

The Association Between Ankle Dorsiflexion and Force-related Sport Performance Variables

SEAN M. CONBOY¹, TEIGE J. BARRET¹, & KEVIN H. CHOE^{1,2}

¹Department of Kinesiology; Whittier College; Whittier, CA

²Center for Sport Performance; Department of Kinesiology; California State University, Fullerton; Fullerton, CA

Category: Undergraduate

Advisor / Mentor: Choe, Kevin (kchoe@whittier.edu)

ABSTRACT

The back squat (BS) is commonly implemented in strength training programs to improve athletic performance. In order to perform the BS successfully, individuals must have adequate ankle dorsiflexion as it allows the knee to travel forward and lower the center of mass. However, it is currently unknown whether ankle dorsiflexion during the squat is associated with important sport performance variables, such as BS 1-rep max (1RM), peak ground reaction force (GRF) or rate of force development (RFD). **PURPOSE:** The purpose of this study was to determine the relationship between peak ankle dorsiflexion angle (DFA) and BS 1RM, peak GRF, and RFD during the BS exercise. We hypothesized there would be a positive correlation between DFA and BS 1RM, peak GRF, and RFD. **METHODS:** 28 healthy participants (17 male, 11 female, 23.7±4.0 yrs., 1.76±0.09 m, 78.10±10.91kg) who had trained the BS at least once per week for the last three months were recruited for data collection. 2 visits were required from each participant with the first visit involving one-repetition-maximum (1RM) testing. During the second visit, participants underwent 3-D biomechanical analyses for the BS at 85% 1RM. The 2nd of the three repetitions was used for analysis. A Pearson's correlation was run to determine the relationship between peak ankle DFA and BS 1RM, peak GRF, and RFD. **RESULTS:** No correlations were found between DFA and BS 1RM ($p=0.699$), peak GRF ($p=0.56$), or RFD ($p=0.982$). **CONCLUSION:** Our results contradict our hypothesis as peak DFA is not associated with how much an individual can squat, greater GRF production, or RFD. This suggests that although some amount of ankle dorsiflexion is required to successfully perform a squat, the peak DFA is not a determinant of squat strength or force-related variables. Future studies may aim to examine the influence of hip or knee kinematics on force-related variables rather than ankle kinematics.