

# EFFECT OF REPEATED NECK RETRACTION MOVEMENTS ON STRENGTH AND EMG ACTIVITY OF THE UPPER LIMBS, RANGE OF MOTION AND POSTURE OF THE CERVICAL SPINE

Bassi Raffaele<sup>1</sup>, Fiorito Serena<sup>2</sup>, Aina Alessandro<sup>3</sup>

<sup>1</sup> Physiotherapy Degree student, Vita-Salute San Raffaele University, Milan

<sup>2</sup> Physical Therapist, NEMO Clinical Centre, Niguarda Hospital, Milan

<sup>3</sup> Physical Therapist, MDT dip., Milan

**Background:** Neck pain is a common clinical condition in result of different factors including changes in cervical posture<sup>[1]</sup> and mobility<sup>[2]</sup>. Repeated cervical movements are the main diagnostic and therapeutic strategy used in Mechanical Diagnosis and Therapy (MDT)<sup>[3]</sup> for neck disorders. The most used is the neck retraction movement, which involves pulling the head and neck posteriorly into a position in which the head is aligned on the thorax, while maintaining the look ahead<sup>[4]</sup>. In scientific literature neck retraction is few investigated even if it has been described as an effective method to treat symptoms, achieve pain centralization<sup>[5]</sup>, improve ROM and correct head posture. To date, no articles have analyzed the effect of retractions on strength performance and few have dealt with related surface EMG activity of the upper limbs. The aim of the study is to investigate the effect of 30 repeated neck retractions on strength performance of the upper limbs, on the posture and mobility of the cervical spine in healthy subjects.

**Materials and Methods:** 50 healthy subjects were recruited and randomly assigned into two groups: (control), INT (intervention). 25 subjects (CTRL) performed in sitting position 3 series of 10 flexion-extension cervical movements, while 25 subjects (INT), in the same position, completed 3 series of 10 neck retractions. Each subject was assessed both at baseline (T0) and at the end of repeated movements (T1) in terms of: cervical range of motion, rest posture of the head, upper limbs' strength and electromyographic activity.

Cervical range of motion was measured with CROM (fig.1). The strength was evaluated with palmar and pinch strength using Jamar and Pinch dynamometers, isometric contraction in shoulder abduction and elbow flexion-extension using Biodex dynamometer (fig.2). During isometric contraction, it was detected surface EMG activation of Deltoid, Biceps and Triceps Brachii (Freeemg300, BTS). All evaluations were bilateral.

**Fig. 1:** starting position of cervical range of motion measurement with CROM;

**Fig.2:** position of isometric elbow extension with Biodex dynamometer, surface EMG.



**Results:** Nonparametric statistics were used, due to a non normal distribution of the data. The two groups were homogeneous at baseline for each variable. At T1 there was an improvement in support of the intervention group as regards cervical ROM in flexion and rotation and rest posture (extension) ( $p < 0,05$ ). Both groups, as predicted, showed a decrease in some strength and EMG variables at T1 ( $p < 0,05$ ), especially the control group. The analysis between groups showed an improvement in the cervical extension and rotation in support of the intervention group ( $p < 0,05$ ), but no statistical significant differences in strength, EMG and posture at rest.

**Discussion and conclusions:** This study suggests that neck retractions improve cervical mobility and posture at rest in healthy subjects. No results showed an improvement in strength, EMG and craniovertebral angle (CV), in spite of the study of Pearson et al. <sup>[4]</sup>. Probably, the cervical retractions in patients with cervicobrachial pain have an effect on the pathology and symptoms, with a consequent improvement in strength and posture; it will be interesting to analyze the effect of neck repeated retraction in patients with cervicobrachial pain, in relation to healthy subjects.

## References:

- [1] Donelson, R. Grant, W. Kamps, C. Richman, P. Cervical and referred pain response to repeated end-range testing: A prospective, randomized trial. Twelfth Annual Meeting of the North American Spine Society, New York, New York October 22-25, 1997.
- [2] Bovim, G. Schrader, H. Sand, T. Neck pain in general population. *Spine*. 1994; 19:1307-1309.
- [3] McKenzie, R. The cervical and thoracic spine: mechanical diagnosis and therapy. 1st ed. Spinal Publication, New Zealand Ltd; 1990.
- [4] Pearson, ND. Walmsley. RP. Trial into the effects of repeated neck retractions in normal subjects. *Spine*. 1995 Jun 1;20(11):1245-50; discussion 1251.
- [5] May, S. Aina, A. Centralization Phenomenon and Directional Preference: a Systematic review. *Man Ther*. 2012;17:497-506.