THE EFFECTS OF EXTENDED PITCHING ON MOTION OF THE UPPER AND LOWER EXTREMITIES

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The success of a pitcher over the course of a game is based on his ability to maintain his pitching motion as the innings progress. There were no reports to analyze the pitching motion of the upper and lower extremities during baseball playing. Therefore, the purpose of this study was to clarify the kinematic changes as a result of extended play in baseball pitching.

Six male baseball pitchers with no injury on the throwing arm voluntarily participated in this study. Mean age, baseball experience, height and weight were 22.2±3.5 (SD) yr, 12.3±1.0 yr, 175.9±7.6 cm and 66.3±10.1kg, respectively. Each subject pitched 140 times consisting of 7 sets of 20 pitches each. The velocity of each throw at the distances of 18.44m (Pitched ball velocity: PBV) was measured by Radar-gun (Mizuno). The relative velocity (VR) in each set was compared to the first set and the coefficient of variation (CV) in each set was calculated. The pitching motion was filmed by two high-speed video cameras, frame rate of 250 frames/s and exposure time of 1/2000s (Digimo). The analyzed phase was from stride foot contact to ball release in the pitching motion. Six landmarks (Ball, Wrist, Elbow, Shoulder, Pelvis and Knee) were manually digitized from video data. Analysis was made of the movement velocity on each partial joint. The reappearance of each movement from 1st set to 7th set was analyzed individual difference in all the subjects.

The following results were obtained: The PBV decreased from the first set to the final set. The VR of the final set had significantly lower values than the second, third and fourth sets (p<0.05). Acceleration in each joints decreased from the first to the final set. Acceleration on elbow joint in final set was significantly lower than the first set (p<0.05). It means the decreases in acceleration of joint in the upper extremity may possibly influence reduce of ball velocity. The differences of time to maximal velocities in all the joints of upper extremity were shorter from the first set to the final set for the subjects who recorded decreased pitched ball velocity. From these results, it was indicated that the difference of time to maximal velocities in all the joints of upper extremity may influence a decrease of ball velocity. The subjects who could reappear of motion of the hip joint during pitching from 1st set to 7th set were closely of motion upper extremity and not reduce the pitched ball velocity. The pitching performances require to faster ball throwing and better ball control. From these considerations, the order of joints movement from lower to upper extremities may be important factors on extended baseball pitching.

References: