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Previous high-intensity activity affects lower limb strength ratios

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Abstract

Lower limb strength ratios are important in assessing muscular imbalances. Typically, these ratios are derived from assessment of explosive, maximum effort activities. Such assessment can be functional or isokinetic. The single-effort nature of these assessments does not provide information on imbalance changes after muscular contractions. Any such change could indicate an increased risk of injury after a period of activity, thus raising questions as to the correct procedure of muscle imbalance assessment. Therefore, the aim of the current study was to assess muscle imbalances over maximum effort repeated cycling sprints. Seventeen healthy, physically active young adults (females: n=4, height 1.62±0.03 m, body mass 68.0±6.5 kg; males: n=13, height 1.80±0.06 m, body mass 80.5±13.8 kg) performed five 6-s sprints with 24-s rest interval on a Lode Excalibur bike with torque and power data recorded for each leg. Average, average maximum (average of maximum from each sprint) and peak torque (TAv, TAvM and TP respectively) and power (PAv, PAvM and PP respectively) were

obtained for each leg. Ratios of these variables were calculated as
$$\left[\frac{\text{Stronger leg} - \text{Weaker leg}}{\text{Average of two legs}} \times 100 \right]$$

Wilcoxon's test revealed a significantly stronger leg ($p<0.05$) for all torque and power variables. Friedman's test indicated a significant ratio increase between TAv (11.7±6.8%) and TAvM (4.6±3.0%, $p=0.001$) and TP (4.1±3.5%, $p=0.001$), as well as between PAv (8.8±5.0%) and PAvM (4.5±2.9%, $p=0.003$) and PP (4.2±2.6, $p=0.003$) but not between TAvM and TP ($p=0.421$) or PAvM and PP ($p=0.981$). The results indicate that high-intensity activity increases lower limb strength imbalance, resulting in different ratios. The authors posit that muscle imbalance assessment activities conducted at rested state may not accurately reflect the true strength difference between limbs, leading to inaccurate training or rehabilitation advice.