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Prevalence and Grading of Rotator Cuff Tears and Labral Injuries in Patients with Shoulder Pain and Instability: An MRI-Based Cross-Sectional Study

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ABSTRACT:

BACKGROUND: Shoulder pain and instability are among the most prevalent musculoskeletal complaints worldwide, significantly impairing daily function and quality of life. Rotator cuff tears and labral injuries constitute the dominant underlying pathologies, yet their precise prevalence, grading, and demographic distribution remain incompletely characterised in the Indian population. Magnetic resonance imaging (MRI) is the gold-standard non-invasive modality for shoulder soft-tissue evaluation, offering superior contrast resolution and multiplanar capability without ionising radiation.

OBJECTIVES: To determine the prevalence and MRI-based grading of rotator cuff tears and labral injuries in patients presenting with shoulder pain and instability; to describe the demographic distribution by age, sex, and occupation; and to examine the association of metabolic comorbidities with pathology severity.

METHODS: A hospital-based cross-sectional study was conducted over 12 months (December 2023–December 2024) at the Department of Radiodiagnosis, Dr. Prabhakar Kore Hospital and Research Centre, Belagavi. Eighty-one consecutive patients (aged 20–75 years) referred from Orthopaedics with shoulder pain or instability underwent standardised 1.5T MRI. Rotator cuff tears were classified by thickness, size, tendon retraction, muscle atrophy, and Fuchs fatty-infiltration grade. Labral pathology was categorised as Bankart, bony Bankart, SLAP, Perthes, reverse Bankart, and reverse Hill-Sachs lesions. Statistical analysis included Chi-square, Fisher's exact test, and descriptive statistics; $p < 0.05$ was considered significant.

RESULTS: Of 81 patients, 42 (51.9%) were male and 39 (48.1%) female; mean age was 54.95 ± 9.07 years. Partial-thickness rotator cuff tears (n = 19) showed male predominance (57.9%), while complete tears (n = 15) were more frequent in females (60.0%). Forty-seven patients had other pathologies including SLAP tears (n = 15) and tendinosis/bursitis/impingement (n = 32). Rotator cuff tears were most prevalent in the

50–59 year age group (36.4%). Farmers exhibited the highest combined tear burden (partial + complete: n = 19). Diabetes mellitus was the most common comorbidity (43.2% overall; 73.7% of the partial-tear group).

CONCLUSION: MRI reliably characterised the full spectrum of shoulder pathology. Rotator cuff disease predominantly affects middle-aged individuals with physically demanding occupations, and metabolic comorbidities—particularly diabetes mellitus—are strongly associated. These findings underscore the necessity of integrating MRI assessment with demographic and comorbidity profiling for optimal clinical decision-making.

1. INTRODUCTION

Shoulder pain is one of the three most common musculoskeletal complaints encountered in primary care, with a reported lifetime prevalence of 67% in industrialised populations.[1] The extraordinary range of motion of the glenohumeral joint—the most mobile articulation in the body—is achieved at the cost of inherent osseous instability, delegating joint congruence to an elaborate soft-tissue envelope comprising the rotator cuff, glenoid labrum, glenohumeral ligaments, and joint capsule.[2]

The rotator cuff is a conjoined tendinous sheath formed by the supraspinatus, infraspinatus, teres minor, and subscapularis tendons. These four muscles co-contract to compress and centre the humeral head within the glenoid cavity, generating a concavity–compression mechanism that is the primary dynamic stabiliser of the joint.[3] Disruption of this balance, whether through acute trauma or cumulative tendon degeneration, results in a clinical syndrome of pain, weakness, and restricted range of motion. Rotator cuff pathology encompasses a continuum from tendinosis and partial-thickness tears to full-thickness complete tears, with each stage carrying distinct prognostic and therapeutic implications.[3,4]

The glenoid labrum is a fibrocartilaginous annular structure attached to the rim of the glenoid, deepening the socket by approximately 50% and substantially increasing glenohumeral contact area. Superior labrum anterior-to-posterior (SLAP) tears and anteroinferior Bankart lesions are the archetypal labral injuries associated with shoulder instability, the former predominating in overhead athletes and the latter following acute anterior dislocations.[4] These lesions frequently coexist with rotator cuff pathology, complicating clinical recognition.

Clinical examination of the shoulder is hampered by overlapping symptomatology and modest sensitivity of individual provocative tests. Plain radiography is insensitive to soft-tissue pathology. Ultrasound, while cost-effective and dynamic, is operator-dependent and limited in deeper structures. Magnetic resonance imaging has emerged as the definitive non-invasive modality, offering multiplanar anatomical detail of tendons, labrum, cartilage, and bone without ionising radiation.[5,6] It permits not only detection but also systematic grading of tear characteristics—depth, size, tendon retraction, muscle atrophy, and fatty infiltration—each of which influences surgical eligibility and expected outcome.

Despite a substantial global literature, Indian-specific data on the prevalence and grading of these lesions remain limited, and information from Karnataka is largely confined to single-centre case series. The present study was therefore designed to systematically document the MRI-based prevalence, grading, and demographic correlates of rotator cuff and labral injuries in a tertiary-care population in Belagavi, Karnataka, thereby informing regional clinical practice and health-resource planning.

2. MATERIALS AND METHODS

2.1 Study Design and Setting

A prospective hospital-based cross-sectional study was conducted over 12 months (1 December 2023–1 December 2024) at the Department of Radiodiagnosis, Dr Prabhakar Kore Hospital and Research Centre, Belagavi, Karnataka—a 1,100-bed government-aided tertiary referral centre affiliated with Jawaharlal Nehru Medical College (JNMC), KAHER.

2.2 Sample Size

Using the formula $n = p(100 - p)Z^2/E^2$, with a reference prevalence (p) of 70% (Chowdhary et al.[7]), Z = 1.96 at 95% confidence, and E = 10% maximum acceptable error, the calculated sample size was 80.64, rounded up to 81 participants.

2.3 Eligibility Criteria

Inclusion: Adults aged 20–75 years of either sex presenting to the Departments of Orthopaedics or Radiodiagnosis with shoulder pain, restricted movement, or instability, who provided written informed consent.

Exclusion: Rheumatoid arthritis; glenohumeral degenerative joint disease; prior shoulder surgery; neurological deficit; fracture of the shoulder girdle; or standard contraindications to MRI (pacemaker, ferromagnetic implant, claustrophobia).

2.4 MRI Protocol

All examinations were performed on a 1.5 Tesla MRI system with a dedicated shoulder surface coil. The patient was positioned supine with the arm in adduction and the palm in a neutral medial position. Standard sequences included coronal oblique T1-weighted (T1W), coronal oblique fat-suppressed proton-density (FSPD), sagittal oblique T1W and STIR, and axial T2W/FSPD sequences. Image matrix was 512 × 512; field of view 14–16 cm; slice thickness 3–4 mm with a 0.5 mm gap.

2.5 MRI Evaluation Criteria

Rotator cuff: Tears were diagnosed when fluid signal traversed the tendon on STIR, FSPD, or T2W sequences. Partial-thickness tears were sub-classified by surface (articular, bursal, or interstitial) and graded by depth: small (< 3 mm), medium (3–6 mm or < 50% thickness), large (> 6 mm or > 50% thickness). Full-thickness tears were sized as small (< 1 cm), medium (1–3 cm), large (3–5 cm), or massive (> 5 cm) in the anteroposterior dimension. Tendon retraction was described as near the humeral insertion, at the humeral dome, or at the glenoid level. Supraspinatus muscle atrophy was assessed on medial sagittal images using the tangent sign: mild (muscle apex even with the coracoid-scapular spine line), moderate (concave), or severe (barely visible). Fatty infiltration was graded on T1W sagittal images as minimal (few fatty streaks), mild (muscle > fat), moderate (equal), or advanced (fat > muscle).

Rotator cuff interval: The long head of biceps tendon (LHBT) was assessed for subluxation, dislocation, tendinosis, partial tears, and tenosynovitis. The biceps-labral complex was classified as Type 1, 2, or 3. Biceps pulley lesions and anterosuperior impingement were noted in LHBT instability cases.

Labral and bony pathology: Anterior instability lesions were categorised as Bankart (soft tissue), bony Bankart, Perthes, or ALPSA. Posterior instability lesions included reverse Bankart and POLPSA. Hill-Sachs and reverse Hill-Sachs lesions were identified on axial images at or above the coracoid level. Acromion morphology was classified as Type 1 (flat), 2 (curved), 3 (hooked), or 4 (upturned) on sagittal oblique sequences.

2.6 Statistical Analysis

Data were entered into Microsoft Excel and analysed using SPSS version 26.0. Continuous variables are expressed as mean ± standard deviation. Categorical variables are expressed as frequencies and percentages. Between-group comparisons were performed using Chi-square or Fisher's exact test as appropriate. A p-value < 0.05 was considered statistically significant.

2.7 Ethical Approval

The study was approved by the Institutional Ethics Committee, JNMC, KAHER, Belagavi (Reference: JNMC/IEC/2023). Written informed consent was obtained from all participants. Patient identity was anonymised; only aggregated or coded data appear in this report.

3. RESULTS AND DISCUSSION

3.1 Baseline Characteristics

A total of 81 patients were enrolled. The mean age was 54.95 ± 9.07 years (range 31–75 years). Males constituted 51.9% (n = 42) and females 48.1% (n = 39) of the cohort. The occupational distribution included farmers (n = 24; 29.6%), teachers (n = 22; 27.2%), business professionals (n = 21; 25.9%), housewives (n = 26; 32.1%), and retired officers (n = 3; 3.7%).

3.2 Gender Distribution by Pathology Category

Table 1. Gender-wise distribution of shoulder pathology categories (n = 81)

Pathology Category	Male (n)	Female (n)	Total (n)	% of Total
Partial-thickness tear	11 (57.9%)	8 (42.1%)	19	23.5%
Complete (full-thickness) tear	6 (40.0%)	9 (60.0%)	15	18.5%
SLAP tear	—	—	15	18.5%
Tendinosis / bursitis / impingement	—	—	32	39.5%
Total	42 (51.9%)	39 (48.1%)	81	100%

Partial tears showed male predominance (57.9% male); complete tears showed female predominance (60.0% female). SLAP, tendinosis, and other category sex distribution follows the cohort ratio.

Among 42 males, 11 had partial tears, 6 had complete tears, and 25 had other pathologies (SLAP tear or tendinosis). Among 39 females, 8 had partial tears, 9 had complete tears, and 22 had other pathologies. The female predominance in the complete tear group (60.0%) was a notable finding consistent with emerging evidence that female sex may predispose to more advanced tear progression.

3.3 Age-wise Distribution

Table 2. Classification of rotator cuff and shoulder pathologies by age group (n = 81)

Age Group (years)	Partial Tear (n)	Complete Tear (n)	Total RCT (n)	SLAP Tear (n)	Tendinosis/Bursitis/Impingement (n)
40–49	6 (31.6%)	4 (26.7%)	10	5 (33.3%)	12 (37.5%)
50–59	9 (47.4%)	7 (46.7%)	16	4 (26.7%)	11 (34.4%)
60–69	2 (10.5%)	2 (13.3%)	4	6 (40.0%)	7 (21.9%)
≥ 70	2 (10.5%)	2 (13.3%)	4	0 (0.0%)	2 (6.2%)
Total	19	15	44	15	32

RCT = rotator cuff tear. Mean age of the cohort: 54.95 ± 9.07 years. The 50–59 year group contributed 36.4% of all rotator cuff tears.

Rotator cuff tears peaked in the 50–59 year age group, which contributed 9 of 19 partial tears (47.4%) and 7 of 15 complete tears (46.7%), accounting for 36.4% of all rotator cuff tears (16/44). SLAP tears showed a bimodal tendency, with a secondary peak in the 60–69 year age group (40.0% of SLAP tears). Tendinosis, subacromial bursitis, and impingement were most prevalent in the 40–59 year age band (71.9% of this category). No SLAP tear was identified in the ≥70 year group.

3.4 Occupational Distribution

Table 3. Distribution of shoulder pathologies by occupation (n = 81)

Occupation	Partial Tear (n)	Complete Tear (n)	Others – SLAP & Tendinosis (n)	Total (n)	% of Cohort
Business	7	6	8	21	25.9%

Farmer	11	8	5	24	29.6%
Housewife	7	9	10	26	32.1%
Teacher	9	6	7	22	27.2%
Retired Officer	0	1	2	3	3.7%
Total	34	30	32*	81†	100%

*Others include 15 SLAP tears and 32 tendinosis/bursitis/impingement; patients could have co-existing pathologies. †Total patients = 81. Farmers constituted 45.8% and 53.3% of partial and complete tear groups, respectively.

Farmers constituted the single largest group in both the partial tear (n = 11; 57.9% of partial tears) and complete tear (n = 8; 53.3% of complete tears) categories. Housewives showed a disproportionate representation in the complete tear group (n = 9; 60.0%). Teachers contributed 9 of 19 partial tears (47.4%). Business professionals and retired officers were comparatively less affected by rotator cuff tears. The pattern is consistent with the hypothesis that sustained repetitive or forceful overhead activity accelerates tendon degeneration.

3.5 Comorbidity Profile

Table 4. Association of comorbidities with rotator cuff tear categories (n = 81)

Comorbidity	Partial Tear (n = 19)	Complete Tear (n = 15)	Others (n = 47)	Total (n)	% Total
None	10 (52.6%)	12 (80.0%)	15 (31.9%)	37	45.7%
Diabetes mellitus (DM)	14 (73.7%)	11 (73.3%)	10 (21.3%)	35	43.2%
Hypertension (HTN)	2 (10.5%)	3 (20.0%)	4 (8.5%)	9	11.1%
DM + HTN	3 (15.8%)	4 (26.7%)	3 (6.4%)	10	12.3%

DM = diabetes mellitus; HTN = hypertension. Percentages within each pathology column exceed 100% where comorbidities co-exist. Overall DM prevalence in the cohort: 43.2%.

Diabetes mellitus was the most prevalent comorbidity, present in 35 patients (43.2%) overall. Its burden was especially high among patients with rotator cuff tears: 73.7% of the partial-tear group (n = 14) and 73.3% of the complete-tear group (n = 11) were diabetic. The combined DM + HTN category was identified in 10 patients (12.3%). These findings suggest that metabolic dysregulation may have a pathophysiological role in tendon degeneration, a hypothesis supported by the known effect of advanced glycation end-products on collagen cross-linking.

3.6 Gender Distribution – Comparison with Literature

The near-equal sex distribution in the present cohort (M:F = 1.08:1) contrasts with the male predominance reported in most Western series. Chowdhary et al.[7] observed a 70.4% male predominance, Lansdown et al.[8] reported 61.9% male, and Yamamoto et al.[9] similarly found higher rotator cuff tear prevalence in men. Dharshika et al.[10] recorded 56% male in an Indian series.

Critically, however, the present data reveal a nuanced sex-specific pattern at the sub-category level: partial tears were more common in males (57.9%) while complete tears predominated in females (60.0%). This divergence suggests that while men may sustain rotator cuff injuries more frequently—possibly reflecting higher physical occupational exposure—women who do develop tears may progress more rapidly to full-thickness lesions. Hormonal influences on collagen metabolism, particularly oestrogen-mediated tendon laxity following menopause, and the cumulative ergonomic demands of domestic work may underlie this finding. Future prospective studies should stratify by menopausal status and specific occupational biomechanics.

3.7 Age Distribution – Comparison with Literature

The mean age of 54.95 ± 9.07 years and the predominance of rotator cuff tears in the 50–59 year age band (36.4%) are consistent with the established paradigm of age-related tendon degeneration. Chowdhary et al.[7] reported 33.3% of their patients as being over 50 years; Yamamoto et al.[9] demonstrated a stepwise rise in tear prevalence with advancing age in their population-based study; and Dharshika et al.[10] observed the highest case density in the 40–49 year group. The present mean age is higher than the 40.28 ± 7.89 years reported by Koparde et al.[11] in a rural Konkan cohort, possibly reflecting differences in referral patterns, disease severity thresholds for MRI referral, and occupational exposure duration.

The bimodal SLAP tear distribution—clustering in the 40–49 and 60–69 year age groups—warrants comment. In younger patients, SLAP tears are typically post-traumatic or sports-related. The secondary peak in the seventh decade likely reflects the evolution described by Lansdown et al.,[8] who demonstrated a statistically significant increase in SLAP prevalence in patients aged > 65 years ($p < 0.001$), consistent with degenerative superior labral detachment accompanying posterior capsular contracture.

3.8 Occupational Analysis

The dominant representation of farmers in both partial (57.9%) and complete (53.3%) tear groups aligns with the biomechanical literature on repetitive overhead loading. Yamamoto et al.[9] documented higher tear prevalence in manual labourers, and Khan et al.[12] demonstrated a dose-response relationship between occupational shoulder exposure and tear severity among gym trainers. Koparde et al.[11] reported manual workers as the largest occupational group (37.5%) in their Indian sample. In Karnataka, agricultural activities—particularly rice cultivation, sugarcane harvesting, and cash-crop picking—involve sustained overhead and forceful shoulder use that may impose cumulative microdamage on the supraspinatus critical zone, a watershed region of relative avascularity.

The disproportionate burden of complete tears in housewives (60.0%) merits consideration. Household work is rarely characterised by overhead loading but involves prolonged low-intensity repetitive tasks (sweeping, grinding, lifting) that may incrementally compromise tendon vascularity and stimulate degenerative matrix remodelling, particularly in the context of concurrent metabolic disease.

3.9 Comorbidity Associations

Diabetes mellitus emerged as the single most important comorbidity, present in 73.7% of partial-tear patients and 73.3% of complete-tear patients. This is congruent with Koparde et al.,[11] who reported diabetes in 40.0% of their series, and substantially higher than the general Karnataka diabetic prevalence of approximately 11–15%.[13] The mechanistic link between diabetes and rotator cuff pathology is well-established: advanced glycation end-products (AGEs) cross-link tendon collagen, reducing elasticity and increasing stiffness; reactive oxygen species (ROS) generated under hyperglycaemic conditions impair tenocyte metabolism and angiogenesis; and microvascular disease reduces nutritive blood flow to the already hypovascular critical zone. Clinically, diabetic patients present with larger tears at diagnosis, higher postoperative re-tear rates, and inferior functional recovery.

Hypertension was present in 11.1% of the cohort, lower than the 27.5% reported by Koparde et al.[11] Gumina et al.[14] demonstrated that hypertensive individuals faced an approximately two-fold risk of large rotator cuff tears and nearly four-fold risk of massive tears compared with normotensive individuals, postulating that chronic arterial hypertension compromises the microvascular supply of the supraspinatus tendon. The combined DM + HTN group (12.3% of the present cohort) may represent the highest-risk subpopulation for rapid progression.

3.10 MRI Findings and Clinical Implications

MRI reliably distinguished the full spectrum of pathology encountered. The ability to simultaneously grade tear dimensions, characterise tendon retraction (which influences reparability), quantify atrophy using the tangent sign, and stage fatty infiltration provides a comprehensive pre-operative roadmap unavailable with ultrasound or plain radiography. Supraspinatus was the most commonly involved tendon across all tear categories, consistent with its position within the coracoacromial arch and the anatomy of the critical zone.

SLAP tears were identified in 18.5% of the cohort; associated Hill-Sachs and bony Bankart lesions were detected in relevant subgroups, highlighting the value of axial imaging planes in characterising instability-related osseous defects. Adhesive capsulitis was documented in several patients, underscoring the breadth of shoulder pathology that MRI can evaluate in a single examination.

3.11 Strengths

This study offers several important strengths. First, it adopts a comprehensive pathology-inclusive approach, examining not only rotator cuff tears but the full spectrum of shoulder soft-tissue and bony pathology—tendinosis, bursitis, SLAP lesions, labral tears, and adhesive capsulitis—in a single MRI-based framework. This mirrors real-world clinical complexity where multiple lesions coexist.

Second, the demographic stratification by age, sex, and occupation, combined with systematic comorbidity profiling, enables a multifactorial interpretation of findings that extends beyond simple prevalence reporting. Third, the nearly equal sex distribution (M:F = 1.08:1) minimises selection bias and improves external validity. Fourth, findings were benchmarked against national and international comparators, strengthening interpretive confidence.

3.12 Limitations

The cross-sectional design precludes causal inference; the temporal relationship between comorbidities and tear onset or progression cannot be established. The single-centre design and hospital-based recruitment introduce potential referral bias; patients represent a self-selecting symptomatic subgroup rather than the general population.

The sample size of 81, while statistically adequate for the primary objectives, limits statistical power in sub-group analyses, particularly for less frequent pathologies (e.g., posterior instability lesions). The absence of validated clinical outcome measures (e.g., Constant-Murley score, ASES score, QuickDASH) prevents correlation between structural severity and functional impairment—a limitation acknowledged as clinically significant.

MRI arthrography was not routinely performed; non-arthrographic MRI has lower sensitivity for partial-thickness tears and labral lesions compared with MR arthrography, and the true prevalence of these conditions may be underestimated. Additionally, potential confounders including smoking status, BMI, serum lipid levels, duration of occupational exposure, and prior conservative treatment were not systematically recorded.

3.13 Illustrative Cases

Representative MRI images from the study cohort are presented below, illustrating the spectrum of rotator cuff and labral pathology encountered.

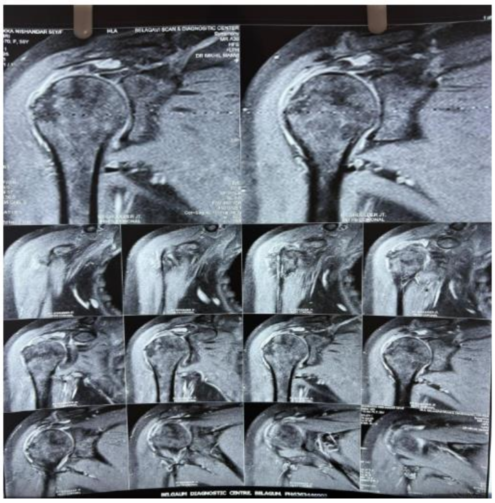

Figure 1. Case 1 — Complete (full-thickness) supraspinatus tear. Coronal oblique fat-suppressed PD/T2-weighted images showing a full-thickness defect of the supraspinatus tendon with fluid signal traversing its entire width, in a 55-year-old female.

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CASE 2: SAP TEAR

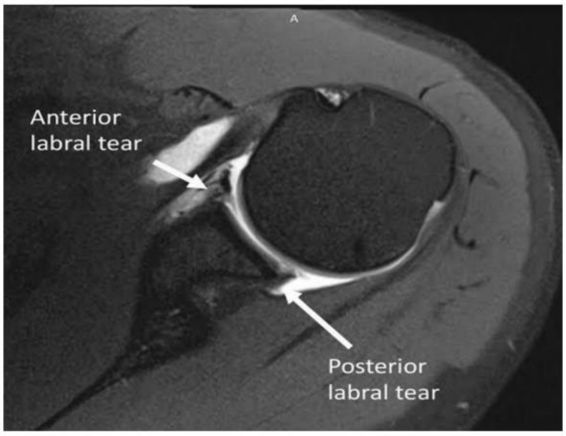

Figure 2. Case 2 — SLAP tear. Axial fat-suppressed image demonstrating fluid signal extending into both the anterior and posterior labrum, consistent with a superior labrum anterior-to-posterior (SLAP) tear.

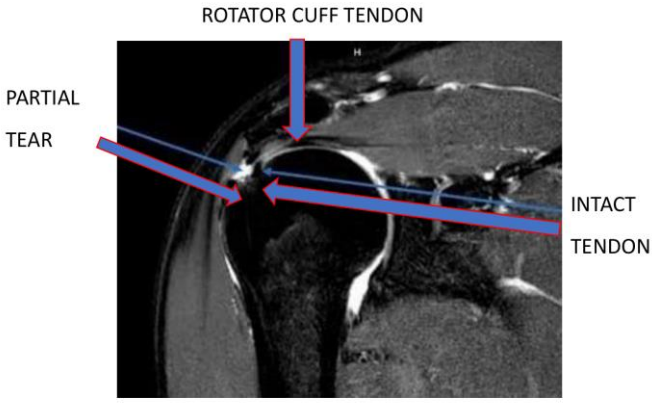

Figure 3. Case 3 — Partial-thickness supraspinatus tear. Coronal image showing focal articular-surface fibre discontinuity (arrow) with the remaining tendon substance intact, distinguishing a partial tear from a full-thickness defect.

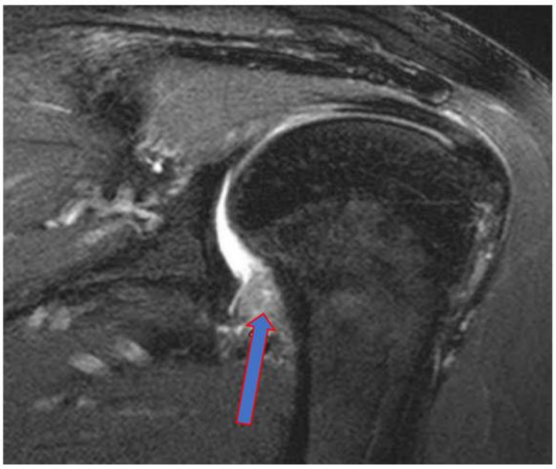

Figure 4. Case 4 — Adhesive capsulitis. Sagittal fat-suppressed image showing thickening and oedema of the rotator interval and axillary pouch capsule (arrow), characteristic of adhesive capsulitis.

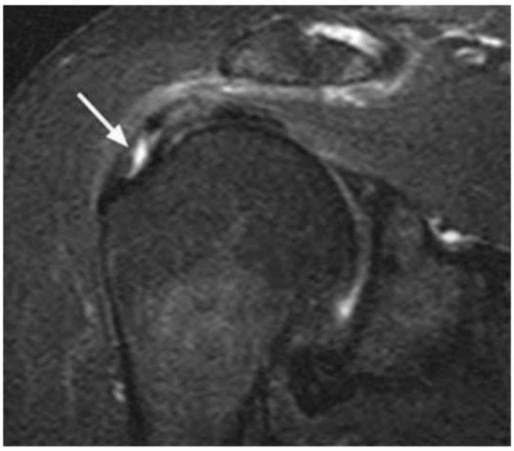

Figure 5. Case 6 — Partial-thickness supraspinatus tear. Coronal oblique image demonstrating a focal hyperintense partial-thickness tear (arrow) at the critical zone of the supraspinatus footprint.

BUCKET ANDLE ,HILL-SACH LESION)

Figure 6. Case 7 — SLAP tear with bucket-handle labral displacement and Hill-Sachs lesion. Coronal image of the right shoulder demonstrating labral tear morphology and an associated posterosuperior humeral head impaction defect.

BANKART LESION)

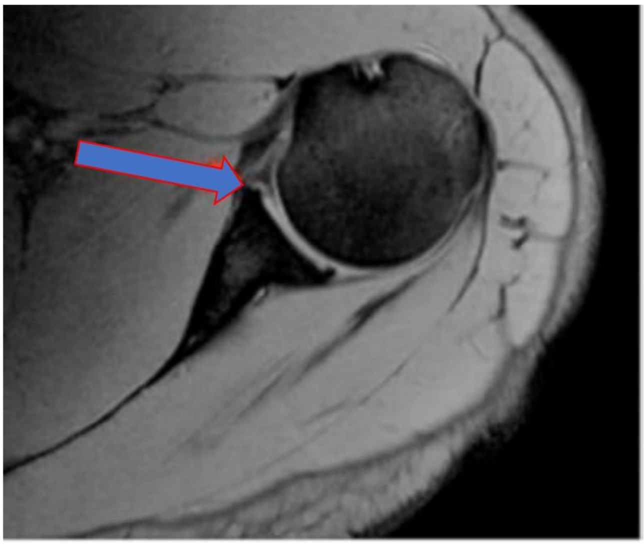

Figure 7. Case 8 — Bankart lesion. Axial image of the right shoulder showing detachment of the anteroinferior labrum from the glenoid rim (arrow), diagnostic of a soft-tissue Bankart lesion.

CASE 9: FULL THICKNESS SUPRASPINATUS TEAR WITH SUBACROMIAL BURSITIS

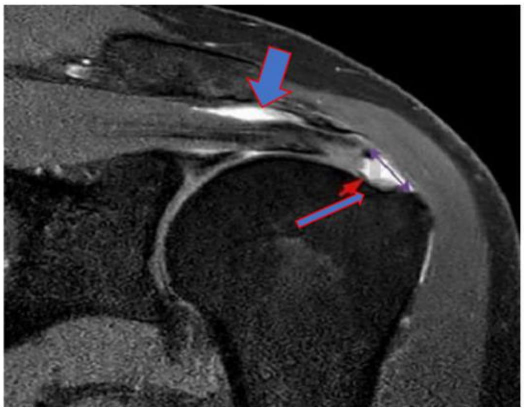

Figure 8. Case 9 — Full-thickness supraspinatus tear with subacromial-subdeltoid bursitis. Coronal fat-suppressed image showing a full-thickness tendon defect (blue arrow) with adjacent fluid distending the subacromial-subdeltoid bursa (red arrow).

4. CONCLUSION

This MRI-based cross-sectional study provides a detailed characterisation of the prevalence, grading, and demographic correlates of rotator cuff and labral pathology in a tertiary-care south Indian population. The principal findings are fourfold:

1. Rotator cuff tears predominantly affect individuals in the fifth and sixth decades, with the 50–59 year age group accounting for more than one-third of all tears.

2. A noteworthy sex-specific gradient exists: partial tears are more common in males, reflecting occupational exposure, whereas complete tears occur disproportionately in females, possibly implicating hormonal and domestic-ergonomic factors in tear progression.

3. Occupations involving repetitive or forceful shoulder activity—particularly farming and housework—are strongly associated with rotator cuff tears, reinforcing the imperative for targeted primary prevention in these groups.

4. Diabetes mellitus is present in over 70% of patients with rotator cuff tears and is the most prevalent metabolic comorbidity, underscoring the pathophysiological role of glycation-mediated collagen degradation in tendon vulnerability.

Magnetic resonance imaging proved indispensable for comprehensive, objective evaluation of shoulder pathology. Integrating MRI findings with demographic and comorbidity data enables precise risk stratification, informs surgical planning, and facilitates accurate prognostication. Future multi-centre longitudinal studies incorporating MR arthrography, validated outcome scores, and BMI/biochemical profiling are warranted to further delineate the determinants of rotator cuff disease in the Indian population.

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AUTHOR CONTRIBUTIONS

Dr Puneet Chamakeri: Conceptualization, Study Supervision (Guide).

Dr Sangamesh B. Umachagimath: Investigation, Data Collection.

Dr Arati Patil: Supervision.

Dr Santosh Y. Nelogi: Writing – Original Draft, Writing – Review & Editing.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ETHICS STATEMENT

The study was approved by the Institutional Ethics Committee, Jawaharlal Nehru Medical College (JNMC), KAHER, Belagavi (Reference: JNMC/IEC/2023). Written informed consent was obtained from all participants prior to enrolment.

DATA AVAILABILITY STATEMENT

Data supporting the findings of this study are available from the corresponding author upon reasonable request.

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