Radiological diagnoses by X-rays of musculoskeletal pain in Japanese patients with psoriasis vulgaris and radiological and clinical characteristics of patients radiologically diagnosed with psoriasis arthritis: A single-center retrospective study in Japan

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Short title: Radiological diagnoses of arthralgia in Japanese psoriatic arthritis patients

Manuscript word count: 2421, figure count: 3, table count: 6

Funding sources: None.

Conflict of interest: None.

Key words: psoriasis, psoriasis vulgaris, psoriatic arthritis, arthralgia, osteoarthritis, enthesitis, erosion, proliferation, peripheral arthritis, axial arthritis

Abbreviations list

PsV, psoriasis vulgaris; PsA, psoriatic arthritis; interleukin, IL; MRI, magnetic resonance imaging; M, male; F, female; PASI, psoriasis area and severity index; WBC, white blood cell count; ESR, erythrocyte sedimentation rate; CRP, C-reactive protein; TARC, thymus and activation-regulated chemokine; MMP, matrix metalloproteinase; RF, rheumatoid factor; MP, metacarpal phalangeal; IP, interphalangeal; PIP, proximal interphalangeal; DIP, distal interphalangeal.

ABSTRACT

Background

Musculoskeletal pain in psoriasis patients does not necessarily indicate psoriatic arthritis (PsA). Data on radiological characteristics of PsA in Japanese patients are limited. We investigated radiological diagnoses by X-rays of musculoskeletal pain in Japanese patients with psoriasis vulgaris (PsV) and radiological characteristics of PsA.

Methods

Patients who had been diagnosed with PsV, complained of musculoskeletal pain, and underwent X-ray examinations in our hospital from April 2018 to March 2020 were included. Data were collected retrospectively from patients' charts. Radiological diagnoses were made based on only X-ray findings by an experienced radiologist.

Results

Among 81 patients in this study, 30 patients (37.0%) were radiologically diagnosed with PsA, 2 patients (2.5%) with PsA and osteoarthritis, and 3 patients (3.7%) with osteoarthritis. No significant differences were observed in inflammatory biomarkers between patients who were or were not radiologically diagnosed with PsA. In 32 patients radiologically diagnosed with PsA, 23 patients (71.9%) had symptoms and radiological findings of peripheral lesions, 2 patients (6.3%) did so of peripheral and axial lesions, and 7 patients (21.9%) did so of axial lesions. Seventeen patients (73.9%) of 23 PsA patients with peripheral lesions demonstrated bone erosion and/or proliferation. Radiological findings of axial lesions were observed at the cervical, thoracic, and lumbar spines, and sacroiliac joints in 2 (22.2%), 5 (55.6%), 3 (33.3%), and 5 patients (55.6%), respectively.

Conclusion

Our study revealed that musculoskeletal pain in psoriasis patients does not necessarily indicate PsA, and that radiological assessment of arthralgia by X-ray is important. Furthermore, no increased systemic inflammation was observed in Japanese patients radiologically diagnosed with PsA.

INTRODUCTION

Psoriasis is a chronic inflammatory skin disease characterized by scaly indurated erythema. The prevalence of psoriasis in adults varies from 0.91% (United States) to 8.5% (Norway)[1]. It has been recognized not only as a skin disease but also as a systemic disease since it can cause arthritis [psoriatic arthritis (PsA)] and mental disorder; furthermore, its association with cardiovascular events has been indicated[2]. A systematic review revealed that 14.0-22.7% of psoriasis patients have arthritis PsA[3]. The prevalence of PsA varies among countries, suggesting that ethnicity, genetic background, and environmental factors affect the onset of PsA. PsA is characterized by enthesitis, dactylitis, and arthritis at peripheral and axial sites[4-6]. In PsA bony changes include bone erosion and new bone growth within the same microenvironment[7]. Bone erosion is initiated by cytokine (specifically RANKL) activation of osteoclasts, which differentiate into mature cells. The mature osteoclasts act directly on the bone at the articular margin, resulting in destruction and bone erosion. Interleukin (IL)-17 stimulates osteoblasts to produce RANKL, which results in osteoclastogenesis. IL-22 is implicated as a proinflammatory cytokine at the site of bone erosion; however, it also promotes osteoblast function by upregulating expression of the pro-osteogenic factors Wnt-3a, Wnt-10b, and bone morphogenetic protein 4. Thus, IL-22 possibly contributes to the complex juxtaposition of bone erosion and bone formation in PsA. PsA patients frequently show distal interphalangeal (DIP) joint involvement, which is usually asymmetric[6]. In severe case, the end of the bone erodes into a sharpened pencil shape, and this “pencil” wears away the surface of an adjoining bone into a cup shape, which is called pencil-in-cup deformity. Although the prevalence of having axial involvement in PsA patients differs by diagnostic criteria, it is reported to range from 23.6 to 55.4%[8]. However, data on Japanese patients with PsA are limited[9].

In clinical practice, it is not easy to diagnose patients with PsA on some occasions. In general, it is difficult to interpret radiological findings appropriately, especially for dermatologists. In addition, arthralgia at peripheral joints and pain at axial lesions such as low back pain which occur in psoriasis patients do not necessarily indicate PsA. De Marco et al. conducted a study in Italy, analyzing data on psoriasis patients with musculo-skeletal discomfort and/or carrying signs (articular/systemic, even asymptomatic) of

rheumatic conditions who were referred to rheumatologists, and revealed that osteoarthritis was frequently observed in 156 patients (56.3%), followed by PsA in 110 patients (39.7%) among the subjects enrolled[10] . Among the PsA patients, degenerative diseases overlapped with PsA in 47 patients. In another study performed in the USA by Mody et al., the diagnosis of arthritis in patients with psoriasis and joint pain was PsA in 41% of patients, PsA concomitant with osteoarthritis in 15% of patients, and osteoarthritis in 27% of patients[11] . The results could vary by country since ethnicity, genetic background, and environmental factors which contribute to the development of PsA are different in individual populations.

In this study we investigated radiological findings of musculoskeletal pain in Japanese patients with psoriasis vulgaris (PsV) and radiological characteristics of PsA.

PATIENTS, MATERIALS and METHODS

Patients who had been diagnosed with PsV, complained of musculoskeletal pain, and underwent X-ray examinations in our hospital from April 2018 to March 2020 were included in this study. Patients who had already been diagnosed with PsA and patients with generalized pustular psoriasis were excluded. The data were collected retrospectively from the charts of psoriasis patients. PsV was diagnosed by board-certified dermatologists. Radiological evaluation was conducted by one board-certified musculoskeletal radiologist (A.Y., 13 years of experience). In this article, the diagnoses of PsA and osteoarthritis were made based on radiographs. In the extra-axial skeleton (peripheral lesion), PsA was diagnosed when radiographs showed marginal erosions with fluffy new bone appositions, erosive changes with widening/narrowing/ankylosis of joints (including pencil-in-cup appearance), and/or bone proliferation along shafts or across joints, along with ligaments and tendons (syndesmophyte, enthesophyte)[6,12-14] . In the axial lesion, PsA was diagnosed when radiographs showed apophyseal bone proliferation along the anterior surface of the spine (ankylosing, narrowing, squaring, marginal syndesmophyte), asymmetrical paravertebral ossification in the thoracic and lumbar spine, irregularities and erosions of the vertebral endplates, and/or erosion and extensive bone repair in the sacroiliac joint[6,12,15] . The diagnosis of osteoarthritis was

conducted when radiographs demonstrated loss of joint space without erosions, subchondral new bone formation, osteophyte formation perpendicular to ligamentous or tendinous orientation, subchondral cysts, or joint subluxation, and absence of ankylosis[16]. Blood tests were performed at the central laboratory of our hospital.

We calculated the percentage of patients diagnosed with PsA and/or osteoarthritis on radiographs in psoriasis patients presenting with musculoskeletal pain, and compared the demographics, clinical characteristics, and laboratory data between patients who were or were not radiologically diagnosed with PsA. In addition, we assessed characteristics of arthritis in PsA patients, including the location of lesions (peripheral or axial arthritis), locations of bone erosion and/or bone proliferation in peripheral joints, and radiological findings of axial involvement. The presence of osteoarthritis was also recorded when all the following imaging findings were evident: joint space narrowing, subchondral sclerosis, and osteophytes formation.

Regarding statistical analyses, normality in each group was evaluated using the Shapiro–Wilk test. The unpaired t-test or Wilcoxon rank sum test was used to compare the means of two independent groups. Fisher's exact probability test or Chi-squared test was conducted to determine whether there were associations between two categorical variables. Values of $P<0.05$ were considered to represent significant differences. EZR (Saitama Medical Center, Jichi Medical University, Saitama, Japan) was utilized for statistical analysis. EZR[17] is a graphical user interface for R (The R Foundation for Statistical Computing, Vienna, Austria). More precisely, it is a modified version of R commander designed to add statistical functions frequently used in biostatistics.

This study was approved by the ethics committee of Teikyo University on June 26, 2019 (19-045), and was carried out under the principles of the Declaration of Helsinki. We obtained consent for this study by an opt-out method on the university website.

RESULTS

Eighty-one patients with PsV who complained of musculoskeletal pain and underwent X-ray examinations were analyzed in this study. Among the 81 patients enrolled in this study, 30 patients (37.0%) were radiologically diagnosed with PsA, 2 patients (2.5%) with

PsA and osteoarthritis, and 3 patients (3.7%) with osteoarthritis (Table 1). Forty-six patients (56.8%) demonstrated no X-ray findings of arthritis or were diagnosed with other diseases. Demographics, clinical characteristics, and laboratory data in patients with arthralgia who were or were not radiologically diagnosed with PsA are shown in Table 2. No significant differences were observed except that the percentage of patients treated with cyclosporine was lower among the patients who were radiologically diagnosed with PsA (0% vs. 14.6%, p=0.03).

Among the 32 patients diagnosed with PsA by X-ray examinations, 23 patients (71.9%) had symptoms and radiological findings of peripheral lesions, 2 patients (6.3%) had peripheral and axial lesions, and 7 patients (21.9%) had axial lesions (Table 3). We next compared demographics, clinical characteristics, and laboratory data between PsA patients who did or did not have symptoms and radiological findings of axial lesions (Table 4). No significant difference was observed between PsA patients with axial involvements and those without it.

Peripheral lesions of bone erosion and/or proliferation in patients with PsA are shown in Table 5. Seventeen (73.9%) of the 23 PsA patients with peripheral involvement demonstrated bone erosion and/or proliferation in peripheral joints. In the other patients, enthesitis, periosteal reaction, syndesmophyte, ankylosis, and sclerosis of enthesis were observed in peripheral joints. Among the 17 patients with bone erosion and/or proliferation in peripheral joints, joints in fingers and/or thumbs were affected the most frequently (16 patients, 94.1%). The numbers of patients whose joints of the hands were affected by bone erosion and/or bone proliferation are shown in Figure 1. In most patients with affected fingers and/or thumbs, both bone erosion and proliferation were observed at the same location. Both bone erosions and proliferations were mainly observed at DIP joints. Pencil-in-cup deformity was not observed in patients of our study. Representative X-ray findings of peripheral joints of patients with PsA are shown in Figure 2.

Lastly, we examined radiological findings of axial involvement in the PsA patients (Table 6). Radiological findings of lesions were observed at the cervical spine in 2 patients (22.2%), at the thoracic spine in 5 patients (55.6%), at the lumbar spine in 3 patients (33.3%), and at sacroiliac joints in 5 patients (55.6%). Squaring, corner shining, and syndesmophyte were observed in lesions at the thoracic and lumbar spines. Lesions at

sacroiliac joints were characterized by bone erosion and joint fusion. Representative X-ray findings of axial lesions in patients with PsA are shown in Figure 3.

DISCUSSION

In this study, among 81 psoriasis patients who complained of musculoskeletal pain, 32 patients (39.5%) were diagnosed with PsA, and 5 patients (6.2%) with osteoarthritis. Among them, PsA and osteoarthritis overlapped in 2 patients. In previous studies, although method of diagnosing PsA was different from that in our study, 39.7% of patients were diagnosed with PsA and 56.3% with osteoarthritis in an Italian study[10]. In a study conducted in the USA, 56% were diagnosed with PsA and 42% with osteoarthritis[11]. Although there are subtle differences in results among these studies and our study probably due to differences in background characteristics, diagnostic methods, and ethnicity, these data indicate that musculoskeletal pain in psoriasis patients does not necessarily indicate PsA, and that appropriate radiological evaluation is needed to differentiate PsA from other diseases, especially osteoarthritis. We should also be aware that PsA and osteoarthritis overlapped in certain cases. In the present study, results of additional radiological examinations including magnetic resonance imaging (MRI) were not included in order to avoid complexity of interpretations. The percentage of patients diagnosed with PsA would have been higher in the present study if the results of additional radiological examinations were included, since the initial phase of PsA could have been detected.

No significant differences were observed in demographics, clinical characteristics, and laboratory data between patients who were or were not radiologically diagnosed with PsA except for the percentage of patients treated with cyclosporine. According to the previous literature[18-21], PsA patients showed higher CRP levels than PsV patients. Generally, in PsA patients, joint destruction gradually progresses by repeated cycles of active inflammation and remission. Inflammatory biomarkers such as CRP level and erythrocyte sedimentation rate could be elevated in sera in the active phase, whereas they may not be elevated in the inactive phase. We could not differentiate PsA patients with active arthritis from those in the inactive phase, which is one of the limitations in our study. This could

account for our result that there were no significant differences in serum levels of inflammatory biomarkers between patients who were or were not radiologically diagnosed with PsA. Ohara et al. investigated characteristics of PsA in Japanese patients, and reported that an elevated CRP level was observed in 45.2% of PsA patients[22], indicating that the serum CRP level was not elevated in more than half of their patients. Considering this and our results together, systemic inflammation might be lower in Japanese PsA patients than in PsA patients in western countries. Therefore, the absence of significant differences in the levels of inflammatory markers between patients with or without PsA in our study could be explained by low systemic inflammation in Japanese PsA patients. Further accumulation of evidence is needed to clarify this.

Our data demonstrated that among the 32 patients diagnosed with PsA by X-ray examinations, 23 patients (71.9%) had peripheral lesions, 2 patients (6.3%) had peripheral and axial involvements, and 7 patients (21.9%) had axial involvements. Most of the patients showed peripheral arthritis and the percentage of PsA patients presenting with axial lesions was low; these results are compatible with the results of the study conducted in 73 institutes in Japan from April 2014 to March 2015 by the Japanese Society for Psoriasis Research[23].

No differences in the levels of inflammatory biomarkers were observed between PsA patients with or without axial involvement in our study. Mease et al. studied the clinical characteristics of 192 PsA patients with axial involvement by comparing them with 1338 PsA patients without axial involvement in the US-based Corrona Psoriatic Arthritis/Spondyloarthritis Registry[24]. Axial involvement was defined as physician-reported presence of spinal involvement at enrollment, and/or radiograph or MRI showing sacroiliitis. They reported that the presence of axial involvement was associated with a higher likelihood of moderate-to-severe psoriasis (body surface area ≥ 3%, 42.5% vs. 31.5%), lower prevalence of minimal disease activity (30.1% vs. 46.2%), higher nail psoriasis scores [visual analog scale (VAS) 11.4 vs. 6.5], higher enthesitis counts (5.1 vs. 3.4), higher serum C-reactive protein levels (4.1 vs. 2.4 mg/l), and higher scores for physical function (Health Assessment Questionnaire, 0.9 vs. 0.6), pain (VAS, 47.7 vs. 36.2), and fatigue (VAS, 50.2 vs. 38.6). Systemic inflammation may be lower in Japanese PsA patients than in PsA patients in western countries as stated above. Generally,

biomarkers reflecting inflammation such as white blood cell count and the serum C-reactive protein level in PsA patients were not so high in our data, which could account for our results that no notable differences in biomarkers were observed between PsA patients with or without axial involvement in this study.

Bone erosion and proliferation are characteristic of PsA[4,5] . PsA patients frequently show DIP joint involvement. Likewise, both bone erosion and proliferation were mainly observed at DIP joints in our study. There was not any particular tendency in frequency of bone erosion and/or proliferation among the fingers.

One of the limitations of our study is the small number of patients since this was a single-center retrospective study. In this study, we focused on radiological diagnoses based only on X-ray findings, and not on the classification criteria for psoriatic arthritis (CASPAR).

PsA is considered to begin with enthesitis, and its progression with repeated exacerbation and remission results in bony changes. At the early stage of PsA, radiographic findings are not evident. Although our study demonstrated the importance of X-ray examinations in diagnosing PsA, physical findings are also important in practice, especially, to detect early PsA.

In conclusion, our study indicates that musculoskeletal pain in psoriasis patients does not necessarily indicate that the patients have PsA. Radiological assessment by X-ray is important in diagnosing PsA. Systemic inflammation was not increased in Japanese PsA patients compared with PsV patients without PsA. Further accumulation of evidence is needed to clarify the differences in clinical characteristics of PsA between Japanese patients and those in western countries.

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Figure legends

Figure 1

Locations of joints with bone erosion and bone proliferation in the hands of patients with psoriatic arthritis. Bone erosion and bone proliferation were assessed by radiological examination of X-rays. The numbers of patients with bone erosion or bone proliferation in the indicated joint of the indicated finger are shown. MP, metacarpal phalangeal; IP, interphalangeal; PIP, proximal interphalangeal; DIP, distal interphalangeal.

Figure 2

Representative X-ray findings of peripheral lesions in patients with psoriatic arthritis. Yellow arrows indicate bone erosion. White arrows indicate bone erosion and proliferation.

Figure 3

Representative X-ray findings of axial lesions in patients with psoriatic arthritis.
(a) Non-marginal osteophyte formation. (b) Erosion at the sacroiliac joints.

Table 1. Diagnoses of arthralgia after radiological examinations in psoriasis patients.

Diagnosis of arthralgia	Number of patients (%)
Psoriatic arthritis	30 (37.0%)
Psoriatic arthritis + osteoarthritis	2 (2.5%)
Osteoarthritis	3 (3.7%)
Others	46 (56.8%)
Total	81 (100%)

Table 2. Demographics, clinical characteristics, and laboratory data in psoriasis patients who were or were not radiologically diagnosed with psoriatic arthritis.

	Patients with PsA (n=32)	Patients without PsA (n=49)	P value
Gender (F:M)	14:18	24:25	0.815
Age (year)	53.0 ± 13.0	51.4 ± 13.9	0.602
Age at onset of PsV (year)	40.3 ±15.1	44.4 ± 16.3	0.633
Duration of PsV (year)	12.3 ± 12.5	12.1 ± 10.0	0.593
PASI	11.4 ± 12.2	11.9 ± 15.0	0.76
Body mass index	26.7 ± 4.6	22.4 ± 6.6	0.157
Family history of psoriasis	1 (7.1%)	2 (10.0%)	1.0
History of smoking	10 (76.9%)	8 (47.1%)	0.141
Nail psoriasis	15/25 (60.0%)	24/36 (66.7%)	0.793
Concomitant diseases			
Diabetes	5 (15.6%)	6 (14.0%)	1.0
Hypertension	6 (18.8%)	9 (20.9%)	1.0
Hyperlipidemia	6 (18.8%)	5 (11.6%)	0.513
Hyperuricemia	1 (3.1%)	7 (16.3%)	0.127
Liver dysfunction	1 (3.1%)	2 (4.7%)	1.0
Treatment			
Topical therapy	32 (100%)	48 (100%)	*
Phototherapy	6 (18.8%)	11 (22.9%)	0.867
Apremilast	3 (9.4%)	11 (22.9%)	0.143
Cyclosporine	0 (0.0%)	7 (14.6%)	0.03
Etretinate	0 (0.0%)	4 (8.3%)	0.146
Methotrexate	6 (18.8%)	3 (6.2%)	0.146
Biologics	1 (3.1%)	1 (2.1%)	1.0
Laboratory findings			
WBC (/μl)	6800 ± 2033	6890 ± 1977	0.848
Neutrophils (/μl)	4847.2 ± 1781.0	4149.8 ± 1715.7	0.116
Eosinophils (/μl)	156.8 ± 107.3	161.7 ± 134.5	0.804
ESR (mm/h)	14.5 ± 15.6	12.3 ± 12.3	0.558
CRP (mg/dl)	0.4 ± 0.9	0.4 ± 0.7	0.287
TARC (pg/ml)	518.9 ± 575.5	424.4 ± 384.7	0.808
MMP-3 (ng/ml)	102.0 ± 95.7	82.1 ± 71.9	0.157
Positive RF (mg/dl)	4 (14.3%)	2 (6.9%)	0.423

Values are presented as mean ± standard deviation. PsV, psoriasis vulgaris; PsA, psoriatic arthritis; M, male; F, female; PASI, psoriasis area and severity index; WBC, white blood cell count; ESR, erythrocyte sedimentation rate; CRP, C-reactive protein; TARC, thymus and activation-regulated chemokine; MMP, matrix metalloproteinase; RF, rheumatoid factor. *Statistical analysis could not be performed because percentages in both groups were 100%.

Table 3. Numbers of PsA patients with peripheral and/or axial lesions.

Lesions	Number of PsA patients (%)
Peripheral lesions	23 (71.9%)
Peripheral and axial lesions	2 (6.3%)
Axial lesions	7 (21.9%)
Total	32 (100%)

PsA, psoriatic arthritis.

Table 4. Demographics, clinical characteristics, and laboratory data in patients with PsA presenting with or without axial lesions.

	PsA patients with axial lesions* (n=9)	PsA patients without axial lesions (n=23)	P value
Gender (F:M)	2:7	12:11	0.235
Age (year)	58.7 ± 11.8	50.8 ± 13.1	0.126
Age at onset of PsV (year)	40.7 ± 21.4	41.0 ± 15.2	0.922
Duration of PsV (year)	17.2 ± 15.7	10.5 ± 11.0	0.25
PASI	8.22 ± 7.50	12.6 ± 13.6	0.503
Body mass index	20.8 ± 4.45	28.6 ± 2.88	**
Family history of psoriasis	0 (0.0%)	1 (7.7%)	1
History of smoking	2 (66.7%)	8 (80.0%)	1
Nail psoriasis	4 (57.1%)	11 (61.1%)	1
Concomitant diseases			
Diabetes	2 (22.2%)	3 (13.0%)	0.604
Hypertension	2 (22.2%)	4 (17.4%)	1
Hyperlipidemia	2 (22.2%)	4 (17.4%)	1
Hyperuricemia	0 (0.0%)	1 (4.3%)	1
Liver dysfunction	0 (0.0%)	1 (4.3%)	1
Treatment			
Topical therapy	9 (100.0%)	23 (100%)	
Phototherapy	1 (11.1%)	5 (21.7%)	0.648
Apremilast	1 (11.1%)	2 (8.7%)	1
Cyclosporine	0 (0.0%)	0 (0.0%)	
Etretinate	0 (0.0%)	0 (0.0%)	
Methotrexate	1 (11.1%)	5 (21.7%)	0.648
Biologics	1 (11.1%)	0 (0.0%)	0.281
Laboratory findings			
WBC (/μl)	6150 ± 1246	7026 ± 2221	0.302
Neutrophils (/μl)	3885.0 ± 759.0	5197.1 ± 1925.4	0.073
Eosinophils (/μl)	238.2 ± 163.2	125.9 ± 56.2	0.074
ESR (mm/h)	14.5 ± 21.5	14.5 ± 13.4	0.467
CRP (mg/dl)	0.2 ± 0.145	0.6 ± 1.0	0.786
TARC (pg/ml)	442 ± 330.3	543 ± 639.3	0.975
MMP-3 (ng/ml)	106.3 ± 36.9	100.6 ± 108.7	0.09
Positive RF (mg/dl)	0 (0.0%)	4 (19.0%)	0.545

Values are presented as mean ± standard deviation. PsV, psoriasis vulgaris; PsA, psoriatic arthritis; M, male; F, female; PASI, psoriasis area and severity index; WBC, white blood cell count; ESR, erythrocyte sedimentation rate; CRP, C-reactive protein; TARC, thymus and activation-regulated chemokine; MMP, matrix metalloproteinase; RF, rheumatoid factor.

*These nine patients had symptoms and radiological findings of axial lesions of PsA.

**The number of patients were too small to evaluate statistically.

Table 5. Peripheral lesions of bone erosion and/or proliferation in patients with PsA.

Joints affected by bone erosion and proliferation	Number of patients with bone erosion and/or proliferation (%)	Bone erosion	Bone proliferation
Joints in fingers and thumbs	16/17 (94.1%)	14	11
Distal interphalangeal joint		10	7
Proximal interphalangeal joint		5	4
Interphalangeal joint in thumb		4	2
Metacarpophalangeal joint		2	2
Wrist joint	1/17 (5.9%)	1	1
Joints in toes	2/17 (11.8%)	2	1
Lisfranc joint	1/17 (5.9%)	1	0
Total number of patients with bone erosion and/or proliferation in peripheral joints	17	15	11

Table 6. Radiological findings of axial lesions in patients with PsA.

Location of axial lesions and radiological findings	Number of patients
Cervical spine	2 (22.2%)
Erosion	1
Lateral mass	1
Thoracic spine	5 (55.6%)
Squaring	2
Corner shining	1
Syndesmophyte	2
Lumbar spine	3 (33.3%)
Squaring	1
Corner shining	1
Syndesmophyte	2
Sacroiliac joint	5 (55.6%)
Bone erosion	1
Joint fusion	5
Total number of PsA patients with axial lesions	9 (100%)