Significantly Increased Odds of Reporting Previous Shoulder Injury in Females Based on Larger Magnitude Shoulder Rotator Side-to-Side Strength Differences

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Context: Musculoskeletal injuries are a primary concern for the United States military. One possible risk factor for injury in this population is side-to-side strength imbalance. Increased odds (1.8-3.3) of reporting lower extremity and/or knee injuries in military Special Forces Operators with greater magnitude side-to-side knee strength differences have previously been demonstrated, but no study to date has investigated this relationship in the upper extremity and female military personnel. **Objective:** To examine the odds of reporting a previous shoulder injury (SI) in US Marines Ground Combat Element Integrated Task Force volunteers based on the magnitude of side-to-side strength differences (StoSD) in isokinetic shoulder strength. **Design:** Retrospective cohort study **Setting:** Research laboratory **Patients or Other Participants:** 207 Marines volunteered to participate at Camp LeJeune, North Carolina in 2014. Male (n=154, age: 22.6±2.6 years, height: 69.8±2.6 inches, weight: 178.9±22.2 pounds) and female (n=53, age: 22.6±2.9 years, height: 65.0±2.3 inches, weight: 144.3±15.3 pounds) Marines were tested. **Interventions:** Self-reported injury history and isokinetic strength testing on shoulder musculature was acquired. Injury history was obtained by a clinician. Peak torque from 5 shoulder internal/external rotation repetitions were averaged and normalized to body weight. StoSD were calculated as the absolute value of the difference between limbs and dividing it by average peak torque of the dominant limb. **Main Outcome Measures:** Subjects were placed into cohorts based on the magnitude of their shoulder rotator StoSD: <10%, 10-20%, and >20%. Odds ratios and 95% confidence intervals were calculated, and significance was assessed using a chi-square test with alpha set at <0.05 *a priori*. These methods were repeated when separating subjects into gender cohorts. **Results:** As a combined cohort, Marines with >20% difference in side-to-side internal rotation strength demonstrated increased odds or reporting a previous SI compared to those with <10% differences (OR=2.5, 95% CI: (1.0-5.9); p=0.036). When separating Marines by sex, females with >20% internal rotation StoSD demonstrated increased odds of reporting a previous SI compared to female Marines with <10% StoSD (OR=15.4, 95% CI: (1.4-167.2); p=0.025) and female Marines with 10-20% StoSD (OR=13.9, 95% CI: (1.3-151.2); p=0.036). No odds ratios for the male Marine cohort were statistically significant. **Conclusions:** Marines with larger magnitude internal rotation strength StoSD demonstrated increased odds of reporting a previous SI compared to those with lesser magnitude differences. Additionally, female sex appears to drastically affect the increased odds of reporting SI (13.9-15.4) with larger magnitude differences (i.e., >20%) compared to those with lesser magnitude differences (i.e., <10% and 10-20%). Female Marines may benefit from targeted rehabilitation strategies that would improve strength balance between upper extremities after sustaining a shoulder injury. Baseline testing may be warranted in this population to identify individuals with larger magnitude StoSD and implementing a prehabilitation program to limit injury risk. This work was supported by ONR Award #N00014-14-1-0021. **Word Count:** 450 words.