints, Able to understand and follow simple verbal instruction. The subjects who had any History of cardio-respiratory disorders, VAS more than 8 and uncooperative patients were excluded from the study. Group A (Experimental group) received conventional physiotherapy i.e. intermittent cervical traction, interferential therapy and isometric neck strengthening exercises along with the technique of “Forced Inspiratory and Expiratory Maneuver” using the incentive spirometer and a peak flow meter for strengthening of the neck muscles. Group B (Control group) received conventional physiotherapy only, i.e. intermittent cervical traction, Interferential therapy and isometric neck strengthening exercises. The given set of treatment duration using modalities was 3 weeks with treatment session for 5 days a week. The isometric exercises were carried out daily once the pain has reduced by 2 points on VAS in group A and group B. Since the patients had no difficulty in doing force inspiratory and expiratory in the experimental group, the maneuver was started from day one of treatment. Pain, cervical range of motion and cervical muscle power were assessed before and after the intervention using the outcome measure- VAS¹⁵, ROM of cervical rotation^[16] and isometric hold time¹⁷-the patients were asked to do isometric contraction of neck muscles against resistances and hold it until pain initiates. This hold time was noted.

I. Incentive spirometer

Patients were asked to maintain an upright position (sitting) and hold the spirometer in front of them at the same level and instructed to breath out normally, then ask to close the lips tightly around the mouthpiece and take a deep breath as deeply as they can and hold the breath for 3 to 5 seconds and encourage repeat 5 times.⁶

II. Peak flow meter

Here the patients were positioned upright in sitting and then ask to inspire deeply and exhale forcefully through the mouth, which is sealed to the mouth piece of the apparatus. The number opposite to the pointer should be noted. The patients were motivated to repeat 5 times.⁶

RESULTS AND STATISTICS

The data was collected and tabulated. The significance of changes in data was estimated using paired t-test in pre and post test of group A and group B. Between group analysis of pre test values of each VAS, isometric hold time and cervical rotation range of motion in group A and group B shows no significant difference between them. i.e. VAS p-value=0.9446,(fig.1) as mention in table 1. Table 3 shows isometric hold time p-value=0.9812(fig.3) and table 5 shows cervical rotation range of motion p-value=0.9664(fig.5). Between group analyses of post test values in group A and group B shows significant differences between them. i.e. VAS p-value=0.9446(fig.2) as mention in table 2. Table 4 shows (p<0.001)(fig.4) for isometric hold time and table 6 shows (p<.0.005) (fig.6) for cervical range of motion.

Visual Analog Scale

Table 1
Between group analysis of the pre test values of Group A & B using paired T-Test

Group-A	Group-B	-Value	Significance
7.93 +/-0.7	7.86 +/-0.63	0.9446	Not Significant

Figure 1

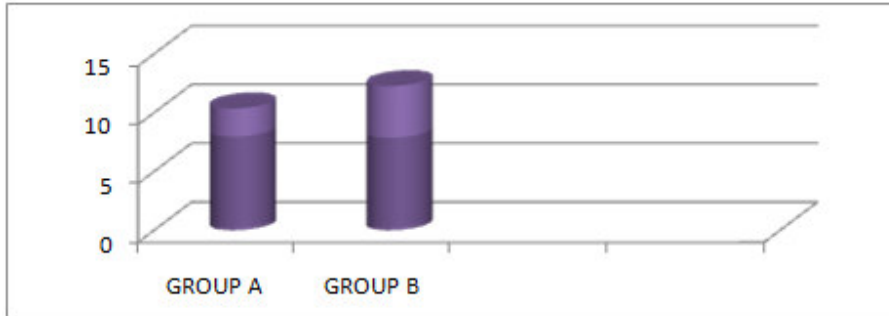
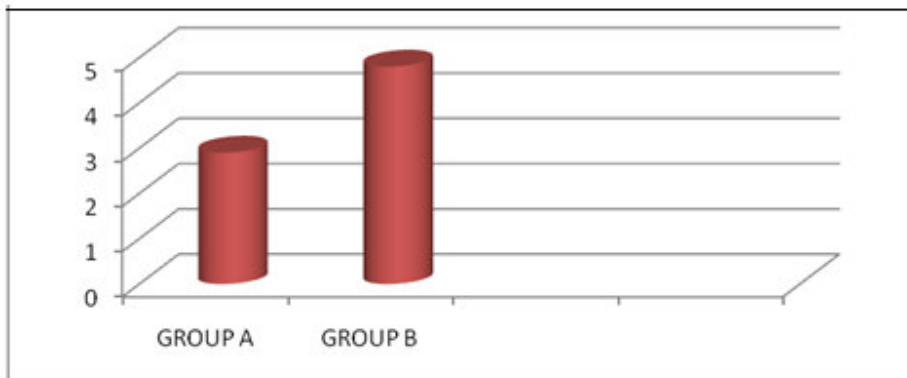


Table 2
Between group analysis of the post test values of Group A & B using paired T-Test

GROUP-A	GROUP-B	P-VALUE	Significance
2.9+/-1.09	4.8+/-1.65	0.001	Significant

Figure 2



Isometric Hold Time

Table3
Between group analysis of the pre test values of Group A & B using paired T-Test

Group-A	Group-B	P-Value	Significance
7.6+/-2.1	7.8+/-2.1	0.9812	Not Significant

Figure 3

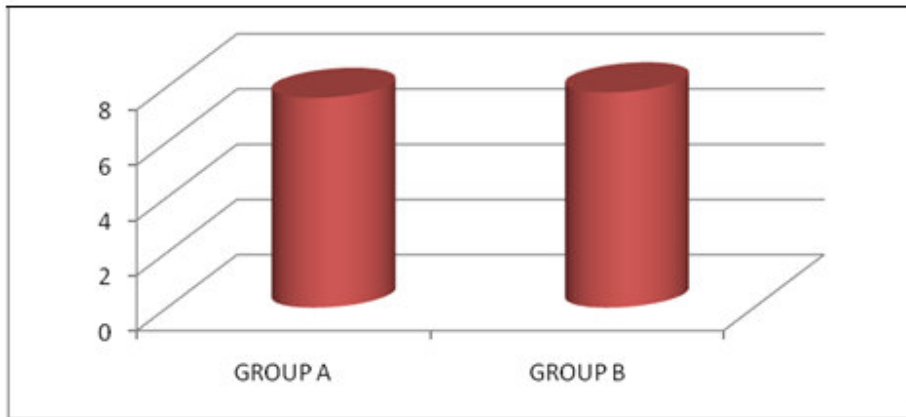
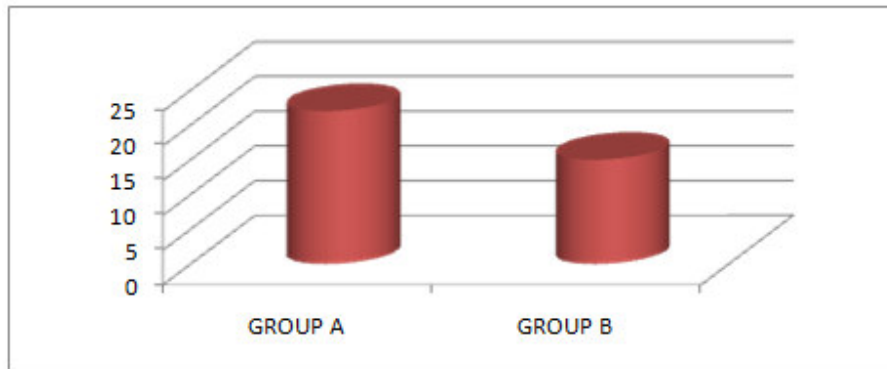


Table 4
Between group analysis of the post test values of Group A & B using paired T-Test

Group-A	Group-B	P-Value	Significance
22+/-1.72	15+/-2.6	0.001	Significant

Figure 4



Neck Rotation Range of Motion

Table 5
Between group analysis of the pre test values of the Group A & by using paired T-Test

Group-A	Group-B	P-Value	Significance
10.3+/-3.5	11+/-3.38	0.9664	Not Significant

Figure 5

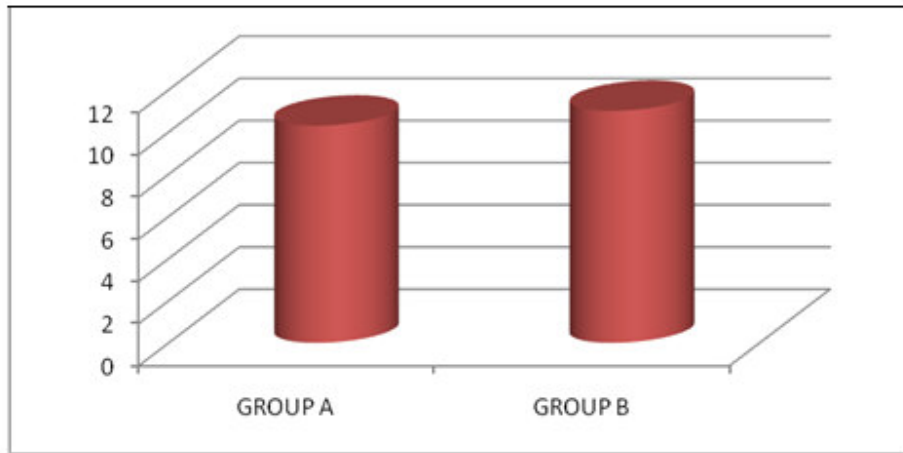
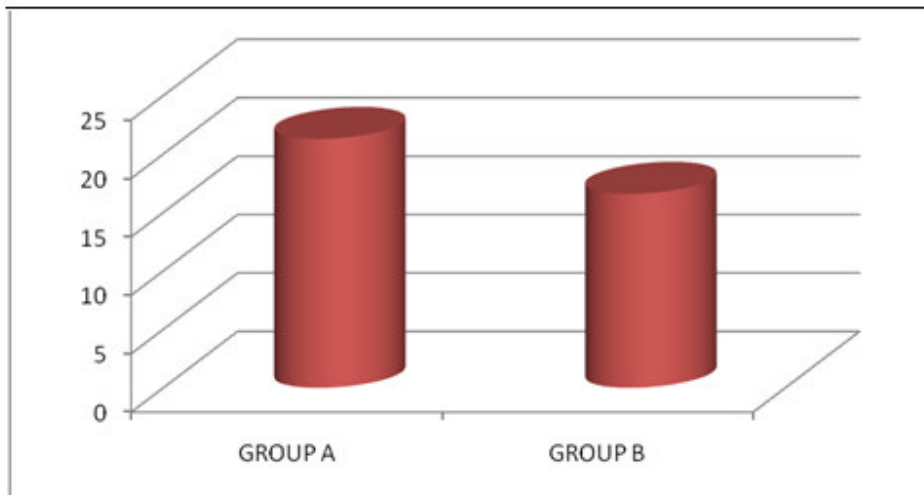


Table 6
Between group analysis of the post test values of Group A & B using paired T-Test

Group-A	Group-B	P-Value	Significance
21+/-6.3	16.6+/-3.08	0.005	Significant

Figure 6



DISCUSSION

Cervical spondylosis is considered to be the major area of research in modern days, where people have encountered it during sedentary work. The fact that the incidence of cervical spondylosis has exceeded the incidence of low back ache is hard to believe, but looking at the biomechanical functions of these two region, one can understand why cervical spine is a spot of concern for many people.⁷ A significant portion (probably more than half) of all upper back pain is caused by problems in the neck. The cervical spine has both mobility as well as stability function as compared to the lumbar spine, which has mostly stability and not mobility.⁸ The connection between dysfunctional accessories muscles and pain in

neck is straightforward in principle as these muscles play a significant role in the stability of cervical spine.^{5, 9} This interconnection step has been taken towards establishing a pain free treatment to strengthen the accessories muscles by force Inspiratory and expiratory maneuver using the incentive spirometer and a peak flow meter. Enright SJ, Unnithan VB 2011 states that Inspiratory muscle training can improve Inspiratory muscle function at high intensity in people who are healthy.¹⁰ in a review of the evidence, Padula CA, Yeaw E indicates that exercising breathing musculature probably works pretty darned well, and benefits take about “20 to 30 minutes per day for 10 to 12 weeks” to achieve. better yet, the evidence also shows that it’s reasonable to expect some benefits “regardless of method” In other words, there’s no great concern about which technique to use. Common

protocols for respiratory training “are generally safe, feasible, and effective.”¹¹ The outcome measures used in this study were VAS, AROM and isometric hold time. The isometric hold time was analyzed by asking the patients to hold against resistance isometrically in all direction of cervical as long as possible and the average is noted as isometric hold time. This outcome shows the strength and endurance of the neck muscles. Range of motion was measured to know the joint integrity which was affected in most of the patients with cervical spondylosis. VAS was used to assess the levels of pain in patients with neck pain. So, all this three standardized scale targeted all the three components of the problem namely pain, joint integrity and muscles performance in patients with cervical spondylosis. Future studies can also concentrate on comparing the present intervention with others.

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CONCLUSION

Based on the result obtained it is concluded that deep Inspiratory and expiratory technique can be use as a tool in inspiring muscles power and function of the cervical muscles and reducing the level of pain. In most of the cervical patients, it is difficult to start exercising from the day one of physiotherapy intervention due to fear of pain on doing isometrics exercises. So, this set of exercise which targets the accessory muscles of respiration (which also acts as the muscles that stabilize cervical spine) will be a better modality in training patients with cervical spondylosis.