



Original Article

Correlation of Radiographic Findings of Sacroiliac Joint with Clinical Profile in Patients with Inflammatory Low Back Pain: An Observational Study

Shamrendra Narayan¹, Tanu Mishra¹, Vikram Singh², Tushant Kumar¹, Mridu Singh², Vandana Tiwari³, Nitin Dikshit¹, Arvind Singh⁴

Departments of ¹Radiodiagnosis, ²Medicine, ³Biochemistry and ⁴Community Medicine, Dr. Ram Manohar Lohia Institute of Medical Sciences, Lucknow, Uttar Pradesh, India.



***Corresponding author:**

Dr. Tanu Mishra,
Junior Resident,
Department of Radiodiagnosis,
Dr. Ram Manohar Lohia
Institute of Medical Sciences,
Lucknow, Uttar Pradesh, India.

tanusadhna94@gmail.com

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ABSTRACT

Introduction: Inflammatory back pain (IBP) is a prominent clinical symptoms in patients with spondyloarthropathy (SpA) affecting young adults and is an important cause of morbidity in the productive age group. SpA characteristically involves sacroiliac joints (SIJs). For the diagnosis of early sacroiliitis, though magnetic resonance imaging (MRI) is the preferred method, conventional radiography has been routinely used for the evaluation of sacroiliitis. Active inflammation in SIJs cannot be assessed on radiographs and they usually appear normal in the early phase of IBP. This study aims to study the clinical and radiographic patterns of IBP in Indian scenario.

Materials and Methods: Treatment naive patients with low back pain and subsequently diagnosed with IBP as per Calin criteria were identified. The clinical and laboratory parameters of these patients were recorded. SIJ radiographs of these patients were analyzed.

Results: Fifty-two patients were registered with 57% of subjects being female. The mean age of onset of symptoms was 32–33 years with a mean duration of symptoms being 40.9 months. No significant difference was noted in the age of onset or duration of illness in males and females. Human leukocyte antigen-B27 (HLA-B27) positivity rate was only 8.7%. About 38.4% of cases demonstrated active inflammation at presentation. Most of the cases (94.2%) though presented for the first time had radiographic evidence of sacroiliitis. A maximum number of cases (38.4%) were seen in Grade 2, followed by Grade 3 (30.8%). Cases with symmetrical sacroiliitis were more (57.1%) as compared to asymmetrical/unilateral sacroiliitis. HLA-B27 positivity in symmetric cases was 10.9% as against 12.5% in asymmetric cases.

Conclusions: There is often delay in the diagnosis of sacroiliitis. This is, in contrast, to profile in developed nations where early detection of the disease occurs ultimately leading to the usefulness of early therapy. Appropriate measures need to be taken in the health-care sector to increase awareness among people and treating physicians and sensitize them to IBP and its associated morbidities. In the present scenario, where the majority of cases are presenting in the chronic stage of the disease, radiography may be advocated in resource poor areas to decrease burden and cost related to the use of MRI.

Keywords: Sacroiliitis, X-ray, Inflammatory low back pain

INTRODUCTION

Inflammatory back pain (IBP) is characterized by insidious onset pain which is associated with morning stiffness, persists for at least 3 months and shows improvement with exercise.^[1] IBP

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is one of the leading clinical symptoms in patients with spondyloarthritis (SpA).^[2] It predominantly affects young adults and is an important cause of morbidity in productive age group.^[3] Sacroiliac joints (SIJs) are characteristically involved in SpA leading to joint inflammation of varying degrees, with predominant involvement of its cartilaginous portion.^[4] For the diagnosis of early sacroiliitis, though magnetic resonance imaging (MRI) is the preferred method, conventional radiography has been routinely used for the evaluation of sacroiliitis. Active inflammation in SIJs cannot be assessed on radiographs and they usually appear normal in the early phase of IBP.^[5] Depending on the diagnostic criteria used, IBP prevalence in the Western world varies from 3% to as high as 7%.^[6-8] While many studies on demographics and imaging features of IBP have been done in the Western part of the world, comparable studies in Indian population are still lagging, highlighting the lack of sensitivity in present health-care system towards this common disease entity with high morbidity. This study aims to study the clinical and radiographic patterns of IBP in Indian scenario.

MATERIALS AND METHODS

A prospective study was conducted after getting approval from the institutional ethics committee. The period of this study was 9 months (January 2019 to September 2019). Treatment naive patients attending general medicine outpatient clinics/rheumatology clinics with low back pain and subsequently diagnosed with IBP as per Calin criteria were identified and included in this study after obtaining informed written consent.^[9] Subjects having low-back pain which was preceded by an event of trauma in lower back region, subjects who were known case of congenital/acquired lower spinal deformity or prolapsed inter-vertebral disc and subjects who were known case of malignancy/infective etiology which can potentially involve bones/spine were excluded from this study. The clinical parameters of these patients were recorded, which included age and sex of the patient and duration of IBP. Human leukocyte antigen-B27 (HLA-B27) status and C-reactive protein (CRP) levels were recorded. Detection of HLA-B27 was done using flow cytometry and CRP levels were assessed using immunonephelometry. These patients underwent conventional radiography of their bilateral SIJs (anteroposterior [AP] and oblique views). Radiographs of the SIJs were evaluated according to modified New York criteria for sacroiliitis.^[10] Radiographs were independently read by two experienced radiologists having experience of nineteen years and 10 years respectively, and blinded to clinical parameters of the patient. Any discrepancy was sorted out with consensus and re-observation. In cases with asymmetric radiographic changes, higher of the two grades were assigned.

Statistical analysis

The data were collected on a pre-designed schedule and entered into Microsoft Excel[®]. The dichotomous variables were recorded as proportions, normally distributed continuous variables were presented as mean \pm standard deviation and non-normally distributed continuous variables were presented as median and interquartile range. Two-tailed probability (*P*) was calculated to test the statistical significance at the 5% level of significance. The data were analyzed using statistical package SPSS version 23.0. The establishment of association between nominal variables was done using Chi-square test and *t*-test.

RESULTS

Over a period of nine months, a total of 52 patients were registered in this study with 57% of subjects being female. Their demographic details are summarized in Table 1. The mean age of the patient at symptoms onset was 32.2 years for males and 33.2 years for females. The mean duration of IBP was 40.9 months. No significant difference was noted in the age of onset or duration of illness in males and females.

The clinical parameters of subjects are summarized in Table 2. Of all patients, 46 patients could undergo testing for HLA-B27. HLA-B27 positivity was noted in only 8.7% subjects whereas 65.2% of subjects had negative HLA-B27 status. The rest of the subjects showed borderline HLA-B27 status. There was no significant difference in the positivity of this gene in male (10%) and female (7.7%) groups. Borderline HLA-B27 status was commoner in males (45%) than females (11.5%). About 38.4% of cases demonstrated active inflammation (raised CRP levels) at presentation. Rest, though presenting for treatment for the first time, did not show raised CRP levels.

Radiographic observation is summarized in Tables 3 and 4. Most of the cases (94.2%) though presented for the first time had radiographic evidence of sacroiliitis. A maximum number of cases (38.4%) were seen in Grade 2 [Figure 1], followed by Grade 3 (30.8%) [Figure 2]. Although there was an equal

Table 1: Demographic characteristics of subjects and duration of inflammatory back pain.

Parameter	Frequency	Percentage
Gender		
Male	22	42.3
Female	30	57.7
Presenting age (year) (mean and range)		
Male	32.27 (18–50)	<i>t</i> -value 0.365 <i>P</i> -value 0.7164
Female	33.20 (18–49)	
Disease duration (months) (mean and standard deviation)		
Total	40.96 \pm 37.80 (3–120)	<i>t</i> -value -0.014 <i>P</i> -value 0.9889
Male	41.05 \pm 40.07 (3–120)	
Female	40.90 \pm 36.75 (3–120)	

Table 2: Laboratory characteristics of subjects.

Parameters	HLA-B27 (n=46)*			CRP (n=52)
	Positive n (%)	Borderline** n (%)	Negative n (%)	Positive n (%)
Total(n=46)	4 (8.7)	12 (26)	30 (65.2)	20 (38.4)
Male (n=20)	2 (10)	9 (45)	9 (45)	7 (31.8)
Female (n=26)	2 (7.7)	3 (11.5)	21 (80.77)	13 (43.3)

Table 3: Radiological characteristics of subjects.

Parameter	Grade 0	Grade 1	Grade 2	Grade 3	Grade 4
Total	4	20	41	17	2
Male	1	6	21	4	2
Female	3	14	20	13	0

Table 4: Radiological characteristics of subjects.

Parameters	Sacroiliitis	
	Definite (n=31)	Suspicious (n=18)
Symmetric	18	10
Asymmetric	9	7
Unilateral	4	1

distribution of cases in Grade 2, higher percentage of females were seen in Grade 3.

Cases with symmetrical sacroiliitis were more (57.1%) as compared to asymmetrical/unilateral sacroiliitis [Table 4]. HLA-B27 positivity in symmetric cases was 10.9% as against 12.5% in asymmetric cases.

DISCUSSION

SIJ is a complex joint. It has two well-differentiated parts – a lower ventral synovial part and an upper dorsal interosseous part. The hyaline cartilage in SIJ is thinner along the iliac aspect of the joint.^[11,12] During the imaging of SIJ, consideration of their complex anatomy is required. SIJs course obliquely from lateral to medial position due to which there is a substantial overlap of ilium with sacrum on standard AP projection of pelvis in the supine position. To avoid misdiagnosis, additional oblique views of bilateral SIJs are taken along with standard AP projections. Alternatively, PA projection techniques can be used in which the patient lies in prone position and X-ray tube is angled by 25-30 degrees.^[5] SIJs are essentially involved in the pathogenesis of SpA.^[13] SIJ involvement in SpA leads to IBP of varying intensity. Radiographs cannot assess active inflammation in SIJs and usually appear normal in the early phase of IBP. Chronic changes in SIJ are well appreciated on conventional radiographs in the form of erosions, sclerosis, pseudo-widening of joint space, and joint space narrowing ultimately leading to bony ankylosis.^[14]



Figure 1: Conventional radiograph of sacroiliac joints in a 32-year-old female who presented with inflammatory back pain for 5 years, showing bilateral Grade 2 sacroiliitis (arrows) (a) anteroposterior view (b) oblique view.



Figure 2: Conventional radiograph of sacroiliac joints in 40-year-old female who presented with inflammatory back pain for 8 years, showing bilateral Grade 3 sacroiliitis (arrows) (a) anteroposterior view (b) oblique view.

Modified New York criteria have been proposed for grading of sacroiliitis on conventional radiography. According to modified New York criteria, five grades of sacroiliitis from Grade 0 (normal SIJ) to Grade 4 (ankylosis) can be differentiated.^[10]

Our study group had higher female cases that were unlike the observation of Braun and Sieper who reported that males are affected slightly more than females.^[15] Furthermore, our observation is not consistent with that of Weisman who reported a higher incidence of IBP in males.^[11] Although the mean age of onset of symptoms was slightly higher in females and mean duration of symptoms was higher in males, there was no significant difference between the two genders statistically ($P < 0.05$). This result may be attributed to relatively small sample size in our study.

HLA-B27 positivity was noted in only 8.7% of the total study population, whereas 26% had borderline values. Borderline HLA-B27 status was commoner in males than females. This difference is statistically significant ($P < 0.05$). Our



Figure 3: Conventional radiograph of sacroiliac joints in a 45-year-old male who presented with inflammatory back pain for 10 years, showing bilateral Grade 4 sacroiliitis (arrows) (a) anteroposterior view (b) oblique view.

observation is consistent with Feldtkeller *et al.* who reported a higher incidence of HLA-B27 positivity in males.^[16] However, overall HLA-B27 positivity reported in our cases is 9.6% which is low in contrast to Woodrow and Eastmond who reported higher HLA-B27 positivity in cases with IBP.^[17] Our observation is as per the statement that the strength of association between HLA-B27 status and IBP is weak in Middle-East, South-East Asian, and sub-Saharan countries as compared to the Western population.^[8] HLA-B27 positivity in Ankylosing Spondylitis (AS) group (symmetric sacroiliitis group) was relatively lower (10.9%) than in the non-AS (asymmetric sacroiliitis) group. This observation shows that HLA-B27 positivity in our AS group is much lower than that observed in the Western world where HLA-B27 positivity in AS group is approximately 90%.^[8]

In our study, only 38.4% of study subjects presented with raised CRP levels. The majority of patients despite being treatment naïve, presented with normal CRP levels indicating the fact that in our population majority of patients with IBP present in chronic stages of sacroiliitis. Our observation is in accordance with Cowling *et al.* who reported that patients with clinically assessed active disease had higher mean CRP and ESR levels.^[18]

Radiographic sacroiliitis was noted in a significantly high number of cases (94.2%). The percentage of patients with radiographic sacroiliitis is much higher in this study as compared to Sudol-Szopińska *et al.* who reported radiographic sacroiliitis in 14% of cases.^[19] Changes in SIJ in cases of IBP pass through different stages from the early stages of edema/synovitis to the late stage of ankylosis. X-ray changes are observed in late stages of the disease and the aim of our intervention should be not to reach a stage where X-ray changes are visible as that is an irreversible stage and the damage causes chronic morbidity, especially in an active population. This observation is unlike observation reported by Lacout *et al.* where most of the cases presented early.^[20]

In our study, females presented with higher grades of sacroiliitis (43.3% females presented with Grade 3 sacroiliitis) as compared to males (22.7% males presented with Grade 3/4

sacroiliitis) [Figures 2 and 3]. This observation is contrary to Western data, which reports the presence of higher grades of sacroiliitis in males.^[8,19] Our observation indicates that females patients in our study group had chronic forms of sacroiliitis and they presented late as compared to their male counterparts likely due to neglect and lack of awareness.

Symmetric (AS type) sacroiliitis was noted in 57% of patients (66.7% males and 33.3% females). This observation is in accordance with Stolwijk *et al.* who reported higher incidence and prevalence of AS in male population.^[8]

CONCLUSIONS

Sacroiliitis is common in cases with clinical IBP in our clinics. Although literature advocate MRI as the gold standard for evaluation of sacroiliitis, present data show a high proportion of cases in chronic phase. Hence, after a proper clinical screening especially when acute phase reactants are not high, radiography may be advocated in resource poor areas to decrease the burden and cost of MRI.

Radiographic changes in SIJs in cases of IBP represent permanent structural damage to the joints, and the majority of our cases had evidence of chronic sacroiliitis. In Indian scenario, there is often delay in diagnosis of active sacroiliitis partly due to limited resources and partly due to ignorance of patients and most patients with IBP end up into chronic sacroiliitis. This is, in contrast, to profile in developed nations where early picks are features and thus the usefulness of early therapy.

Appropriate measures need to be taken in the health-care sector to increase awareness among people and treating physician and sensitize them to IBP and its associated morbidities.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms.

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Conflicts of interest

There are no conflicts of interest.

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