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## Validity and Reliability of Electronic Devices to Measure Muscular Power during Linear Weight Lifting Movements

Eben Sneddon, Kyle Bjorkman, Jennifer Fairbanks, Bryce Watkins, Malachi Thompson, Kevin Ogden, H. Scott Kieffer, FACSM. Messiah College, Mechanicsburg, PA

**PURPOSE:** The purpose of this study was to determine the validity and reliability of three electronic measuring devices used to assess mean power during inter-set compound linear barbell movements. **METHODS:** 9 athletes experienced in resistance training (8 males, 1 female) participated in this study. Subjects attended a familiarization session, gave written informed consent, received lifting form analysis and established their 1 repetition max (RM) from a 5RM protocol. Each subject attended a single testing session in which they performed a 5-minute aerobic warmup followed by the parallel back squat and bench press. The subjects executed 3 sets of 2 reps to produce power at 70% of their 1RM with 3 minutes rest between sets for each lift. A mobile app (APP), tri-axial accelerometer (ACC) and Tendo power analyzer (TEN) were used to record mean power during each lift. An iPad loaded with the APP was set on a tri-pod 15 feet from the platform, the ACC was placed inside a foam sleeve and slid onto the barbell, and the TEN was placed on to the left side of the barbells sleeve. The velocity and bar displacement were downloaded from the APP and the ACC and mean power was calculated from the raw data. The mean power from the TEN was recorded from the microcomputer. An interclass correlation coefficient (ICC) was used to assess reliability of intra rep lifts and a one-way ANOVA with repeated measures was used to determine validity of inter set differences ( $p < 0.05$ ) with the TEN as the criterion value. **RESULTS:** The APP, ACC and TEN demonstrated a high reliability with ICC r-values for the parallel back squat of 0.93, 0.83 and 0.98, respectively and values for the bench press were 0.95, 0.40 and 0.96, respectively. The APP and ACC exhibited high validity by showing no differences for mean power (W) between sets for parallel back squat (APP,  $703.72 \pm 155.4$ ; ACC,  $743.74 \pm 274.3$ ; TEN,  $728.78 \pm 754.1$ ) or bench press (APP,  $367 \pm 75.4$ ; ACC,  $324.07 \pm 148.5$ ; TEN,  $283.76 \pm 69.3$ ). **CONCLUSION:** Each electronic method demonstrated high reliability between lifts and produced valid measures when compared to a criterion method for measuring mean power. The results indicate that inexpensive, mobile and readily available devices can provide reputable feedback for assessing mean power during linear lifting movements.