ABSTRACT

Background: There is little research on how the amount of shoulder joint range of motion, specifically glenohumeral rotation, may be related to the muscle strength of the rotator cuff muscles. A long held belief is that a joint with excessive range of motion needs sufficient muscular strength for stability. However, no studies have examined this concept.

Purpose: The purpose of this study was to see if total arc of glenohumeral joint rotation (External rotation [ER]+Internal rotation [IR]) could predict peak isometric muscle strength of the IR or ER muscles of the shoulder.

Study Design: Cross-sectional study design

Methods: Fifty-three participants (41 females, 12 males) participated in the study. Passive glenohumeral joint internal rotation and external rotation motion was measured for each participant with a standard goniometer. Isometric muscle force of the ER and IR muscles were tested using a handheld dynamometer in three positions: end range ER, neutral 0°, and end range IR. Data were analyzed using a non-parametric tree based regression method (CART) and then cross-validated.

Results: The results showed that those with an increased total arc of motion of glenohumeral rotation (greater than 165.0°) had less muscle isometric muscle strength in all tests positions than those with less glenohumeral rotation.

Conclusion: Decreased force of the ER and IR muscles of the shoulder was noted in those with increased total arc glenohumeral rotation (> 165.0°), specifically those with increased glenohumeral internal rotation (> 80.0°) when compared to those with glenohumeral rotation (< 165.0°) and glenohumeral internal rotation (< 80.0°). Future studies should include more males and attempt to develop strategies to assist those with larger excursions of shoulder rotation who may be at risk of developing shoulder problems.

Level of Evidence: Level 2

Keywords: Classification and regression tree, range of motion, rotator cuff, shoulder