RELATIONSHIPS BETWEEN SPRINT RUNNING AND TWO DIFFERENT JUMP TESTS

Cunha Luis, Armada-da-Silva Paulo, Ferreira Carlos
(Faculty of Human Kinetics, Portugal)

Many have been the attempts to predict sprint performance and some authors (1, 2, 3) have tried to find the relationships between the whole sprint performance or performance of specific sprint phases with different tests mostly meant to evaluate strength and power abilities (measuring muscle strength in stretch shortening cycle – SSC contraction mode), as an indirect measure and are also used by coaches during performance monitoring, and sprint capability.

The aim of this study was to examine the relationships between the acceleration (ACC) and Maximal speed (MAX) phases of sprint running and the results obtained with the test of 5 step jumps, (short SSC) and the squat jump (SJ) (pure concentric contraction) using not only the jump displacements but also power and forces generated during these tests.

Fourteen male sprinters, (age 22.6 ± 2.12 years; height 1.74 ± 0.05m; weight 71.2 ± 4.75kg, 100 m personal record 10.71 ± 0.17), were assessed for sprint running, and horizontal SSC actions (5 horizontal jumps) and the squat jump (SJ) (pure concentric contraction).

The subjects performed 5 maximal effort sprints over distances of 15m (from starting blocks) and 60 m (with spike shoes), and the 5 horizontal jumps (with normal shoes) on an outdoor synthetic track. The trials (sprint and jumps) were separated by a rest period to ensure full recovery for maximal efforts. Times of each five meters interval (5m, 10m, 15m for acceleration phase and 45m, 50m and 55m for maximal velocity phase) were recorded using photo-cells (Brower Timing Systems) whilst contact times were obtained from high-speed (250 Hz) video camera (Motion-Scope Redlake Imaging PC 1000).

The subjects were instructed to jumps forward as far as possible. The horizontal jumps were recorded using electronic contact mat system and the vertical jumps were recorded using a force platform. The fastest trial for each sprint trial and longest trial for the jump test were selected for data analysis.

Results

We obtain results from the follow variables (Mean±SD):
Time values of the acceleration phase in the first 5 meters (ACC 0-5: 1.23 ± 0.07 sec); in the first 10 meters (ACC 0-10: 0.72±0.03sec); in the first 15 meters (ACC 0-15: 0.64±0.03 sec); in the maximal phase (MAX: 0.517±0.017 sec); the average of the first 5 contact times (ACC CT); in the contact time of maximal phase (MAX CT: 0.099±0.006 sec).The distance of the 5 jumps test (5 jumps: 13.23±0.93m) and squat jumps (SJh: 0.40±0.04 m); the power of the 5 jumps test (5Sp: 1362±469 N/bw) and squat jump absolute and relative to the body weigh (SJp: 4440±471W; 6.30±0.91 W/bw); and the Ground Reaction Force of the squat absolute and relative to the body weigh (SJgrf: 1973±148 N; 2.79±0.24 N/bw).

Discussion and Conclusion

A significant relationship between the horizontal jump test performance and sprint maximal phase was expected due to similar direction of force application characteristics. But it has find only between MAX and the 5 jumps (-.578, p<0.05) and SJgrf (-.573, p<0.05), and between ACC and SJh.

The coaches may find it beneficial to use training programs that incorporates horizontal jumps exercises as part of the overall training and evaluation plan.

References
(2) Berthoin et al., Journal of Strength and Conditioning Research, 15(1), 75-80, 2001
(3) Bret et al., Journal of Sport Medicine and Physical Fitness, 42(3), 274-281, 2002

Keywords: Stretch-Shortening Cycle, Training and Testing, Sprint