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RESEARCH ARTICLE

Sacroiliitis in patients with low backache with Normal Lumbosacral spine MRI

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Abstract

The detection and characterization of sacroiliac lesions on MR imaging has been well established, but its presence during evaluation of low backache cases has not been fully analyzed.

Aim: determine the presence of sacroiliitis in cases with low back ache found to have a normal lumbosacral spine MRI and analyze its prevalence and radiological patterns

Patients and Methods: A diagnostic study recruit 72 patients, they referred for lumbosacral spine MRI (1.5 Tesla) unit (16 channel coil) in Al-Sader- Medical City between March and August of the last year. Patients with abnormal LSS MRI were excluded .Information was taken from all patients about past medical and surgical history. Patients with normal LSS MRI were further evaluated for SIJ fast spin echo MRI applying the following study protocol: FSE coronal T1 WI & T2 WI STIR if abnormal finding seen then intravenous contrast gadolinium-DTPA about 0.1 mmol/ kg of body mass was injected and rescanned 10 minutes after injection to rule out the existing sacroiliitis or other SIJ abnormalities.

Results: 72 patients with mean age of 33.2 ± 10.11 years ,male to female ratio was (1:2.483), a small but significant number of patients with sacroiliitis seen in patients with normal LSS MRI, there was no significant statistical differences between patients with normal finding and those with sacroiliitis. Three-fifth of the patients show narrowing of the joint space and one fifth show widening. The study revealed that all the patients had articular erosion and one fifth of the patients showed bone marrow edema. Conclusions: Sacroiliac joint lesions accounts small but significant number of lower backache patients. The enforcement of the diagnostic value and utility of adding a single fat suppressed sequence of the lumbo-sacral region in the coronal plane; adds marginally to the scan time but increases the yield of identifying incidental or manifest sacroiliac involvement in all cases referred for MRI for low backache.

Keywords: Sacroiliitis, Lumbosacral Spine, Magnetic Resonance Image.

1 | INTRODUCTION

The diagnosis of infectious sacroiliitis is difficult, many times delayed because of its insidious clinical presentation with non-specific and poorly localized signs, frequently simulating abdominal syndromes, lumbar discopathies or lumbosciatalgia. CT and MRI allow an earlier diagnosis, but are not able to define the etiologic agent. Generally radiographic alterations can be observed only two or three weeks after the first symptoms onset while on contrast-enhanced MRI, alterations can be observed within up to three days, showing MRI higher sensitivity (1-3). CT findings in the infectious process are the same of those observed in the sacroiliitis of spondyloarthropathies, except for the juxtarticular bone demineralization considered as the earliest finding besides signs suggestive of soft tissues involvement and unilaterally of the process(4).
MRI, besides determining alterations in the affected sacroiliac joint and in the contiguous bone, also clearly demonstrates the involvement of adjacent soft tissues or collections, frequently posteriorly to the iliopsoas muscle these findings being highly suggestive of infectious involvement and not seen in spondyloarthropathies(1,3,4-7). The intravenous gadolinium injection can more accurately define these soft tissues involvement(4,5,7).

The main disadvantages of MRI are:

High cost, low availability, and long duration of examination (30 minutes) although the latter is well tolerated by the majority of patients included (1, 2 8, 9) 10-16-13-18)
Aim of study: The aim of this study was to determine the presence of sacroiliitis in cases with low backache found to have a normal lumbosacral spine MRI and analyze its prevalence and radiological pattern.

2 | PATIENTS AND METHODS

A diagnostic correlative study done prospectively to include(72) patients (21male and 51 female) aged (17-55 years) at MRI Unit in Al-Sader-Medical City, Al- Najaf governorate/ Iraq for a period of six months (from March 2017 to August 2017).
All selected patients were already referred to the MRI unit for lumbosacral spine evaluation because of low backache.
LSS fast spin echo MRI was done for the patients using MRI machine Philips Acheiva 1.5 Tesla. The applied matrix was: 512X224, Slice width: 4 mm. Protocol of LSS MRI is: T2WI sagittal, T1WI sagittal, T2WI axial and T1 WI sagittal

Qualitative and quantitative composition:

Active substance:
Dimeglumine gadopentetate 1ml aqueous injection solution contains 469 mg of gadopentetate dimeglumine (corresponding to 0.5 mmol of gadopentetate dimeglumine, corresponding to 78.63 mg of gadolinium). Patients with normal LSS MRI were further evaluated &examines for SIJ MRI by coronal T1 WI & T2 WI STIR if abnormal finding seen then we further evaluate the patient with intravenous contrast gadolinium (Magnevist® 0.5 mmol/ml) about 0.1 mmol/ kg to rule out the existing SIJ abnormalities that explaining patient symptoms.
We evaluate the features of active inflammation; peri-articular bone marrow edema, synovitis and capsulitis/ enthesitis
Peri-articular edema, visible as a region of increased signal intensity of bone marrow in fast spin echoT2weighted images, and the enhancement after contrast media administration was evaluated in T1 +contrast image
Inclusion criteria: patients who have low back ache with normal LSS

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MRI, between the age of (17-55 year) were included.

Exclusion criteria: any patient with abnormal finding in LSS MRI examination was excluded from this study even if he/ she has abnormality in SIJ.

Data collection: Age, gender, past medical and surgical history documented in questionnaire.

Ethical consideration: Data and information of the participants were kept confidentially and not disclosed to unauthorized personal the study protocol was approved by the council of Faculty of Medicine/ Kufa University and the Department of Radiology, Official agreements were obtained, and Patients agreements were obtained.

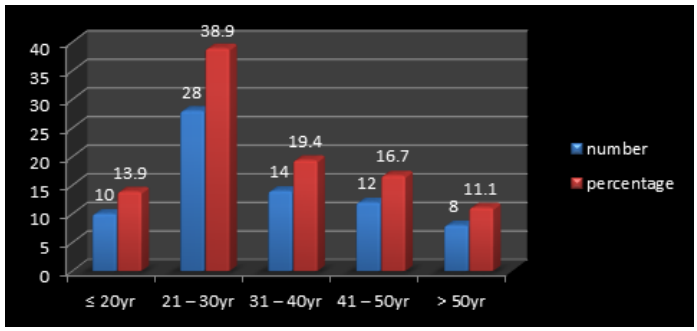
Statistical analysis

Data of the studied group were entered and analyzed using the statistical package for social sciences, SPSS, version 24. Descriptive statistics presented as mean, standard deviation (for the age), frequencies and proportions (for categorical variables). Chi square test was used to compare patients with and without sacroiliitis with regard to age group and gender. Level of significance, P. value of less than or equal 0.05 was considered as significant. Results presented in tables and figures with an explanatory paragraph for each.

3 | RESULTS

The studied group consisted of 72 patients, with a mean age of 33.2 ± 10.11 (range 17 – 55) years, females were 51/72, represented 70.8% of the studied group, (figure 1 A and B).

According to the findings of the studied group, only 7 patients (9.7%) had sacroiliitis, while the remaining 65 patients had not, (Figure 2).



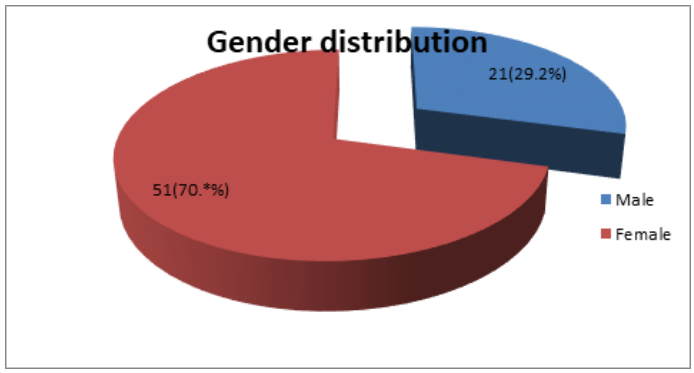
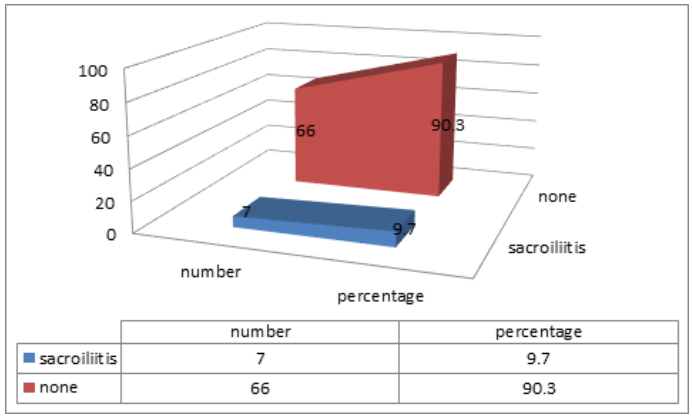


Figure 1. A and B: Age and gender distribution of the studied group (N = 72)



	number	percentage
sacroiliitis	7	9.7
none	66	90.3

Figure 2 Distribution of Sacroiliitis among the studied group

Furthermore, the 7 patients with sacroiliitis were compared to those with no sacroiliitis regarding the age and gender, this comparison revealed no statistically significant differences between the two subgroups neither in age, nor gender, indicated that the incidence of sacroiliitis was insignificantly affected by the age or gender of the patient, in both comparison (P>0.05), (figure 3 A and B).

The clinical characteristics of the 7 sacroiliitis patients are shown in tables (3, 4, 5& 6) in addition to (figure 3. 2).

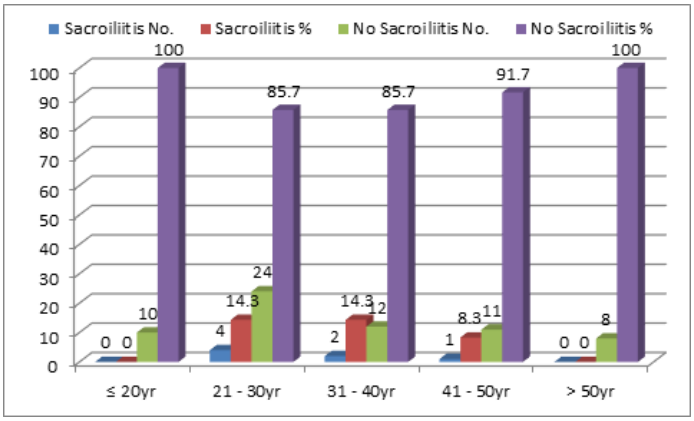


Figure 3A.Distribution of Sacroiliitis according to age of the studied group

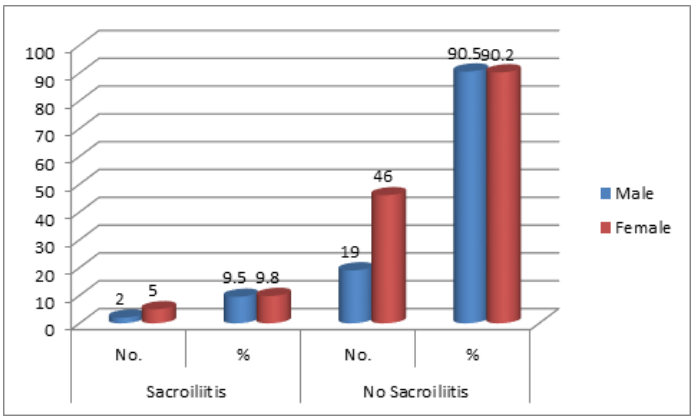


Figure 3B: .Distribution of Sacroiliitis according to gender

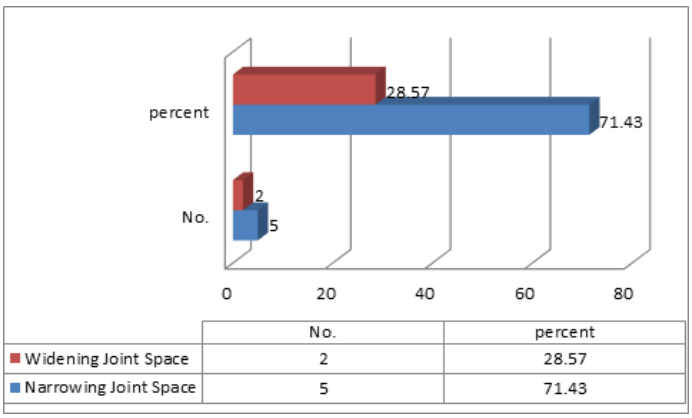


Figure 4: Joint Space characteristics of the patients with sacroiliitis

Regarding the Joint Space characteristics, narrowing was reported in 5 patients (71.43%) and widening in 2 patients (28.57%), (figure 4). The Lesion characteristics of the 7 patients with sacroiliitis revealed that all of them (100%) had Articular erosions, in addition, 2 patients had marrow edema (28.57%), (figure 5) .

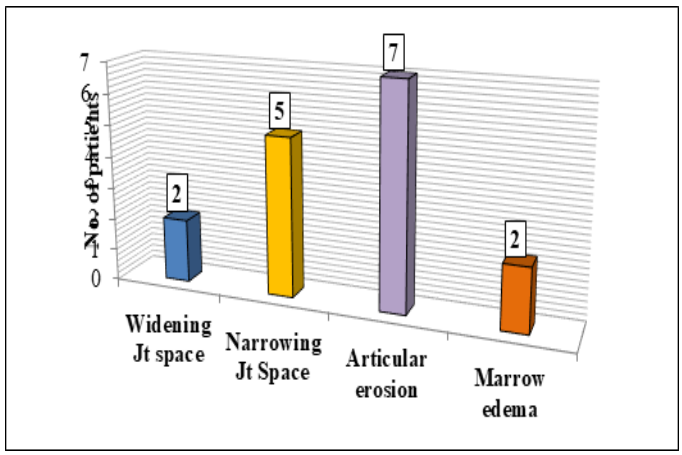


Figure 5: Pattern of MRI in Sacroiliitis patients (N =7)

(Figure 5) summarizes the sacroiliitis patients MRI pattern, including 5 narrowing, 2 widening joint space, 7 articular erosions and 2 marrow edema

4 | DISCUSSION

The true prevalence of sacroiliac joint lesions is unknown in most population groups, either with or without low backache. This study analyses the presence of sacroiliitis in MRI of lumbar spine referred for low backache, signifying the importance of this less highlighted entity in correct assessment of low backache. Low back ache is a common referral cause in routine MRI practice. Clearly, it is one of the most common symptoms evaluated and treated by practitioners. It has been observed in USA that annually a 15% to 20% of the population has an episode of lumbosacral pain with low back symptoms occurring in 50% of working age adults (1) Low backache is associated

with a wide range of clinical disorders. The commonest group is mechanical disorders, which occurs in more than 90% of all episodes of backache, 10% of the remaining patients with backache have symptoms related to systemic illness, like cancer, inflammatory back disease or infection (10).

In our study we found 28.57% of the patients had marrow edema in the evaluation of the sacroiliac joint. MRI of normal sacroiliac joint reveals an intermediate signal of the cartilage of the synovial compartment on T1 and T2 images limited by the signal void of bone cortex. On T1FSE and Fast STIR images the cartilage has an intermediate to high signal. The marrow on T1, T2 and T1FS images has a homogeneous intermediate signal. Fat suppressed images are extremely useful in imaging of cases with sacroiliitis. Fat suppression causes rescaling of signal intensities, categorizes cartilage as the brightest structure(6,9) This additive effect along with the darkened appearance of fat in adjacent soft tissues and sacral, iliac and lumbar marrow, renders improved visualization of structures and increases the conspicuity of lesion, thereby improving their pickup rate. There are two fat suppressed sequences that are available: T1-weighted with fat suppression (T1FS) and fast short tau inversion recovery (Fast STIR) sequences. These are superior to T1 and T2 images, in demonstrating the changes of sacroiliitis(11).

The study was conducted by Hanly et al (12) has proposed that subchondral bone marrow edema is the earliest manifestation of the acute sacroiliitis, since 57% of their patients with subchondral bone edema did not present any sign of articular cartilaginous alteration. This theory is histopathologically corroborated by another study, by means of open biopsy in patients with initial stage of disease, where the earliest finding was subchondral inflammation. The sequence with highest sensitivity and specificity in detecting per articular bone marrow edema is the STIR sequence, since, differently from the conventional T2-weighted spin-echo sequence, it saturates de fat, differentiating it from fluid (1, 11)).

The limitation of this finding — subchondral bone marrow edema — is that it also occurs in early phases of the degenerative process resulting from vascularization of fibrous tissue. For differentiating them, it is important to observe the site of the edema, i.e., hyper signal on the synovial portion of the sacroiliac joint indicates inflammatory disease, and, on the ligamentous portion, indicates degenerative disease(13) the patient's age should be taken into consideration, since osteoarthritis is frequent in elder, asymptomatic patients. These alterations are characterized by marginal osteophytes, subchondral sclerosis, and eventually articular fusion(8,14) but unfortunately in our study we found that the incidence of sacroiliitis was insignificantly affected by the age or gender of the patient when compare to those with no sacroiliitis (p value more than 0.05) probably because of low sample size in this study. In normal population the sacroiliac joint space is influenced by age, gender, bone mass index and childbirth (15). Below the 40 years old the joint space is 2.49 ±0.66mm and above that age there is a high incidence of joint space narrowing (less than 2mm) and non-uniform joint space (15)33). Obese patients, multiparous women (with 3 or more child-births) had a high prevalence of non-uniform joint space as well as shortening of joint space in multiparous women (15).

we found in our study 71.43% of the patients have narrowing and 28.57% of the patients have widening, this in agreement with Bigos et al(1) 74% of the patients show joint space narrowing. This is mean missing early detection of sacroiliitis, since narrowing of sacroiliac joint is consider as stage 3(1,8, 12,16) .

In our study we found 100% of the studied patients have articular erosion.

Partial volume artifact between the synovial and ligamentous compartments can be misinterpreted as erosions. There is normally a region of high signal at the immediate subchondral marrow, on Fast STIR images, which can be mistaken for early sacroiliitis. A patchy distribution of fat within the bone marrow as the sole finding should not be considered as an indicator for sacroiliitis(17,18)

5 CONCLUSIONS

Low backache is one of the commonest referral in MRI scan centers .Sacroiliitis which is a demonstrable cause of low backache is often missed clinically or under estimate during routine MRI scanning of the lumber region. Sacroiliac joint lesions accounts for a small but significant number of low backache as evident from this study. This study highlights the diagnostic value and utility of adding a single fat suppressed sequence of the lumbo-sacral region in the coronal plane. This adds marginally to the scan time but increases the yield of identifying incidental or manifest sacroiliac involvement in all cases referred for MRI for low backache.

Recommendations:
1-To include fat suppressed sequence of LSS, coronal plane in every patients with LSS MRI
2-To emphasize and alert the clinician about the significance of sacroiliac joint as a cause for low backache.

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