Unilateral Handgrip Holds to Failure Result in Sex-Dependent Contralateral Facilitation

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ABSTRACT

There can be differences in fatigue characteristics between men and women. In some cases, these differences may be manifested in unique strength responses in the fatigued and non-fatigued limbs following a unilateral fatiguing task. **PURPOSE:** This study examined changes in maximal voluntary isometric contraction (MVIC) force following dominant (Dm) and nondominant (NDm) unilateral, isometric handgrip holds to failure (HTF) for the exercised ipsilateral (IPS) and non-exercised contralateral (CT) limbs. Sex- and hand- (Dm vs NDm) dependent responses in HTF time, performance fatiguability (PF, %Δ in MVIC) for the exercised IPS limb, as well as changes in MVIC force for the CT limb following the HTF were examined. **METHODS:** Ten men and 10 women (Age = 22.2 yrs) performed an isometric, HTF at 50% MVIC for the Dm and NDm hand on separate days. Prior to, and immediately after the HTF, a MVIC was performed on the IPS and CT limbs, in a randomized order. A 2 (hand [Dm, NDm]) x 2 (limb [IPS, CON]) x 2 (time [pre-HTF, post-HTF]) x 2 (sex [men, women]) mixed-model ANOVA was used to examine the MVIC force (kg) and a 2 (hand [Dm, NDm]) x 2 (sex [men, women]) mixed-model ANOVA was used to examine time for the HTF. **RESULTS:** The Dm (130.3 ± 36.8s) HTF (collapsed across sex) was significantly longer ($p = 0.002$) than the NDm (112.1 ± 34.3s). The men (collapsed across hand) demonstrated IPS (%Δ= 22.9 ± 10.8%) PF and CT facilitation (%Δ= -6.1 ±6.9%) following the HTF, while the women demonstrated differences in PF between the Dm and NDm hands for the IPS (%Δ Dm = 28.0 ± 9.4%; NDm = 32.3% ± 10.1%; $p = 0.027$), but not the CT limb (%Δ Dm= -1.6 ± 5.7%; NDm = 1.7 ± 5.9%). **CONCLUSIONS:** Despite the greater fatigue resistance for the Dm compared to the NDm hand, there were no differences in PF for the IPS side for the men, but lesser IPS PF for Dm compared to NDm hand for the women. The cross-over facilitation of the CT limb for men, but not women, following a unilateral, isometric handgrip HTF may be related to post-activation potentiation.