

AN ASSOCIATION BETWEEN HAMSTRING FLEXIBILITY AND THROWING SHOULDER TOTAL RANGE OF MOTION IN ADOLESCENT BASEBALL PLAYERS



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BACKGROUND AND HYPOTHESIS

Previous studies have demonstrated that the significant amount of repetition and stress load on the shoulder throughout the entire overhead throwing motion in baseball can lead to shoulder injuries. The stride position is the component for proper positioning of the trunk and lower extremity in the transfer of energy to the throwing shoulder by increasing the distance and time that the trunk can rotate. A short stride would decrease force development by reducing trunk rotation potential. A key factor limiting stride length is soft tissue flexibility restrictions in the lead leg hamstring muscle group. Restricted hamstring range of motion (ROM) may place additional stress on the throwing shoulder and increase the risk of injury.

Current literature emphasizes the effects of hamstring inflexibility and throwing shoulder total ROM in adult baseball players. We aim to identify the association between the contralateral hamstring-popliteal angle and throwing shoulder total ROM in high school baseball players, specifically.

METHODS

14 high school varsity baseball players (ages 14 to 18 years old) volunteered for this observational study. All the athletes played 5 times a week and played different positions. The study was completed at a local baseball field where the high school team practiced under the supervision of a board-certified physician. The study received institutional review board approval and obtained informed parental consent for those under 18 years and informed consent from those over 18 years. Inclusion criteria included high school aged males on the varsity baseball team. Exclusion criteria included current leg or arm injuries, as documented with a pre-screening questionnaire. Bilateral hamstring and throwing shoulder total ROMs were measured using a goniometer by the same examiner. Three examiners determined maximum ROM by joint end feel for each measurement to ensure quality control. Contralateral hamstring flexibility was measured using the popliteal angle test. These measurements were compared to the throwing shoulder total ROM to determine the presence of an association. The relationship between the contralateral hamstring flexibility and throwing shoulder total ROM was determined using a linear regression analysis.

RESULTS

On the medical history questionnaire, 6 players reported a history of injury with 4 being upper extremity injuries and 2 being lower extremity injuries. 8 players reported no history of injury. 1 player reported both a history of an upper extremity and lower extremity injury. There were 4 left-handed players and 10 right-handed players. 13 players had limited lead leg hamstring flexibility with values being greater than 30 degrees. Additionally, all players with higher-than-normal total range of motion in the throwing shoulder demonstrated reduced hamstring flexibility.

The relationship between the contralateral hamstring flexibility and total throwing shoulder ROM was determined using a linear regression analysis.

The correlation coefficient, r , was + 0.3928, indicating a moderate positive linear relationship (Figure 1).

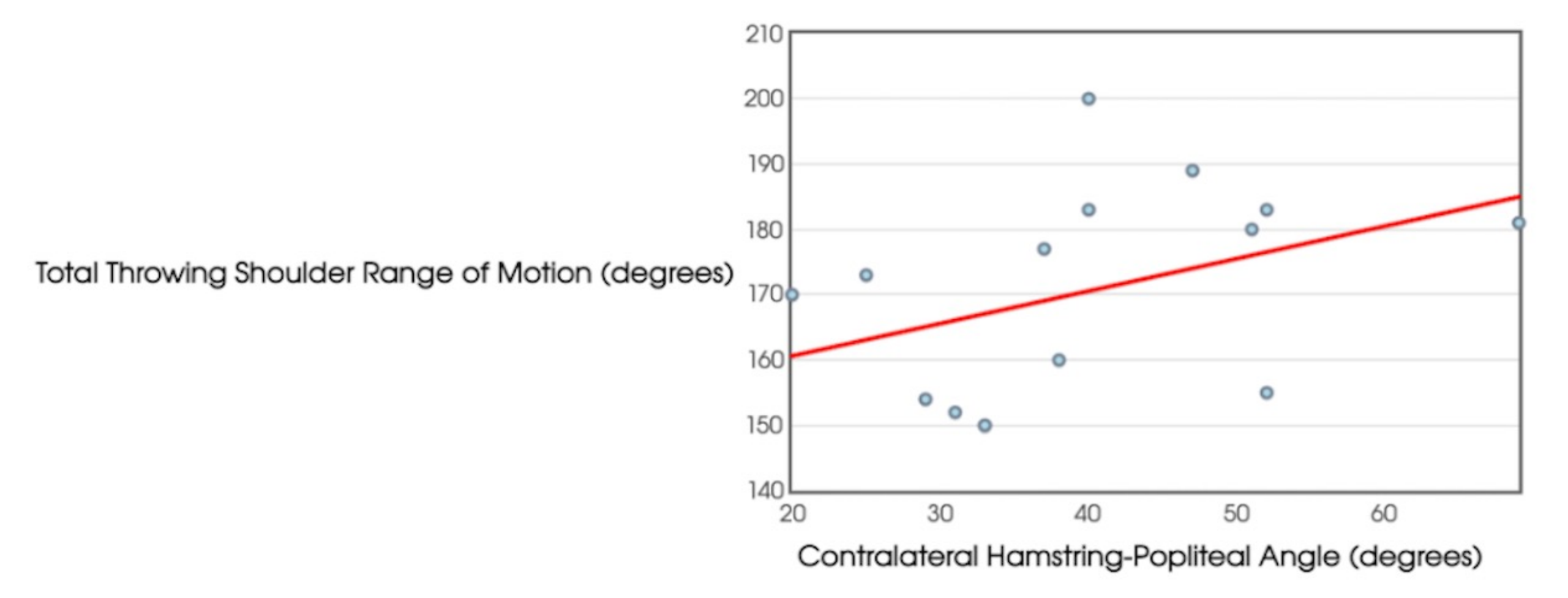


Figure 1: Contralateral Hamstring Flexibility and Throwing Shoulder Total Range of Motion in High School Baseball Players

Our study suggests that reduced hamstring flexibility may be a potential risk factor for increased upper extremity load, resulting in excessive throwing shoulder total range of motion and injury.

Our study concluded that there was a moderate association between higher contralateral hamstring-popliteal angles and higher total throwing shoulder ROM. We found that reduced hamstring flexibility could cause excessive throwing shoulder total range of motion, which serves as a potential risk factor for injury in adolescent baseball players. One interesting finding that is important to note is that we had one player who had a previous history of a left hamstring strain and on examination demonstrated the highest total shoulder range of motion of 200 degrees.

CONCLUSION

Overhead throwing athletes with limited hamstring flexibility should be counseled appropriately regarding their risk for shoulder injury. Baseball players should stretch and prepare their bodies to throw to reduce the compensatory mechanisms that may occur from hamstring inflexibility. Additional research with a larger sample size is encouraged to further establish the association between contralateral hamstring-popliteal angles and throwing shoulder total ROM. We highlight the role hamstring inflexibility may play in shoulder injury development in adolescent baseball players.

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