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FREQUENCY OF ROTATOR CUFF ABNORMALITIES ON SHOULDER MRI IN SYMPTOMATIC PATIENTS OF DIFFERENT AGE GROUPS

Laiba Batool[*1], Muhammad Uzair[2], Umair Ilyas[3], Ghulam Murtaza[4], Anum Khalid[5]

[*1,2,3]*Radiography and Imaging Technology, The Green International University Lahore, Pakistan*
[4,5]*Baba Bulleh Shah, Social Security Hospital, Kasur, Pakistan.*

Corresponding Author: *
Laiba Batool
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ABSTRACT

Background

Shoulder pain can be caused by problems with the rotator cuff, which is common among all individuals. Its causes are both external and internal. Management relies on anatomical knowledge and accurate diagnosis through testing. The aim is to bring things back to normal. MRI helps determine the nature and extent of the problem, which facilitates treatment planning and diagnosis.

Objective

To determine frequency of rotator cuff abnormalities on shoulder MRI in symptomatic patients of different age groups.

Methodology

Using a GE 1.5T scanner, data were gathered from symptomatic patients (less than 60 years old) having shoulder MRI scans. Convenient sampling was used. Microsoft Excel 2025 and SPSS were used for data analysis, along with chi-square tests and descriptive statistics (p-value <0.05 was deemed significant).

Results

The study of 99 symptomatic patients (59.6% male) revealed rotator cuff tears in 52.5% of cases (33.3% complete, 19.2% partial), with tendonitis in 50.5% and age-related tendon thickening in 35.4% (p=0.003). Younger patients (19-30 years) showed more complete tears, while degenerative changes increased with age, and males exhibited more severe pathology than females.

Conclusion

Rotator cuff abnormalities demonstrate distinct age and gender patterns, indicating both traumatic and degenerative origins. These findings highlight the importance of clinical correlation when interpreting MRI results and support age-specific diagnostic approaches.

Keywords: *Rotator cuff abnormalities, Shoulder MRI, Rotator cuff tears, Symptomatic patients, Age groups, Tendinitis, Full thickness tear.*

Introduction

Shoulder discomfort is a leading musculoskeletal disorder impacting quality of life. Imaging techniques like MRI and ultrasound can effectively diagnose conditions such as subacromial bursitis and rotator cuff tears. However, the relationship between imaging findings and patient outcomes remains unclear,

highlighting the need for further research to understand their clinical implications.[1] Rotator cuff abnormalities, including tendinopathy and tears, are prevalent, increasing sharply with age—31% in those 60 and older versus under 10% under 40.[2]

A review of multiple studies estimates that 26.5% of adults aged 50 and older have PTTs and FTTs, with prevalence increasing significantly with age. In symptomatic patients, 50–70% exhibit rotator cuff tears, highlighting the connection between symptoms and imaging.[3] Long-term MRI research have logistical and cost considerations that make it difficult to determine the true frequency of fresh rotator cuff injuries in the general population. Still, research tracking seniors with few or no symptoms show that roughly 2. 1% of them get fresh full-thickness tears annually. Important elements related to these tears are older age, use of the dominant arm, manual activity, and diabetic status. Although there isn't much long-term MRI data, the frequency of surgical repairs can be a helpful indicator of symptomatic tears requiring treatment.[4] One important factor arising from recent studies is the difference between clinically significant pathology and MRI results. Partial-thickness tears, which account for 30–50% of detected anomalies, are often found in asymptomatic people.[5] Finding a tear does not establish it causes pain, therefore the text stresses the need of integrating imaging results with clinical evaluations. Additionally observes that development of rotator cuff injuries results in part from non-age-related elements including smoking, high cholesterol, and some job activities.[6] The results highlight that decisions on treatment should depend on a thorough clinical evaluation including patient history, physical examinations, and imaging, not only MRI results alone. Ultrasound of 51 symptom-free males revealed anomalies in 96% of them; usual problems were thickened bursa, tendinosis in the supraspinatus, and ACJ osteoarthritis.[7]

Diagnosing and treating shoulder issues is challenging due to inconsistent research results. Many studies have not fully explored how various diseases relate to shoulder symptoms, leading to a lack of understanding about what causes shoulder pain. Some evidence indicates that pain may connect to certain parts of the shoulder joint, and increasing rotator cuff injuries might play a role in these symptoms. With this study we aim to find out frequency of different rotator cuff injuries to better understand the shoulder pain. [8]

Methodology

It was a cross-sectional analytical study; the data was gathered from General Hospital Lahore. All symptomatic patients who came for a shoulder MRI scan were included in the sample. A convenient sampling method was used. Male and female volunteers under 60 years of age were included in the study. Additionally, the study did not include those who had trauma patients, post-surgery.

After gaining informed written consent, data was obtained using a **GE 1.5T** MRI scanner. Shoulder MRI scans using sequences **(T2, T1, STIR, PD)** in the coronal, axial, and sagittal planes were performed while the patients were in a supine position. Films were generated after scanning and given to the patients. Data were analyzed using SPSS and Microsoft Excel 2025, with descriptive statistics and chi-square tests applied to investigate associations (**p-value <0.05** considered significant)

Results

The study included 99 symptomatic patients (59.6% male, 40.4% female) who underwent shoulder MRI scans. Males had higher tendon thickening (71.4%), tendonitis (58.0%), full thickness tears (69.7%), partial tears (63.2%), and

Females had lower tendon thickening (28.6%), tendonitis (42.0%), full thickness tears (30.3%), partial tears (36.8%).

Table 1.1: Gender-Based Distribution of Rotator Cuff Cases

Descriptives		%(Frequency)86787
Gender	Male	59.6% (59)
	Female	40.4% (40)

The study had 99 participants in all. There were 40.4% (n = 40) females and 59.6% (n = 59) males among them. According to this gender distribution, the study population is rather predominately male.

Table 1.2: Prevalence of Right and Left Shoulder Pathologies

Descriptives		%(Frequency)
Affected side	Left	37.4% (37)
	Right	62.6% (62)

In terms of the afflicted shoulder, the right shoulder was impacted in 62.6% (n = 62) of instances, whilst the left shoulder was affected in 37.4% (n = 37). According to this, the study participants' right shoulder was impacted more frequently.

Table 1.3: Prevalence of Rotator Cuff Abnormalities

Rotator Cuff Pathologies		%(Frequency)
Tendon thickening	No	64.6% (64)
	Yes	35.4% (35)

Tendon scarring	No	65.7% (65)
	Yes	34.3% (34)
Tendonitis	No	49.5% (49)
	Yes	50.5% (50)
Tear	No	47.5% (47)
	Yes	52.5% (52)

Regarding tendon health, 64.6% (64) did not exhibit tendon thickening, whereas 35.4% (35) did; similarly, 34.3% (34) of the subjects had tendon scarring, while 65.7% (65) did not; slightly more than half (50.5%) of the sample had tendinitis, while 49.5% were unaffected; and 52.5% (52) of the participants had tendon rips, whereas 47.5% (47) did not.

Table 1.4: Prevalence of Rotator Cuff Tear Types

Descriptives		**%(Frequency)**
Types of tear	Complete	33.5% (33)
	No	47.5% (47)
	Partial	19.2% (19)

Of the 99 trial participants, 47.5% (n = 47) had no rotator cuff injury symptoms. However, it was found that 19.2% (n = 19) had a partial tear and 33.3% (n = 33) had a total rip. According to these results, almost one out of every three patients experienced a full tear, although partial tears were less frequent.

Table 1.5: Age Group Analysis of Rotator Cuff Abnormalities and Tear Types

Rotator cuff	Pathologies	Age group	%(frequency)	P-value
Tendon thickening	No	19-30	73.4% (47)	0.003
		31-40	18.8% (12)	
		41-50	4.7% (3)	
		51-60	3.1% (2)	
	Yes	19-30	41.2% (14)	
		31-40	29.4% (10)	
		41-50	5.9% (2)	
		51-60	23.5% (8)	
Tendon scarring	No	19-30	54.2% (26)	0.455
		31-40	27.1% (13)	
		41-50	6.3% (3)	
		51-60	12.5% (6)	
	Yes	19-30	70.0% (35)	
		31-40	18.0% (9)	
		41-50	4.0% (2)	
		51-60	8.0% (4)	
	No	19-30	59.4% (38)	

Tendonitis		31-40	25.0% (16)	0.816
		41-50	4.7% (3)	
		51-60	10.9%(7)	
	Yes	19-30	67.6% (23)	
		31-40	17.6% (6)	
		41-50	5.9% (2)	
		51-60	8.8% (3)	
Tear	No	19-30	66.0% (31)	0.647
		31-40	23.4% (11)	
		41-50	4.3% (2)	
		51-60	6.4% (3)	
	Yes	19-30	58.8% (30)	
		31-40	21.6% (11)	
		41-50	5.9% (3)	
		51-60	13.7% (7)	
	Complete	19-30	53.1% (17)	
		31-40	18.8% (6)	
		41-50	9.4% (3)	
		51-60	18.8% (6)	
	No	19-30	66.0% (31)	

Type of tear		31-40	23.4% (11)	0.361
		41-50	4.3% (2)	
		51-60	6.4% (3)	
	Partial	19-30	68.4% (13)	
		31-40	26.3% (5)	
		41-50	0.0% (0)	
		51-60	5.3% (1)	

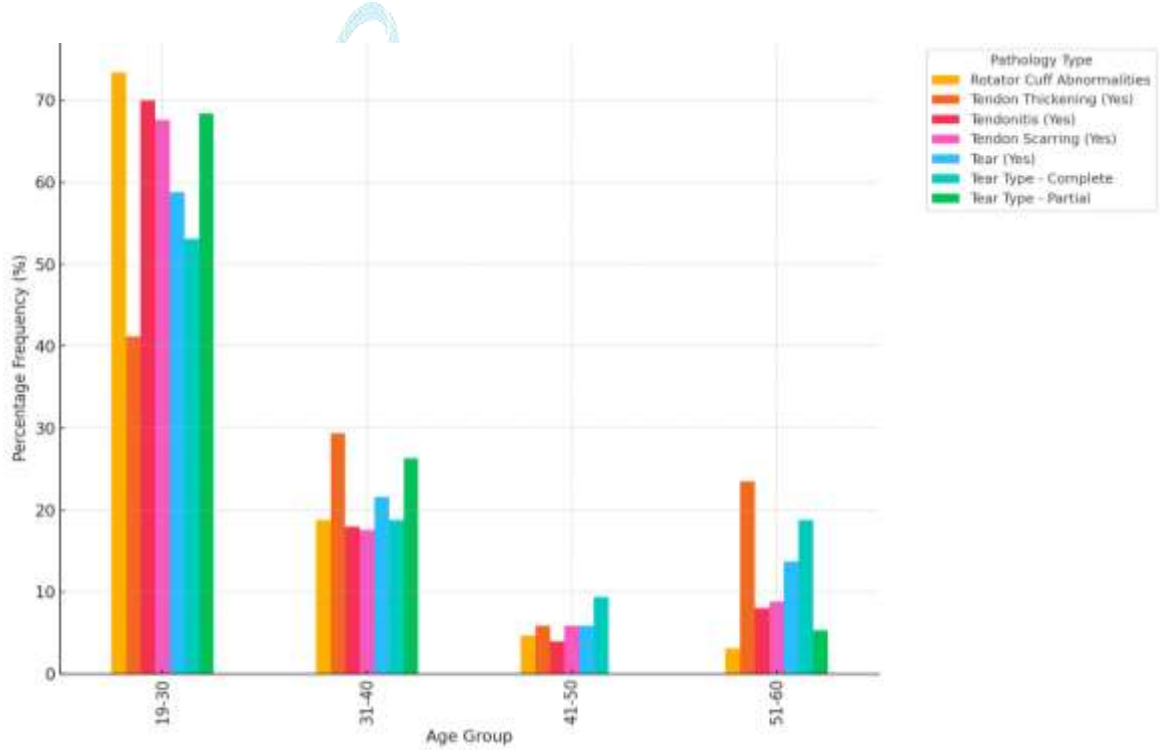

Fig 1.1: Rotator cuff pathologies by age group

A comparison of rotator cuff anomalies in various age groups showed a number of patterns. Tendon thickening was most common in people between the ages of 19 and 30, accounting for 73.4% (47) of instances and then sharply declining in older age groups. The p-value of 0.003 indicated an

important age-related correlation, making this finding statistically significant. Despite the fact that the highest incidence of tendinitis occurred in the 19–30 age group (54.2%) and the 31–40 age group (27.1%), there was no statistically significant correlation between age and tendinitis ($p = 0.455$). In addition, tendon scarring was most common in the 19–30 age range (59.4%), with decreasing rates in older cohorts; nevertheless, the age distribution was not statistically significant ($p = 0.816$). Similarly, the 19–30 age group had the highest rate of rotator cuff tears (66.0%), although this was also not statistically significant ($p = 0.647$).

Complete tears were more common in the 19–30 age group (53.1%), while partial tears were more common in the youngest age group (68.4%). With p-values of 0.361 and higher, neither tear type showed a statistically significant correlation with age. The only abnormality that showed a significant correlation with age was tendon thickening, even though the majority of abnormalities were most commonly detected in younger people (particularly those aged 19 to 30).

Discussion

Tendon thickening is rare in young individuals (19–30 years old: 26.6% thickening), according to the dataset, and its prevalence increases with age(23.5% in those aged 51–60). This trend is consistent with well-established sonographic literature, which shows that decreasing echogenicity signaling deterioration is followed by a progressive thickening of the supraspinatus tendon with age, which is particularly apparent in older cohorts.[9] Additionally, ultrasonography research demonstrates that older adults' rotator cuff tendons are noticeably thicker than those of younger people, supporting the link between age-related tendon thickening and tendinopathy or subacromial impingement.[10] Generally, tendon thickening is uncommon in people under 30 but becomes more noticeable as people age, which is consistent with the degenerative changes observed in rotator cuff disease.[11]

In this dataset, tendon scarring was surprisingly highest in the 19–30 year group (70%) and declined sharply through the 31–40 (18%), 41–50 (4%), and 51–60 (8%) age brackets. This pattern diverges from conventional imaging studies largely focused on tears and degenerative changes which consistently report an increasing prevalence of rotator cuff pathology with age.[12] For instance, asymptomatic tears rise from nearly 0% in under-40s to 10% in the 50s, 15% in the 60s, and up to 36–62% in those aged 80 and above. These high scar rates in young adults likely reflect early micro-trauma or inflammatory responses that resolve into visible scar tissue, stages typically under-reported in cross-sectional studies centered on overt tears.[13] The subsequent low scar prevalence in older groups may indicate tendon remodeling or degeneration overshadowing scar visibility.[14] Thus, these findings suggest a potential early-life scar peak possibly due to repetitive micro-injury that precedes the well-documented structural degeneration seen later. Incorporating scar evaluation into standard imaging assessments could therefore provide valuable insight into the full progression of rotator cuff pathology across ages.[15]

In this dataset, symptomatic rotator cuff tendonitis appears most commonly in the 19–30 age group (67.6%), then sharply declines through middle age (31–40: 17.6%; 41–50: 5.9%; 51–60: 8.8%). Notably, even younger adults display a substantial burden of tendonitis contrary to conventional prevalence trends which typically emphasize older age, where degenerative tendinopathy predominates.[16] Systematic reviews show rising tendinopathy rates after age 50, with age over 50 being a major risk factor (OR = 3.3). Additionally, studies report less than 10%

prevalence of tendon pathology in those under 40, increasing dramatically with each decade.[17] These findings suggest that tendonitis may peak earlier in life than expected possibly linked to active lifestyles or repetitive strain and then decline as degenerative changes supplant inflammatory symptoms in older individuals. This juxtaposition highlights the need to recognize early-onset tendonitis as a distinct phase in rotator cuff pathology and underscores the value of age-stratified imaging and management approaches across the lifespan.[18]

The prevalence of rotator cuff tears was 58.8% in those aged 19 to 30, 21.6% in those aged 31 to 40, 5.9% in those aged 41 to 50, and 13.7% in those aged 51 to 60. This distribution was comparatively stable throughout age groups. According to documented prevalence studies, tear rates are generally low under 40 and sharply increase after 50, going from about 13% in the 50s to over 50% in people over 80. These findings stand in contrast to these findings.[19] This data's abnormally high early-age tear frequency could indicate an increased risk of microtrauma from sports or the workplace. A smaller sample size or selection bias may be the cause of the older cohorts' lower tear rates when compared to the literature. All things considered, these findings suggest that rotator cuff injuries might happen to younger people more often than previously thought.[20]

In this dataset, the youngest group (19–30 years: 53.1%) had the highest frequency of total rotator cuff tears, which then decreased during middle age (31–40: 18.8%; 41–50: 9.4%), before increasing once more in elderly persons (51–60: 18.8%). Large-scale prevalence studies, which show low tear rates in younger age groups and a gradual increase with advancing age, greatly differ from this pattern.[21] For instance, Yamamoto et al. discovered that those under 40 had only 0% full-thickness tears, but those in their 50s had 10.7% and those over 80 had 36.6%.[22]

In a similar vein, cadaveric and ultrasound studies indicate that the prevalence of tears has increased from 13% in those aged 50–59 to 51% in people aged 80–89.[23] On the other hand, in this dataset youngest cohort's unusually high complete tear rate points to either an overrepresentation of traumatic or sports injuries.

In the 19–30 age group, partial-thickness rotator cuff tears were most common (68.4%), reduced to 26.3% in the 31–40 age group, and were almost nonexistent in the over-40 age group (0% in the 41–50 and 5.3% in the 51–60). In contrast, established epidemiologic research consistently demonstrates modest rates of partial tears in younger persons (4% under 40) that rise with age, reaching about 26% in those over 60. This pattern stands in stark contrast to that.[24]

The exceptionally high frequency among youngest cohort most likely results from selection bias in favor of people who are active or who have microtrauma from overuse or sports. It implies that rather than the degenerative processes common in older cohorts, partial tears in younger adults might be caused by mechanical overload.[25]

Conclusion

Our study concluded that tendon thickness increased as expected for older people, but tendon scarring, tendinitis, and rips were most common among men and women in the youngest age range (19–30 years). The findings indicated that among all rotator cuff diseases, tendon thickening ($p = 0.003$) and partial tears were most common in younger people (19–30 years old). Groups between the ages of 31 and 40 showed moderate involvement in the majority of diseases. Overall pathology rates were decreased in older age groups

(41–60). The only factor that varied statistically significantly with age was tendon thickness.

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