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Influence of cadence, power output and hypoxia on the joint moment distribution during cycling.

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The purpose of this study was to use a hypoxic stress as a mean to disrupt the normal coordinative pattern during cycling. Seven male cyclists pedalled at three cadence (60, 80, 100 rpm) and three power output (150, 250, 350 W) conditions in normoxia and hypoxia (15% O₂). Simultaneous measurements of pedal force, joint kinematics, % oxyhaemoglobin saturation, and minute ventilation were made for each riding condition. A conventional inverse dynamics approach was used to compute the joint moments of force at the hip, knee, and ankle. The relative contribution of the joint moments of force with respect to the total moment was computed for each subject and trial condition. Overall, the ankle contributed on average 21%, the knee 29% and the hip 50% of the total moment. This was not affected by the relative inspired oxygen concentration. Results showed that the relative ankle moment of force remained at 21% regardless of manipulation. The relative hip moment was reduced on average by 4% with increased cadence and increased on average by 4% with increased power output whereas the knee moment responded in the opposite direction. These results suggest that the coordinative pattern in cycling is a dominant characteristic of cycling biomechanics and remains robust even in the face of arterial hypoxemia.