TACSM Abstract

Power Production Asymmetry during Submaximal Cycling: Preliminary Results

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ABSTRACT

Significant differences between the lower limbs (i.e., asymmetry, ≥ 10% difference between contralateral limbs) in power production during cycling has been suggested to contribute to the early development of fatigue and to limit performance. Exercise intensity represents one factor that may contribute to the development of asymmetry in power production during cycling, with previous investigations reporting conflicting results with a variety of methods utilized during assessments. **PURPOSE**: To determine the day-to-day reliability in power production asymmetry assessment and to examine the effect of exercise intensity on power production asymmetry during submaximal cycling. **METHODS**: Participants completed an incremental cycling test (ICT), via a cycle ergometer, to determine maximal oxygen consumption (VO_2max) and the power which elicited VO_2max (pVO_2max). VO_2max and pVO_2max were confirmed using a verification protocol immediately following the completion of the ICT. After 25-minutes of rest, participants then completed a submaximal cycling protocol, which consisted of a 5-minute warm-up at 50 watts (W) followed by 4 X 3-minute intervals separated by 5-minutes of recovery at 50 W. Participants cycled at 60%, 70%, 80%, or 90% of pVO_2max during the intervals. Participants were blinded to the intensity and order was randomly determined. Participants self-reported their dominant (DL) and non-dominant (NDL). An asymmetry index (AI) in power production between the lower limbs was determined via the equation ((W of DL – W of NDL)/((W of DL + W of NDL)/2) *100). AI values range from -100 to 100, with positive values indicating greater contribution from the DL, negative values indicating greater contribution from the ND, and zero indicating equal contribution from both limbs. Participants repeated all assessments on a subsequent visit, separated by at least 48 hours. Intraclass correlation coefficients (ICCs) were utilized to assess reliability in power production AI, and a one-way repeated measures analysis of variance (ANOVA) was utilized to detect differences in power production AI at different exercise intensities. **RESULTS**: 7 trained cyclists (6 males and 1 female, 36.6 ± 18.6 yrs, 174.2 ± 7.22 cms, 74.4 ± 16.7 kgs) have completed the investigation. VO_2max (343.8 ± 98.2 W) and pVO_2max (51.1 ± 9.5 ml/kg/min) were averaged across the two visits. ICCs revealed good reliability in power production AI at 70% (r=0.77, p=.046), 80% (r=0.85, p=.019), and 90% (r=0.88, p=.014) of pVO_2max, with excellent reliability at 60% (r=0.97, p=0.00). Power production AI was -2.9 ± 13.9%, -3.3 ± 13.7%, 0.1 ± 12.4%, and -1.7 ± 8.7% at 60%, 70%, 80%, and 90% of pVO_2max, respectively. No significant main effect for exercise intensity was detected with a small effect size observed (f=.079, p=.513, η^2=.177). **CONCLUSION**: Good-to-excellent reliability in power production AI was observed depending upon the exercise intensity. Average power production AIs were below the 10% threshold used to indicate the presence of asymmetry, and no significant differences were observed for power production AI between the different exercise intensities.