A Community-Based Study on the Prevalence of Spondyloarthritis and Inflammatory Back Pain in Mexicans

Ingris Peláez-Ballestas, MD, PhD, José Eduardo Navarro-Zarza, MD,* Bernardo Julian, MD,* Armando Lopez, MD,† Roxanna Flores-Camacho, MD,* Julio C. Casasola-Vargas, MD,* Luz Helena Sanin, MD, PhD,‡ Lourdes Rivas, MD,† Janitzia Vázquez-Mellado, MD, PhD,* and Rubén Burgos-Vargas, MD§*

Background: The prevalence of spondyloarthritis (SpA) varies across populations. In Mexicans, the prevalence of SpA is still unknown.
Objective: The objective of this study was to determine the prevalence of SpA in the community as well as that of inflammatory back pain (IBP) and ankylosing spondylitis (AS).
Methods: We identified individuals older than 18 years with nontraumatic back pain (BP) in a door-to-door nurse survey using the Community Oriented Program for the Control of Rheumatic Diseases. Then, general physicians and rheumatology fellows selected those likely to have IBP (Berlin criteria). Finally, 2 expert rheumatologists assessed IBP individuals according to clinical data and classification criteria and requested HLA-B27 and radiographic studies to determine the clinical condition of the individual and SpA (European SpA Study Group) classification.
Results: The prevalence of BP among 4059 individuals was 14.6% (95% confidence interval [CI], 13.6–15.8). The prevalence of IBP and SpA was 1.3% (95% CI, 1.0–1.7) and 0.6% (95% CI, 0.4–0.9), respectively. Ankylosing spondylitis prevalence was 0.1% (95% CI, 0.02–0.2). Inflammatory back pain and SpA percentage of males and females was similar. The percentage of individuals with IBP according to the 2 experts was lower than that determined by general physicians and rheumatology fellows, but all cases with HLA-B27, radiographic sacroiliitis, SpA, and AS had previous IBP confirmation by the expert.
Conclusions: The prevalence and sex distribution of patients classified with SpA in this community study—as well as that of patients diagnosed with AS—are consistent with those found in recent studies. Expert assessment of individuals with positive responses to questionnaires is relevant for the classification of IBP and SpA.

Key Words: spondyloarthritis, inflammatory back pain, ankylosing spondylitis, spondyloarthritis in Mexicans

(*J Clin Rheumatol* 2013;19: 57–61)

From the *Department of Rheumatology, Hospital General de México; †American British Cowdry Medical Center, México, México; ‡Universidad Autónoma de Chihuahua, Chihuahua and Instituto Nacional de Salud Pública, Cuernavaca; and §Department of Rheumatology, Hospital General de México, Faculty of Medicine, Universidad Nacional Autónoma de México, México, México.

Rubén Burgos-Vargas has served as member of advisory boards of and speaker for Abbott, BMS, Jannsen, Pfizer, and Roche.

This study was supported by the Consejo Nacional de Ciencia y Tecnología and Secretaría de Salud (CONACYT-Salud 2007-C01-69439). Imaging studies were financed by an unrestrictive support from Abbott Laboratories México. Drs. Navarro-Zarza and Flores-Camacho are supported by scholarships from the Consejo Nacional de Ciencia y Tecnología and Secretaría de Salud.

Correspondence: Rubén Burgos-Vargas, MD, Department of Rheumatology, Hospital General de México, Dr Balmis 148, México DF 06720, México. E-mail: burgosv@prodigy.net.mx.

ISSN: 1076-1608/13/1902–0057
DOI: 10.1097/RHU.0b013e3182862e65

Spondyloarthritis (SpA) refers to a group of HLA-B27–associated rheumatic diseases sharing clinical and genetic features that include ankylosing spondylitis (AS), undifferentiated SpA, reactive arthritis, SpA subsets of psoriatic arthritis, Crohn disease, and ulcerative colitis.[1] The prevalence of SpA in the population ranges from 0.23%[2] to 1.6%[3] and depends on the population's prevalence of HLA-B27 and the design of the study. Most studies, including those following the recommendations of the World Health Organization/International League Associations for Rheumatology Community Oriented Program for the Control of Rheumatic Diseases (COPCORD),[4] focus first on the identification of individuals with back pain (BP).[3–11] Then, the recognition of SpA relies on typical signs and symptoms of SpA and on the criteria of Amor et al[12] or the European SpA Study Group (ESSG) classification criteria,[13] or modified sets of such criteria. In this regard, the importance of inflammatory BP (IBP) has increased in recent years as one of the initial steps in the recognition of preradiographic axial SpA or AS,[14] but little is known about its prevalence in the community. In a recent study, Weisman et al[15] found a prevalence of 6.0% in the American population, including individuals older than 50 years.

In this article, we determined the prevalence of SpA according to ESSG criteria in the Mexican population and in addition the prevalence of IBP and AS. Although the prevalence of SpA in México is still unknown, their incidence has increased in most specialized departments in the last 10 years. Clinically, the presentation of AS and other SpA in Mexicans is often a combination of axial and peripheral symptoms, and most patients with AS have HLA-B27.[16,17] The prevalence of this allele in the general population is around 4% to 5%[16,18]

MATERIALS AND METHODS

This is a community-based, door-to-door survey of individuals older than 18 years in a predetermined urban population (Cuajimalpa, México City) comprising 9269 individuals identified by the American British Cowdry (ABC) Medical Center in a population census in 2005. The local ethics and research institutional review committee approved the protocol of this investigation. Study participants were informed about the study before signing an informed consent of collaboration.

Trained nurses screened all study participants with the Mexican adaptation of the COPCORD stage 1 questionnaire[4,19] starting in 2009 in search of traumatic and nontraumatic musculoskeletal (MSK) pain as well as diverse aspects in relation with the joints and/or the MSK system. Specifically, the nurses looked for individuals with nontraumatic BP scoring of 1 or greater (0 = no pain at all to 10 = the most intense pain on a visual analog scale) in the last 7 days and/or any time in the past. Once identified, such individuals were referred to the ABC Medical Center primary health clinic where trained general physicians (GPs) and rheumatology fellows confirmed or refuted such diagnosis and identified those suspected of having IBP if

they fulfilled at least one of the following Berlin clinical criteria[20]: (1) morning stiffness longer than 30 minutes, (2) improvement with exercise, but not with rest, (3) awakening in the second half of the night, and (4) alternating buttock pain. Regarding the Berlin entry criteria, we modified the age at onset of BP (<50 years of age at the onset of BP instead of <45 years) and duration of symptoms (>6 weeks instead of >3 months) to avoid recalling biases. Individuals with suspected IBP were referred to the rheumatology department for expert's evaluation.

Two expert rheumatologists reassessed all individuals with suspected IBP for the presence of IBP according to the modified Berlin entry criteria and at least 1 IBP parameter. Individuals fulfilling such criteria underwent the following assessments: clinical history and physical examination, HLA-B27 (polymerase chain reaction oligotyping), serum high-sensitivity C-reactive protein (CRP) concentration (nephelometry), and posteroanterior x-rays of the pelvis with 30-degree caudal angulation. At the same time, all participants underwent magnetic resonance imaging of the pelvis and the lumbar spine (not reported here). Interpretation of the clinical, laboratory, and imaging studies was carried out independently and blindly to each other's results. One radiologist and 1 rheumatologist interpreted x-ray studies independently (κ value of 0.8); their discrepancies were solved by consensus. The modified New York criteria for AS were required to fulfill the diagnosis of AS.[21]

Statistical Analysis

Demographic and clinical characteristics were analyzed with descriptive statistics. Group's comparisons were carried out with the χ^2, Fisher exact, and Student *t* tests. The level of significance was set at 0.05. Radiographic interobserver's agreement was assessed by the κ test. The prevalence of SpA, IBP, and AS was calculated on the basis of the population surveyed door-to-door and expressed as percentage and 95% confidence interval (95% CI).

RESULTS

We screened 4059 (43.8%) of 9269 individuals listed in the ABC Medical Center primary health clinic with the COPCORD's stage 1 questionnaire[4,19] in the door-to-door survey. The mean (SD) age of the screened population was 44.6 (16.8) years, and 2795 (68.8%) were women. Mean (SD) educational level was 7.4 (4.0) years, and 2581 (63.6%) had a paid job. The diagnosis of nontraumatic BP was confirmed by GPs and rheumatology fellows in 596 individuals (78.6%) of 758 identified in the door-to-door survey by the nurses; 397 (66.7%) were women, and 199 (33.3%) were men, and their mean (SD) age was 42.4 (14.7) years.

One hundred eighty-seven of those 596 individuals with nontraumatic BP were suspected of having IBP and were therefore referred to the rheumatology department. According to opinion of the 2 experts, 58 individuals did not fulfill any of the 2 entry criteria or any clinical parameter of the modified Berlin criteria for IBP and were therefore not further assessed. Likewise, 8 additional individuals with contraindications for imaging studies (n = 6) or who withdrew consent (n = 2) were also excluded from the study.

In all, 121 individuals with probable IBP were assessed for the presence of SpA. Their mean (SD) age was 41.3 (11.1) years, and 60.4% were women. The frequencies of HLA-B27 and familial aggregation of SpA were 4.1% and 6.9%, respectively. The mean (SD) level of pain was 7.3 (2.3), and as result of IBP, 27 individuals (22.3%) had impaired functioning, and 88 (72.7%) regularly took nonsteroidal anti-inflammatory drugs. Grade 2 bilateral or grade 3 or 4 unilateral radiographic sacroiliitis was seen in only 3.3% of these individuals. According to the expert, 28 individuals (23.1%) fulfilled the ESSG classification criteria for SpA,[13] and 4 (3.3%) fulfilled the modified New York criteria for AS.[21]

The subgroup of individuals with definite IBP (n = 52), defined by the 2 experts' opinion on the presence of at least 2 of the 4 Berlin clinical criteria, was compared with those with probable IBP (n = 69), which comprised all individuals that according to the experts had only one of such criteria. The frequency of most demographic and clinical features concerning SpA, except for CRP, was significantly higher in the group with definite IBP (Table 1). All patients with HLA-B27, radiographic sacroiliitis, SpA, and AS had definite IBP.

We also compared the characteristics of the group of individuals with SpA and those without SpA (Table 2). We found no significant differences in regard to demographic features, but the

TABLE 1. Univariate Analysis of Demographic and Clinical Characteristics as Well as Classification Categories in Individuals With Probable or Definite IBP

	Probable IBP (n = 69)	Definite IBP (n = 52)		Total (n = 121)
	n (%)	n (%)	*P*	n (%)
Males	21 (30.4)	27 (51.9)	0.01	48 (39.6)
Females	48 (59.6)	25 (48.1)	0.01	73 (60.4)
Age, mean (SD), y	42.3 (9.9)	39.9 (12.6)	0.06	41.3 (11.1)
HLA-B27	0	5 (9.6)	0.009	5 (4.1)
Pain NRS, mean (SD), cm	7.0 (2.6)	7.7 (1.8)	0.004	7.3 (2.3)
Impaired functioning	13 (18.5)	14 (26.9)	NS	27 (22.3)
Regularly taken NSAID	46 (66.6)	42 (80.7)	NS	88 (72.7)
Raised hsCRP (>3 mg)	16 (23.2)	9 (17.3)	0.4	25 (20.6)
SpA family aggregation	2/63 (3.2)	6 (11.5)	0.05	8/115 (6.9)
Radiographic sacroiliitis[a]	0	4 (7.7)	0.02	4 (3.3)
SpA, ESSG criteria	0	28 (53.8)	<0.001	28 (23.1)
AS, modified New York criteria	0	4 (7.7)	0.02	4 (3.3)

[a]Grade 2 bilateral or grade 3 unilateral. These 4 patients were those with AS according to the modified New York criteria.

NRS indicates numerical rating scale; NSAID, nonsteroidal anti-inflammatory drugs; hsCRP, high-sensitivity CRP.

TABLE 2. Main Demographic and Clinical Data of Individuals Classified as SpA and Non-SpA[a]

	SpA (n = 28)	Non-SpA (n = 93)	
	n (%)	n (%)	*P*
Demographic and clinical data			
Men	14 (50.0)	34 (36.5)	0.2
Women	14 (50.0)	59 (63.4)	0.3
Age, mean (SD), y	40.7 (14.2)	41.5 (10.1)	0.7
HLA-B27	4 (14.3)	1 (4.1)	0.04
Pain NRS, mean (SD), cm	7.8 (1.9)	7.1 (2.4)	0.1
Impaired functioning	9 (32.1)	18 (19.3)	0.1
High hsCRP	4 (14.3)	21 (22.5)	0.3
Classification criteria (ESSG)			
IBP	28 (100.0)	24 (25.8)	<0.001
Peripheral oligoarthritis	12 (42.8)	0 (0)	<0.001
Enthesopathy	11 (39.2)	1 (1.0)	<0.001
Family aggregation of SpA	6 (21.4)	2 (2.1)	<0.001
Alternating buttock pain	18 (64.2)	11 (11.8)	<0.001
Radiographic sacroiliitis	3 (10.7)	1 (1.0)	0.01

No cases of psoriasis; Crohn disease, colitis ulcerosa; urethritis/cervicitis or acute diarrhea preceding arthritis; dactylitis, uveitis; or balanitis were found.

hsCRP indicates high-sensitivity CRP.

frequency of each component of the ESSG SpA criteria[13] and HLA-B27 was indeed significantly higher in patients with SpA.

Classification categories were established by the experts' opinion on the presence or absence of classification criteria (Table 3). The prevalence of SpA according to ESSG[16] was 0.6%. The prevalence of IBP was 1.3%, and that of AS was 0.1%. Applying such figures to the Mexican population, we estimated that 431,242 individuals could fulfill SpA-ESSG[13] criteria, 934,359 may have IBP, and 64,686 could meet the modified New York criteria for AS[21] of 71,873,784 individuals older than 18 years of a total of 111,211,785 inhabitants.[22]

DISCUSSION

This study investigated the prevalence of SpA as well as those of IBP and AS in the community. For each of the steps performed, we collected information through questionnaires derived from specific criteria and then evaluated the clinical condition of each individual by expert review and opinion. The prevalence of SpA found in this study according to ESSG classification criteria[13] was 0.6% with no sex predominance. Such prevalence was slightly higher than that reported in Sweden,[23] France,[5] Greece,[6] and China (Han population)[11] and similar to that reported in Lithuania.[10] Our SpA prevalence was also similar to that found by Reveille et al[24] among Mexican Americans in the United States according to Amor criteria,[12] but less than a half when ESSG criteria[13] were applied. It was also lower than that found in Azores,[3] other parts of China,[8] and Turkey.[9] On the other hand, the prevalence of SpA in our study was much lower than that of rheumatoid arthritis (1.60% [95% CI, 1.42–1.78]) found in a parallel community study in our country.[25]

TABLE 3. Prevalence of the Different Diagnostic and Classification Categories

Classification	Criteria	n	%	95% CI
Nontraumatic BP	COPCORD	596	14.6	13.6–15.8
IBP	Modified Berlin	52	1.3	1.0–1.7
SpA[a]	ESSG	28	0.6	0.4–0.9
AS[a]	Modified New York	4	0.09	0.02–0.2

[a]Including those with ankylosing spondylitis.

The prevalence of SpA relied on the classification of SpA according to ESSG criteria[16] because all parameters—except radiographic sacroiliitis—consist of clinical symptoms. In addition to IBP, the ESSG criteria[16] most frequently found in our study were alternating buttock pain, peripheral arthritis, and enthesopathy; radiographic sacroiliitis was rare. The proportion of women with SpA reached 50% in the community, which was consistent with a trend described in other population studies[4,9–11,23] and interestingly in preradiographic sacroiliitis or early axial SpA clinics in several European countries.[26–32] The relatively increased proportion of women classified as SpA in the community may be related with the prevalence of MSK complaints in women in whom physical, psychological, and intellectual demands are imposed by home duties, socioeconomic deprivation, and complementary jobs.[22,32,33] In the clinic, explanations include increasing awareness of SpA and its clinical features among women[34] and the implementation of BP and IBP referral clinics.[26–28,35–37] In contrast, the higher prevalence of men with AS in rheumatology clinics has been attributed to more severe disease in such genre than in women.

Based on the Berlin criteria[20] evaluation by the experts, we found an IBP prevalence of 1.3% in the community. That prevalence is lower than that of 6.0% found by Weisman et al[15] according to the same criteria in the United States. Such difference could be explained in terms of population's age and the design of the study. Whereas we included only individuals younger than 50 years, Weisman et al[15] as well as Reveille et al[24] in regard to SpA included an important percentage of individuals older than 50 years in their studies. In our study, the diagnosis of IBP resulted from an expert's assessment of the individuals in whom GPs and rheumatology fellows suspected IBP as a diagnosis. In the study of Weisman et al,[15] the diagnosis

of IBP was based on the responses to a well-designed questionnaire for the ascertainment of IBP administered by trained interviewers, but not verified by any physician or experienced rheumatologist.

The distinction of individuals with probable IBP from those with definite IBP was certainly problematic, and we therefore relied on the expert opinion to diagnose it. Thus, the prevalence of IBP established by the expert was 71.8% lower than that found by GPs and rheumatology fellows. Interestingly, the prevalence of IBP found by GPs and rheumatology fellows (4.6%) was close to that found by trained interviewers in the United States (6%).[15] The validity of rheumatologist's reassessment is supported by the circumstance that most individuals with SpA features, including those classified as SpA and AS, were in the group of individuals with definite IBP.

Because the identification of individuals with IBP attending orthopedic and primary care clinics plays an important role in the recognition of preradiographic sacroiliitis or axial SpA,[14] we consider that an experienced person should perform the assessment of IBP in the clinic. It is clear that the identification of patients in the early, predominantly inflammatory stage of the disease may result in early treatment with biologic agents and better responses.[38] In this context, we would expect an improvement in the rationale for using biologic therapies in SpA. Currently, some articles have suggested changes in the role of IBP in diagnostic algorithms for axial SpA.[26,39,40] However, the identification of IBP seems to be the best screening method for axial SpA thus far. In fact, the diagnostic properties of a new set of criteria have been recently improved.[4]

In this study, 0.1% of the population had AS, which is in the lowest range of that found in other populations, but very close to that found in Sweden.[2] The 4% prevalence of HLA-B27 in Mexicans[16–18] is likely to determine such a low prevalence of AS in our study.

In conclusion, the prevalence of SpA in the Mexican community was 0.6%. The sex distribution in this population is consistent with that found in some recent epidemiologic studies. The prevalence rates of IBP and AS were 1.3% and 0.1%, respectively. In our experience, the role of experts in each step resulted in a more careful assessment of classification criteria.

ACKNOWLEDGMENTS

The authors thank the following persons for their participation in the study: Denisse Álvarez, Everardo Álvarez-Hernández, Diana Anaya, Ivonne Arena, Nidya Cordero, Nancy García, María Inés García, Marisol González, Adalberto Loyola, Sara Marín, Guillermo Pérez, Nadia Saavedra, and Gerlinde Schlang.

REFERENCES

1. Moll JMH, ed. *Ankylosing Spondylitis*. Edinburgh: Churchill Livingstone, 1980;301.
2. Davatchi F, Jamshidi AR, Banihashemi AT, et al. WHO-ILAR COPCORD study (stage 1, urban study) in Iran. *J Rheumatol*. 2008;35:1384–1390.
3. Bruges-Armas J, Lima C, Peixoto MJ, et al. Prevalence of spondyloarthritis in Terceira, Azores: a population based study. *Ann Rheum Dis*. 2002;61:551–553.
4. Darmawan J, World Health Organization-International League of Associations for Rheumatology Community Oriented Program for Control of Rheumatic Disease. Recommendations from the Community Oriented Program for Control of Rheumatic Disease for data collection for the measurement and monitoring of health in developing countries *Clin Rheumatol*. 2007;26:853–857
5. Saraux A, Guedes C, Allain J, et al. Prevalence of rheumatoid arthritis and spondyloarthropathy in Brittany, France. Société de Rhumatologie de l'Ouest. *J Rheumatol*. 1999;26:2622–2627.
6. Hukuda S, Minami M, Saito T, et al. Spondyloarthropathies in Japan: nationwide questionnaire survey performed by the Japan Ankylosing Spondylitis Society. *J Rheumatol*. 2001;28:554–559.
7. Trontzas P, Andrianakos A, Miyakis S, et al. Seronegative spondyloarthropathies in Greece: a population-based study of prevalence, clinical pattern, and management. The ESORDIG study. *Clin Rheumatol*. 2005;24:583–589.
8. Ng SC, Liao Z, Yu DT, et al. Epidemiology of spondyloarthritis in the People's Republic of China: review of the literature and commentary. *Semin Arthritis Rheum*. 2007;37:39–47.
9. Onen F, Akar S, Birlik M, et al. Prevalence of ankylosing spondylitis and related spondyloarthritides in an urban area of Izmir, Turkey. *J Rheumatol*. 2008;35:305–309.
10. Adomaviciute D, Pileckyte M, Baranauskaite A, et al. Prevalence survey of rheumatoid arthritis and spondyloarthropathy in Lithuania. *Scand J Rheumatol*. 2008;37:113–119.
11. Liao ZT, Pan YF, Huang JL, et al. An epidemiological survey of low back pain and axial spondyloarthritis in a Chinese Han population. *Scand J Rheumatol*. 2009;38:455–459.
12. Amor B, Dougados M, Mijiyawa M. Critères des classification des spondylartropaties. *Rev Rhum*. 1990;57:85–89.
13. Dougados M, van der Linden S, Juhlin R, et al. The European Spondylarthropathy Study Group preliminary criteria for the classification of spondylarthropathy. *Arthritis Rheum*. 1991;34: 1218–1227.
14. Rudwaleit M, van der Heijde D, Landewé R, et al. The development of Assessment of SpondyloArthritis International Society classification criteria for axial spondyloarthritis (part II): validation and final selection. *Ann Rheum Dis*. 2009;68:777–783.
15. Weisman M, Witter J, Reveille J. The prevalence of inflammatory back pain: population-based estimates from the US National Health and Nutrition Examination Survey, 2009–10 [published online ahead of print]. *Ann Rheum Dis*. 2012.
16. Burgos-Vargas R, Granados-Arriola . In: Khan MA, ed. *Ankylosing Spondylitis and Related Spondyloarthropathies*. Philadelphia, PA: Hanley & Belfus; 1990:665–678.
17. Burgos-Vargas R, Naranjo A, Castillo J, et al. Ankylosing spondylitis in the Mexican mestizo: patterns of disease according to age at onset. *J Rheumatol*. 1989;16:186–191.
18. Vargas-Alarcón G, Londoño JD, Hernández-Pacheco G, et al. Effect of HLA-B and HLA-DR genes on susceptibility to and severity of spondyloarthropathies in Mexican patients. *Ann Rheum Dis*. 2002; 61:714–717.
19. Cardiel MH, Rojas-Serrano J. Community based study to estimate prevalence, burden of illness and help seeking behavior in rheumatic diseases in Mexico City. A COPCORD study. *Clin Exp Rheumatol*. 2002;20:617–624.
20. Rudwaleit M, Metter A, Listing J, et al. Inflammatory back pain in ankylosing spondylitis: a reassessment of the clinical history for application as classification and diagnostic criteria. *Arthritis Rheum*. 2006;54:569–578.
21. Van der Linden S, Valkenburg HA, Cats A. Evaluation of diagnostic criteria for ankylosing spondylitis. A proposal for modification of the New York criteria. *Arthritis Rheum*. 1984;27:361–368.
22. Instituto Nacional de Estadística y Geografía [homepage]. México: INEGI; 2008. Available at: www.inegi.org.mx. Accessed June 5, 2010.
23. Haglund E, Bremander AB, Petersson IF, et al. Prevalence of spondyloarthritis and its subtypes in southern Sweden. *Ann Rheum Dis*. 2011;70:943–948.

24. Reveille JD, Witter JP, Weisman MH. Prevalence of axial spondylarthritis in the United States: estimates from a cross-sectional survey. *Arthritis Care Res (Hoboken)*. 2012;64:905–910.
25. Peláez-Ballestas I, Sanin LH, Moreno-Montoya J, et al, Grupo de Estudio Epidemiológico de Enfermedades Músculo Articulares (GEEMA). Epidemiology of the rheumatic diseases in Mexico. A study of 5 regions based on the COPCORD methodology. *J Rheumatol Suppl*. 2011;86:3–8.
26. Heuft-Dorenbosch L, Landewé R, Weijers R, et al. Performance of various criteria sets in patients with inflammatory back pain of short duration; the Maastricht early spondyloarthritis clinic. *Ann Rheum Dis*. 2007;66:92–98.
27. Rudwaleit M, Haibel H, Baraliakos X, et al. The early disease stage in axial spondylarthritis: results from the German Spondyloarthritis Inception Cohort. *Arthritis Rheum*. 2009;60:717–727.
28. Hermann J, Giessauf H, Schaffler G, et al. Early spondyloarthritis: usefulness of clinical screening. *Rheumatology (Oxford)*. 2009; 48:812–816.
29. Muñoz-Fernández S, de Miguel E, Cobo-Ibáñez T, et al; ESPIDEP Study Group. Early spondyloarthritis: results from the pilot registry ESPIDEP. *Clin Exp Rheumatol*. 2010;28:498–503.
30. Chung HY, Machado P, van der Heijde D, et al. HLA-B27 positive patients differ from HLA-B27 negative patients in clinical presentation and imaging: results from the DESIR cohort of patients with recent onset axial spondyloarthritis. *Ann Rheum Dis*. 2011;70:1930–1936.
31. Kiltz U, Baraliakos X, Karakostas P, et al. The degree of spinal inflammation is similar in patients with axial spondyloarthritis who report high or low levels of disease activity: a cohort study. *Ann Rheum Dis*. 2012;71:1207–1211.
32. Woolf AD, Pfleger B. Burden of major musculoskeletal conditions. *Bull World Health Organ*. 2003;81:646–656.
33. Brekke M, Hjortdahl P, Kvien TK. Severity of musculoskeletal pain: relations to socioeconomic inequality. *Soc Sci Med*. 2002;54:221–228.
34. Feldtkeller E, Bruckel J, Khan MA. Scientific contributions of ankylosing spondylitis patient advocacy groups. *Curr Opin Rheumatol*. 2000;12:239–247.
35. Brandt HC, Spiller I, Song IH, et al. Performance of referral recommendations in patients with chronic back pain and suspected axial spondyloarthritis. *Ann Rheum Dis*. 2007;66:1479–1484.
36. Jois RN, Macgregor AJ, Gaffney K. Recognition of inflammatory back pain and ankylosing spondylitis in primary care. *Rheumatology (Oxford)*. 2008;47:1364–1366.
37. Poddubnyy D, Vahldiek J, Spiller I, et al. Evaluation of 2 screening strategies for early identification of patients with axial spondyloarthritis in primary care. *J Rheumatol*. 2011;38:2452–2460.
38. Rudwaleit M, Listing J, Brandt J, et al. Prediction of a major clinical response (BASDAI 50) to tumour necrosis factor alpha blockers in ankylosing spondylitis. *Ann Rheum Dis*. 2004;63:665–670.
39. Rudwaleit M, van der Heijde D, Khan MA, et al. How to diagnose axial spondyloarthritis early. *Ann Rheum Dis*. 2004;63:535–543.
40. van den Berg R, de Hooge M, Rudwaleit M, et al. ASAS modification of the Berlin algorithm for diagnosing axial spondyloarthritis: results from the SPondyloArthritis Caught Early (SPACE)-cohort and from the Assessment of SpondyloArthritis international Society (ASAS)-cohort. *Ann Rheum Dis* [Epub ahead of print].