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Beinert K. et al. Neck muscle vibration can improve sensorimotor function in patients with neck pain. The Spine Journal 2015;15: 514–521

Summary: The results from this study show that vibration to the neck improves joint positioning sense and reduces dynamic postural sway in neck pain patients.

Abstract: BACKGROUND CONTEXT: People with neck pain display a diminished joint position sense and disturbed postural control, which is thought to be a result of impaired somatosensory afferent activity and/or integration. Afferent processing can be artificially manipulated by vibration and was shown to reduce motor performance in healthy subjects. However, the effect of vibration on sensorimotor function in neck pain patients is scarcely investigated.

PURPOSE: To assess the effect of neck muscle vibration on joint position sense and postural control in neck pain subjects and healthy controls.

STUDY DESIGN: Case control study.

PATIENT SAMPLE: Thirteen neck pain patients and 10 healthy controls participated in the present study.

OUTCOME MEASUREMENTS: Cervical joint position sense and dynamic and static postural stability.

METHODS: Short-term, targeted neck muscle vibration with 100 Hz was applied after baseline measurement.

RESULTS: Vibration had opposite effects in patients and healthy subjects. Patients showed improved joint position sense (p!.01) and reduced dynamic postural sway (p!.05) after vibration, whereas vibration resulted in reduced joint position sense acuity (p!.05) and a nonsignificant increase in postural sway in healthy controls.

CONCLUSIONS: This is the first study showing an improved motor performance after neck muscle vibration in patients with neck pain. Thus, vibration may be used to counteract sensorimotor impairment of the cervical spine. Potential underlying mechanisms are discussed.

Oh B.-W. et al. Comparison of physical function according to the lumbar movement method of stabilizing a patient with chronic low back pain.
Journal of Physical Therapy Science 2015; 27: 3655–3658, 2015.

Summary: This study indicates that exercises in Redcord slings are more effective than exercises on a Swiss ball for patients with long term LBP.

Abstract: PURPOSE: The purpose of this study was to examine the changes caused by lumbar stabilization exercises in chronic low back pain patients.

SUBJECTS AND METHODS: Swiss ball exercise regimen group and sling exercise regimen group exercised for 30 minutes a day, 5 days a week, for 12 weeks. The control group was to continue performing their usual daily living activities.

RESULTS: We obtained significant results in both the Swiss ball and sling exercise groups, but not in the control group. The best effect was obtained in the sling exercise group.

CONCLUSION: The Oswestry Low Back Pain Disability Index and visual pain scale scores of the patients with low back pain decreased in both the Swiss ball exercise group and the sling exercise group, and these patients experienced an increase in waist isometric muscular strength after 12 weeks of exercise compared with those doing no exercise (the control group).

Park M.-H. et al. Effect of core muscle thickness and static or dynamic balance on prone bridge exercise with sling by shoulder joint angle in healthy adults. Journal of Physical Therapy Science 2016;28: 945–950.

Summary: The results in this study demonstrate that prone bridging in Redcord slings performed with less than 90 degrees of shoulder flexion is more effective in activating the transversus abdominis compared to more than 90 degrees of shoulder flexion.

Abstract: PURPOSE: To date, core muscle activity detected using ultrasonography during prone bridge exercises has not been reported. Here we investigated the effects of core muscle thickness and balance on sling exercise efficacy by shoulder joint angle in healthy individuals.

SUBJECTS AND METHODS: Forty-three healthy university students were enrolled in this study. Ultrasonography thickness of external oblique, internal oblique, and transversus abdominis during sling workouts was investigated. Muscle thickness was measured on ultrasonography imaging before and after the experiment. Dynamic balance was tested using a functional reaching test. Static balance was tested using a Tetrax Interactive Balance System.

RESULTS: Different muscle thicknesses were observed during the prone bridge exercise with the shoulder flexed at 60°, 90° or 120°. Shoulder flexion at 60° and 90° in the prone bridge exercise with a sling generated the greatest thickness of most transversus abdominis muscles. Shoulder flexion at 120° in the prone bridge exercise with a sling generated the greatest thickness of most external oblique muscles.

CONCLUSION: The results suggest that the prone bridge exercise with shoulder joint angle is an effective method of increasing global and local muscle strength.

Rodríguez-Jiménez S. et al. Effect of vibration frequency on agonist and antagonist arm muscle activity. European Journal of Applied Physiology 2015;115: 1305–1312.

Summary: The findings in this study suggest that exercises performed with additional vibration results in increased activation of the antagonist.

Abstract: PURPOSE: This study aimed to assess the effect of vibration frequency on the electromyographic (EMG) activity of the biceps brachii (BB) and triceps brachii (TB) muscles when acting as agonist and antagonist during static exercises with different loads.

METHODS: Fourteen healthy men were asked to hold a vibratory bar as steadily as possible for 10 s during lying row (pulling) and bench press (pushing) exercise at of 0 (non vibration condition), 18, 31 and 42 Hz with loads of 20, 50, and 80 % of the maximum sustainable load (MSL). The root mean square of the EMG activity (EMGRMS) of the BB and TB muscles was expressed as a function of the maximal EMGRMS for respective muscles to characterize agonist activation and antagonist coactivation.

RESULTS: We found that (1) agonist activation was greater during vibration (42 Hz) compared to non-vibration exercise for the TB but not for the BB muscle ($p < 0.05$); (2) antagonist activation was greater during vibration compared to non-vibration exercise for both BB ($p < 0.01$) and TB ($p < 0.05$) muscles; (3) the vibration-induced increase in antagonist coactivation was proportional to vibration in the range 18–42 Hz and (4) the vibration induced increase in TB agonist activation and antagonist coactivation occurred at all loading conditions in the range 20–80 % MSL.

CONCLUSION: The use of high vibration frequencies within the range of 18–42 Hz can maximize TB agonist activation and antagonist activation of both BB and TB muscles during upper limb vibration exercise.