

Exercise Science

Ground Reaction Force Analysis in Football

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The purpose of this study was to evaluate the ground reaction force (GRF) for three different hand-striking positions of linemen and to compare the components of the resultant forces. Twelve linemen (19.9 ± 1.24 yrs, 251.4 ± 36.66 lbs, 72.5 ± 1.97 in) participated in this study. All subjects completed a dynamic warmup followed by two warmup hits on the sled. Using maximal effort, each participant struck the sled in 3 different locations (high, medium, low) in randomized order. Ground reaction force data were collected via a tri-axial force plate (Bertec 6090D) sampling data at 1000 Hz. After data collection was completed, the participant's ground force reactions were analyzed. Using a t test comparing the vertical and horizontal components during blocking regardless of position showed a statistical difference between the two. The ground reaction force of the vertical component was an average 2245.499 ± 394.4 N with a 95% confidence interval between 1999.18 - 2491.82 N, compared to the ground reaction force of the horizontal component with an average of 394.3981 ± 205.73 N with a 95% confidence interval between 327.19 - 461.6 N. Using an ANOVA to compare all of the variables at the different blocking positions we found that there were no statistical differences between them. This study found that more GRF was produced vertically than horizontally and that the position of the block did not have statistically significant differences between the three of them. Practically speaking, vertical oriented strength training should be implemented within offensive linemen's strength programs in order to increase their vertical GRF components which in turn, will lead to a more forceful block. Future research should evaluate associations between player's weight room statistics such as their 1 repetition max in squat, bench, clean, and vertical jump with GRF variables during football blocking.