

ing equation to estimate the ground reaction force was extrapolated:  $\text{Load} = -132.9134 + 0.3724671 \cdot \text{Angle} - 1.299028 \cdot \text{Body weight} + 0.9844512 \cdot \text{Height} + 3.675008 \cdot \text{BMI} - 2.073684 \cdot \text{Elbow}$ .

In the second model (ICC of 0.37), the body inclination angle was replaced by the ST device's length. By analyzing this model, the following equation to estimate the ground reaction force knowing the length of the straps was extrapolated:  $\text{Load} = -69.80267 - 0.2199257 \cdot \text{Length} - 1.281452 \cdot \text{Body weight} + 0.8883487 \cdot \text{Height} + 3.624841 \cdot \text{BMI} + 5.188559 \cdot \text{Elbow}$ .

CONCLUSION: The proposed models could provide different methods to quantify the training load distribution, even if the use of the straps' length could result easier and faster than body inclination angle, helping practitioners and instructors to personalize the workout to reach specific purposes and provide load progression.

References

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Key-words: body weight; instability; back-row; resistance training; functional training; biomechanics

## CORRELATION BETWEEN POWER CAPABILITIES AND TROWING PERFORMANCE IN FEMALE ATHLETES

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INTRODUCTION: In throwing events the power production capabilities can have a large impact on athlete's performance. This study aims to establish the relationship between parameters assessed in a jump protocol and performance in female athletes.

METHODS: 27 young regional and national level female throwers (age  $18.9 \pm 2.7$  years, height  $1.70 \pm 0.09$  m, body mass  $78.7 \pm 16.4$  kg) were selected to take part to regional level training camps with a four-monthly cadence. During those camps, athletes jumping performance was assessed in the following tests: squat jump (SJ), countermovement jump with fixed arms (CMJ), countermovement jump with arms swing (CMJa) and multiple jumps with arms swing for 8 seconds (MJT). Jump height was computed from flight times measured by an optoelectric system (Optojump, Microgate, Bolzano, Italy) (Glatthorn et al., 2011). Additionally, relative power (Prel) and absolute power (Ptot) produced in MJT were computed (Landolsi et al.). Season's best performance for each participant was collected and standardized for discipline's world record (SBS). Correlations between performance parameters and SBS were tested using Pearson's product moment correlation coefficient.

RESULTS: SBS showed neither correlation with height reached in all jump test nor Prel in MJT. Otherwise, a significant correlation was established between SBS and Ptot ( $0.673$ ;  $p < 0.001$ ) and SBS and Bodymass ( $0.717$ ;  $p < 0.001$ ).

CONCLUSION: The results are in accordance with recent literature showing significant linear correlation between SBS performance and ability to generate power. Bourdin et al. (2010) did not found correlation between relative power measurements and SBS in male national level throwers, while half squat Ptot, bench press Ptot and body mass were significantly correlated. In that study, body mass showed a lower correlation with SBS ( $r = 0.540$ ;  $p < 0.001$ ) than our results, possibly suggesting a larger impact of body mass on performance for female subjects. In another study, while testing national level male shot putters, MJT absolute power showed significant correlation ( $r = 0.810$ ;  $p < 0.01$ ) with SBS whereas MJT relative power was not correlated (Landolsi et al., 2015). The present study widens current literature on the importance of power production towards throwing performance in female athletes. Thus, showing how body mass seems to play a key role for female athletes, training practice should be adapted accordingly.

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## CHANGES IN EMG ACTIVITY OF GLUTEUS MAXIMUS AND STRENGTH AFTER SQUAT MASTERING PROGRAM – CASE STUDY

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INTRODUCTION: There is a disagreement of previous studies about EMG activity of gluteus maximus muscle during squat exercise (1,2,3,4,6). It indicates potential impact of squat variations (3,4), movement experience (5) and bar placement (6) on the differences in EMG activity of muscles of lower extremities. In this study we track how the squat mastering program will change EMG activity of gluteus maximus and maximal isometric force.

METHODS: Two male subjects without previous experience with squat exercise were randomly divided into experimental (EXP) and control (CON) group (EXP: age, 20.8 years; height, 185 cm; weight, 81 kg; CON: age, 19.9 years; height, 182 cm; weight, 82 kg). EXP subject performed 3-weeks deep squat mastering program which consisted of eleven training sessions aimed on mastering the squat without any attention for strength development. Pre and post program tests were: maximal isometric force (ISOmax50°,90°) and rate of force development (RFD0-200ms,50°,90°), measured by dynamometric platform (Fitro Force Plate, SVK) in two different angles (50° and 90° of knee flexion). EMG activity (maximal value - EMGmax50°,90° and integrated EMG activity of full contraction - EMGint50°,90°) of gluteus maximus muscle of dominant leg was measured during the test by EMG Delsys Tringo Wireless System (UK). This paper was created with support of VEGA MŠVVaŠ SR and SAV č. 1/0333/18.

RESULTS: There were found changes of EMG activity and strength in EXP subject (followed squat mastering program) and CON subject (without squat mastering program intervention). ISOmax50° in EXP increased by 7.8 % (+129 N), ISOmax50° in CON increased by 3.1 % (+75 N), RFD0-200ms,50° in EXP increased by 31.4 % (+1,1 N.ms-1), RFD0-200ms,50° in CON decreased by 5.9 % (-0,2 N.ms-1), EMGmax50° in EXP increased by 151.8 % (+188 μV), EMGmax50° in CON decreased by 30.9 % (-26 μV), EMGint50° in EXP increased by 182.6 % (+126 μV.s-1), EMGint50° in CON decreased by 21.2 % (-11 μV.s-1), ISOmax90° in EXP increased by 9.5 % (+219 N), ISOmax90° in CON increased by 0.8 % (+21 N), RFD0-200ms,90° in EXP increased by 31.4 % (+1,1 N.ms-1), RFD0-200ms,90° in CON decreased by 6.3 % (-0.2 N.ms-1), EMGmax90° in EXP increased by 10.1 % (+28 μV), EMGmax90° in CON decreased by 32.9 % (-50 μV), EMGint90° in EXP increased by 35.3 % (+60 μV.s-1), EMGint90° in CON decreased by 31.2 % (-29 μV.s-1).