12 BIOMECHANICS OF LUMBAR SPINE INJURY IN YOUNG AUSTRALIAN FAST BOWLERS

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10.1136/bjism.2010.078725.12

Cricket fast bowlers have a high incidence of serious lumbar injuries, such as lesions in the pars interarticularis. As lumbar loading is the causal mechanism of such injuries, the purpose of this study was to find relationships between lumbar spine kinetics, selected kinematic variables and the subsequent development of lumbar spine injury. At the beginning of the cricket season, the bowling techniques of 13 young fast bowlers (17.4 ± 1.9 years) from the Cricket New South Wales development squad were assessed using a three-dimensional motion analysis system (200 Hz). Using Kintrak software, kinematics and lumbar spine kinetics (forces and moments) were calculated about the L5/S1 joint during the arm acceleration phase. Towards the end of that season, each bowler underwent an MRI scan that took sagittal and axial sequences (T1 and T2) from T12 to S1. The largest kinetic values were lumbar compression forces and lumbar flexion moments. Maximum lumbar spine moments were associated with several kinematic variables such as front knee angle, pelvic and thoracic rotation at ball release and shoulder counter-rotation. There was an increased incidence of S1, L4 and L5 stress fractures and responses when shoulder counter-rotation exceeded 44° , lumbar compression force exceeded 8 time body weight (BW) and compression multiplied by flexion torque exceeded $20 \text{ BW}^2 \text{ m}$. This study suggests that lumbar spine forces and moments are dependent on a number of fundamental kinematic descriptors of bowling technique. By modifying the technique, bowlers may be able to reduce lumbar loads to reduce the risk of lumbar injury.