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The Effects of Supervised Six Weeks Breathing Exercise on Dyspnea and Respiratory Muscle Strength in Cervical Spinal Cord Injury Patients

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Objectives: In spinal cord injured patients, injury to the cervical and upper thoracic cord disrupts function of the diaphragm, intercostal muscles, accessory respiratory muscles, and abdominal muscles, thereby causing reduction in spirometric parameters and static mouth pressures. As a result, subjects may have ineffective cough and difficulty clearing secretions which in turn predispose to mucus retention, atelectasis and pulmonary infections. Respiratory muscle dysfunction induces heart function decline then give rise to worse dyspnea, activities of daily living and even affect the lifespan of patients. Thus, improvement of respiratory function respiratory complications are essential for patients with spinal cord injury. As seen in able bodied individuals evidence suggest use of pulmonary rehabilitation exercise methods to improve respiratory health in spinal cord injury patients. Therefore, aim of the study to evaluate the effectiveness of supervised six weeks breathing exercise on dyspnea and respiratory muscle strength in cervical spinal cord injury patients.

Methods: In the present study a total of 28 cervical spinal cord injury (C4-C6 level) patients were recruited. The study consisted of majority in male participants (n=26) and few female (n=2). The mean of age (year) patient was 34.1±13.5. Breathing exercise included pursed lip breathing and abdominal breathing, lip breathing: deeply inhaling through nose for 2 second and slowly exhaling through mouth for 4-6 seconds approximately, expiration required to whistle like lips to maintain constant speed. Abdominal breathing: patients hold sitting position, left hand on the chest and right hand were put on the abdomen, deep breathing with abdominal distention, then squeezed abdomen to collapse by right hand at the time of lip expiration, the time ratio of inspiration and expiration was 1:2. Each supervised training session lasted 15-20 minutes and two times a day and for six weeks. Maximal inspiratory pressure (MIP), maximal expiratory pressure (MEP), and for measuring perceived dyspnea level modified Borg dyspnea scale is used, measurements were performed before training and at the end of 6-weeks of training.

Results: Cervical injury levels of the patients; 21.4% was C4, 28.6% was C5 and 50.0% was C6. Baseline Borg dyspnea scale, MIP and MEP mean values; 4.4±1.7, 55.2±17.5 cmH₂O and 57.5±16.9 cmH₂O, respectively. After 6-weeks breathing exercise perceived dyspnea such as Borg dyspnea scale score (2.7±1.9), respiratory muscle strength indicators such as MIP (67.2±17.1) and MEP (73.2±21.5) had been greatly improved (p<0.05).

Conclusion: The six weeks supervised breathing exercise had great improvements on dyspnea and respiratory muscle strength in cervical spinal cord injury patients.

Keywords: Spinal cord injury, dyspnea, respiratory muscles, pulmonary rehabilitation