Validity of Barbell Velocities Recorded from the GymAware Device during Squat and Bench Press Exercises

PURPOSE: To assess the validity of the GymAware linear position transducer (LTP) during the squat and bench press exercises. METHODS: Thirteen resistance-trained men (age: 21.7±0.4 years; height 1.74±0.07 m; mass: 82.9±9.5 kg; squat 1RM: 149.85±20.68 kg; bench 1RM: 114.77±18.47 kg,) performed three trials of squat and bench press using the following percentages of a one repetition maximum (1RM): 20, 30, 40, 50, 60, 70, 80%. The order of the loads was counterbalanced across the participants. The mean vertical velocity of the barbell during the concentric phase of each repetition was recorded using a 3-D motion analysis system (Vicon; 200 Hz) and the GymAware LTP. Analysis of variance was used to assess the differences in the vertical velocities across the seven load conditions for each of the two exercises. RESULTS: Mean velocities were significantly different between devices for both the squat and bench press exercises (p<0.05). Specifically the GymAware LTP provided significantly greater velocities under the 20% 1RM and 40% 1RM load conditions in the squat exercise (mean differences: 0.05±0.03 m/s; 0.02±0.02 m/s; p<0.05) in addition to the 30%1RM load for the bench press exercise (mean difference: 0.04±0.02 m/s; p<0.05). CONCLUSION: The GymAware LTP had a tendency to overestimate barbell velocities during the squat and bench press exercises when compared to the Vicon 3-D motion analysis system, particularly at the lighter loads. Such differences may bring into question the validity of the force-velocity characteristics derived from the LTP device during these resistance exercises.