

MUSCLE MECHANICAL DETERMINANTS OF SPRINT PERFORMANCE ACROSS THE PROFESSIONAL LIFE-SPAN IN SOCCER PLAYERS

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Introduction

The functional relevance of strength and power measures as an index of functional performance (i.e., sprinting speed) in soccer remains unclear. The aim of this study was to investigate the relationships among mechanical variables related to strength and power and their influences on sprinting speed in professional soccer players across their life-span.

Methods

Isokinetic measures (quadriceps (Q) peak torques and power at 60°/s and 300°/s), kinetic outputs of the counter-movement jump (CMJ), and sprinting speed (the first 5 m split time (i.e., initial speed) and the 15 to 20 m split time (i.e., leading sprint) of a 20 m sprint), were measured in 224 professional soccer players (age 23.7±4.4 y, body mass 71.4±8.8 kg and height 1.75±0.06 m).

Results & Discussion

The values for each variable for the fast and slow groups are displayed in Table 1. All the mechanical variables were significantly different between the fast and slow players regardless of the results were ranked according to 5 m or 15-20 m times. The results of the multiple regression analyses identified CMJ height as the best predictor of sprinting performance for the 5 m (R=0.39, P=0.000) and 15-20 m (R=0.51, P=0.000) sprint.

Table 1: Differences between the fastest and slowest players based on 5m and 15-20m rankings

| Variable/Ranking based on | Fast | | Slow | | P value | |
|--------------------------------|------------|------------|------------|------------|---------|--------|
| | 5m | 15-20m | 5m | 15-20m | 5m | 15-20m |
| 5m s | 1.04±0.04 | 1.07±0.07 | 1.15±0.00 | 1.12±0.06 | 0.000 | 0.000 |
| 15-20m s | 0.61±0.03 | 0.59±0.02 | 0.63±0.03 | 0.64±0.02 | 0.000 | 0.000 |
| CMJ height m | 0.39±0.05 | 0.40±0.05 | 0.35±0.04 | 0.34±0.04 | 0.000 | 0.000 |
| CMJ max pushing net force N/kg | 1.66±0.52 | 1.67±0.53 | 1.49±0.37 | 1.49±0.35 | 0.004 | 0.004 |
| CMJ max net power W/kg | 32.27±6.12 | 32.76±5.91 | 28.76±5.43 | 28.25±5.24 | 0.000 | 0.000 |
| Q 60°/s max torque Nm/kg | 3.25±0.40 | 3.29±0.39 | 3.08±0.36 | 3.03±0.34 | 0.001 | 0.000 |
| Q 300°/s max torque Nm/kg | 1.83±0.23 | 1.87±0.22 | 1.74±0.22 | 1.70±0.21 | 0.003 | 0.000 |
| Q 60°/s power W/kg | 2.10±0.28 | 2.14±0.26 | 2.00±0.26 | 1.97±0.26 | 0.011 | 0.000 |
| Q 300°/s power W/kg | 4.57±0.74 | 4.66±0.70 | 4.26±0.75 | 4.16±0.75 | 0.002 | 0.000 |

Conclusion

All the mechanical variables could discriminate between the fast and slow players. However, a great degree of unexplained variance still remains indicating there may be better mechanical predictors of sprinting speed in soccer players.

References

1. Cronin JB & Hansen KT (2005), *J of S&C Research*, 19(2): 349–357.