

EFFECT OF LOWER LIMB MUSCLE FATIGUE ON POSTURAL SWAY

Vincenzo Giovanni Ferrara(1)(3), Paolo Trezza(2)(3)

(1) Università degli Studi di Milano, Cdl in Fisioterapia

(2) ASST Gaetano Pini-CTO, Milano

(3) Centro Medico Futura Medicina e Riabilitazione, Milano

Objective

Measure by stabilometric test the effects of lower limb muscle proprioceptive isometric exercise on balance in healthy subjects.

Background

Postural instability can be induced by mechanically stimulating and stress of Golgi tendon organ and muscle spindles. Postural changes are also observed in individuals who suffer from chronic spine pain, whiplash injury, cervical muscle fatigue(1)(2).

Methods

Using a stabilometric platform, balance was measured, in 20 blindfolded healthy subjects before and after exhaustion proprioceptive isometric voluntary training on Humantecar® MAT during forward lunge exercise for a period of 10 minutes. Paired stabilometric data were analysed for differences. Control measurements were performed on the same subjects by measuring balance before and after subjects sitting quietly for 5, 10 and 15 minutes without performing isometric contraction.

Results

The results indicate that exhaustion proprioceptive isometric contraction of the lower limb muscles on Humantecar® MAT for 10 minutes duration produced significant changes in some posturographic parameters in young healthy males and increase postural instability. Evaluation session at 15 minutes show restoration of body sway parameters. Furthermore, this contraction also produced a significant local fatigue on lower limb muscles.

Discussion

Posturographic parameters affected are in according to those observed in subjects that have suffered a whiplash injury(1). These subjects appear to experience lower limb musculature fatigue quickly, which in turn not only affects the lower limb function but also seems to affect the balance in a standing posture.

This study suggests the physiological link between lower limb muscle fatigue(2) induced by proprioceptive training and impaired postural control, and also that an appropriate physiotherapy can relieve symptoms and signs of impaired postural sway by reducing muscle fatigability.

Conclusions

The similarity of results with other studies performed on subjects suffering from chronic neck pain and from whiplash injuries may suggest a similar cause for loss of postural control. Muscle fatigue may affects the functioning of the somatic reflex system. Ultimately, this should help us in developing objective evaluation procedures for better training program for rehabilitation in sport activity. Further investigation on this matter should be recommended.

References

- 1) Quantitative posturography in altered sensory conditions: a way to assess balance instability in patients with chronic whiplash injury 1. Pascal M. et al, Arch phys med and rehab; 85 (3), 432-438, 2004.
- 2) Standing balance in persistent whiplash: a comparison between subjects with and without dizziness. Treleaven J, et al. J Rehabil Med; 37: 224-229, 2005.

