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Prevalence of non-radiographic sacroiliitis in patients with psoriatic arthritis: a real-life observational study.

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Non-radiographic sacroiliitis in PsA

Abstract

Objective:

To establish the prevalence of non-radiographic sacroiliitis within a real-life sample of patients with psoriatic arthritis (PsA), using pelvic radiographs and magnetic resonance imaging (MRI) of sacroiliac joints (SIJ).

Methods:

This cross-sectional study included 107 consecutive adults with PsA (CASPAR criteria). Participants completed clinical and laboratory evaluation, pelvic radiographs scored for radiographic sacroiliitis according to the modified New York (NY) criteria, and non-contrast MRI of SIJ, scored by Berlin score and categorized into active sacroiliitis using the 2016 Assessment of Spondyloarthritis International Society (ASAS) criteria and structural sacroiliitis.

Results:

Radiographic sacroiliitis/NY criteria was detected in 28.7% (n=29), confirmed by MRI-detected structural lesions in 72.4% (n=21). Active sacroiliitis was detected by MRI in 26% (n=28) of patients, with 11% (n=11) qualifying for non-radiographic sacroiliitis. Patients with radiographic and non-radiographic sacroiliitis had similar clinical characteristics, except of a longer duration of psoriasis and PsA in the radiographic subgroup, 23.8±12.5 vs 14.1±11.7, p=0.032 and 12.3±9.8 vs 4.7±4.5 years, p=0.019, respectively. Inflammatory back pain (IBP) was reported in 46.4% (n=13) with active sacroiliitis and 27% (n=3) with non-radiographic sacroiliitis. The sensitivity of IBP for

detection of non-radiographic was low (27%) and moderate for radiographic sacroiliitis (52%), whereas specificity ranged from 72 to 79%, respectively.

Conclusion:

The prevalence of active sacroiliitis among a real-life population of patients with PsA was 26%. However, the prevalence of non-radiographic sacroiliitis was low (11%) compared to radiographic sacroiliitis (28.7%) seen in patients with longer disease duration. IBP was not a sensitive indicator for the presence of early stage sacroiliitis that was commonly asymptomatic.

Introduction

Psoriatic arthritis (PsA) is a multi-domain inflammatory disease, involving peripheral joints, entheses, and axial skeleton. Prolonged disease duration, severe peripheral joint disease, and presence of HLA-B27 have been associated with axial disease development in PsA.(1, 2) The reported prevalence of axial disease in PsA widely varies between 25% to 75%, based on disease duration (early versus long-term disease) and the definition of axial disease (clinical or radiographic). (3-7) Previous studies conducted in the PsA population used mainly conventional radiographs of sacroiliac joints (SIJ) for the detection of structural lesions (e.g. erosions and ankylosis) and diagnosis of *radiographic* sacroiliitis, applying the 1984 modified New York (NY) criteria developed for ankylosing spondylitis (AS).(8) While this method of assessment is broadly available, it has only moderate reliability and validity for the diagnosis of axial spondyloarthritis (axSpA), especially at the early stages of the disease.(9) Over the last decade, magnetic resonance imaging (MRI) has evolved as an important imaging modality for the detection of early inflammatory disease of SIJ prior to the development of structural damage apparent on conventional radiographs. According to the current terminology introduced by the Assessment of SpondyloArthritis International Society (ASAS), axSpA encompasses both *radiographic* and *non-radiographic* forms of sacroiliitis, differentiated by the presence or absence of structural lesions on pelvic radiographs, respectively.(10) Non-radiographic sacroiliitis is defined by the presence of active inflammation (subchondral bone marrow edema, BME) of SIJ depicted on MRI, in the absence of corresponding radiographic sacroiliitis.(11)

The clinical course of axial PsA can be highly heterogeneous, ranging from asymptomatic disease (5, 12, 13) to severe inflammatory back pain (IBP). Lack of IBP in patients with PsA commonly leads to a late diagnosis of the axial disease.(5, 12, 14) Early detection of axial PsA is thus important for monitoring disease activity and appropriate treatment initiation, as reflected in the international guidelines for the treatment of non-radiographic axSpA(15), underlining an ongoing need for investigating early axial disease in PsA.

To our knowledge, only limited data on the prevalence of MRI-detected sacroiliitis in patients with PsA is available. A Brazilian study conducted on patients with PsA (n=45) reported the prevalence of active inflammatory lesions of SIJ detected by MRI in 37.8% of patients.(16) In this study, the prevalence of non-radiographic sacroiliitis was not reported. Furthermore, little is known about the difference in clinical phenotypes of non-radiographic versus radiographic sacroiliitis in PsA. Herein, we conducted a cross-sectional observational study based on consecutively recruited patients with PsA aiming to establish the prevalence of non-radiographic sacroiliitis (*primary outcome)* within a real-life clinic sample. We further compared the clinical characteristics associated with non-radiographic versus radiographic sacroiliitis and investigated the correlation between the clinical indices of axial disease and MRI findings of sacroiliac joints (*secondary outcome)*.

Methods

Ethical considerations

The study was conducted according to the guidelines of the Declaration of Helsinki and the approval of the institute's review board (0352-13-TLV). All patients signed informed consent upon enrollment into the study.

Patients

Inclusion criteria: adult consecutive patients (≥ 18 yo) with PsA according to the CASPAR criteria(17) attending the Rheumatology Clinic of the Tel Aviv Medical Center, Tel Aviv, Israel, were eligible to participate in the study during the years 2016 to 2018.

Exclusion criteria: refusal to sign the written informed consent; pertinent exclusion criteria for a standard radiographic/MRI examination, such as pregnancy, claustrophobia, metallic foreign body (stent, coils, filters), implanted pacemaker or defibrillator, cochlear implants, insulin pump.

Study Design and Clinical Parameters

We conducted a cross-sectional observational study. The following patients' information was obtained: age, height, weight, psoriasis and PsA duration, comorbidities, history of previous and present medical treatments. A detailed history regarding the presence of back pain, including location, intensity, and duration of pain was collected. Assessment of IBP using ASAS criteria rendered positive in patients with chronic back pain (duration > 3 months) with 4 out of 5 variables present (age at onset < 40 years old, insidious onset, improvement with exercise, no improvement with rest, and nocturnal pain).(18) A comprehensive physical examination of PsA domains included the following measures/indices: 68 tender joint count, 66 swollen joints count, Leeds Enthesitis Index (LEI)(19), Maastricht Ankylosing Spondylitis Enthesitis Score (MASES)(20), Bath

Ankylosing Spondylitis Metrology Index (BASMI)(21). Participants completed patient reported outcome measures validated for use in axial PsA: Health Assessment Questionnaire (HAQ)(22), Bath Ankylosing Spondylitis Disease Activity Index (BASDAI)(23), Bath Ankylosing Spondylitis Functional Index (BASFI)(24), pain and patient's global assessment of disease activity measured using 1–100 visual analogue scales (VAS). Ankylosing Spondylitis Disease Activity Score (ASDAS)(25) was calculated. The disease activity of PsA was assessed by the Disease Activity index for PSoriatic Arthritis (DAPSA) score(26). This index is a composite measure, which comprises swollen and tender joint counts, patient global and pain assessment, and an acute phase reactant(26), that corresponds to joint damage and disability in PsA.(27) Peripheral PsA disease activity was defined based on the DAPSA score: remission (0-4), low (5-14), moderate (15-28) and high (> 28). Physicians' global assessment of disease activity was measured using 1–100 VAS.

The severity of *skin disease* was defined based on the psoriasis area and severity index (PASI)(28).

Laboratory assessment

All patients underwent HLA–B27 testing and C-reactive protein (CRP) level measurement.

Axial radiographic assessment

The axial disease was assessed in all study participants by an anterior-posterior pelvic radiograph of sacroiliac joints (SIJ) and semicoronal T1-weighted and STIR MRI sequences of SIJ, without contrast material. All MRI examinations were performed on a

1.5T unit (Optima 450W-70cm, GE Healthcare, Milwaukee, WI). The spine of these patients was also imaged by MRI for further evaluation.

The pelvic radiograph of each patient was independently interpreted by two separate experienced musculoskeletal radiologists (GF, ID), blinded to clinical data and MRI findings. *Radiographic sacroiliitis* was determined based on the 1984 modified New York criteria, considered positive in case of unilateral grade ≥3 or bilateral grade≥2 sacroiliitis on pelvic radiographs.(8) The final score was the average of the two readers. Inter-reader agreement (κ) between both readers was calculated and found to be good (κ=0.73).

MRI images were interpreted by a third experienced musculoskeletal radiologist (IE), blinded to the radiographs' findings and to clinical data. The intra-reader reliability was calculated, as the intraclass correlation coefficient (ICC), based on the repeated reading of 20 randomly selected MRI scans with an interval of one month between the readings. Intra-reader ICC for the reliability of MRI assessment of SIJ was good for erosions (0.71) and bone marrow edema (0.70), moderate for fat metaplasia (0.64), and poor for sclerosis (0.36), consistent with a limited ability of MRI to detect sclerosis of SIJ.(29)

SIJ on MRI were evaluated for the presence of active inflammatory according to the 2016 ASAS criteria. The presence of BME highly suggestive of sacroiliitis was defined as active sacroiliitis/ASAS(11), and the presence of structural lesions, such as erosions, fat metaplasia, subchondral sclerosis, and ankylosis, was defined as structural sacroiliitis.(30) SIJ were evaluated using a validated and accepted scoring method - the Berlin score as follows: each joint was divided into 4 quadrants. Each quadrant was

scored for osteitis/BME as follows: 0, absent (no osteitis); 1, less than 33% of quadrant area; 2, 33% or more to less than 66% of quadrant area; 3, 66% or more of quadrant area with a maximum score of 24.(31) Subchondral sclerosis was scored in the same way. Erosions were scored as follows: 0, normal joint margin; 1, 1-2 erosions; 2, 3-5 erosions; 3, >5 erosions. Fatty lesions and ankylosis are scored binarically: 0, absent; 1, present. *Non-radiographic* sacroiliitis was defined by the presence of active sacroiliitis/ASAS of SIJ on MRI in the absence of corresponding radiographic sacroiliitis on pelvic radiographs.(11)

Statistical analysis

Descriptive statistics of the study population was performed using mean and standard deviation for continuous variables and frequency tables for categorical variables. When applicable, continuous variables were compared using independent sample t-test for 2 samples and one-way ANOVA for more than 2 independent groups (with post-hoc tests when needed), and categorical variables were compared using chi-squared test of independence. The inter-reader agreement was determined by calculating kappa coefficient (κ).(32) To assess the diagnostic value of IBP for detecting radiographic sacroiliitis defined by X-ray and sacroiliitis defined by MRI (active or structural lesions in SIJs), sensitivity, specificity, negative and positive likelihood ratios, along with their respective 95% confidence intervals were calculated. Two-sided p-value < 0.05 was considered significant. All analyses were performed using Rstudio version 1.1.383.

Results:

Characteristics of the study population

The study included a total of 107 Caucasian patients with PsA, aged 49.7±12.5 years, with a nearly equal representation of both genders, males:females 53:54. The demographics and clinical characteristics of the study population are summarized in Table 1. The majority of patients had a long-standing psoriasis (≥5 years) and PsA (≥5 years), 83.2% (n=82) and 62% (n=65), respectively. Peripheral joint disease, assessed by DAPSA, was well-controlled in 58% of the study population: remission in 21% (n=22) and low disease activity in 37% (n=40). A third of patients (31%, n=33) had moderate disease activity, and a minority (11%, n=12) had high disease activity. The severity of psoriasis, assessed by PASI, was mild (PASI<7) in 93% (n=99) of patients.

A history of general back pain was present in 69% (n=74), predominantly in the lumbar region (55%, n=59). A history of IBP (ASAS criteria) was reported in a third of patients (29%, n=31), mainly in the lumbar area. Axial disease activity, assessed by ASDAS-CRP, was inactive in 26.4% (n=28), low in 17.9% (n=19), high in 47.2% (n=50), and very high in 8.5% (n=9) of patients. Only 4 patients (3.7%) were HLA-B27 carriers, with 2 of them diagnosed with radiographic (n=1) and non-radiographic (n=1) sacroiliitis. Concomitant fibromyalgia was detected in 10% patients (n=11), contributing to higher scores of disease activity indices and patient reported outcomes in this sub-group.

About half of patients (48%, n=51) were treated with synthetic disease modifying anti-rheumatic drugs (sDMARDs), with methotrexate being the most prevalent sDMARD (38%, n=41), followed by leflunomide (8%, n=9). A total of 38% (n=41) of patients were treated with biologics at the time of enrollment into the study. Tumor necrosis factor inhibitors (TNFi) constituted the most prevalent biologic treatment (33%, n=35),

followed by ustekinumab (4%, n=4), and secukinumab (2%, n=2). Exposure to any biologic treatment in the past or present was reported in 47% (n=50) of patients.

Radiographic and MRI outcomes

Imaging outcomes of SIJ imaging are presented in Figure 1. Active sacroiliitis/ASAS was detected in 26% (n=28) of patients. Among the cases with active sacroiliitis, 39% (n=11; 11% of the entire study population) qualified for non-radiographic sacroiliitis. Only 46.4% (n=13) of patients with active sacroiliitis and 27.3% (n=3) of patients with non-radiographic sacroiliitis reported IBP.

Radiographic sacroiliitis based on the modified NY criteria was detected in 28.7% of patients (n=29), confirmed by the presence of structural sacroiliitis by MRI in the majority of cases (72.4%, n=21). Six patients (5.6%) presented with isolated structural lesions of SIJ by MRI in the absence of corresponding radiographic structural changes. IBP symptoms were present in 41.4% (n=12) of patients with radiographic sacroiliitis. Notably, 8 patients with radiographic sacroiliitis had no evidence of active or structural sacroiliitis by MRI. The majority of this "positive XR/negative MRI" subgroup (75%, n=6) reported general back pain, which was consistent with IBP in only one patient. All were HLA-B27 negative. In comparison to the rest of the sample, "positive XR/negative MRI" patients had significantly worse functional limitation measured by BASFI, 4.6±1.7 versus 2.9±1.7, p= 0.041, respectively.

The comparison between the clinical characteristics of patients with non-radiographic and radiographic sacroiliitis in Table 2. Both subgoups had a similar gender distribution, age, BMI, and history of comorbidities. Patients with radiographic sacroiliitis had a

significantly longer duration of psoriasis and PsA compared to non-radiographic sacroiliitis subgroup, 23.8±12.5 versus 14.1±11.7 years, p=0.032 and 12.3±9.8 versus 4.7±4.5 years, p=0.019, respectively. There was no significant difference in the prevalence of IBP between both subgroups (41% in radiographic vs 27% in non-radiographic subgroup, p 0.648). Spinal mobility was lower in the radiographic sacroiliitis subgroup, as reflected by higher BASMI scores (mean±SD): 3.2±1.4 versus 2.2±0.9, p=0.046, respectively). Treatment pattern with sDMARDs and biologics was similar between both subgroups. Patients with radiographic sacroiliitis had an overall higher exposure rate to biologic treatments: 58.6% versus 18%, p=0.053, respectively. Patients with non-radiographic sacroiliitis and patients without radiographic or non-radiographic sacroiliitis had similar demographic, clinic, and treatment characteristics and patterns.

Notably, a small number of patients (5.6%, n=6) demonstrated structural sacroiliitis on MRI only, in the presence of normal pelvic XR. Comparison between this subgroup and patients with radiographic sacroiliitis showed a similar demographic, clinical and patient-reported outcomes profile.

We further explored the clinical phenotype of back pain, axial disease indices, and prevalence of the radiographic phenotype based on the gender difference (females n=54, males n=53). General lumbar back pain was significantly more prevalent in females compared to males (68.5%, n=37 versus 41.5%, n=22, p=0.009, respectively). The prevalence of IBP (33.3%, n=18 in females and 24.5%, n=13 in males, p=0.429) and radiographic outcomes (radiographic and non-radiographic sacroiliitis) was similar between females and males. Despite similar prevalence of sacroiliitis, females presented

significantly higher indices of axial disease activity, including BASDAI (mean ± SD 4.4±2.6 in females versus 3.4±2.0 in males, p=0.03), ASDAS-CRP (mean ± SD 2.4±1.1 in females versus 2.0+0.9 in males, p=0.049), BASFI (mean ± SD 3.4±2.4 in females versus 2.4±2.1 in males, p=0.032), and HAQ (mean ± SD 0.9±0.7 in females versus 0.5±0.6 in males, p=0.012). This observation might be potentially explained by a high prevalence of fibromyalgia among female patients (20.4%, n=11) compared to none among male patients in this cohort (p 0.002). The treatment pattern was similar between both groups.

An additional sub-analysis of the study population based on the exposure to any biologic treatment in the past or present revealed a trend toward a higher prevalence of non-radiographic sacroiliitis among patients not exposed to biologics (17.3%, n=9 versus 4.1%, n=2, p=0.07). The prevalence of radiographic sacroiliitis was similar in both groups.

Finally, we calculated the sensitivity and specificity of the IBP symptoms for the detection of sacroiliitis by XR and MRI, using imaging as the "gold standard" for the diagnosis of sacroiliitis (Table 3). Overall, the sensitivity of IBP was very low for a non-radiographic sacroiliitis detected by MRI (ranging from 17 to 27%), increasing to 52% for radiographic sacroiliitis, whereas specificity ranged from 72 to 79%, respectively. By comparing the positive LRs, IBP performed the best to rule in radiographic sacroiliitis based on the modified NY criteria (LR 2.46). By comparing the negative LRs, IBP performed the best for ruling out non-radiographic ASAS sacroiliitis (LR 0.35).

Discussion

This is the first study using concurrent imaging of SIJ by pelvic radiographs and MRI to determine the prevalence of non-radiographic sacroiliitis conducted in a large real-life clinic PsA sample. Detection of axial involvement in patients with PsA is important, as axial involvement is associated with worse outcomes and worse quality of life compared to patients with peripheral disease alone.(1, 33) Our findings indicate a low prevalence (11%) of non-radiographic sacroiliitis compared to radiographic sacroiliitis detected by pelvic radiographs and MRI in about a third of the study population. This low prevalence of non-radiographic sacroiliitis, indicating an early stage of axial disease, may be explained by the fact that the majority of patients had a long-standing psoriasis and PsA. While data on the prevalence of non-radiographic sacroiliitis among patients with PsA is limited, the prevalence of radiographic sacroiliitis in our study is consistent with a number of previous reports. (3, 7, 34) In addition, we evaluated the prevalence of structural lesions in the SIJ in the absence of inflammation on MRI, defined as "structural only non-radiographic sacroiliitis" (5.9%). The phenomenon of structural lesions, particularly erosions, present on MRI but not X-ray of the SIJ, has been previously reported in axial SpA and probably results from the reduced sensitivity and specificity of 2D pelvic radiographs compared to the 3D MRI.(35) While the prognostic implication associated with structural lesions in axial PsA is presently unknown, detection of these lesions may be potentially important for patients' management and follow-up. Moreover, we identified a small group of patients (7.9%) qualifying for radiographic sacroiliitis defined the modified NY criteria(8) in the absence of active/structural sacroiliitis on MRI, pointing to the low reliability of radiographic evaluation alone. (9, 36)

Our study points out the similar demographics, disease characteristics, and treatment patterns, including exposure to biologic treatments in the past and in the present, among patients with non-radiographic and radiographic sacroiliitis, with the only significant difference of a shorter duration of psoriasis and PsA among the former subgroup. Indeed, in the Toronto PsA cohort, 15% of patients without axial involvement at presentation developed axial disease during 10 years of follow-up.(1) Further, the clinical similarity between both subgroups is consistent with the observational data comparing patients with non-radiographic and radiographic axSpA. For instance, US-based CORRONA registry of patients with AS showed that both subgroups had comparable disease burden and similar treatment patterns.(37) Other studies in axSpA also reported similar levels of disease activity, overall physical impairment, health-related quality of life between these subgroups, while the non-radiographic-axSpA patients were more often female, had shorter mean disease duration and displayed lower levels of acute phase reactants.(38-42) Moreover, both subgroups had a similar rate of persistence and response to treatment with anti-TNF therapy over time.(42) Our study did not show female predominance in the non-radiographic group nor a significant difference in the level of inflammatory markers in blood. Overall, preliminary data on the axial disease in PsA is consistent with the accumulated data in AS/axSpA cohorts implying that both non-radiographic and radiographic forms of sacroiliitis represent a spectrum of the same axial disease at different stages.

On the clinical grounds, efficient screening for axial disease among patients with PsA is warranted. While the history of IBP is essential for the diagnosis of sacroiliitis, only 57.1% of patients with radiographic sacroiliitis and 27.3% of patients with non-

radiographic sacroiliitis reported the history of IBP in our study. This data is further supported by other studies, reporting a high prevalence of asymptomatic axial disease and transient nature of axial symptoms in PsA(5, 7, 12) A recent study reported the prevalence of MRI-detected acute sacroiliitis/ASAS in 37.8% of a clinic PsA sample (n=45), with low back pain reported only in 29.4% of patients with MRI-detected sacroiliitis. (16)Furthermore, clinical criteria for IBP developed for AS did not perform well when ascertaining axial involvement in PsA.(43) Thus, awareness of asymptomatic axial disease in patients with PsA is warranted, dictating the use of appropriate imaging for axial disease detection.

One of the unique features of this study is a very low prevalence of HLA-B27, confirming a similar observation reported in another PsA cohort in Israel.(44) The accumulating evidence supports the notion of HLA-B27 carriage being linked to susceptibility, extent, and severity of psoriatic axSpA (1, 2, 7, 45-47), with an exception of one study conducted in the UK that did not demonstrate a correlation between HLA-B27 and sacroiliitis diagnosed by MRI in patients with PsA.(48) Thus, other mechanisms seem to contribute to the pathogenesis of axial disease in our population.

Our study has a number of limitations. The cross-sectional design of the study precludes the observation of the development and clinical course of the radiographic findings. Inception cohort studies with a longitudinal follow up are needed to address this issue. There is a potential selection bias in the recruitment of this study population, with patients suffering from any type of back pain inclined to participate as opposed to asymptomatic patients. The study population is heterogeneous with variable disease duration and treatment exposures. Data on family history of SpA features is missing.

Finally, the definition of active sacroiliitis by MRI was based on the updated 2016 classification criteria for axial spondyloarthritis(11). The most updated definitions of other MRI SIJ lesions defined by the ASAS MRI working group 2019 were not applied in our study protocol.(49) Importantly, the definition for subchondral BME in the SIJ indicative of active sacroiliitis was not revised in 2019.(49)

To conclude, this study indicates that the prevalence of non-radiographic sacroiliitis among a real-life population of patients with PsA is low (11%) compared to radiographic sacroiliitis, prevalent in about 30% of patients, with longstanding disease. IBP is not a sensitive indicator for the detection of early-stage sacroiliitis, prompting the performance of MRI for diagnosis of sacroiliitis. These results further contribute to understanding of the axial disease pattern in PsA. Longitudinal follow up studies are warranted to explore the rate and factors affecting the progression of sacroiliitis from non-radiographic into a radiographic stage.

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Figure 1. Sacroiliitis prevalence based on pelvic radiographs and magnetic resonance imaging (MRI) in patients with psoriatic arthritis (n=107).

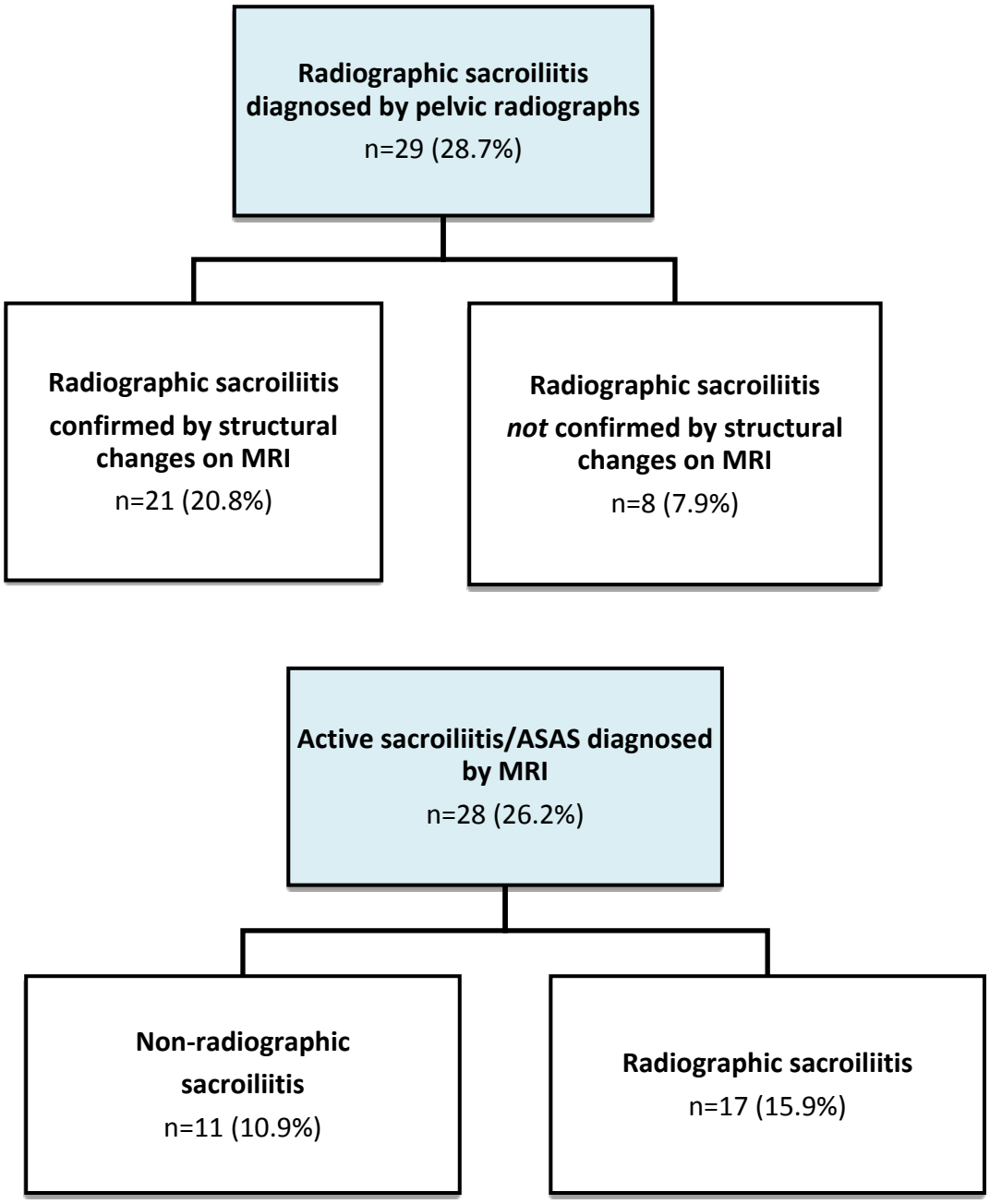

Figure 1 legend: Radiographic sacroiliitis was determined based on the 1984 modified New York criteria, considered positive in case of unilateral grade ≥3 or bilateral grade≥2 sacroiliitis on pelvic radiographs. Active sacroiliitis detected by MRI was defined based on the 2016 ASAS criteria. Non-radiographic sacroiliitis was defined by the presence of active sacroiliitis/ASAS of SIJ on MRI in the absence of corresponding radiographic sacroiliitis on pelvic radiographs.

Percentage is calculated related to the total study population.

Table 1. Patients characteristics (n=107).

Demographics and clinical characteristics	
Age, years ((mean, SD)	49.7 (12.5)
Gender M:F	53:54
Tender joint count (mean, SD)	5.5 (8.5)
Swollen joint count (mean, SD)	1.1 (2.8)
CRP, mg/L (mean, SD)	6 (7)
DAPSA (mean, SD)	15.3 (12.1)
LEI (mean, SD)	1 (1.2)
MASES (mean, SD)	1.4 (2.5)
Dactylitis (n, %)	16 (15%)
PASI (mean, SD)	3.8 (8.5)
Low back prevalence (n, %)	68 (63.5%)
Inflammatory back pain prevalence (n, %)	31 (29%)
Back pain intensity (patient VAS 0-10) (mean, SD)	3.3 (3.3)
BASDAI, (mean, SD)	3.9 (2.4)
ASDAS-CRP (mean, SD)	0.9 (2.2)

BASMI (mean SD)	2.7 (1.2)
BASFI (mean SD)	2.9 (2.3)
Current medication use	
Current sDMARD treatment (n, %) Current apremilast treatment (n, %)	51 (47.7%) 1 (0.9%)
Current biologic treatment (n, %) Anti-TNF (n, %) Anti-IL-17 (n, %) Anti-IL12/23 (n, %)	41 (38.3%) 35 (32.7%) 1 (0.9%) 3 (2.8%)
MRI SIJ scores	
Total Berlin score , (mean, SD)	6.9 (10.7)
Osteitis/bone marrow edema (0-24) (mean, SD)	1.6 (3.3)
Fat Infiltration score (0-24) (mean, SD)	1.3 (3.5)
Erosion score (0-24) (mean, SD)	3.4 (5.8)
Sclerosis score (0-8) (mean, SD)	0.4 (1.2)
Ankylosis score (0-8), (mean, SD)	0.3 (1.4)

Table 2. Comparison between psoriatic arthritis patients with radiographic and non-radiographic sacroiliitis.

Demographics and clinical characteristics	Radiographic sacroiliitis	Non-radiographic sacroiliitis	p value
Number of patients	29	11	---
Gender, female (n, %)	10 (34.5%)	4 (36%)	1.000
Age, mean, years (mean, SD)	52.5 (12.2)	47.6 (9.9)	0.247
BMI kg/m2 (mean, SD)	25.9 (5.8)	26.3 (5.4)	0.837
Active smoking status (n, %)	1 (3,4%)	1 (9.1%)	0.615
Fibromyalgia (n, %)	2 (6.9%)	0 (0.0)	0.935
Psoriasis duration, years (mean, SD)	23.8 (12.5)	14.1 (11.7)	0.032
PsA duration, years (mean, SD)	12.3 (9.8)	4.7 (4.5)	0.019
Tender joint count (mean, SD)	5.6 (8.9)	3.6 (4.7)	0.467
Swollen joint count (mean, SD)	0.9 (1.6)	0.9 (1.5)	0.933
CRP, mg/L (mean, SD)	8.7 (9.4)	7.1 (7.8)	0.617
DAPSA (mean, SD)	15.1 (12.5)	14.2 (7.2)	0.836
LEI (mean, SD)	0.7 (0.9)	0.6 (0.8)	0.564
MASES (mean, SD)	0.9 (1.9)	0.3 (0.7)	0.392

Dactylitis (n, %)	6 (20.7%)	3 (27.2%)	0.744
PASI (mean, SD)	8.2 (14.3)	2.0 (2.6)	0.166
Low back prevalence (n, %)	21 (72.4%)	8 (72.7%)	1.000
IBP prevalence (n, %)	13 (44.8%)	3 (27.3%)	0.515
Back pain intensity (patient VAS 0-10) (mean, SD)	3.0 (3.0)	2.5 (3.1)	0.591
BASDAI (mean, SD)	3.5 (2.5)	4.3 (1.9)	0.344
ASDAS-CRP (mean, SD)	2.1 (1.1)	2.3 (0.8)	0.709
BASMI (mean, SD)	3.2 (1.4)	2.2 (0.9)	0.046
BASFI (mean, SD)	2.9 (2.3)	2.4 (2.1)	0.521
Current medication use			
Current sDMARD treatment, (n, %)	8 (27.6%)	6 (54.5%)	0.221
Current biologic treatment, (n, %)	14 (48.3%)	2 (18.2%)	0.170
MRI SIJ scores			
Total Berlin score, (mean, SD)	17.5 (13.1)	8.5 (7.7)	0.040

Osteitis/bone marrow edema (0-24) (mean, SD)	3.7 (4.7)	4.2 (3.3)	0.747
Fat Infiltration score (0-24) (mean, SD)	4.0 (5.5)	0.1 (0.3)	0.023
Erosion score (0-24) (mean, SD)	7.9 (7.8)	3.5 (3.6)	0.076
Sclerosis score (0-8) (mean, SD)	0.8 (1.6)	0.8 (1.6)	0.483
Ankylosis score (0-8), (mean, SD)	1.1 (2.6)	0 (0)	0.085

Legend: ASAS - Assessment of SpondyloArthritis International Society, ASDAS - Ankylosing Spondylitis Disease Activity Score, BASDAI - Bath Ankylosing Spondylitis Disease Activity Index, BASFI - Bath Ankylosing Spondylitis Functional Index, BASMI - Bath Ankylosing Spondylitis Metrology Index, BMI – body mass index, DAPSA - Disease Activity in PSoriatic Arthritis, IBP – inflammatory back pain, LEI – Leeds Enthesitis Index, MASES - Maastricht Ankylosing Spondylitis Enthesitis Score, MRI – magnetic resonance imaging, PASI - Psoriasis Area and Severity Index (PASI), sDMARD – synthetic disease modifying anti-rheumatic drug, SIJ – sacroiliac joint, VAS - visual analogue scale.

Table 3. Sensitivity, specificity and likelihood ratios (LRs) of inflammatory back pain defined by ASAS criteria in detecting sacroiliitis by various imaging methods and criteria.*

Imaging outcome	Sensitivity (%)	Specificity (%)	LR+	LR-
Radiographic sacroiliitis NY criteria	52%	79%	2.46	0.6
MRI sacroiliitis ASAS	46%	77%	2.04	0.69
MRI non-radiographic sacroiliitis ASAS	27%	72%	0.98	0.35
MRI non-radiographic structural sacroiliitis	17%	72%	0.59	1.16

* Sacroiliitis defined by X-ray or MRI is defined as gold standard.

Legend: ASAS - Assessment of SpondyloArthritis International Society