

Schaeffer B, Brown A, Cruz H, Freeman S, Martin B, Nickerson C. Hardin A STROKE OF GENIUS: THE INFLUENCE OF SHOULDER RANGE OF MOTION AND STRENGTH ON TENNIS FOREHAND VELOCITY IN COLLEGIATE ATHLETES. -Simmons University Department of Physical Therapy, Abilene, TX.

**PURPOSE:** (1) To assess and investigate the relationship between ball velocity during a tennis forehand swing and shoulder strength and range of motion. (2) The ratio of internal to external rotation will also be compared to ball velocity. (3) Identify if there is an internal to external rotation ratio imbalance present in the subjects tested. **SUBJECTS:** Collegiate level tennis players participants, n=39 (M=19, F=20; mean  $\pm$  SD; ht: 176cm  $\pm$  8.6; weight: 73.46kg  $\pm$  13.89; body mass: 23.77 $\pm$ 4.34) were evaluated by five physical therapy students at the participants' University tennis court in Abilene, TX. **METHODS:** Subjects were asked to complete an informed consent document and survey regarding past injuries that may affect performance prior to beginning testing. Baseline measurements included height, weight, and BMI. ROM using a goniometer and isometric strength using the J-Tech Onsite Commander was measured on the dominant arm in the motions of external rotation, internal rotation, and horizontal adduction. Subjects were led in a warmup consisting of jogging, self-stretching for 3 minutes, and 3 minutes of warm up hitting forehand strokes fed from the ball machine. Following the warmup with the ball machine, subjects were notified of the start of the test, at which they were fed a series of balls from the machine to the subjects' forehand side until three crosscourt hits had been recorded inbounds. A Stalker Pro Radar Gun was used to measure the velocity of the test trials. **RESULTS:** A bivariate correlation was used to determine the significance and strength of correlation between various glenohumeral range of motions and manual muscle testing to max velocity of the ball. It was found that the stronger the internal and external rotation, and horizontal adduction range of motion, the greater the max velocity. Additionally, the lower the degree of external range of motion, the greater the max velocity. A multiple regression analysis was used to determine an equation that will predict ball velocity. Strength and range of motion variables including: internal rotation, external rotation, and horizontal adduction were found to account for 73% of ball velocity. **CONCLUSIONS:** Our findings suggest that increasing the strength of muscles active in internal and external rotation and muscles of horizontal adduction can successfully increase the velocity of a ball hit by a forehand stroke in tennis. Furthermore, our research challenges the idea that greater external rotation range of motion increases velocity potential, but more research is needed to generalize these findings to a larger population. **CLINICAL RELEVANCE:** Athletes repetitively generating a greater swing velocity potentially cause hypertrophy of shoulder internal rotator muscles and can lead to strength and range of motion imbalances. This places the athlete at a greater risk for sustaining musculoskeletal injuries. Deficits in glenohumeral range of motion and rotator cuff strength imbalances have been shown to correlate with injury risk factors and may assist in guiding return to play after injury. Our findings along with further research evaluating this population may provide insight as to proper training and treatment of tennis players pre- and post-shoulder injury.