Effects of isometric handgrip exercise on executive function in young and older adults: a FNIRS study.

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Résumé

Introduction

Evidence suggesting that acute exercise enhances executive functions predominantly arises from studies focused on aerobic exercise. It remains unclear whether strength physical exercises, such as intermittent isometric handgrip exercises, affect executive functions in young and older adults. We examined the dose-effect response of several physical loads and their potential effect on perceptual cortex hemodynamics effects.

Methods

Using a crossover design, 46 participants completed intermittent isometric handgrip exercise using three modalities concerning repetition or duration 1): 4 repetitions of 2 min of 30% of maximal voluntary contraction (MVC) with 3 min of recovery 2) with 1 minute of recovery and 3) 8 repetitions of 2 min of 30% of MVC with 3 min of recovery and 4) a control condition in a randomized order. Before and after each condition, they performed a Stroop task assessing inhibition and flexibility processes. Perceptual, cognitive difficulty and prefrontal cortex oxygenation were measured during both tasks.

Results

For the Stroop task, we found a greater good response only for the condition 4 repetitions with 3 minutes of recovery of flexibility task. We found no effect of exercise on inhibition task. This was accompanied by a lower perceived difficulty of the task and lower physical perceived physical effort only on this condition. Although hemodynamic changes have been observed, they do not seem to explain the cognitive changes.

Conclusions

Acute isometric handgrip exercise with adequate load improves flexibility, but the inhibition remains unaffected. This effect of the load is accompanied by an improved perceived difficulty of physical and cognitive effort.

Key words: Acute exercise, handgrip, strength exercise, Stroop, fNIRS,

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