

Apr 25th, 6:00 PM - 7:00 PM

Comparison of Two Different Stretching Interventions on Glenohumeral Range of Motion of Overhead Athletes

Jackson Brownstein
Ohio Wesleyan University

Follow this and additional works at: <https://digitalcommons.owu.edu/studentsymposium>

Part of the [Kinesiology Commons](#)

Brownstein, Jackson, "Comparison of Two Different Stretching Interventions on Glenohumeral Range of Motion of Overhead Athletes" (2019). *Student Symposium*. 5.

https://digitalcommons.owu.edu/studentsymposium/2019/poster_session/5

This Poster is brought to you for free and open access by the Student Scholarship at Digital Commons @ OWU. It has been accepted for inclusion in Student Symposium by an authorized administrator of Digital Commons @ OWU. For more information, please contact earutigl@owu.edu.

Comparison of Two Different Stretching Interventions on Glenohumeral Range of Motion of Overhead Athletes



DEPARTMENT OF
Health and Human Kinetics

Jackson Brownstein
Ohio Wesleyan University, Delaware, OH

INTRODUCTION & PURPOSE

The baseball throwing motion repetitively creates large forces on the shoulder and elbow as the arm dynamically moves through susceptible end-range positions. It has been well established in studies investigating shoulder range of motion (ROM) in baseball players that differences between arms, such that external rotation increases while internal rotation decreases in the dominant arm compared to the non dominant arm. This adaptation is commonly known as glenohumeral internal rotation deficit (GIRD) which is the excessive loss of internal rotation in the glenohumeral joint compared to the opposite arm. Many retrospective studies have demonstrated relationships between a decrease in shoulder ROM and shoulder injuries, such as labral tears and impingement syndrome. In collegiate baseball players, poor shoulder ROM increases the likelihood of experiencing overuse symptoms during the season. The question often asked by coaches is how to best improve shoulder ROM in players that have had prior problems with overuse injuries.

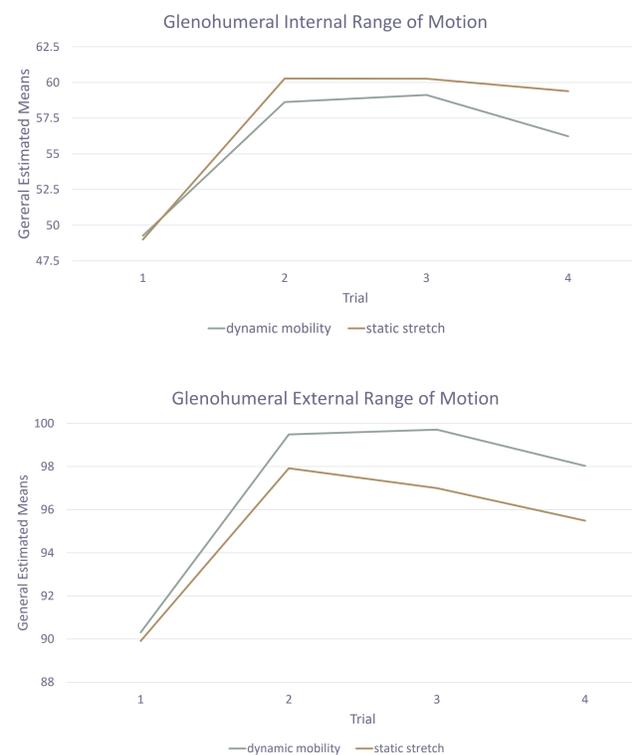
A recent systematic review of 10 randomized controlled trials attempting to improve GIRD and posterior shoulder tightness found that most stretching interventions were performed as single interventions, with six of the articles only utilizing passive stretching, four utilized active stretching, and only two articles compared passive to active stretching, with only four articles using control groups with no intervention. While passive and active stretching have been shown to improve shoulder ROM, athletes tend to perform more dynamic exercises immediately prior to competition. The use of dynamic exercises after a pitching session have been shown beneficial in restoring normal shoulder ROM in professional pitchers. Understanding the differences between dynamic and passive flexibility routines have on improving shoulder mobility within a single intervention may help coaches and athletes choose appropriate exercises to efficiently increase shoulder mobility. The purpose of this research was to compare dynamic mobility (DM) exercises with passive stretching (PS) in the upper extremities to determine which strategy best improved glenohumeral ROM.

The objective of this project is to investigate differences in glenohumeral ROM as a result of two different stretching interventions. Participants underwent a dynamic mobility routine and a passive stretching routine, and a digital inclinometer was used to record glenohumeral internal rotation and external rotation. Measurements will be taken prior to intervention in both the left and right arms to identify any possible GIRD among the athletes that participated in this study. Immediately after one stretching intervention was completed, measurements were retaken, and taken again in thirty minute intervals for up to 1 hour. (4 total trials) Two separate days of measurements were taken, so that each participant could partake in the DM and PS interventions. The hypothesis is that there will be significant increases in shoulder ROM when examining the data prior to post-intervention. Results can be used to prevent re-injury in collegiate athletes.

TESTING



RESULTS



SUBJECTS

- The subjects selected to participate in the study were 36 NCAA Division III collegiate athletes.
- A mix of 25 baseball players, 4 volleyball players, and 7 softball players participated in the study. They had not pitched at least two days prior to taking measurements.
- The data for the baseball team is portrayed in the study, as it was difficult to collect data of three different teams in season. The baseball team's data was more complete and had a much larger sample size to analyze.

CONCLUSIONS

A two way repeated measures ANOVA statistical analysis was used on this data. It can be concluded from the pairwise comparisons that there are significant changes in Shoulder internal rotation and external rotation between the baseline data and the post intervention trials ($P=0.000$). No statistical significance was found between the post intervention and the 30 minute post intervention trials ($p=1.000$) with both interventions. There was also a significant change in shoulder ROM from the post and 30 minute post trials to the 60 minute trial; for internal rotation ($p=0.025$, 0.000), for external rotation ($p=0.005$, 0.001). Using this data it can be concluded that both stretching interventions increased total shoulder ROM by an average of 20 degrees. It is interesting to note that the dynamic mobility group increased external rotation more than internal rotation, and passive stretching intervention increased internal rotation more than external rotation. Many Major League pitchers and professional overhead athletes will warm up using a combination of static stretches and dynamic mobility exercises to achieve optimal shoulder ROM improvement.

METHODS

- Twenty-five male NCAA Division III collegiate baseball players, 4 NCAA Division III collegiate volleyball players, and 7 NCAA division III collegiate softball players were recruited from Ohio Wesleyan University. Inclusion criteria required the participants to be listed on the active roster, and free of injury at the time of screening.
- Due to the difference in sample sizes, only the baseball team's data was analyzed. Of this population, The primary positions of the participants enrolled were: pitchers ($n=11$), catchers ($n=3$), infielders ($n=5$), and outfielders ($n=6$). The academic year of the participants were: senior ($n=1$), junior ($n=6$), sophomore ($n=9$), and freshman ($n=9$).
- The testing was completed on two different days to ensure the athletes did not get fatigued and lead to skewed results. Also, measurements were taken at least two days after pitching in competition.
- Shoulder ROM was measured by digital inclinometer in the Ohio Wesleyan University exercise lab. Participants laid supine on a flat table and placed their elbow on a towel so that the arm was abducted 90 degrees and the elbow was flexed at 90 degrees.
- Participants were randomly assigned to either the Passive Stretch intervention or the Dynamic Mobility intervention. Many different muscles can influence shoulder mobility. The goal of this study was to improve shoulder ROM in a time-efficient manner, therefore only six exercises were chosen for each intervention. Many different muscles can influence shoulder mobility.
- The PS group held each stretch for 30 seconds, whereas the dynamic mobility group completed 10 repetitions of each movements. Participants in both groups completed six consecutive exercises targeting areas believed to contribute most to improving shoulder ROM.
- The PS intervention included: Doorway Stretch, Flexion, Extension, Horizontal Abduction, Overhead Triceps, and Standing Internal Rotation. The DM intervention included: Flexion, Extension, Overhead Throw, Reverse Throw, Medium Scapular Row, and Standing External Rotation.
- Measurements began in Spring of 2019. The teams participating in the study were in season, but measurements were taken at least two days after competition. Baseline measurements were taken prior to stretching in both the left and right arms. Immediately after completion of either intervention, shoulder ROM was re-measured.
- ROM was re-measured in thirty minute intervals for up to one hour after the stretching intervention was performed. This data was used to assess the longevity of the effects from the different stretching interventions.

PRACTICAL APPLICATIONS

This study will help develop a better understanding of the effects stretching has on improving total ROM. Improving shoulder ROM reduces the likelihood of injury throughout the athletic season. This study provides insight to coaches and athletes when determining how the effects of stretching last. It helps develop a better understanding of how every individual is different, and will respond uniquely to the different interventions. Shoulder mobility is not only affected by soft-tissue extensibility, as for almost any joint in the body, there is a required amount of mobility and stability necessary to send appropriate proprioceptive messages within a joint to allow efficient movement. To achieve optimal shoulder ROM, most athletes will use a combination of passive stretching and dynamic mobility exercises in order to increase their ROM and prepare their body for competition.

REFERENCES

- Busch, A. Acute Effects of Dynamic vs. Passive Stretching on Shoulder Mobility in Collegiate Baseball Players: A Randomized Trial
- Shanley E, Rauh MJ, Michener LA, Ellenbecker TS, Garrison JC, Thigpen CA. Shoulder range of motion measures as risk factors for shoulder and elbow injuries in high school softball and baseball players. *Am J of Sp Med.* 2011;39(9):1997-2006.