The effect of muscle fatigue in neuromuscular activity during sleep

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Introduction: It is well known that systematic exercise training is beneficial for many chronic diseases. Furthermore, it has been well established that exercise training is an established and effective component of rehabilitation for many neuromuscular disorders. However, patients with neurological disorders like restless leg syndrome (RLS) and periodic leg movement syndrome (PLMS) complain of restlessness before and during sleep after intense exercise activities or simply after “a very long day”.

Objectives: The purpose of this study was to examine whether exercise-induced muscle fatigue and body pain could affect neuromuscular activity during sleep (restlessness) in healthy volunteers with no sleep or movement disorders.

Methods: Twenty-one healthy adults (12 males/9 females, age 24±3.7 yr), participated in a 3–hour mild intensity exercise fatigue protocol (walking at 5 km/hr, 0% inclination). Maximal isometric torque and standard biochemical indices were assessed before the exercise protocol (day 2) and at 72 hours (day 5). Maximal isometric torque was also assessed immediately after the exercise protocol. Neuromuscular activity during sleep (Isolated Limp Movements) was recorded using an actigraphy system, the night before the exercise protocol and during the three following nights. In addition, various questionnaires were used in order to assess general health, body pain and sleep quality.

Results: Even though the score of muscle pain peaked the night after the exercise protocol ($p<0.05$), returning to baseline values on the last day, no statistical differences were found before and after the exercise protocol in any of the other examined parameters, including the indices of neuromuscular activity during sleep.

Discussion: Our results show that a 3-hour bout of mild intensity exercise did not significantly affect neuromuscular activity during sleep in healthy adults. This is promising since this is the first report to contradict the notion that exercise training could worsen symptoms of restlessness during sleep. However, future research should evaluate whether our findings are applicable in specific clinical populations such as those with RLS or PLMS.