Summary of Sensitivity and Specificity for Psoriatic Arthritis in a South African Cohort according to Classification Criteria

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ABSTRACT. ***Objective.*** To evaluate the sensitivity and specificity of the classification criteria for psoriatic arthritis (PsA) in a South African cohort.

Methods. Data from consecutive patients with PsA and other chronic inflammatory arthritides were collected prospectively. Subjects were classified according to the classification criteria. The sensitivity and specificity in each group of patients were compared with a clinical diagnosis made by a rheumatologist.

Results. The European Spondylarthropathy Study Group criteria exhibited the lowest sensitivity followed by the Moll and Wright criteria. The sensitivity and specificity of the ClASsification for Psoriatic ARthritis (CASPAR) criteria were 98.4% and 99.7%, respectively.

Conclusion. The CASPAR criteria were evaluated in our cohort and they performed well. (J Rheumatol First Release April 15 2015; doi:10.3899/jrheum.141537)

Key Indexing Terms:
PSORIATIC ARTHRITIS RHEUMATOID ARTHRITIS ANKYLOSING SPONDYLITIS

Psoriatic arthritis (PsA) is a well-recognized and distinct disease entity. In the past, research has been handicapped by the scarcity of validated disease criteria. The original Moll and Wright[1] diagnostic criteria for PsA have remained the most widely used criteria in clinical research. Since 1973, various classification criteria have been proposed, such as Bennett and McCarty[2], Gladman, *et al*[3], Vasey and Espinoza[4], McGonagle, *et al*[5], and Dougados, *et al* [European Spondyloarthropathy Study Group (ESSG)][6]. Wide variability in definitions and classification criteria is a problem that affects the results and interpretation of clinical studies performed in these patients.

The ClASsification of Psoriatic ARthritis (CASPAR) criteria were developed for the classification of PsA[7]. These criteria were developed from a prospective, multicenter observational study of 588 consecutive clinic patients with PsA. Controls were also consecutive clinic attendees with other forms of inflammatory arthritis matched for approximate disease duration. CASPAR provides a sensitivity and specificity of 91.4% and 98.7%, respectively, in the classification of PsA from non-PsA. To fulfill the CASPAR criteria, a patient must have inflammatory joint disease in either a peripheral joint or the spine, or enthesitis with at least 3 points from the following: (1) current psoriasis (scores 2 points); (2) a personal or family history of psoriasis if psoriasis is not currently present; (3) dystrophic changes in the nails; (4) rheumatoid factor negativity; (5) dactylitis; and (6) juxtaarticular new bone formation on radiographs of the hands or feet.

Epidemiological studies on South African patients in particular and African patients in general with PsA are extremely rare. Prior to the advent of human immunodeficiency virus infection, psoriasis and PsA were extremely uncommon in the African black population. The CASPAR criteria were developed mainly from white descendants. Large numbers of patients of South African ethnicity were not included in the study. We therefore decided to evaluate these criteria in a cohort of South African patients with PsA, including both whites as well as patients of South African Indian ethnicity.

MATERIALS AND METHODS

All of the patients with PsA attending the rheumatology clinic at 2 hospitals in Durban, South Africa, from January 2007 to December 2012 were enrolled in our study. The diagnosis of PsA was made by a rheumatologist with a special interest in PsA. Physicians examining the patients were blinded to the patients' primary diagnoses. We had a 3-tier referral system for the rheumatology clinic. Patients were first seen by a general practitioner and then referred to the rheumatology clinic. At the rheumatology clinic, patients

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were assessed by specialist physicians. We had 3 specialist physicians who assessed these patients in a blinded fashion. Once the diagnosis was confirmed by the specialist physician, these patients were then referred to the chief rheumatologist to confirm the diagnosis and clinical findings. Controls were consecutive patients of the same clinic with rheumatoid arthritis (RA) and ankylosing spondylitis (AS). Patients with RA were required to fulfill the 1987 American College of Rheumatology criteria for the diagnosis of RA[8]. Patients with AS were required to fulfill the modified New York criteria for the diagnosis for AS[9]. All of the patients enrolled were above the age of 18 years, and the study included patients of white and South African Indian ethnicities. The study did not have any patient with PsA who was categorized as African black because there were no African black patients with PsA, owing to psoriasis being extremely uncommon in this population[10]. Two patients were of mixed race. All of the patients were interviewed. After providing informed consent, the patients were examined by a rheumatologist according to standard procedures. The examination included all of the historical information required by various criteria, including a family history. Among basic demographic data collected were current history of psoriasis, a family history of psoriasis, symmetrical joint disease, a current or previous history suggestive of enthesitis, and a history of inflammatory back pain. Tender and swollen joint counts were recorded. Standard anteroposterior radiographs of the hands and wrists, as well as feet and pelvis, were obtained to examine them for erosions, new bone formation, and sacroiliitis. The radiographs were read by a radiologist who was blinded to the patients' clinical features.

Statistical analysis. The sensitivity and specificity of the 4 criteria (Moll and Wright, ESSG, Vasey and Espinoza, and CASPAR) for classifying PsA were calculated; the rheumatologist's clinical diagnosis served as the gold standard. The evaluation was done using the latent class (LC) analysis. The LC analysis is simple: it assumes that some of the variables of a postulated statistical model differ across unobserved subgroups of the same class and that acceptance between the subgroups is compared to the gold standard, i.e., the diagnosis by a rheumatologist in this instance. This approach enables the sensitivity and specificity of each criterion within the group to be derived without actually knowing the true diagnosis of the patient. The concordance between the clinical diagnosis and LC model was evaluated with a κ statistic[11,12].

Our study was reviewed and approved by the Pharma-Ethics research ethics committee of South Africa. Before entering the study, participants were informed of the nature and purpose of the study, and written consent was obtained before study inclusion.

RESULTS

The demographics and disease characteristics of the 308 patients diagnosed with PsA by a rheumatologist as well as 860 controls (686 RA and 174 AS subjects) are provided in Table 1. Of the 308 consecutive patients with PsA, 192 were South Africans of Indian descent, 114 were South Africans of European descent, and 2 were of mixed race. None of the patients were of South African black descent. Of the 308 patients with PsA, 173 were men and 135 were women. The mean age was 50.2 years old (range 20–83 yrs). The mean duration of arthritis before diagnosis was 11.3 months (range 3–226 mos). All subtypes of PsA were noted in the various populations. Patients with RA were older, whereas those with AS were younger but experienced a slightly longer disease duration. Among the PsA cohort, 56 subjects had early PsA that is defined as having duration of symptoms of less than 2.5 years. As expected, the patients with early PsA were younger and exhibited less damage on radiological examination; however, minimal differences in pain scores, tender joint counts, and swollen joint counts were noted in these patients compared with patients with chronic PsA.

Among the PsA cohort, 303 of the 308 subjects fulfilled the CASPAR criteria with a sensitivity and specificity of 98.4% and 99.7%, respectively. The ESSG criteria exhibited the lowest sensitivity followed by the Moll and Wright criteria. The sensitivity and specificity of the 4 criteria by comparing a clinical diagnosis compared to that of the LC model are presented in Table 2.

There were 174 patients who fulfilled the modified New York criteria for the diagnosis of AS. There were 129 white and 45 patients of Indian origin. Our cohort did not include any African black patients or mixed-race patients with AS. The male-to-female ratio was 3.1:1. The mean age was 36 years (range 22–68 yrs) with a mean delay in diagnosis of 62 months (range 28–97 mos).

None of the patients with AS had either current or a history of psoriasis. Three patients in the RA group had a family history of psoriasis (0.004%), and 5 patients in the AS cohort had a family history of psoriasis (2.87%).

The breakdown of patients fulfilling the various CASPAR criteria is presented in Table 3. A good correlation between the sensitivities and specificities of the clinical diagnosis model and the LC model was noted, thereby confirming the validity of using expert clinical diagnoses as a gold standard.

DISCUSSION

This is the first study, to our knowledge, to evaluate and validate the performance of the CASPAR criteria in a South African population. Our evaluation of the CASPAR criteria in a South African cohort yielded an overall sensitivity and specificity of 98.4% and 99.7%, respectively. The sensitivity of the CASPAR criteria was superior to that of the previously commonly used Moll and Wright criteria. Although South African patients with PsA were included in the initial CASPAR cohort, the number of those patients was limited. It is promising that the CASPAR criteria performed well and were validated in a larger South African cohort. A similar observation was made by Leung, *et al* when validating the CASPAR criteria in a Chinese population[13].

Our present study has a number of strengths and limitations. The strengths include the fact that all possible psoriatic patients available at the time of the study were enrolled. This inclusion minimized the possibility of observer bias. The controls were consecutive unselected patients attending the same clinics. Hence, they were not matched for disease duration when compared with PsA. We also demonstrated good correlation using 2 statistical models. Our study also had a few limitations, such as being a cross-sectional study of patients with PsA with a longer duration of illness attending 2 rheumatology clinics. This is not a multicenter study. Another limitation is that all patients were examined by 1 rheumatologist. A further limitation could be the inclusion of a small number of controls limited to RA and

Table 1. Demographic details of patients with PsA, RA, or AS on enrollment. Values are mean (SD) unless otherwise specified.

Demographic Details	PsA, n = 308	RA, n = 686	AS, n = 174
Age, yrs	50.2 (11.8)	56.8 (13.6)**	36 (9.6)*
M:F	1.4:1	1:3.8**	3.1:1*
Disease duration, yrs	5.88 (3.78)	7.8 (8.4)*	15.8 (8.9)*
VAS pain, 0–100 mm	58.4 (22.8)	44.8 (26.8)*	42.6 (30.1)*
PGA	52.8 (12.3)	43.8 (24.7) *	44.2 (28.4)*

Statistical significance compared with PsA: * $p < 0.01$ and ** $p < 0.05$. PsA: psoriatic arthritis; RA: rheumatoid arthritis; AS: ankylosing spondylitis; VAS: visual analog scale for pain (0 = no pain; 100 = maximum pain); PGA: physician's global assessment (0 = good, 100 = poor).

Table 2. Summary of classification criteria for PsA. Values are %.

Classification Criteria	Clinical Diagnosis		Latent Class Model	
	Sensitivity	Specificity	Sensitivity	Specificity
Moll and Wright	83.6	100	84.2	100
ESSG	79.3	99.8	81.3	99
Vasey and Espinoza	98	100	99	99
CASPAR	98.4	99.7	99	99

PsA: psoriatic arthritis; ESSG: European Spondyloarthropathy Study Group; CASPAR: ClASsification of Psoriatic ARthritis.

Table 3. Percentages of patients with PsA fulfilling the CASPAR criteria. Values are %.

Characteristics	PsA, n = 308
Current psoriasis	99.3
Family history of psoriasis	26.3
Nail change	76.9
RF-negative	93.8
Dactylitis, past or present	58.1
Juxtaarticular new bone formation	38.3

PsA: psoriatic arthritis; CASPAR: ClASsification of Psoriatic ARthritis; RF: rheumatoid factor.

AS. Only 18.2% of our cohort had early PsA based on the previous definition. Chandran, *et al*[14,15] assessed the CASPAR criteria in patients with early PsA attending a referral center and concluded that these criteria exhibit a high sensitivity and specificity in early and late PsA.

The CASPAR criteria were developed and validated as a system for classifying PsA. These criteria performed well in a South African population and exhibited high sensitivity and specificity.

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