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Increased incidence and prevalence of psoriasis in multiple sclerosis

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ABSTRACT

Background: Psoriasis and multiple sclerosis (MS) share some risk factors, and fumarates are effective disease-modifying therapies for both psoriasis and MS, suggesting a common pathogenesis. However, findings regarding the occurrence of psoriasis in the MS population are inconsistent.
Objectives: We aimed to estimate the incidence and prevalence of psoriasis in the MS population versus a matched cohort from the general population.
Methods: We used population-based administrative data from the Canadian province of Manitoba to identify 4911 persons with MS and 23,274 age-, sex- and geographically-matched controls aged 20 years and older. We developed case definitions for psoriasis using ICD-9/10 codes and prescription claims. These case definitions were compared to self-reported psoriasis diagnoses. The preferred definition was applied to estimate the incidence and prevalence of psoriasis over the period 1998–2008. We used multivariable Cox regression to estimate the risk of psoriasis in the MS population at the individual level, adjusting for sex, age at the index date, socioeconomic status and physician visits.
Results: In 2008, the crude incidence of psoriasis per 100,000 person-years was 466.7 (95%CI: 266.8–758.0) in the MS population, and 221.3 in the matched population (95%CI: 158.1–301.4). The crude prevalence of psoriasis per 100,000 persons was 4666.1 (95%CI: 3985.2–5429.9) in the MS population, and 3313.5 (95%CI: 3057.4–3585.3) in the matched population. The incidence and prevalence of psoriasis rose slightly over time. After adjusting for sex, age at the index date, socioeconomic status and physician visits, the risk of incident psoriasis was 54% higher in the MS population (HR 1.54; 95%CI: 1.07–2.24).
Conclusion: Psoriasis incidence and prevalence are higher in the MS population than in the matched population.

1. Introduction

The etiology of multiple sclerosis (MS) remains unknown but insight may be gained by studying comorbidities that occur with different frequency than expected in MS as compared to the general population. In this regard, immune-mediated disorders have been of particular interest. Psoriasis is an immune-mediated skin disorder characterized by scaly erythematous plaques. It is common in the general population with prevalence estimates ranging from 0.9% to 8.5% in adults depending on the region, and like MS, the prevalence appears to increase with increasing distance from the equator.(Parisi, Symmons et al., 2013) Psoriasis and MS share risk factors,(Setty, Curhan et al., 2007; Cotsapas, Voight et al., 2011; Handel, Williamson et al., 2011; Hedstrom, Olsson et al., 2012; Armstrong, Harskamp et al., 2014) and fumarates are effective disease-modifying therapies for both psoriasis and MS,(Gold, Kappos et al., 2012) suggesting a common pathogenesis.

Findings regarding the occurrence of psoriasis in the MS population are inconsistent, with the estimated incidence of psoriasis ranging from 0.17% to 1.63% while the estimated prevalence ranges from 0.39% to 7.74%.(Marrie, Reider et al., 2014) However, few prior studies were population-based, and most were conducted in Europe. Whether psoriasis occurs more often than expected in those with MS remains uncertain.(Marrie, Reider et al., 2014) One Danish study found the

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incidence of psoriasis to be non-significantly higher in the MS population than expected for the general population.(Nielsen, Frisch et al., 2008) One English study also found the prevalence of psoriasis to be higher than expected in the MS population based on the literature for the general population, but five other studies have reported no difference in prevalence.(Marrie, Reider et al. 2014)

Therefore, we developed and validated an administrative case definition for psoriasis and determined the incidence and prevalence of psoriasis in the MS population as compared to a matched cohort drawn from the general population.

2. Materials and methods

2.1. Setting

We conducted this population-based study in the Canadian province of Manitoba.

2.2. Administrative data

Manitoba Health delivers publicly funded health services to nearly all provincial residents, and maintains electronic records of those health services. Since 1984, each health service encounter includes a unique personal health identification number (PHIN) identifying who received the service. We linked the anonymized versions of the population registry, hospital Discharge Abstract Database (DAD), physician claims and Drug Program Information Network (DPIN) datasets via scrambled PHIN (to protect confidentiality). The population registry captures demographic information (dates of birth and death, sex, postal code) and dates of insurance coverage. Hospital abstracts include admission and discharge dates, and up to 25 discharge diagnoses recorded using the International Classification of Disease (ICD)–9-CM or ICD-10-CA codes, depending on the year. Physician claims include the date of service, and one diagnosis, recorded using a three-digit ICD-9-CM code. The DPIN has captured the date of dispensation, drug name and identification number (DIN) for all outpatient prescriptions dispensed to Manitoba residents since 1996. Except for prescription claims, administrative data were available from 1984 to 2011.

2.3. Study populations

First, we identified all persons with MS in Manitoba who met a validated administrative case definition for MS (Marrie, Yu et al., 2010) between 1984 and 2011, and assigned the date of their first claim for demyelinating disease as the date of MS diagnosis (index date). Next, we identified a matched cohort from the general population by excluding individuals with any diagnostic codes for demyelinating disease and then matching up to 5 controls for each case on sex, exact year of birth and region of residence (postal code) to the MS cohort. Each control was assigned the same index date as their matched cases. MS cases and matched controls were included in the analyses from the index date until death, emigration, or end of the study, whichever came first.

2.4. Case definitions for Psoriasis

Based on previous studies that employed administrative data, or validated algorithms based on electronic medical records databases for the identification of psoriasis,(Chang, Chen et al., 2009; Seminara, Abuabara et al., 2011; Asgari, Wu et al., 2013; Lofvendahl, Theander et al., 2014) we selected ICD-9/10 codes for psoriasis and psoriasis with psoriatic arthritis (696.0, 696.1, L40.xx, M07.0, M07.2, M07.3) for our candidate case definitions. We generated lists of prescription medications available for treatment of psoriasis in Canada using the Anatomic Therapeutic Chemical classification system. These included D05AC (antracen derivatives), D05AD (psoralens for topical use), D05AX (other antipsoriatics for topical use), D05BA (psoralens for systematic use), and D05BB (retinoids for treatment of psoriasis). Thereafter, we constructed candidate case definitions that varied the number of physician, hospital and prescription claims required and the number of years over which these were required, to classify a person as having psoriasis.

As described elsewhere, we employed a validation cohort that included 327 persons with MS who reported their MS history and comorbidities using a questionnaire and consented to linkage of their clinical information with their administrative data.(Marrie, Yu et al., 2010) This cohort was constructed by asking Manitoba Health to identify all hospital, physician and prescription claims for demyelinating disease between April 1, 1984 and March 31, 2007. (Marrie, Yu et al., 2010) Manitoba Health then mailed questionnaires to 2000 randomly selected individuals from this cohort who were: ≥ 18 years old as of January 1, 2007, alive and residing in Manitoba when the study started and who had ≥ 3 hospital, physician or prescription claims between 1984 and 2007; or ≥ 1 claim for persons resident in 2004 or later, where ≥ 1 claim was for MS or neuromyelitis optica. The validation cohort for the present study comprised the individuals with confirmed diagnoses of MS who responded. This questionnaire asked "Has a doctor ever told you that you have any of the following conditions?", adding the condition of psoriasis to a validated questionnaire that listed multiple conditions.(Horton, Rudick et al., 2010) The specificity of a self-reported diagnosis of psoriasis as compared to medical records was 96%. Within this validation cohort, we compared the performance of the candidate administrative case definitions for psoriasis with self-report, using sensitivity, specificity, positive predictive value and negative predictive value. Also, we compared the agreement between the two data sources using a kappa (κ) statistic where neither was considered the reference standard. We interpreted κ as: slight (0–0.20), fair (0.21–0.40), moderate (0.41–0.60), substantial (0.61–0.80), and almost perfect agreement (0.81–1.0).(Landis and Koch, 1977).

2.5. Incidence and prevalence of Psoriasis

Based on findings in the validation cohort, we selected and applied a preferred case definition to both the MS and matched study populations. Because psoriasis is chronic, once an individual met the case definition, he/she was considered affected in all subsequent years while alive and resident in Manitoba. We estimated the prevalence on October 1 each year using the mid-year population figures as the denominators. To estimate incidence after MS diagnosis (index date) we used a 2-year run-in period preceding the first psoriasis claim to enhance the likelihood that cases were truly incident. However, as the preferred case definition included prescription claims which only became available in 1996, the first incident case could only be identified from 1998 onwards. Incidence may artificially drop at the end of a study period when there is insufficient time to meet the case definition. Thus, to reduce the likelihood of artefactual temporal trends we limited our reporting of incidence and prevalence to the 10-year period, 1998–2008.

Incidence and prevalence estimates were age-standardized to the 2001 Canadian population, the census population closest to the study mid-point. Age-specific average annual incidence was reported using age groups 20–44, 45–59, and ≥ 60 years, to ensure adequate cell sizes to protect participant confidentiality and for consistency with prior work regarding the burden of comorbidity in MS.(Marrie, Fisk et al., 2015) Sex-specific estimates were also reported. We report 95% confidence intervals (CI) for each parameter based on the binomial distribution. We compared age-standardized incidence and prevalence estimates between groups using negative binomial regression, to account for overdispersion, adjusting for year. We report incidence rate ratios (IRR), prevalence ratios (PR) and the corresponding 95%