

Evaluation of Sacroiliac Joint Radiographic Patterns in Relation to Clinical Profile Among Individuals with Inflammatory Low Back Pain

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Abstract

Background: Sacroiliac joints (SIJs) are frequently implicated in Inflammatory low back pain (ILBP) and are often associated with axial spondyloarthritis. MRI is the gold standard in the early identification of ILBP. However, standard radiography still plays an important role in initial assessment, particularly when resources are limited. To investigate the relationship between radiographic changes in the sacroiliac joints and clinical / laboratory parameters in patients presenting with ILBP, focusing on the relevant use of radiography. **Material and Methods:** A cross-sectional study took place from January 2024 to August 2025, involving 100 treatment-naive patients aged 18-55 years who met ASAS criteria for inflammatory low back pain. Demographic, clinical, and laboratory data were collected (HLA-B27, CRP, ESR). Bilateral Sacroiliac joint radiographs (AP and oblique views) were graded according to Modified New York criteria (2). Data was analyzed using SPSS v26. Chi-square and t-tests were used to assess associations among variables ($p < 0.05$). **Results:** The study included 56 male subjects and 44 female subjects (mean age = 33.6 ± 8.9 years). The mean symptom duration was 36.2 ± 24.7 months. Of the total cohort, 89% presented with radiologic sacroiliitis. Of those with sacroiliitis, Grade 2 was present in 40%, Grade 3 in 27%, and Grade 4 in 7%. Of the cohort, 58% presented with symmetric involvement of sacroiliitis. The HLA-B27 antigen was positive in 22% of participants, and there were more positive HLA-B27 results among those with symmetric sacroiliitis ($p = 0.03$). CRP was elevated in 42% of individuals, with elevated CRP correlated with higher radiological severity ($p = 0.01$). **Conclusion:** In the event of limited MRI access, Conventional radiography shows considerable diagnostic utility in patients with chronic ILBP. The association of inflammatory markers with higher sacroiliitis grades underscores the importance of imaging in early evaluation. Awareness among clinicians and early access to radiology services will lead to earlier diagnosis and improved outcomes.

Keywords: Inflammatory back pain, sacroiliitis, HLA-B27.

Received: 15 September 2025

Revised: 25 October 2025

Accepted: 11 November 2025

Published: 15 November 2025

INTRODUCTION

Inflammatory low back pain (ILBP) is the most common symptom of axial spondyloarthritis and is one of the major contributors to disability in young adults. The clinical diagnosis of sacroiliitis is an assessment of inflammation of the sacroiliac joints (SIJs) and precedes any involvement of the spine. Early detection is demonstrated by MRI, which allows visualization of bone marrow edema; however, conventional X-ray is also essential. Conventional X-ray is readily accessible, relatively inexpensive, and can also demonstrate chronic structural damage. Recent studies (Navallas et al., 2021; Mandl et al., 2023) indicate that early imaging and clinical profiling improve prompt treatment and prevent long-term fusion. Due to limited resources, many healthcare systems have to rely on conventional X-ray assessment for prompt diagnosis.^[1-5]

The purpose of this study was to relate clinical and laboratory findings to radiographic patterns of sacroiliitis in ILBP patients in an Indian population, reaffirming the value of radiography in the diagnostic pathway.

A hospital-based cross-sectional study was performed at a Radiodiagnosis department of Medical College from January 2024 to August 2025. Inclusion criteria: Adults aged 18–55 years with ≥ 4 months of low back pain fulfilling ASAS inflammatory back pain criteria. Exclusion criteria: History of trauma, malignancy, spinal deformity, infection, or prior biologic therapy.

Data Collection

Demographic information (age, sex, duration of symptoms), clinical data (morning stiffness, peripheral arthritis, enthesitis), and laboratory data (HLA-B27 status by flow cytometry, CRP and ESR by nephelometry) were collected.

Radiographic Protocol:

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DOI:

10.21276/amit.2025.v12.i3.178

How to cite this article: Dash S, Dash B. Evaluation of Sacroiliac Joint Radiographic Patterns in Relation to Clinical Profile Among Individuals with Inflammatory Low Back Pain. Acta Med Int. 2025;12(3):791-793.

MATERIALS AND METHODS

Study Design and Population

Radiographs of the bilateral sacroiliac joints (anterior-posterior and 30° oblique views) were performed using a digital radiography system. Two independent radiologists, with no access to clinical information, graded the sacroiliac joints according to the modified New York criteria (grades 0-4). Any discordance in the grading response was resolved through consensus.

Statistical Analysis:

Continuous variables were summarized as means ± SDs, and categorical variables were summarized as percentages. Independent-sample t-tests or Chi-square tests were conducted to assess group differences. Spearman’s rho was used to determine correlations among radiographic grade, inflammatory markers, and HLA-B27. The statistical significance threshold was set at $p < 0.05$.

RESULTS

Table 1: Demographic and Clinical Characteristics

Parameter	Value / Distribution
Sample size	n = 100
Males / Females	56 / 44
Mean age (years)	33.6 ± 8.9
Mean duration of ILBP (months)	36.2 ± 24.7
Morning stiffness > 30 min	72 %
Peripheral arthritis	21 %
Enthesitis	16 %

Table 2: Laboratory Parameters

Parameter	Positive (%)	Mean ± SD
HLA-B27	22 %	—
Elevated CRP	42 %	11.8 ± 7.3 mg/L
Elevated ESR	47 %	28.5 ± 11.9 mm/h

HLA-B27 positivity was higher in males (27 %) vs. females (15 %), but not statistically significant ($p = 0.09$).

Table 3: Radiographic Findings

Grade (Modified NY Criteria)	Frequency (%)
Grade 0 (Normal)	11
Grade 1 (Suspicious)	15
Grade 2 (Mild)	40
Grade 3 (Moderate)	27
Grade 4 (Severe)	7

Symmetrical sacroiliitis was seen in 58 %, asymmetrical in 31 %, and unilateral in 11 %. Symmetric cases exhibited significantly higher mean CRP and ESR ($p = 0.01$).



Figure 1: Conventional radiographs of the sacroiliac joints in a 32-year-old female with a 5-year history of inflammatory low back pain, demonstrating bilateral Grade 2 sacroiliitis (arrows). (a) Anteroposterior view; (b) Oblique view.

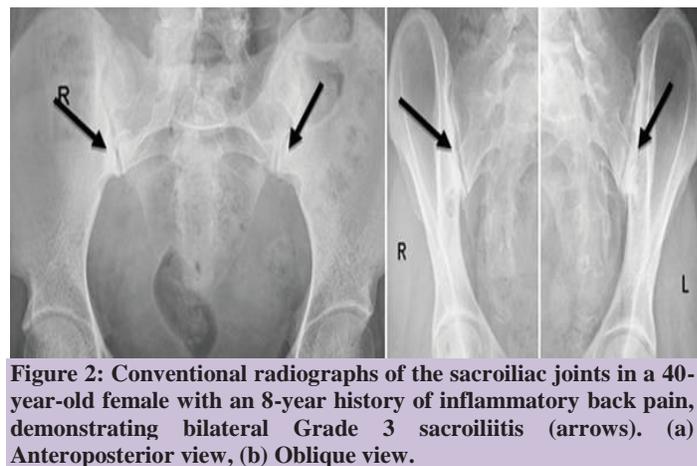


Figure 2: Conventional radiographs of the sacroiliac joints in a 40-year-old female with an 8-year history of inflammatory back pain, demonstrating bilateral Grade 3 sacroiliitis (arrows). (a) Anteroposterior view, (b) Oblique view.

Correlation Analysis:

- Both CRP ($r = 0.42, p < 0.01$) and ESR ($r = 0.36, p = 0.02$) found positively correlated with radiographic grade.
- HLA-B27 significantly associated with symmetric sacroiliitis pattern ($p = 0.03$).

- There was no significant correlation was observed between symptom duration and radiographic grade ($p = 0.12$).

DISCUSSION

Our investigation revealed that traditional radiographic imaging, while limited in diagnosing early inflammatory changes, still shows typical radiographic findings characteristic of chronic ILBP. The overwhelming majority of patients (nearly 90%) demonstrated radiographic sacroiliitis, regardless of diagnostic delay. It was particular to chronic ILBP patterns, suggesting advanced disease similar to the trends in developing countries. The average age of diagnosis (≈ 33 years) is identical to that reported by Park et al. (2021) and Singh et al. (2023). The HLA-B27 positivity rate (22%) was much lower than Western reports ($\approx 80\%$ in AS), demonstrating the regional genetic variability observed by Rajan et al. (2022). The association between higher CRP and increased radiographic grade indicates ongoing inflammatory activity that persists and leads to structural joint changes.^[6-9]

Although MRI is superior for early diagnosis (Hofmann et al., 2020), radiographic evaluation, when provided in an optimized manner, may be an effective triage tool for evaluating ILBP in low-resource and peripheral settings. Our results indicate a radiology-led screening strategy for patients with chronic ILBP, in conjunction with clinical assessment and serologies.

CONCLUSION

1. As a result of delayed diagnosis, at the time of presentation, Radiographic sacroiliitis is very common among ILBP patients.
2. Higher CRP and ESR levels had a strong association with sacroiliitis grade severity.
3. Symmetric joint involvement is associated with HLA-B27 positive status.

4. In resource-limited settings, radiography is a practical front-line imaging method that allows a connection to MRIs later. Clinical Implication: Implementing early referral to radiology departments for standardised Sacroiliac joint imaging can significantly reduce diagnostic latency and improve patient outcomes.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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