

Arm Isometric Force Production in NCAA Softball Players is Greater in the Dominant Arm Independent of Arm Angle

Nicole M. Henson, Morgan N. Gersch, Kyle L. Sunderland
 Exercise and Performance Nutrition Laboratory, Lindenwood University, St. Charles, MO 63301

Introduction

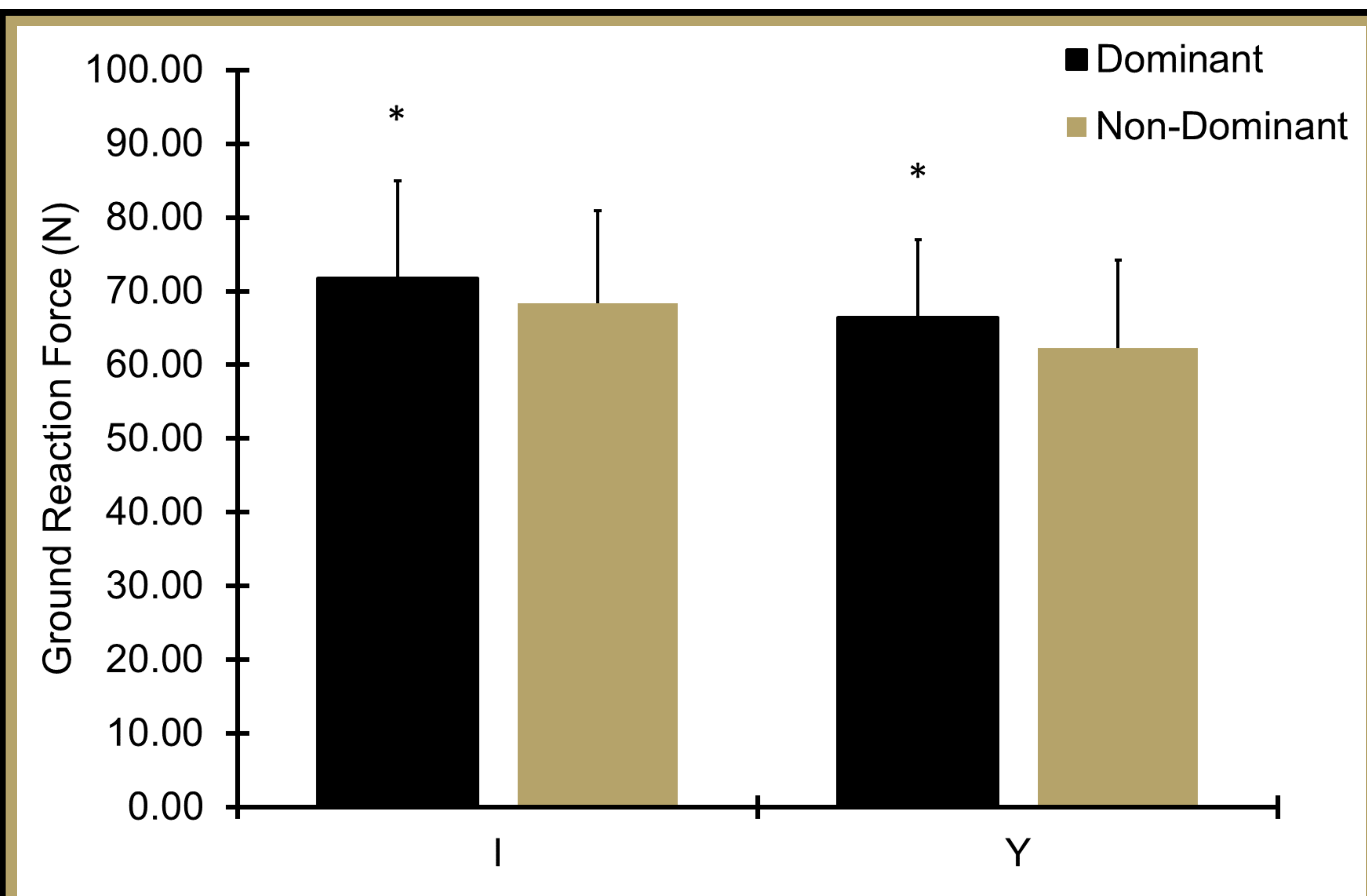
- Interlimb asymmetry is a comparison of one limb to the other and has been of great interest in athletic populations.
- Asymmetries of >15% have been related to an increased injury risk whereas an asymmetry of <10% is commonly used for athletes returning to sport following an injury.
- The Athletic Shoulder (ASH) test is a valid and reliable test used to determine isometric strength across the shoulder girdle.
- Baseball pitchers have been reported to have significant asymmetries in the “Y” position, but not in the “I” position.
- However, the ASH test has never been examined in college softball players.
- Therefore, it is important to understand typical forces and asymmetries produced during the ASH test in this population so that practitioners can properly interpret and provide interventions.

Purpose

- To examine shoulder isometric force production in college softball players at two arm angles to predict performance

Methods

- Seventeen collegiate women softball players volunteered for this study.
- Athletes performed three bilateral isometric shoulder contractions on dual force plates.
- All tests were performed with the athlete in the prone position
- The two testing positions were with shoulders abducted 180° (“I”) and 135° (“Y”). The first shoulder angle tested was randomly selected for each athlete.
- For the tests, athletes were given a three second countdown for each repetition, then instructed to maximally push for five seconds
- Sixty seconds rest was given between each repetition.
- This was then repeated for a total of three repetitions
- Athletes then switched positions the opposite one they started with.



* Signifies a significant difference between arms



Results

- Isometric shoulder force revealed no significant interaction ($p=0.584$) between the dominant and non-dominant shoulders in the “I” and “Y” positions.
- Significantly ($p=0.006$) greater force was produced in the dominant arm (69.1 ± 12.1 N) compared to the non-dominant arm (65.3 ± 12.4 N) independent of arm angle.
- There was no significant ($p=0.07$) difference in the force production between the “I” position (70.0 ± 12.8 N) compared to the “Y” position (64.4 ± 11.2 N).
- Ground reaction forces:
 - Dominant “I” = 71.8 ± 13.2 N
 - Non-dominant “I” = 68.3 ± 12.6 N
 - Dominant “Y” = 66.5 ± 10.5 N
 - Non-dominant “Y” = 62.3 ± 11.8 N

Conclusions

- The results demonstrate that the dominant (throwing) arm produced more force regardless of arm angle.
- However, this difference was 5.5%, which is within the commonly applied guidelines for healthy symmetry.
- Our data conflict with those seen in baseball pitchers. However, we included positional players as well as pitchers which would increase the variety of arm angles used during throwing.
- Previous research reported that college softball players demonstrated symmetry between the arms in a modified (supine) ASH test. However, that data would not be representative of the major muscle groups involved in the overhead throwing motion of a softball player.
- These data can be utilized by athletic training and strength and conditioning professionals for assessment of injury risk and return to play decisions.