



## Mobilization of the Thoracic Spine in the Management of Spondylolisthesis

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### Description

The objective of this study was to determine the effect of thoracic joint mobilization and self-stretching exercise on the pulmonary functions of patients with chronic neck pain. The present study was performed with 34 patients with chronic neck pain featuring thoracic kyphosis; we divided them into a thoracic joint mobilization group, self-stretching exercise group, and thoracic joint mobilization and self-stretching exercise group. Treatments and exercise were conducted three times a week for six weeks in the subjects' pulmonary functions in terms of forced vital capacity, forced expiratory volume at one second, and peak expiratory flow was measured using cardio touch equipment. Comparisons of the individuals within each of the TJMG, SSEG, and TJMSSEG showed that all. Comparisons within each of the showed that FVC increased significantly. Among the study groups, FVC was significantly higher in TJMSSEG than in TJMG after six weeks. The study results indicate that thoracic joint mobilization and self-stretching exercise are effective interventions for increasing FVC, FEV1, and PEF among pulmonary functions. In modern society as more people are sitting for longer periods and aging progresses, kyphosis in the thoracic vertebra has been increasing these results in rounded shoulders and a decrease in thoracic cavity and vital lung capacity. In addition, this slouched posture puts the upper and lower cervical spine into a relative tension state while forwardly inclining the lower part of the cervical spine. A sustained forward-bending posture in the cervical spine could increase the load around the tissues near the neck, as well as the activities of muscles near the neck; additionally, the load increase in the assistant muscles and joints becomes a main cause of chronic pain near the neck and shoulder areas. Many studies have sought to determine various causes of chronic neck pain, and to present therapeutic approaches from various aspects; the results of studies on what constitutes the best therapeutic approach to chronic neck pain, however, have been divergent. Among the studies, one study reported that abnormal movement of the thoracic vertebra is a fundamental cause of cervical disorder in terms of the biomechanical correlation between the cervical spine and thoracic vertebra. Another study reported that not only direct joint mobilization of the cervical spine but also improvement of movement in the upper thoracic vertebra can increase the range of motion and reduce pain in the cervical spine. The most effective joint exercise therapy for increasing mobility in the thoracic vertebra is thoracic joint mobilization, which extends the joint in a direction in which

movement is restrained. A self-stretching exercise can not only increase the flexibility of muscles in the joints but can also reduce muscle tension and increase blood circulation. Although many previous studies have sought to determine the effect of thoracic joint mobilization and self-stretching exercise on pain and range of joint motion, previous studies have not addressed their effects on pulmonary functions.

### Effect of Exercise on the Pulmonary Functions

The aim of the current study was to determine the effect of such treatment and exercise on the pulmonary functions of patients with chronic neck pain and thoracic kyphosis. The therapist stood to the left of the subject and fixed his vertebrae to the spinal segments intended to be treated. Using hands, the therapist then adjusted the back support of the therapeutic chair or a wedge placed between the subjects and chair. The therapist then wrapped the subject's crossed elbows with his/her hands and flexed the subject's trunk slowly while pressing both elbows in the rear lower direction of the back support. During this process, the therapist used hand to check the amount of spinal movement and potential movement of the vertebrae. Next, thoracic extension mobilization was performed. The therapist and the subject maintained the same posture as that of thoracic flexion mobilization. After wrapping the subject's crossed elbows with a hand, the therapist slowly stretched the subject's trunk backward by pressing both elbows in the rear upper direction of the back support. Finally, the separation technique of thoracic facet joint distraction mobilization was then employed. The subject lay face down on a treatment table. The therapist then selected the segments with less movement among the spinal auricular surfaces using a wedge and placed across the wedge crossways the selected vertebrae. The therapist grabbed the wedge with both hands and exerted a force for joint traction using weight SSEG conducted SSEs on the major and minor pectorals. First, the subject sat on a chair with back straightened and pulled in jaw. The subject held a long belt with both hands and spread it wider than the distance between the shoulders. While bending the shoulders at 180°, the subject flexed the shoulders excessively, as if stretching. After maintaining this position for 10 sec, the subject returned to the original position. Next, SSEs of the upper trapezius were performed. While seated with a correct posture on the chair, the subject fixed the hand intended to be extended behind a sheet placed under the hip to depress the shoulder. After this, the subject adopted a cervical posture to extend the upper trapezius to the fullest and maintained this posture for 45 sec. Finally, the SSE was performed on the elevator scapulae of the shoulder bone. In this exercise, the subject adopted the correct sitting posture on a chair and depressed the shoulders by fixing the hand intended to be extended behind the sheet under the hip. The subject then adopted a posture to extend the elevator scapulae to the fullest and maintained it for 45 sec. This study conducted experiments three times a week for six weeks to identify the effects of TJM and SSEs on pulmonary function in patients with chronic neck pain. Reported that the ROM in the jointed part of the neck and spine and chronic neck pain show a high correlation. In other words, if the ROM in the jointed part of the neck and spine increases, the VAS and neck disability index also increase in patients with chronic neck pain. It is reported that manipulation of the upper vertebrae and middle vertebrae exercises resulted in a statistically significant decline in chronic neck pain. Sterling et al. reported that the VAS declined from 5.8 cm-2.8 cm after applying the joint mobilization technique. Hurwitz suggested that

a three-week program of electrical therapy and joint mobilization was more effective than joint exercise in patients with sub-acute neck pain. It is noted that the range of motion of the upper spine was an effective intervention for dynamic stability among chronic neck pain patients.

### **Flexibility of Thoracic Vertebra Extension**

In active exercise therapies, extension is effective in increasing the ROM in soft tissues and the ROM in reduced narrow ROM structures. Jung reported that an 8 week home based cervical exercise program changes the curves in the right side. Omer also asserted that mobilization and stretching relaxation techniques are effective for reducing and increasing the ROM of computer users who exhibit cervical and trapezius pain. It is showed that application of thoracic vertebra extension exercises resulted in statistically significant increases in VAS, spinal length and flexibility of thoracic vertebra extension. Found that male office workers who complained of cervical pain experienced a minor level of improvement after application of upper thoracic vertebra exercises, but this result was not statistically significant. As mentioned, comparisons of the individuals within

TJMG, SSEG, and TJMSSEG showed that FVC, FEV1, and PEF had increased significantly. Among the study groups. Chronic neck pain patients with thoracic kyphosis develop round shoulders that stem from increased thoracic kyphosis; this triggers decreases in vital capacity and thoracic cavity capacity. This is because thoracic joint mobilization or self-stretching exercises for the spine improve limited movements of the spine, recover facet joint sliding, and normalize the articular capsule, thereby decreasing kyphosis and enhancing the flexibility of thoracic extension. Therefore, it is considered that increased mobility of the thorax ameliorates pulmonary functions. In addition, pulmonary functions were better in TJMSSEG than in TJMG and SSEG after six weeks because the simultaneous performance of thoracic joint mobilization and self-stretching exercise was effective in recovering facet joint sliding of the spine and normalizing the articular capsule. This study had some limitations. The main one is the limited number of subjects with chronic neck pain, resulting in difficulties generalizing the results. Furthermore, this study failed to measure range of motion of thoracic kyphosis and the flexibility of spinal extension. Future studies will be required to identify the effects of TJM and SSEs on the pulmonary functions of patients with stroke.