Epidemiology of Systemic Sclerosis in a Large US Managed Care Population

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ABSTRACT. ***Objective.*** To estimate the incidence and prevalence of systemic sclerosis (SSc) in a large US managed care organization (MCO) database.

Methods. Subjects with claims-based evidence of SSc (ICD-9-CM code 710.1x) were identified from a health plan database. Incidence and prevalence for the period 2003-2008 were calculated.

Results. The overall age- and sex-adjusted incidence rate (2003-2008) for SSc was 5.6 cases per 100,000 person-years. The annual prevalence of SSc ranged from 13.5 in 2003 to 18.4 (per 100,000) in 2008.

Conclusion. This analysis suggests a higher incidence and lower prevalence of SSc in this MCO than those previously reported for the United States. (J Rheumatol First Release March 1 2012; doi:10.3899/jrheum.111106)

Key Indexing Terms:
SYSTEMIC SCLEROSIS EPIDEMIOLOGY INCIDENCE PREVALENCE CLAIMS

Systemic sclerosis (SSc) is a chronic connective tissue disease that affects the skin and internal organs[1]. Patients may experience damage of blood vessels, inflammation, fibrosis, scarring, renal crisis, pulmonary fibrosis, and cardiac problems[2,3]. Two subsets of SSc have been described: limited SSc and diffuse SSc[4]. Estimates of the incidence and prevalence of SSc have historically been difficult due to the rarity of the disease and the wide range of symptoms and severity[5]. We used a large US healthcare claims database to provide a current estimate of the prevalence and incidence of SSc.

MATERIALS AND METHODS

Study subjects were commercial enrollees from a US managed care organization (MCO) consisting of about 35 million commercially insured members with medical and pharmacy benefits during the study period 2003–2008 (about 14 million total covered lives per year). Subjects were included in the incidence cohort if they had a medical claim with an SSc ICD-9-CM code of 710.1x and an index date from 2003–2008 that satisfied the following criteria: (1) at least 1 inpatient claim or ≥ 2 office or emergency room visits at least 30 days apart with a diagnosis code for SSc; (2) age ≥ 18 years on the index date; (3) continuously enrolled for 12 months before and after the index date; and (4) no SSc claims 12 months prior to the index date. Patients were identified for the prevalence cohort using the same criteria, with the exception of requirement 4. Subject's information in the database was reviewed back to the year 1999, and subjects with evidence of SSc from 2000 to 2002 (per the above criteria) were excluded from the incidence cohort (but not from the prevalence cohort). The earliest service date that met the above criteria was set as the index date for incident subjects, and for the prevalence population, the index date for each person was chosen at random, from all qualifying service dates.

Overall and annual incidence rates for the duration of 2003–2008 were estimated and adjusted for age and sex to the US 2000 census population. Annual incidence was calculated as the proportion of (1) subjects who were identified as SSc incident during the calendar year of interest to (2) all health plan enrollees ≥ 18 years old the year of interest; continuously enrolled for ≥ 2 years, including year of interest; and who did not have a qualifying SSc service date before the year of interest. Overall incidence was calculated as the proportion of (1) number of subjects with an SSc index date between 2003 and 2008 to (2) the total number of at-risk person-years from 2003 to 2008 (to contribute a single at-risk person-year, an enrollee must have been continuously enrolled for a total of ≥ 2 years, including the entire year of interest; age ≥ 18 years; and not identified as SSc incident or prevalent before the calendar year). Annual prevalence was calculated for each year from 2003 to 2008 as the proportion of (1) all subjects identified as prevalent during the year of interest to (2) all commercial health plan enrollees who were ≥ 18 years of age and were continuously enrolled for ≥ 2 years, including the entire calendar year of interest. Patients contributed to annual incidence only once but could contribute to prevalence in multiple years. Sensitivity analysis results were obtained as described above, with the exception of limiting the numerators to the subgroup of SSc subjects with specific relevant clinical evidence from medical and pharmacy claims.

RESULTS

The incidence cohort consisted of 1529 subjects (85% women) and the prevalence cohort consisted of 2739 subjects (86% women; Table 1). During the postindex period, nearly 50% of subjects in the incidence and prevalence cohorts had pharmacy claims for corticosteroids and about 10% had pharmacy claims for methotrexate, but fewer than 5% of subjects had pharmacy claims for any of the other medications of interest (Table 1). The overall crude SSc incidence rate estimate between 2003 and 2008 was 4.6 cases per 100,000 person-years (Table 2). After adjustment

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Supported by MedImmune LLC.

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Accepted for publication December 9, 2011.

Table 1. Characteristics of subjects with systemic sclerosis (SSc) (2003–2008).

Characteristic	Incidence Cohort Subjects n (%)	Prevalence Cohort Subjects n (%)
SSc (overall)	1529 (100.0)	2739 (100.0)
Year		
2003	226 (14.8)	656 (24.0)
2004	220 (14.4)	725 (26.5)
2005	232 (15.2)	757 (27.6)
2006	304 (19.9)	918 (33.5)
2007	278 (18.2)	966 (35.2)
2008	269 (17.6)	1076 (39.3)
Age, yrs		
18–44	430 (28.1)	732 (26.7)
45–64	916 (59.9)	1682 (61.4)
65+	183 (12.0)	325 (11.9)
Sex		
Female	1297 (84.8)	2357 (86.1)
Male	232 (15.2)	382 (14.0)
Medications (1 Year postindex)		
Methotrexate	152 (9.9)	246 (9.0)
Cyclosporine	10 (0.7)	13 (0.5)
Cyclophosphamide	39 (2.6)	75 (2.7)
Mycophenolate mofetil	67 (4.4)	132 (4.8)
Corticosteroids	707 (46.2)	1213 (44.3)

for age and sex, the overall incidence rate of SSc was estimated at 5.6 cases per 100,000 person-years (Table 2). Overall incidence estimates were slightly lower in sensitivity analyses, which were limited to SSc subjects with specific clinical/treatment characteristics (Table 2). Between 2003 and 2008, the highest age- and sex-adjusted SSc incidence estimate was in 2007 (6.3 cases per 100,000), and the lowest was in 2004 (4.8 cases per 100,000; Table 2). Annual prevalence of SSc (per 100,000 persons) ranged from 13.5 in 2003 to 18.4 in 2008 (Table 3). In sensitivity analyses, the annual prevalence decreased slightly (Table 3).

DISCUSSION

Previous studies estimated the yearly incidence of SSc in the United States at under 2 cases per 100,000 individuals and the prevalence in the United States at over 25 cases per 100,000 individuals[6,7,8,9,10]. Studies of SSc incidence in the US have been limited to just 1 specific geographic region, failed to adjust for age and sex, or used data from 20 years ago or more. In contrast, our study used recent, geographically diverse data from across the country. The methodological approach (identification of SSc subjects using claims data) differed from that used in other studies (e.g., medical record survey, hospital census). Importantly, as subjects from our study were from an MCO, these results may not be generalizable to non-MCO populations.

Limitations of administrative claims data should be considered when interpreting these results. Presence of a diagnosis code could be a marker for a rule-out criterion rather than actual disease, and claims are subject to possible coding errors (e.g., provider billing staff submitting erroneous codes). It was not possible to obtain entire medical histories for study subjects, so it is possible that some subjects had SSc prior to the beginning of the study period, causing incidence rate estimates to be inflated. Also, subjects who were counted in prevalence reports in one year were not necessarily counted in subsequent years, which may have led to lower prevalence estimates in some years. Future studies should validate the findings reported here, investigate

Table 2. Systemic Sclerosis incidence (2003–2008).

	Incidence (per 100,000)*		
	Crude Rate	Age and Sex Adjusted Rate	95% CI, Adjusted Rate
Annual incidence			
2003	4.6	5.4	4.5–6.2
2004	4.2	4.8	4.0–5.6
2005	4.2	5.1	4.2–5.9
2006	5.2	6.0	5.1–6.9
2007	4.7	6.3	5.3–7.3
2008	4.6	6.0	5.0–6.9
Overall incidence (2003–2008) and sensitivity analysis			
SSc base-case analysis	4.6	5.6	5.2–6.0
Presence of specialist visit on index date**	2.2	2.5	2.3–2.8
Presence of specialist visit in the year following index date**	3.6	4.2	3.9–4.6
Presence of select drugs 1 year following index date†	2.3	2.8	2.5–3.0
Presence of any of the above††	3.9	4.7	4.4–5.1

* Rates are per 100,000 individuals for yearly rates, and are per 100,000 person-years for overall rates. ** Specialist included rheumatologist, dermatologist, or nephrologist. † Drugs included immunosuppressants (methotrexate or cyclosporine) and/or systemic corticosteroids (betamethasone, corticotropin, dexamethasone, methylprednisolone, prednisone, or triamcinolone). †† Determined for specialist visit, immunosuppressant use, and/or corticosteroid use, using the same time frames as described above.

Table 3. Annual SSc prevalence (2003–2008).

Year	Annual SSc Prevalence (per 100,000 individuals)	95% CI
Base-case analysis		
2003	13.5	12.4–14.5
2004	13.7	12.7–14.7
2005	13.6	12.7–14.6
2006	15.6	14.6–16.6
2007	16.2	15.1–17.2
2008	18.4	17.3–19.5
Sensitivity analysis*		
2003	11.2	10.2–12.1
2004	11.5	10.6–12.4
2005	11.2	10.3–12.1
2006	13.2	12.3–14.1
2007	13.8	12.9–14.8
2008	16.0	14.9–17.0

* Inclusion required evidence of specialist visit (rheumatologist, dermatologist, or nephrologist) on or within a year following a prevalence date (a prevalence date was any service date that satisfied all inclusion criteria for the prevalence cohort, and specialist visit was recorded at every nonmissing prevalence date between 2003 and 2008).

effects of ethnic and other socioeconomic factors that affect SSc, and explore reasons behind the observed differences in SSc epidemiology between this study and previous reports.

ACKNOWLEDGMENT

The authors thank Jesse Potash, PhD, for assistance with preparation of this report and Jon P. Fryzek, PhD, for consultation for epidemiology methods.

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