EFFECT OF FATIGUE ON THE COORDINATION VARIABILITY IN ROWERS

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INTRODUCTION: According to the Dynamical Systems Theory (DST), movement variability is an essential feature of human motor behaviour. This theory of motor control has led to a paradigm shift in sport biomechanics research. Whereas previously, variability in sports biomechanics data was viewed as erroneous and in need of elimination, more recently the existence, amount and effect of variability on different aspects of sports biomechanics has been considered (Hamill *et al.*, 1999). Numerous studies have also considered the effect of fatigue on coordination. Aune *et al.* (2008) found that fatigue induced a reduction in variability in segment positioning for highly skilled table-tennis players. Also a high level of performance was maintained by reducing racket velocity and thus altering the racket position at the point of racket-ball contact. In rowing, the athlete is seated throughout the event the back is continuously in a flexed position, this leads to high levels of lower back pain (LBP) among rowers (Perich *et al.*, 2006). The current study will investigate coordination variability using an ergometer based rowing protocol designed to induce fatigue. The current research question is how does coordination variability react to fatigue and how does this relate to LBP.

METHODS: Three national level rowers (2 males, 1 female) involved in the winter training stage of their season participated in the study. The rowers were asked to row at a steady, challenging pace on a RowPerfect ergometer (CARE RowPerfect, Netherlands). Retro-reflective markers were placed bilaterally on the wrist, elbow, shoulder, knee, greater trochanter, mid-axilla line at the level of the iliac crest and used to identify the elbow and hip angles for each subject. An infra-red motion analysis system (Motion Analysis Corporation, Santa Rosa, CA) recorded the movements of each subject at 60Hz. Upon reaching a rating of 17 on the RPE scale the rower was instructed to stop (rowers 1, 2, 3 – 10, 10, 12 mins). All data (circa. 38000 frames per rower) were subsequently processed and analysed using customised software written on LabVIEW (National Instruments, Texas, USA); this software identified each stroke based on a kinematic event, normalised the data to 101 points, and calculated the continuous relative phase (CRP) relationship between the elbow and hip angle.

RESULTS: Initial CRP based results indicate that the variability of the rower's kinematics were relatively unaffected by the fatiguing protocol used here [rower 1 – mean baseline vs. mean fatigued – 3.35rads. vs 3.21rads.; rower 2 – mean baseline vs. mean fatigued – 3.4rads. vs 3.53rads.; rower 3 – mean baseline vs. mean fatigued – 3.73rads. vs 3.52rads.].

CONCLUSIONS: From the results it is clear that fatigue does not affect coordination variability amongst these rowers; this may be due to the ability of these rowers to perform skilfully under fatigued conditions during competition. The next stage of the research is to examine the link between these results and LBP.

REFERENCES

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