

Adaptive Changes in Blood Flow Volume in the Throwing Arm of Baseball Pitchers

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Background: Due to the accumulation of repetitive forces placed on the throwing arm of baseball players, various range of motion and strength adaptations have been identified in these athletes. However, no research has identified if vascular adaptations exist among baseball players.

Purpose: To determine if baseball players present with adaptive changes in blood flow of their throwing arm. More specifically, we compared the bilateral brachial artery blood flow volume among baseball pitchers and position players.

Design and Setting: Cross-sectional study conducted in athletic training facility of professional baseball organization.

Patients or Other Participants: Fifty-one professional baseball pitchers and 34 position players volunteered to participate in this study.

Methods: Diagnostic ultrasound was used to measure bilateral blood flow of the brachial artery. These measurements were taken in a standing position with the test arm resting at the participants' side and again with the test arm in a provocative shoulder position. We conducted separate one-way analyses of variance for flow volume ($p < 0.05$). Effect sizes were calculated to provide an indication of clinical meaningfulness of the changes in blood flow.

Results: The throwing arm of the pitchers had significantly less blood flow volume when in the provocative shoulder position compared to their non-throwing arm ($p=0.01$). Pitchers did not have any bilateral difference while in the rest position ($p=0.19$). There were no bilateral differences among the position players for either test position ($p>0.63$).

Conclusions: Pitchers have significantly less blood flow volume in their throwing arm compared to their non-throwing arm when in a provocative shoulder position. However, position players do not have any bilateral differences in blood flow. These results indicate a chronic adaptation among baseball pitchers that may heighten their risk of arterial disorders, such as thoracic outlet syndrome and deep vein thrombosis in their throwing-side arm. Such adaptations may also help explain the occurrence of "dead arm syndrome" in pitchers, which has been described as the experience of arm fatigue, decreased ball velocity and decreased ball control while throwing.

Clinical Relevance: Clinicians should consider these findings in the prevention, evaluation, and treatment of the various upper extremity pathologies associated with decreased blood flow among baseball pitchers.