

## ELITE FOOTBALL GOALKEEPER'S LOWER LIMBS EXPLOSIVE STRENGTH

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### Introduction

Explosive strength of lower limbs is very important for footballers and for goalkeepers mainly. Vertical jump is one of the most common test for explosive strength evaluation. Implementation of a vertical jump is usually evaluated in three types of execution [1]. The first type is with knees bent with the help of the upper limbs – countermovement jump – free arms (CMJ-F), the next is with knees bent without the support of the upper limbs – countermovement jump (CMJ) and the squat jump without the help of the upper limbs – squat jump (SQJ) [2]. The goal of the study was state explosive strength and its indicators regard with the type of execution.

### Methods

The research group consisted of 19 top level players (age =  $28,3 \pm 9,1$  years, height =  $184 \pm 7,3$  cm, wight =  $85,7 \pm 13,2$  kg). The lower limbs strength was scanned by force platforms (KISTLER Instrumente AG, Switzerland). Monitored participants performed three types of a vertical jump, T1 – CMJ-F, T2 – CMJ, T3 - SQJ. Evaluation parameters: height of the jump  $h$  (cm), breaking impulse  $I1$  ( $Ns^{-1}$ ), acceleration impulse  $I2$  ( $Ns^{-1}$ ), time of the braking phase  $t1$ (s), time of the take off  $t2$  (s).

### Results & Discussion

The results of explosive strength were: T1 –  $h_{T1} = 0.45 \pm 0.061$  m;  $I1_{T1} = 105,5 \pm 34,3$   $Ns^{-1}$ ;  $I2_{T1} = 263.8 \pm 41,1$   $Ns^{-1}$ ;  $t_{1varT1} = 0,079$  s;  $t_{2varT1} = 0,0815$  s. T2 –  $h_{T2} = 0.39 \pm 0.06$  m;  $I1_{T2} = 130,3 \pm 20.1$   $Ns^{-1}$ ;  $I2_{T2} = 246.8 \pm 44,9$   $Ns^{-1}$ ;  $t_{1varT2} = 0,055$  s;  $t_{2varT1} = 0,08$  s. T3 –  $h_{T3} = 0.35 \pm 0.051$  m;  $I2_{T1} = 238.2 \pm 39,3$   $Ns^{-1}$ ;  $t_{2varT1} = 0,106$  s. Maximal height was achieved in the first type of the jump when  $h_1 = 0.45 \pm 0.03$  m. This result was better by 13.3% (0.06 m) compared to the jump from standing position without the arm support (T2) and by 20% (0.09 m;) higher than the squat jump without the arm support (T3).

### Conclusion

Observing group of elite goalkeepers revealed high homogeneity. Best performances were achieved, in accordance with expectation, in the first type of the jump (T1). The results of vertical jump implementation without the upper limbs support (T2) and from squat without the help of the upper limbs (T3) are more comparable; although we could expect that jump implementation with squat could help to higher absolute value of the vertical jump. All tests of jumps brought well informations about explosive strength.

### References

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