Correlation of Rotator Cuff Strength and Handgrip Dynamometer Measurements in NCAA Division III Men’s Lacrosse Players

Alvernia University Athletic Training Program

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Abstract

• The purpose of this research project was to examine the correlation between rotator cuff strength (RCS) and handgrip strength (HGS) dynamometer measurements in NCAA Division III Men's Lacrosse Players. Researchers measured RCS and HGS at three different functional positions. Results included a correlation between HGS and RCS on the right arm. No significant correlation was found on the left arm.
Purpose

- The purpose of this research project was to examine the relationship between RCS and HGS through the use of quantitative data analysis.
Research Question

• Is there a correlation between rotator cuff muscle strength and handgrip dynamometer measurements in NCAA Division III Men's Lacrosse Players?
Rotator cuff pathology is one of the most common causes of shoulder pain in primary care facilities. Increasing strength of the rotator cuff is part of a general rehabilitation protocol for treating shoulder injuries. Ensuring optimal RCS is important in order for participants to return to sport participation.
There are few existing studies comparing HGS and RCS simultaneously; therefore, more research is necessary to examine the correlation between HGS and RCS. The correlation between HGS and RCS could lead to findings which help shape and improve future rehabilitation protocols.

Providing a correlation could aid in improving evaluations, performance testing and rehabilitation techniques for shoulder injuries. Discovering a connection between HGS and RCS would guide rehabilitation protocols by showing what muscles should or should not be targeted in order to return the athlete to full function.
Materials

• Black TheraBand® & Jump Rope
  • Used by subject in warm-up activities
• Data Collection Sheets
  • Recorded athlete information and values for rotator cuff and handgrip strength performance
Materials

- Athletic Treatment Table
  - Support subject in supine position during testing
- Hoggan MicroFET2™
  - Rotator cuff strength measuring device
- Jamar Hand Dynamometer
  - Handgrip strength measuring device
Methods: Sampling/Recruitment

- A convenience sample of NCAA Division III Men's Lacrosse Players were used in this study.

- Researchers conducted a meeting with all potential participants prior to testing and obtained informed consent forms.
Methods: Testing

- The investigators utilized a Make Test with the clinician in a power position.

- To measure RCS researchers used a MicroFET2™

- To measure HGS researchers used a hand held dynamometer (HHD). The HHD has been proven to be one of the most reliable tools for measuring maximal muscle strength.3,4
Testing Procedures

• Each participant engaged in a dynamic warm-up prior to data collection.

• Dynamic warm-up components:
  • One minute of jump rope
  • One minute of internal and external rotation with a TheraBand®
    • Both arms 15 seconds for each exercise
  • One minute of walking with arm swings
  • One minute of jump rope
Testing Procedures

- HGS and RCS were measured bilaterally from the supine position in each participant. Data collection included the following measurements:
  - Shoulder at neutral with 90° of elbow flexion
  - 90° of shoulder abduction with 90° of elbow flexion
  - 90° of shoulder abduction and 90° external rotation and 90° of elbow flexion
Participants

- **Inclusion Criteria**
  - Male, 18-54 years of age
  - Healthy NCAA Division III Lacrosse Players
  - Presently cleared for athletic participation in lacrosse by a licensed physician

- **Exclusion Criteria**
  - Athletes that had not been cleared by a physician for athletic participation in lacrosse
  - Athletic Training Students enrolled in courses instructed by the Principal Investigators
Graph Key

- RC = Rotator Cuff
- HG = Hand Grip
- 1 = Right Arm
- 2 = Left Arm
- A = Shoulder at neutral with 90° of elbow flexion
- B = 90° of shoulder abduction with 90° of elbow flexion
- C = 90° of shoulder abduction, 90° external rotation and 90° of elbow flexion
Neutral Position of RCS vs. HGS

Prediction of HGS
90/90 Position of RCS vs. HGS
Prediction of HGS

![Graph showing the position of RCS vs. HGS with predictions for different series and positions.](image-url)
Data Comparison

**Right vs. Left**

![Bar Chart 1](chart1.png)

![Bar Chart 2](chart2.png)
Correlation

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<th></th>
<th>HG1a</th>
<th>HG1b</th>
<th>HG1c</th>
<th></th>
<th>HG2a</th>
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</table>

**. Significant at the 0.01 level (2-tailed)

*. Significant at the 0.05 level (2-tailed)
Conclusions

- A significant correlation was found between RCS and HGS in the right arm of the athlete compared to the left arm.
- In the right arm, the correlation between the neutral position was the highest predictor of HGS in all three positions.
- No significant correlation was found in the left arm in predicting HGS.
Limitations

- Small sample size
- Limited number of participants with left-hand dominance
- This study only evaluated HGS and RCS in NCAA Division III Men’s Lacrosse Players. No other athletic populations were represented.
- Human error in measuring using the Make Test
- Participants were selected from the same institution.
Future Considerations

- Increase participant rest time between strength tests to minimize the effects of fatigue on results.

- Evaluate HGS and RCS in female athletes.

- Evaluate HGS and RCS in athletes who participate in different sports, at different levels of competition (NCAA DI, DII, professional, and high school athletes).

- Conduct research studies in the off-season for each sport included.
References


