Psoriatic Arthritis in Reykjavik, Iceland: Prevalence, Demographics, and Disease Course

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ABSTRACT. ***Objective.*** To determine the prevalence, demographics, and course of psoriatic arthritis (PsA) in the Reykjavik area of Iceland.

Methods. In total 220 patients ≥ 18 years of age living in the Reykjavik area of Iceland were located in a community registry of psoriatic patients and in hospital records. Of these, 156 (71%) were interviewed and examined for verification of skin and joint disease according to published criteria.

Results. Prevalence of PsA in the adult population was estimated to be 164 per 100,000 (95% CI 143–187), adjusted to 139 per 100,000 (95% CI 112–169) after exclusion of 25 individuals. The female to male ratio was close to 2:1. The mean age at skin disease onset was 23 years, with significantly earlier onset in women (age 20 yrs in women vs 26 yrs in men; p = 0.01), but there was no significant difference for age at the time of onset of joint disease. Mean duration of PsA was 20 years. Oligoarthritis was the most common (44%), followed by polyarthritis (31%), enthesitis (8%), and inflammatory back pain (7%). According to patients' recall of clinical features at onset, 78 patients (60%) had changed categories of PsA at the time of the study, most frequently from polyarthritis to oligoarthritis (48%), followed by oligoarthritis to polyarthritis (36%). These changes seemed independent of use of disease modifying drugs, which 54% had received.

Conclusion. PsA in Reykjavik, Iceland, has a prevalence of at least 0.14% and is strikingly more common in women. The majority of patients reported a change in the pattern of affected joints during the course of their disease. (First Release August 1 2007; J Rheumatol 2007;34:2082–8)

Key Indexing Terms:
PSORIATIC ARTHRITIS PREVALENCE DEMOGRAPHICS DISEASE COURSE SEX

Psoriatic arthritis (PsA) is an inflammatory joint disease affecting patients with psoriasis and is an entity separate from rheumatoid arthritis (RA)[1]. Diagnostic criteria are being developed[2], but the definition proposed by Moll and Wright in 1973 of a usually seronegative inflammatory arthritis associated with psoriasis is often used[3].

Population based studies have shown a prevalence of PsA ranging from 57 per 100,000 in Greece to 195 per 100,000 in Norway, while a telephone survey in the US showed a prevalence of 250 per 100,000[4-7]. On the basis of recent reports on the prevalence of PsA in patients with psoriatic skin lesions and estimates of the population prevalence of psoriasis, a prevalence range of 300 to 1000 cases per 100,000 has been suggested[8]. It should be noted that reports dating from the 1930s and 1940s in the US indicated a prevalence of arthritis among psoriatic patients as high as 32%–40%[9], and studies of psoriasis in various populations have shown a range of prevalence from 0% to 11.8%, with most in the range of 0.5%–2.5%[10,11]. Because of these varying reports and estimates of the population prevalence of both psoriasis and PsA, further studies are needed to directly address the prevalence of PsA.

Following the early work on PsA by Wright[12], several attempts have been made to define disease subcategories[13-16]. The initial 5 subcategories have been modified over time, and it has been suggested that only 2 or 3 subsets of disease are relevant, namely, oligoarthritis, polyarthritis, and spondyloarthritis[14,16]. A mathematical model recently applied to the clinical classification of RA and PsA confirmed that distal interphalangeal (DIP) joint involvement, enthesitis, spinal involvement, and dactylitis are useful to differentiate between these 2 diseases. However, the model also indicates that the symmetrical joint involvement of RA is a consequence of a higher number of involved joints, and that symmetrical involvement is just as likely in PsA when the same number of joints are affected[17].

Textbooks and most review articles describe PsA as a disease that affects men and women equally[8]. However, relatively few studies have addressed possible gender differences. Reviewing data from 15 studies published over 20 years reveals male to female ratios ranging from 1.3 to 1.6[13,17-20] to

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Supported by the Science Fund of Landspitali University Hospital and the Research Fund of the Icelandic College of Rheumatology.

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Accepted for publication June 12, 2007.

female to male ratios of 1.3 to 1.6[21-23]. However, a ratio close to 1:1 is most commonly reported[7,15,24-27].

Our goal was to determine the prevalence of PsA in the Reykjavik area of Iceland and to describe the demographics, clinical features, and disease course in this population.

MATERIALS AND METHODS

Study group. The study involved patients with PsA in the Reykjavik area of Iceland, where 63% of the adult population resides. Landspitali University Hospital (LUH) serves as a primary hospital for Reykjavik and its suburbs, and it is the only secondary and tertiary care hospital in Iceland.

Patients were recruited from 2 sources, as shown in Figure 1. First, from a database of 1386 patients with verified psoriasis created during ongoing studies of psoriasis[28,29]. This database contains information on about 1% of the Reykjavik population and its recruitment sources included all affected members of the Icelandic Psoriasis Foundation (SPOEX) and all available relatives and other family members of these patients, regardless of whether they were reported to have psoriasis or not, and patients recruited through a publicity campaign. Patients who had only pustular psoriasis were not included. From this database, 152 individuals who lived in the Reykjavik area in 2003 and reported that they had been diagnosed with PsA by a rheumatologist were included in our study.

The second source was an electronic registry of patients admitted to the LUH between 1981 and 2001. It yielded 98 patients who had been diagnosed with PsA and lived in the Reykjavik area in 2003. As 30 patients were present in both these databases they jointly provided 220 potential PsA patients for evaluation.

Clinical examination. As indicated in Figure 1, these 220 patients were initially contacted by letter, followed by a telephone call; 21 individuals (10%) could not be reached or did not respond. Of the remaining 199, 162 (81%) agreed to participate in the study, but 6 patients did not attend. The remaining 156 patients, 71% of the original study group, were eventually interviewed and examined by one of 2 physicians, an experienced rheumatologist (BG) or a resident physician (TJL) trained by the rheumatologist for this task. Skin and joints were evaluated for evidence of psoriasis and PsA and a specific history was acquired. Patients also answered a questionnaire regarding their skin disease and their arthritic symptoms.

Inclusion criteria. The inclusion criteria used for this study are derived from those of the Swedish Psoriatic Arthritis Registry (SwePsA)[27] requiring that patients fulfill the following 2 criteria. First, at least 6 consecutive weeks of one or more of the following: inflamed joint(s), tenosynovitis, inflammatory back pain, enthesitis, or dactylitis. Second, the patients had to have been diagnosed with psoriasis by a dermatologist or have psoriatic skin lesions at the time of the examination. Patients who did not have an active arthritis were included if they had been diagnosed with PsA by a rheumatologist and were taking remitting drugs at the time of the study. However, patients who reported a diagnosis of a rheumatic disease other than PsA when interviewed, or who were observed to have another rheumatic condition when examined, were excluded.

Of the 156 patients examined, 25 (16%) were excluded because they did not fulfill the above conditions. The remaining 131 patients (84%) had verifiable PsA and were included in the study.

Disease assessment. Extent of joint involvement was assessed according to the American College of Rheumatology joint count for tenderness and swelling, with 66 and 68 joints evaluated, respectively. Both counts include the DIP joints, and have previously been shown to be useful in PsA[30]. Skin involvement was rated by the Psoriasis Activity and Severity Index (PASI) score[31]. Radiographs were not evaluated, as radiographic changes were not part of the diagnostic criteria used. However, over two-thirds of the patients had previously been examined by radiography as a part of diagnostic procedures.

The patients were initially divided into the following predefined subgroups based on their joint involvement: inflammatory back pain, symmetric polyarthritis, asymmetric polyarthritis, oligoarthritis, enthesitis, and arthralgia. However, during the course of the analysis the subgroups were reduced to 4: oligoarthritis, polyarthritis, inflammatory back pain, or enthesitis. This was done by merging the 2 groups of polyarthritis and defining joint tenderness as a form of joint involvement, distinguishing between oligo- and polyarthritis based on the number of tender joints. This reflects the trend toward simplified classifications referred to in the introduction[17]. Figure 2 shows how subgroups were defined. Thus, patients were classified as having peripheral arthritis even though they also had inflammatory back pain and/or enthesitis, and inflammatory back pain if they also had enthesitis but no peripheral arthritis. Only those patients with exclusive enthesitis at the time of the study were classified as having enthesitis.

Data analysis. The study data were stripped of information allowing identification of individuals before the analysis of data began and the code for this information was kept in a separate, encrypted database. The study was approved by the National Bioethics Committee of Iceland (approval 03-006) and the Data Protection Committee of Iceland. Informed consent was obtained from all the participants in the study. Data were analyzed using Statview 5.0 statistical software. Chi-squared and t-tests were used for comparisons of dichotomous values and means, respectively. When predicting the number of confirmable cases based on inclusion of examined patients, direct standardization was used to correct for age and sex discrepancies between the group of patients who were examined and those who were not. We calculated 95% confidence intervals for prevalence rates using binomial distribution. All reported p values are based on 2-tailed analysis.

RESULTS

Prevalence. According to census data, 134,253 individuals aged 18 years or older lived in the Reykjavik area of Iceland in 2003 when the study was done[32]. Based on this, a prevalence of 164 per 100,000 (95% CI 143–187) was calculated when all 220 individuals with self-reported or hospital-diagnosed PsA were included. Of the 156 patients who could be examined, PsA was confirmed according to the inclusion criteria in 131 or 84% (Figure 1), and the confirmation rate was similar for patients recruited from the community and hospital databases. Assuming that no case of PsA would have been confirmed among the 64 individuals who did not come in for reevaluation of their disease, a highly conservative prevalence estimate of 98 per 100,000 (95% CI 82–116) can be calculated. Conversely, if all these patients had PsA the prevalence estimate would be 145 (95% CI 126–167). However, as these patients had all been previously diagnosed with PsA, and there was no obvious selection bias regarding the individuals who could not be reached for clinical reevaluation, we extrapolated the inclusion ratio for the patients who were examined clinically to all the 220 patients in the original study group, correcting for age and sex, resulting in an adjusted prevalence ratio of 139 per 100,000 (95% CI 112–169).

Notably, a higher prevalence was observed among women (208 per 100,000, 95% CI 175–245) than among men (118 per 100,000, 95% CI 93–147), and this held true for our adjusted prevalence calculations as well (174 per 100,000, 95% CI 145–209 vs 101 per 100,000, 95% CI 78-128). Figure 3 shows adjusted prevalence grouped by sex and age.

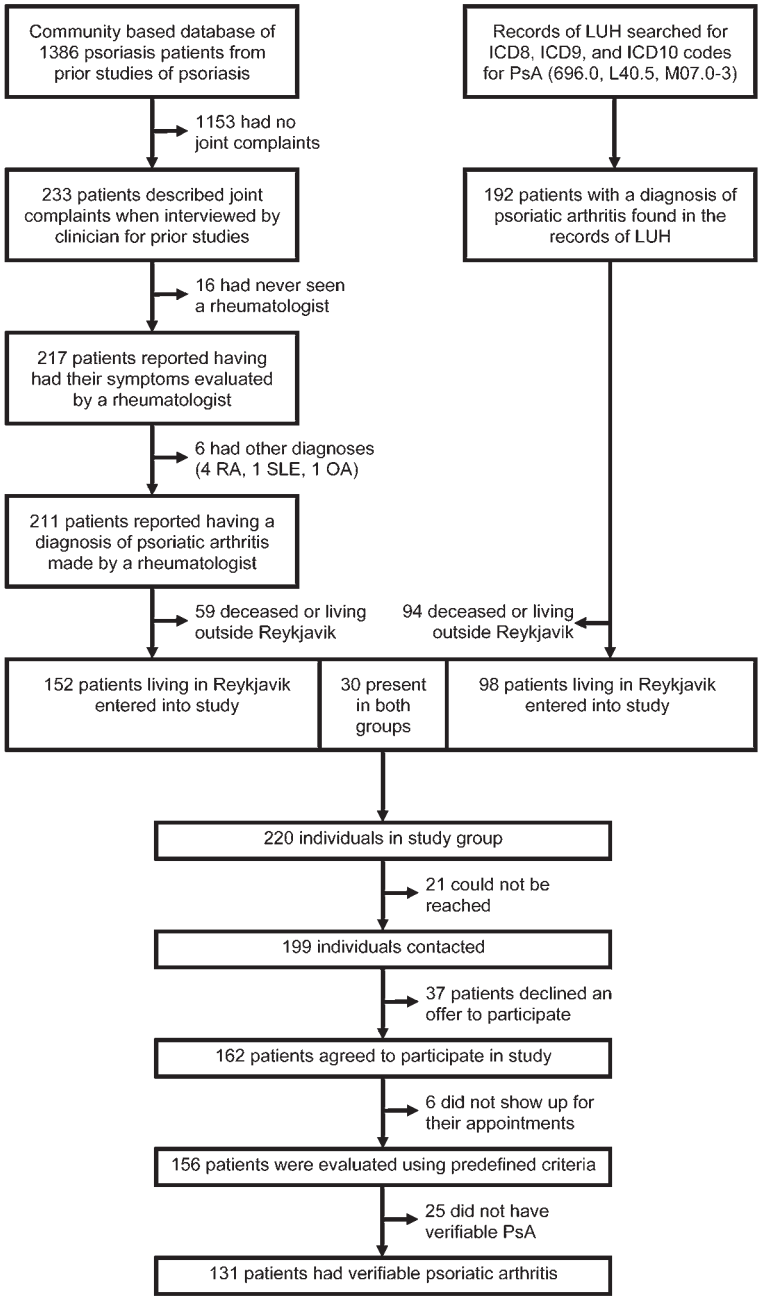

Figure 1. The process of how cases were located, contacted, examined, and finally included or excluded based on published criteria.

Demographics. Demographic data for the 131 patients who passed the inclusion criteria are presented in Table 1. The mean age at onset of PsA was 35 years, with 40% of patients having onset of symptoms in their fourth decade of life. Age at disease onset varied by sex, the men having an average onset of skin symptoms 5.9 years later than the women ($p = 0.01$) and joint symptoms 3.4 years later ($p = 0.12$). For the 83 patients who reported developing skin symptoms before joint symptoms, the arthritis presented on average 16 years later. Eleven patients reported simultaneous onset of skin and joint symptoms, another 11 insisted that the joint symptoms preceded the skin lesions, while 26 patients did not recall which came first. The mean time from the onset of joint symptoms to the onset of skin symptoms was 6 years

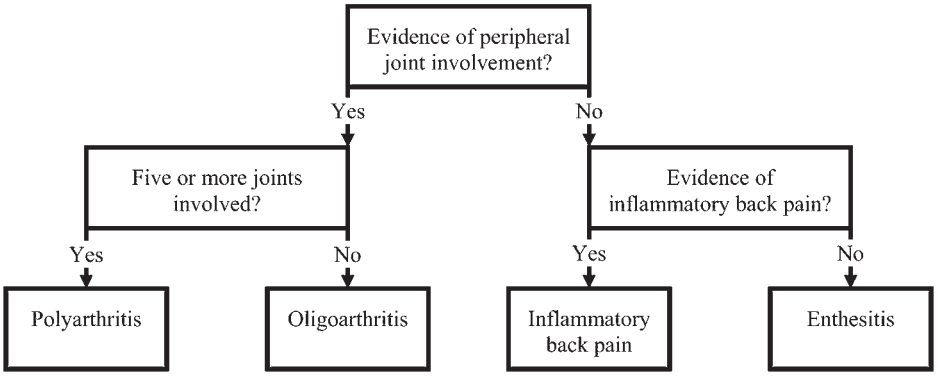

Figure 2. Subgroup classification. As each patient may have multiple symptoms simultaneously, each symptom was assigned a significance, peripheral joint involvement being the most significant and enthesitis the least. Patients who had none of these symptoms were excluded.

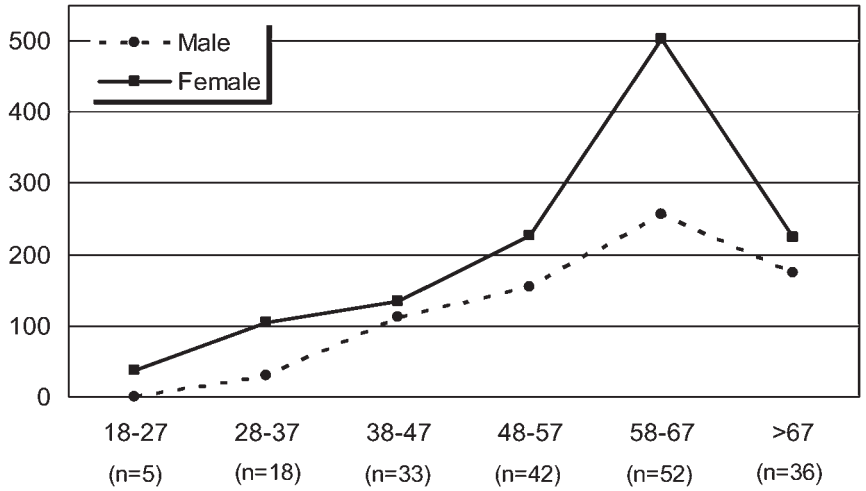

Figure 3. Adjusted prevalence of PsA, calculated using the number of patients in the entire study group predicted to have verifiable PsA based on the ratio of verifiable disease in the 71% of patients that were examined, with results adjusted for age and sex. Numbers are per 100,000 individuals age ≥ 18 years, living in Reykjavik at the time of the study. Data are categorized by age groups and sex.

among the 11 patients who reported that arthritis preceded the skin disease. It should be noted that 42 patients (32%) were taking a disease modifying drug (DMD) at the time of the study, mostly methotrexate (67%), and a total of 71 patients (54%) reported having used a DMD at some stage.

Skin and joint involvement. At the time of the evaluation, 115 patients (88%) were found to have active skin involvement, with an average PASI score of 4.1. Peripheral joint involvement was observed in 104 (79%) patients, 89 (68%) with swelling and 97 (74%) with joint pain on palpation. Both skin and joint involvement was present in 90 patients (69%), while 2 individuals (1.5%) had neither joint nor skin symptoms at the time of the study. Only one patient was included based solely on the presence of enthesitis but none had tenosynovitis only. Nail involvement was detected in 104 individuals (79%) and small joints were affected in 42 (40%) patients with nail involvement compared with 5 of the 27 (19%) with no nail involvement ($p = 0.059$). These findings are summarized in Table 2. Dactylitis was observed in one patient (<1%), and another reported a specific history of dactylitis.

Patterns of joint involvement and treatment. Oligoarthritis was the most common presentation both at disease onset (66%) and at the time of the examination (44%). However, 78 patients (60%) changed categories during the course of the disease and 13 (10%) had no clinical evidence of active arthritis when they were examined, although they all had a clear history of joint disease verified by their rheumatologist. Enthesitis was observed in 64 (49%), arthritis in 104 (79%), and signs of inflammatory back pain, i.e., likely spondyloarthritis, were observed in 36 (27%) patients. Changes in the disease course are shown in Table 3, where

Table 1. Demographic information on the 131 patients who satisfied the inclusion criteria.

	Men, n = 54	Women, n = 77	p
BMI on day of examination, mean kg/m^2 ± SD (n)	28 ± 5 (51)	29 ± 6 (69)	0.42
Age at examination, mean yrs ± SD (n)	56 ± 13 (54)	54 ± 14 (77)	0.38
Age at onset of skin disease, mean yrs ± SD (n)	26 ± 12 (48)	20 ± 12 (61)	0.01
Duration of psoriasis, mean yrs ± SD (n)	30 ± 12 (48)	34 ± 14 (61)	0.15
Age at onset of PsA, mean yrs ± SD (n)	37 ± 13 (52)	34 ± 12 (75)	0.12
Duration of PsA, mean yrs ± SD (n)	19 ± 10 (52)	21 ± 13 (75)	0.35
Skin to joint onset, mean yrs ± SD (n)	11 ± 12 (46)	13 ± 12 (59)	0.24

BMI: body mass index.

Table 2. Frequency and severity of skin and joint involvement at the time of the study (n = 131).

Disease Category	
Active psoriasis (skin or nails), n (%)	125 (95)
Skin involvement, n (%)	115 (88)
PASI score	
Mean (SD)	4.1 (4.2)
Median (25–75%)	2.8 (1.1–5.7)
Nail involvement, n (%)	104 (79)
Active peripheral arthritis, n (%)	104 (78)
Joint swelling, n (%)	89 (68)
ACR swollen joint count	
Mean (SD)	5.1 (4.0)
Median (25–75%)	2.0 (3.0–7.3)
Joint tenderness, n (%)	97 (74)
ACR tender joint count	
Mean (SD)	5.5 (4.7)
Median (25–75%)	2.0 (4.0–7.0)

ACR: American College of Rheumatology, PASI: Psoriasis Area and Severity Index.

joint symptoms at onset as recalled by the patients and findings by objective evaluation at study entry are given. Peripheral arthritis coexisted with enthesitis in 52 patients (40%), and with inflammatory back pain in 29 patients (22%). While 71 patients reported that they had received a DMD at some stage, 55 (42%) said that their DMD treatment had been targeted at their arthritis. However, patients with oligoarthritis, polyarthritis, and inflammatory back pain all had similar odds of having been administered a DMD (47%, 50%, and 44%, respectively, 48% combined). In contrast, only one of 11 patients (9%) presenting with enthesitis reported DMD use (p = 0.01). Patients with peripheral arthritis were twice as likely to have received a DMD as those who did not have this type of PsA (48% vs 24%, respectively; p = 0.03).

DISCUSSION

This cross-sectional study is based on a cohort of 220 patients who were recruited from both hospital and community based registers and had previously been diagnosed with PsA by rheumatologists. It addresses the prevalence of PsA in the Reykjavik area of Iceland, as well as the clinical and demographic features of these patients. Our finding of an adjusted prevalence of 139 per 100,000 is relatively high when compared with the 57 to 195 per 100,000 range reported in previous population based studies[4,6,7]. However, a recent telephone survey in the US suggested a prevalence as high as 250/100,000[5], which is considerably higher than even our unadjusted prevalence of 164 per 100,000, a figure based in large part on self-report of PsA diagnosis.

Explanations for these discordant prevalence findings may include the wide range of prevalence of psoriatic skin disease reported in different populations[10,11], differences in study design, and the lack of universally accepted diagnostic criteria for PsA. Further, PsA remains a diagnostic challenge, and is likely to be underdiagnosed. Thus, it has been reported that even rheumatologists may fail to diagnose patients with typical features of PsA[33]. Information obtained from clinical databases without a careful confirmatory evaluation may, on the other hand, overestimate the prevalence as shown by our study.

Table 3. Subcategories of PsA at onset and at the time of evaluation (n = 131).

	Category at Examination as Evaluated by Rheumatologist				
Category at Onset as Recalled by the Patient	Oligo-arthritis, n = 58	Poly-arthritis, n = 40	Inflammatory Back Pain, n = 9	Enthesitis, n =11	None** n = 13
Oligoarthritis, n = 86	39*	31	2	7	7
Polyarthritis, n = 31	15	8*	2	3	3
Inflammatory back pain, n = 7	3	1	3*	0	0
Enthesitis, n = 1	0	0	1	0*	0
Unknown†, n = 6	1	0	1	1	3

* Patients who stayed in the same category. ** Patients had no disease activity on examination. † Patients could not remember their symptoms at the onset of PsA.

We are not aware of any previous demographic study in which the majority of patients with self-reported PsA have been carefully examined and the diagnosis verified in accord with published criteria. It should be noted in this context that the diagnosis could not be verified for 16% of the participants in our study although they had all previously been diagnosed with PsA.

Studies of PsA among patients with psoriatic skin disease have suggested a prevalence ranging from 6% to 48%, with designs varying from prospective referral or record review studies[7,21,22,25] to a self-report questionnaire study[34]. Some of these studies were based on psoriasis patients attending hospital clinics, and may therefore be skewed toward those with severe disease who are more likely to develop PsA[21]. However, 69% of our patients were recruited from a community based register and the average PASI score of our cohort was low (mean 4.1, median 2.8; Table 2). We therefore do not think that a bias toward severe skin disease affected our findings. The prevalence of PsA among patients in our community based psoriasis register was 16%[29].

Studies have shown a wide range of sex ratios in PsA. Our finding of a female to male ratio approaching 2:1 among PsA patients is strikingly different from the female to male ratio for the skin disease in our psoriasis registry (1:1.3; $p < 0.001$). This calls for further scrutiny, as it is different from the 1:1 sex ratio most frequently reported for PsA. It is not likely that the relatively high prevalence of PsA among women in our study is due to underestimation of axial arthritis in men because the frequency of this form of PsA was similar to previous studies reporting equal sex prevalence[4,6]. Thus, objective evidence for inflammatory back pain as the exclusive presentation of PsA was found in only 7% of our patients and peripheral disease in 79%, which is in agreement with some previous studies[4,6,7,21]. Three of the 9 patients classified as PsA on the basis of axial disease alone had been diagnosed with the help of radiographic imaging, and the remaining 6 had all previously been diagnosed by a rheumatologist, very likely with the help of an imaging technique.

Reported mean age at onset of PsA ranges from 35 to 41 years[7,19,21] and we found it to be 35 years. Skin symptoms of psoriasis have been shown to have an earlier age of onset in women[28,35], and our data support this.

No subgroup classification of PsA is universally accepted, and our approach takes into account a trend toward reduced numbers of subgroups. In a study in which 87 patients were followed prospectively for 5 years it was found that 21% of PsA patients changed their disease pattern, most often progressing from oligo- to polyarthritis (43%)[23]. We found that 60% of our patients had changed categories during an average disease course of 20 years, but most commonly from poly- to oligoarthritis (48%), while 36% of the patients had progressed from oligo- to polyarthritis. These changes may partly reflect inherent features of the disease, but could also to some extent result from therapy, as more than half our patients had been treated with a DMD at some stage. Also, the distinction between oligoarthritis and polyarthritis is prone to error when patients with a joint count close to the cutoff value are evaluated, and even more so when based on patient recollection. It should therefore be noted that this aspect of our study is based on patients' recollection of the onset of their joint symptoms, which obviously introduces a memory bias, and the data should be interpreted accordingly.

The main strength of our study is that all available patients from both community and hospital based data sources who had all previously been diagnosed with PsA were recruited. Each source has different selection biases that complement the other. Thus, hospital based patients tend to have severe disease, and therefore a relatively high prevalence of PsA[21]. Conversely, PsA may be underdiagnosed in population based cohorts, especially in patients with minimal skin lesions. The psoriasis register includes all affected members of the Icelandic Psoriasis Association as well as their relatives and family members, and it should be emphasized in this context that members of extended families are still very interactive in Iceland. When these individuals were reevaluated according to predefined and published criteria, 16% did not have verifiable PsA (Figure 2). This is important, as previous studies of the prevalence and demographics of PsA have relied either on patient records[4,6,7] or on self-report over the telephone[5].

The main shortcoming of our study is that the participants were not recruited randomly from the population living in the Reykjavik area of Iceland, but such a strategy is hardly realistic for complex diseases with prevalence well below 1%. As it is likely that relatively mild PsA is underdiagnosed in patients with psoriasis, especially those who only attend dermatological clinics or health centers, our adjusted PsA prevalence of 0.14% is probably an underestimate.

Further studies are clearly needed to refine epidemiological information on psoriatic arthritis, including sex ratios, as well as prospective studies with multiple followup visits to monitor the disease course over long periods.

ACKNOWLEDGMENT

The authors thank Helgi Sigvaldason for his assistance with statistical analysis.

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