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Epidemiology of Spondyloarthritis in North America

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Abstract

Many challenges have made it difficult to determine the prevalence of spondyloarthritis (SpA) in North America. They include the ethnic heterogeneity of the population, the lack of feasibility of applying current criteria (such as requirements for HLA-B27 testing and imaging studies such as pelvic radiographs and MRI scanning) and the transient nature of some SpA symptoms (ie, peripheral arthritis, enthesitis). Current estimates of the prevalence of SpA in the United States range between 0.2% and 0.5% for ankylosing spondylitis, 0.1% for psoriatic arthritis, 0.065% for enteropathic peripheral arthritis, between 0.05% and 0.25% for enteropathic axial arthritis, and an overall prevalence of SpA as high as over one percent. With newer population-based instruments becoming available, the availability of the widely validated European Spondyloarthropathy Study Group (ESSG) criteria and the lower cost and greater feasibility of genetic testing, opportunities for true population-based studies of SpA are possible and will likely soon ensue.

Key indexing terms

Epidemiology; ankylosing spondylitis; psoriatic arthritis; enteropathic arthritis; spondyloarthritis

Introduction

Many challenges affect the determination of spondyloarthritis (SpA) in the Americas. One is the ethnic heterogeneity underlying the population composition. Current genetic studies support two, and possible three, genetically distinct groups that originally settled the Americas. The first, occurring up to 30,000 years ago (the Amerinds) comprised the groups in South and Central America and Eastern North America. Data from South American Amerindian tribes suggest that the frequency of HLA-B27 was very low, if not absent.^{1,2} The second, occurring later, comprised the Pacific Northwest (Athabascans, Tlingits) and some Southwest tribes (Apache, Navajo, etc-the NaDenes). A third group comprised the Eskimos (Inuits). The latter two groups have a high frequency of HLA-B27, and correspondingly, of SpA.^{3–6} When the Europeans began arriving in large numbers after 1492, they brought with them infectious diseases such as measles and smallpox, against which the Native Americans had little natural immunity, and high mortality ensued.⁷ To meet the labor needs that colonization required, a brisk (largely West) African slave trade ensued, importing a population that has become dominant in the Caribbean and parts of South America, which has extensively admixed elsewhere, and which has a very low

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frequency of HLA-B27 and SpA.^{8,9} Superimposed on this scene are the massive immigrations of Europeans and Asians that accelerated in the nineteenth century and that have continued to this day, each group bringing with them their own respective HLA-B27 frequencies and SpA prevalence.

Another challenge in determining the epidemiology of SpA is the application of the various criteria currently extant. The “gold standard” for the diagnosis of ankylosing spondylitis (AS) is the modified New York criteria.¹⁰ These require the availability of pelvic radiographs, however, which are no longer feasible in population-based epidemiologic studies. With the recognition of the need to better define the broader SpA phenotype, the European Spondyloarthropathy Study Group (ESSG) criteria were developed,¹¹ which have been extensively applied and validated in numerous populations. More recently, with newer imaging techniques such as magnetic resonance imaging (MRI), a “pre-radiographic” stage of AS has been recognized, leading to the concept of axial SpA and the development of criteria for axial SpA that have been developed by ASAS (Assessment of Spondyloarthritis International Society).¹² However, application of these criteria require availability of MRI scanning and/or HLA-B27 testing, which are expensive and not readily available in developing countries for population screening, and which have limited the feasibility in epidemiologic studies. Moreover, HLA-B27 associated with some but not all types of SpA, and not all ethnic groups show the same associations (ie, those of African or Middle-East origin, reviewed in Reveille et al).¹³ Yet another challenge is the transient nature of arthritis/enthesitis in those with peripheral involvement and the lack of reliability of determining this based on patient history alone.

Currently, what is known about SpA in the US is summarized below.

Ankylosing Spondylitis

A 1979 study from Rochester Minnesota reported an overall prevalence of AS of 1.29/1000 in a population that was 99% Caucasian.¹⁴ However, this study was highly biased, predating extant criteria and including only those who had sought medical care for their condition. Limited prevalence data for African-American males suggest AS occurs at about 25% the frequency of Caucasians.⁸

The first National Health and Nutrition Examination Survey (NHANES I) was a nationally representative study conducted between 1971 and 1975 at 100 locations.¹⁵ Among 6,913 participants between the ages of 25 and 74 in whom the prevalence of low back pain was ascertained (Table 1), pelvic radiographs were obtained in all but 2,010 of these individuals (the latter being women under the age of 50 years). The prevalence of severe or moderate radiographic sacroiliitis in men was 4.0/1000 for ages 25–34 years, 3.0/1000 for ages 35–44 years, 27/1000 for ages 55–64 years, 6.0/1000 for ages 65–74 years, and 7.3/1000 for ages 25–74 years (Table 2). Among women, the prevalence was 3.0/1000 for ages 55–64 years, 4.0/1000 for ages 65–74 years, and 3.0/1000 for ages 50–74 years.

Of note, 54% of those who had moderate to severe radiographic sacroiliitis reported never having been treated for joint problems, and only 7.6% were currently experiencing “significant pain in their lower backs on most days for at least one month.” How many had AS by modified New York criteria was not ascertained, as questions regarding inflammatory back pain (IBP) or measurements of spinal mobility were not done. These may be underestimates for radiographic sacroiliitis, as the knee and hip osteoarthritis readings by the same observers were found to be under-read;¹⁶ moreover, the overall grade for disease was averaged between bilateral sites, which may have diluted the scores if there was only unilateral disease (www.cdc.gov/nchs/data/nhanesi).

Reactive Arthritis

The prevalence of reactive arthritis appears to be on the decrease in many developed countries.¹⁷ Despite one study of the incidence of reactive arthritis in Rochester, Minnesota,¹⁸ its actual prevalence in the US is unknown. One study of HIV-positive patients at a large county rheumatology clinic in Houston, TX between February 1994 and December 2002 described a prevalence of 0.21%,¹⁹ although how representative this is of the general population is less clear. Older studies among Native American groups have shown frequencies of 3/1,000 in Navajos⁴ and between 2–10/1,000 in Alaskan Yupik and Inupiat Eskimos,⁶ two groups with a high frequency of HLA-B27.

Psoriatic Arthritis

In Rochester, Minnesota, the prevalence of psoriatic arthritis on January 1, 1992, was 1/1000 (95% CI 0.81, 1.21),²⁰ strikingly similar to data reported from Greece²¹ and Finland²² and in HIV-positive outpatients in Texas.¹⁹ No specific epidemiologic data on psoriatic arthritis among African-Americans and Hispanics are available.

Enteropathic Arthritis

The prevalence of inflammatory bowel disease (IBD) in the US has been estimated at 5/1000;²³ however, that of enteropathic arthritis/spondylitis has not been determined. The self-limited and nondestructive nature of peripheral enteropathic arthritis complicates prevalence calculations,²⁴ although it has been reported in up to 13% of patients.^{25–27} Although IBP has been reported in up to 50% of patients with IBD,^{26,27} AS occurs in less than 10%.²⁵ Applying these percentages (13% for peripheral arthritis and 10–50% for axial arthritis) to the background prevalence of 0.5% of the US population with IBD, the estimated US prevalence of enteropathic peripheral arthritis is 0.65/1000, and enteropathic axial arthritis ranging from 0.5–2.5/1000. There are no data on the prevalence of enteropathic arthritis in African Americans or Hispanics.

Undifferentiated Spondyloarthritis

Limited data from Europe^{28,29} and Alaska³⁰ suggest that approximately 40% of patients with SpA have “undifferentiated” SpA. Better population-based data are needed, especially in the US. This is a focus of the NHANES 2009–2010 survey, and newer data will be available soon.

Overall Spondyloarthritis

The prevalence of SpA in the US by currently accepted classification criteria is unknown. In studies of Caucasians from Europe, the prevalence has varied widely, ranging from 4.7/1000²⁸ to up to 19/1000.²⁹ Higher prevalences have been reported in Eskimo groups from Siberia and Alaska.³⁰ The prevalence of SpA in the US is estimated to range between 4.0–13.1/1000, age 25+ years (Table 3).³¹ The lower range comprises the only true US-AS prevalence data,¹¹ as well as the lowest frequency on IBP and peripheral arthritis in patients with IBD (ie, 13% assuming these are linked phenomena). The higher range estimate takes into account the NHANES I¹⁶ AS data plus the highest frequency of IBD-associated IBP (50%) plus the frequency of peripheral joint involvement (13%) in those with IBD (assuming they are unrelated complications). The frequency of psoriatic arthritis is constant (1/1000) in generating the SpA prevalence estimate ranges. The undifferentiated SpA estimate is derived by multiplying the additive frequency of the other SpA by 40% (assuming the maximum estimate for enteropathic arthritis). This upper range of 1.3%

prevalence is likely an overestimation as these clinical subsets are to some extent overlapping and the prevalences are thus not additive.

Conclusions from breakout session at SPARTAN

Future studies will be limited by the application of criteria that are both feasible at a population level and cost effective. In a breakout session on SpA criteria at the 2010 SPARTAN/PANLAR meetings, it was widely recognized that the new ASAS criteria³² requiring HLA-B27 testing or MRI scanning were cost prohibitive, not widely available and thus infeasible, and it was decided that the widely validated ESSG criteria would be more practical.

Alternatively, newer instruments such as have been developed by the Spondylitis Association of America and adapted for use in the NHANES 2009–2010 US population screening may prove practical options. Moreover, collection of saliva samples using commercial kits are more feasible for genetic (ie, HLA-B27) testing than blood samples, and may comprise a promising approach to better defining the epidemiology of SpA in the Americas.

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Table 1Prevalence of various categories of low back pain by race, age and gender^a

	Any LBP in past year, %	Frequent LBP in past year, %	Lifetime occurrence of LBP >2 weeks, %
Race			
White	69	19	14
Black	46	19	11
Other	48	na	9
Age (years)			
18–34	61	14	10
35–49	53	21	12
50–64	56	21	17
>65	49	18	16
Gender			
Male	53	15	14
Female	57	20	13

LBP = low back pain; na = not applicable

^aFrom NHANES I, 1971–1975¹⁵

Table 2Percent distribution of radiographic sacroiliitis in men ages 25–74 years in the US population 1971–75^a

Age (years)	Number of Subjects Studied	Severe Sacroiliitis (%)	Moderate Sacroiliitis (%)
25–34	672	-	0.4
35–44	528	0.2	0.1
45–54	746	-	-
55–64	626	1.0	1.75
65–74	599	0.1	0.5

^aFrom NHANES I, 1971–1975¹⁵

Table 3

Prevalence of Four Types of Spondyloarthritis and Overall Prevalence in the United States

Group	Prevalence per 1000		
	Men	Women	Total
Ankylosing Spondylitis			
Nationally representative (age 25+years, men; 50+years, women)	7.3	3.0	5.2
Whites (ages 15+) men and women	1.97	0.73	1.29
Blacks	0.48–2.0	na	na
Reactive arthritis			
HIV positive overall	-	-	2.1
Eskimos (age 20+)	-	-	4.0
Psoriatic arthritis (Caucasian age 20+)	-	-	1.01
Enteropathic Arthritis			
Peripheral	-	-	0.65
Axial	-	-	0.5–2.5
Undifferentiated Spondyloarthritis	-	-	3.74
Overall Spondyloarthritis	-	-	4.0–13.1

na = not applicable