

A Comparison of Rotator Cuff Fatty Infiltration in Older Adults With Affected and Unaffected Shoulders and its Relationship to Function

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Summary

This study quantified rotator cuff fatty infiltration (FI) using magnetic resonance imaging (MRI) and ultrasound modalities to determine whether FI was different between older adults with affected and unaffected shoulders. We also evaluated whether FI was related to subjective and objective shoulder function. Our initial findings suggest that affected shoulders show significantly greater levels of FI, associated with decreased subjective function, but not objective function.

Introduction

Shoulder function and rotator cuff tissue health are critical to the performance of activities of daily living (ADLs), with impairments directly related to decreases in quality of life [1]. Importantly, there is a high incidence of rotator cuff pathology in the aging population (~ 65%) which negatively impacts shoulder function and consequently ADLs [2,3]. Further, greater rates of muscle FI have been shown to limit mobility and reduce muscle function in healthy older adults [4], however this relationship has yet to be studied in older adults experiencing shoulder pathologies. Thus, the purpose of this study was to assess whether FI differs between older adults with affected and unaffected shoulders and whether FI relates to objective and subjective shoulder function in this population.

Methods

Twenty-six right hand dominant older adults (12 M, 14 F; 71.3 (8.33) years) have been recruited for this study thus far (Anticipated sample size: n=40). Among these participants, 13 had unaffected (9 M, 4 F) and 13 had affected shoulders (4 M, 9 F). Shoulder health (unaffected or affected) was determined by a series of clinical tests used to identify the presence of shoulder pain [5]. MRI was performed on participants' right shoulder using a 3T Siemens MAGNETOM PrismaFit scanner (Two-Point T1 Dixon sequence). Manual segmentation of the supraspinatus (SS) and infraspinatus (IS) muscles were performed using 3DSlicer (<https://www.slicer.org/>). Ultrasound images of the SS and IS muscles were also captured to assess FI using echogenicity measurements. Objective function was assessed by isolating the participant's right upper limb using a Biodex System 3 (Biodex Medical Systems, New York, USA). Maximum strength measurements were recorded for flexion/extension, abduction/adduction, and internal/external rotation. A series of questionnaires were administered to assess the participants' subjective function. An independent samples t-test was used to assess differences in FI in older adults with affected shoulders compared to those without. Further, Pearson

correlations were performed to examine the relationship between FI and subjective and objective function.

Preliminary Results and Discussion

From a preliminary analysis of 18 participants, significant differences have been found in FI of both SS and IS between older adults with affected and unaffected shoulder ($p < 0.01$ and $p = 0.03$). Thus far, Pearson correlation has revealed that SS and IS FI have moderate relationships with objective function ($r = -0.42$ and $r = -0.54$), and have a moderate-strong relationship with subjective function ($r = -0.69$; $r = -0.61$). Ultrasound analysis will be conducted after the full sample is collected.

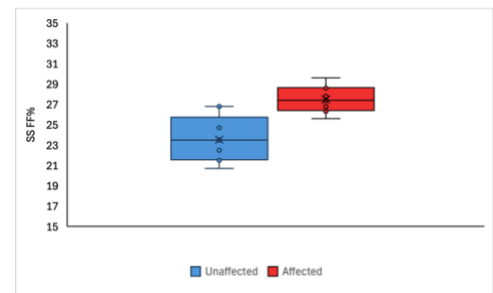


Figure 1. SS Fat-Fraction% are significantly greater in the affected group (red) in comparison to the unaffected (blue; $p < 0.01$).

The current study reveals that rotator cuff FI is significantly greater in affected participants compared to unaffected participants. This is expected as research has previously shown increased levels of FI in patients with rotator cuff pathology [6]. Further, this current analysis shows subjective function to be more highly correlated with FI in comparison to objective function.

Conclusions

Rotator cuff FI was significantly different between older adults with affected and unaffected shoulders. Further, rotator cuff FI is a stronger predictor of subjective function but not objective function. This study is expected to provide insights into the importance of FI for maintaining adequate shoulder function among our aging population.

References

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