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The National Prevalence of Clinically Diagnosed Psoriatic Arthritis in Sweden in 2017

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ABSTRACT. ***Objective.*** Psoriatic arthritis (PsA) prevalence estimates vary across studies; studies based on national data are few. We aimed to estimate the prevalence of clinically diagnosed PsA in Sweden in 2017, overall and stratified by sex, age, education, and geography, and to quantify disease-modifying antirheumatic drug (DMARD) use among those in contact with specialized rheumatology care between 2015 and 2017.

Methods. Individuals who were 18 to 79 years of age, alive and residing in Sweden on December 31, 2017, and had a prior PsA diagnosis were identified from the National Patient Register (NPR) and/or the Swedish Rheumatology Quality Register (SRQ). PsA prevalence was estimated according to a base case (BC) definition (ie, ≥ 1 main PsA International Classification of Diseases code from rheumatology or internal medicine departments in the NPR or a PsA diagnosis in the SRQ), according to 4 sensitivity analysis definitions, and for those seen in specialized rheumatology care between 2015 and 2017. In the latter group, DMARD use during 2017 was also assessed. Data for stratifications were retrieved from national registers.

Results. The crude national prevalence of PsA for adults, aged 18 to 79 years, was estimated at 0.39%, according to the BC definition; 0.34% after accounting for diagnostic misclassification; and 0.32% to 0.50% across all sensitivity analyses. The prevalence was lower in males and in those with a higher level of education. The prevalence for those seen in specialized rheumatology care between 2015 and 2017 was estimated at 0.24%. During 2017, 32% of patients in this population received biologic or targeted synthetic DMARDs, and 41% received conventional synthetic DMARDs only.

Conclusion. The prevalence of clinically diagnosed PsA in adults, aged 18 to 79 years, in Sweden in 2017 was around 0.35%. Among PsA cases in recent contact with specialized rheumatology care, almost three-fourths received DMARD therapy in 2017.

Key Indexing Terms: DMARD, epidemiology, prevalence, psoriatic arthritis, Sweden

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Psoriatic arthritis (PsA) is a chronic inflammatory disease that is strongly associated with psoriasis and is a member of the spondyloarthritis family.[1]

Previous prevalence estimates of PsA in the general population vary considerably, ranging from 0.02% to 0.67% across studies.[2] This variation can be partly attributed to methodological differences but may also reflect ethnic and geographic variations in genetic or environmental factors related to PsA onset, as well as variations over time in the prevalence of PsA. A previous metaanalysis estimated the pooled global prevalence of PsA at 0.13% (Asia, 0.20%; North America, 0.14%; and South America, 0.12%) and showed pooled estimates in Northern Europe (0.17%) to exceed those in Southern Europe (0.10%), with no clear sex difference.[2]

PsA leads to reduced health-related quality of life in many cases and imposes a considerable economic burden on patients and society, comparable to that of rheumatoid arthritis (RA) and ankylosing spondylitis (AS).[3,4] Contemporary and nationwide estimates of PsA occurrence are, thus, important to not only better understand and characterize the disease but to gain insight into the unmet needs required by patients with PsA from healthcare systems.

The present study aimed to estimate the national prevalence of clinically diagnosed PsA among adults in Sweden in 2017 overall as well as stratified by sex, age, geographical factors, and socioeconomic factors, and among those in contact with specialized rheumatology care between 2015 and 2017. In the latter group, the use of disease-modifying antirheumatic drugs (DMARDs) during 2017 was also assessed.

METHODS

Study setting – data sources. This is a nationwide observational study based on prospectively collected data from a number of national Swedish administrative, healthcare, and quality control registers. Linkage of these registers was enabled by the use of the unique personal identity number possessed by each individual residing in Sweden on a permanent basis; these identity numbers have been assigned since 1947.

Health provision in Sweden is tax funded, with equal access to public care, independent of individual financial or insurance considerations. Moreover, there is an upper limit to an individual's annual costs for medical consultations and prescription medications.[5,6] PsA is typically diagnosed and treated at public—or, less commonly, private—rheumatology or internal medicine departments, although milder cases, such as those not requiring DMARD therapy, may be referred back to primary care after the diagnosis has been made.

In Sweden, inpatient and specialized outpatient care is recorded in the Swedish National Patient Register (NPR).[7] The NPR encompasses the Inpatient Register, which contains data from inpatient healthcare episodes since 1964, with complete national coverage since 1987, and the Outpatient Register (OPR), which was launched in 2001 and contains information about visits to specialized outpatient care (not primary care). The coverage of the OPR is not complete, mainly because of missing data from private caregivers, but coverage has improved over time and is now close to 100%.[8] Apart from the administrative data (eg, date of admission/discharge, date of visit to specialized outpatient care, and type of department), 1 main and optionally secondary diagnoses are registered in the NPR at each discharge/visit. Diagnoses are registered according to the International Classification of Diseases (ICD) system.[9]

For the present study, the NPR was one of the sources used to identify prevalent PsA cases. The validity of clinical ICD, 10th revision (ICD-10) codes for PsA (L40.5, M07.0, M07.1, M07.2, and M07.3) in the NPR has been shown to be good, with a positive predictive value (PPV) of 86% for fulfillment of established PsA classification criteria.[10] Additionally, the NPR was used to identify exclusion diagnoses (eg, RA) and extramusculoskeletal manifestations (ie, inflammatory bowel disease and anterior/posterior uveitis; for ICD codes see Supplementary Table S1, available with the online version of this article).

The Swedish Rheumatology Quality Register (SRQ),[11] which contains clinical data on diagnosis, treatments, and follow-up for patients with rheumatic diseases since 1999, was used as an additional data source for identification of PsA cases as well as exclusion diagnoses.

The Swedish Prescribed Drug Register (PDR),[12] which includes information about all prescribed drugs dispensed by Swedish pharmacies since 2005, was used to identify pharmacological treatments with nonsteroidal antiinflammatory drugs (NSAIDs), oral glucocorticoids (GCs), conventional synthetic DMARDs (csDMARDs), targeted synthetic DMARDs (tsDMARDs), and subcutaneous biologic DMARDs (bDMARDs); the PDR also served as an auxiliary source for identification of intravenous bDMARD treatments. The SRQ was used as the main source for identification of intravenous bDMARDs, which to a lower extent are captured by the PDR (for Anatomical Therapeutic Chemical codes, see Supplementary Table S2, available with the online version of this article).

Data on the total Swedish population in 2017, as well as information about demographics and levels of formal education for both PsA cases and the Swedish population, were retrieved from the Total Population Register.[13] The vital status of the prevalent PsA cases in 2017 was retrieved from the Cause of Death Register, which includes data on dates and causes of death since 1961.[14]

Study population – PsA case definitions. The following individuals were identified: those who were 18 to 79 years of age, were alive and residing in Sweden on December 31, 2017, and had received at least 1 ICD code for PsA (Supplementary Table S1, available with the online version of this article) in the NPR (1968-2017) or have been registered with a diagnosis of PsA in the SRQ.

The base case (BC) definition for PsA prevalence estimation required having received at least 1 main ICD code for PsA from a department of rheumatology or internal medicine in the NPR or a PsA diagnosis in the SRQ (Table 1). The distribution of specific ICD codes for PsA is presented in detail in Supplementary Table S3 (available with the online version of this article). Apart from the BC definition, a number of more liberal and strict sensitivity analysis case definitions were also used, as described in Table 1. A validation-adjusted case definition was also applied in order to account for possible misclassification and was based on the results of a prior validation of the BC definition, in which 86% of 400 cases fulfilled established PsA classification criteria.[10] Further, we assessed the prevalence of PsA in current contact with specialized rheumatology care using a 3-year time frame (2015-2017), based on the clinical observation that patients with PsA with mild or well-controlled disease may be visiting rheumatologists less frequently than every 2 years.

Outcomes. The primary outcome was the estimation of the national prevalence of clinically diagnosed and registered PsA among adults, 18 to 79 years of age, in Sweden on December 31, 2017, based on the BC definition. As secondary outcomes, the prevalence—according to the BC definition—was stratified by sex, age group (18-29, 30-39, 40-49, 50-59, 60-69, or 70-79 years), level of formal education (≤ 9, 10-12, or > 12 years), and healthcare region (Northern, Uppsala-Örebro, Stockholm, Western, Southeastern, or Southern region). In addition, assessment of prevalence was restricted to patients in current contact with specialized rheumatology care between 2015 and 2017. Sensitivity analyses were performed by estimating the prevalence of clinically diagnosed PsA among adults, 18 to 79 years of age, based on more liberal or strict case definitions (Table 1).

Table 1. Definitions used for the identification of PsA cases.

Case Definition	Description
BC definition	≥ 1 main ICD[a] code for PsA diagnosis from a department of rheumatology or internal medicine in the NPR or a PsA diagnosis in the SRQ
Liberal case definition	≥ 1 main or secondary ICD code of PsA diagnosis from any department in the NPR or a PsA diagnosis in the SRQ
Strict case definition	≥ 2 ICD diagnoses of PsA in the NPR, of which ≥ 1 as a main diagnosis from a department of rheumatology or internal medicine
Validation-adjusted BC definition	As BC *but* reducing the number of cases by 14%, in line with a prior validation of the BC definition, in which 86% of 400 cases fulfilled established PsA classification criteria
BC minus RA	As BC *but* excluding cases that had received ≥ 1 ICD main diagnosis of RA from a department of rheumatology or internal medicine in the NPR
BC in current contact with rheumatology care	As BC *but* limiting the cases to those in contact with specialized care (ie, to those with ≥ 1 ICD diagnosis of PsA from a department of rheumatology or internal medicine in the NPR) or ≥ 1 visit in the SRQ between 2015-2017

[a]ICD-7: 1964-1967; ICD-8: 1968-1986; ICD-9: 1987-1996; ICD-10: 1997-present. BC: base case; ICD: International Classification of Diseases; ICD-10: ICD, 10th revision; ICD-7: ICD, 7th revision; ICD-8: ICD, 8th revision; ICD-9: ICD, 9th revision; NPR: National Patient Register; PsA: psoriatic arthritis; RA: rheumatoid arthritis; SRQ: Swedish Rheumatology Quality Register.

Among all individuals with at least 1 registered main or secondary PsA diagnosis from any department of specialized care in the NPR between 1968 and 2017, 345 patients had registered a diagnosis of PsA, juvenile PsA, or juvenile idiopathic arthritis (JIA) only in childhood (ie, < 16 years of age). These cases were decided, a priori, to be excluded since the validity of diagnoses during childhood has not been previously assessed, and this group may represent self-limiting disease or misdiagnosis. However, individuals were included in the prevalence estimates if they had received a first ICD diagnosis of PsA, juvenile PsA, or JIA (all: 1.10%; juvenile PsA: 0.62%; JIA: 0.50%) before the age of 18 years as well as at least 1 PsA diagnosis during adulthood.

An upper age limit of 79 years was set since estimates showed a substantial drop in PsA prevalence among people ≥ 80 years of age (Supplementary Figure S1, available with the online version of this article). In addition, prevalence estimates stratified by level of education were limited to individuals 30 to 79 years of age (for additional information, see Supplementary Data S1, available with the online version of this article).

Apart from the PsA prevalence estimates, the treatment penetrance during 2017 was assessed in prevalent PsA cases (18-79 years) overall and among those in contemporary contact with specialized rheumatology care between 2015 and 2017.

Statistics. Crude prevalence estimates are presented for all PsA case definitions and all secondary analyses. Both crude and age- and sex-standardized—to the Swedish population 18 to 79 years in 2017—prevalence estimates by level of education and by healthcare region, as well as 95% CIs, are shown. Use of the different pharmacological treatments was described by case definition and stratified by sex for the BC definition.

Ethical approval. Ethical approval for the study was granted by the Regional Ethics Committee in Stockholm, Sweden (Dnr. 2015/1844-31/2). Consent from individual patients was not required as part of the approval.

RESULTS

General population. On December 31, 2017, the adult (≥ 18 years) population of Sweden was almost 8 million (n = 7,998,644), of which 93.6% (n = 7,485,974) were aged 18 to 79 years (50.6% males).

Characteristics of prevalent PsA cases. A total of 29,359 subjects—18 to 79 years, alive and residing in Sweden on December 31, 2017—with clinically diagnosed PsA according to the BC definition were identified (Table 2). The vast majority of these had a registered diagnosis in the NPR; only 1.5% were derived exclusively from the SRQ. The corresponding numbers of PsA cases identified when instead applying the liberal and strict case definitions were 37,288 and 24,062, respectively (Table 2). Of those fulfilling the BC definition of PsA, 45.73% were males. The mean age of the subjects on December 31, 2017, was 56.6 (SD 13.3) years and was similar between the sexes (Table 2). The majority of the prevalent PsA cases (30-79 years) with available information about educational level had achieved at least 10 years of formal education (Table 2). Approximately 30% were ranked as highly educated (> 12 years), with a female predominance in this group. Of those fulfilling the BC definition, 62% (n = 18,097) had contact with specialized rheumatology care between 2015 and 2017. Finally, in regard to PsA phenotype, the proportion of PsA cases according to our BC definition, with registered diagnoses indicating more predominant axial disease, is described in Supplementary Table S4 (available with the online version of this article).

Prevalence estimates. The national prevalence of clinically diagnosed PsA in the adult (18-79 years) population in Sweden in 2017, according to the BC and all sensitivity analysis case definitions, are presented in Figure 1. PsA prevalence according to the BC definition was estimated at 0.39%. Corresponding estimates when instead applying the liberal and strict case definitions were 0.50% and 0.32%, respectively. The use of the

Table 2. Characteristics of prevalent PsA cases.

Demographics and Pharmacological Treatment[a]	BC Definition			Liberal Case Definition	Strict Case Definition
	Men, n = 13,426	Women, n = 15,933	Total, n = 29,359	Total, n = 37,288	Total, n = 24,062
Demographics					
Male sex	NA	NA	13,426 (45.73)	16,813 (45.09)	11,172 (46.43)
Age on Dec 31, 2017, yrs, mean (SD)	56.4 (12.9)	56.8 (13.5)	56.6 (13.3)	57.0 (13.5)	56.8 (13.2)
Level of education, yrs					
Participants (30-79 yrs of age[b]), n	13,060	15,319	28,379	35,910	23,280
≤ 9	2668 (20.43)	2474 (16.15)	5142 (18.12)	6689 (18.63)	4252 (18.26)
10-12	6754 (51.72)	7698 (50.25)	14,452 (50.92)	18,257 (50.84)	11,946 (51.31)
> 12	3594 (27.52)	5115 (33.39)	8709 (30.69)	10862 (30.25)	7020 (30.15)
Pharmacological treatment during 2017[c]					
NSAIDs[c]	5424 (40.40)	6833 (42.89)	12,257 (41.75)	15,025 (40.29)	10,319 (42.89)
Oral GCs[c]	2224 (16.56)	3267 (20.50)	5491 (18.70)	6673 (17.90)	4825 (20.05)
csDMARDs[c]					
Total	5971 (44.47)	6112 (38.36)	12,083 (41.16)	14,024 (37.61)	11,001 (45.72)
MTX	5243 (39.05)	5077 (31.86)	10,320 (35.15)	11,930 (31.99)	9429 (39.19)
csDMARDs other than MTX	1100 (8.19)	1509 (9.47)	2609 (8.89)	3050 (8.18)	2334 (9.70)
TNFi therapy					
Total	2942 (21.91)	2717 (17.05)	5659 (19.28)	6573 (17.63)	5227 (21.72)
Adalimumab[c]	926 (6.90)	808 (5.07)	1734 (5.91)	2081 (5.58)	1575 (6.55)
Certolizumab pegol[c]	134 (1)	135 (0.85)	269 (0.92)	316 (0.85)	252 (1.05)
Etanercept[c]	1269 (9.45)	1321 (8.29)	2590 (8.82)	3026 (8.12)	2416 (10.04)
Golimumab[c]	307 (2.29)	247 (1.55)	554 (1.89)	615 (1.65)	514 (2.14)
Infliximab[d]	461 (3.43)	402 (2.52)	863 (2.94)	957 (2.57)	800 (3.32)
tsDMARDs or bDMARDs other than TNFi					
Abatacept[d]	21 (0.16)	70 (0.44)	91 (0.31)	132 (0.35)	77 (0.32)
Apremilast[c]	224 (1.67)	298 (1.87)	522 (1.78)	662 (1.78)	475 (1.97)
Secukinumab[c]	275 (2.05)	377 (2.37)	652 (2.22)	778 (2.09)	609 (2.53)
Ustekinumab[c]	124 (0.92)	143 (0.90)	267 (0.91)	364 (0.98)	243 (1.01)
bDMARDs or tsDMARDs	3417 (25.45)	3346 (21)	6763 (23.04)	7983 (21.41)	6231 (25.90)
Only csDMARDs	4337 (32.30)	4375 (27.46)	8712 (29.67)	10,194 (27.34)	7855 (32.64)

Data are in n (%) unless otherwise indicated. [a] Demographics and pharmacological treatment use in patients with prevalent PsA (18-79 years) in Sweden on December 31, 2017, according to the base case, liberal case, and strict case definitions. [b] Information on level of education was not retrieved for residents < 30 years, who may not have completed their education. [c] Based on dispensed medications registered in the Prescribed Drugs Register according to ATC codes. [d] Based on dispensed medications registered in the Prescribed Drugs Register according to ATC codes or medication registered in the Swedish Rheumatology Quality Register. ATC: Anatomical Therapeutic Chemical; BC: base case; bDMARD: biologic disease-modifying antirheumatic drug; csDMARD: conventional synthetic disease-modifying antirheumatic drug; GC: glucocorticoids; MTX: methotrexate; NA: not applicable; NSAID: nonsteroidal antiinflammatory drug; PsA: psoriatic arthritis; TNFi: tumor necrosis factor inhibitor; tsDMARD: targeted synthetic disease-modifying antirheumatic drug.

validation-adjusted BC definition resulted in a prevalence estimate of 0.34%. After exclusion of patients with PsA who had also received a main diagnosis of RA, the prevalence was estimated at 0.36%. Moreover, the prevalence of patients with PsA in contact with specialized rheumatology care between 2015 and 2017 was 0.24%.

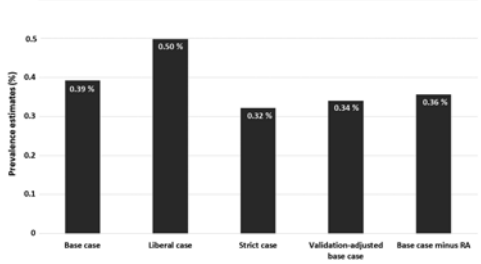

Figure 1. The national prevalence of clinically diagnosed psoriatic arthritis among adults (18-79 years) in Sweden in 2017, according to different case definitions. RA: rheumatoid arthritis.

Irrespective of age group or the PsA case definition applied, PsA prevalence was numerically higher among females, with a total female to male ratio of 1.2 to 1 (0.43% vs 0.35%, by the BC definition; Figure 2). The prevalence increased with age, up to 69 years of age, before decreasing again in the 70- to 79-year age group in both sexes (Figure 2), a pattern observed regardless of the case definition used (data not shown).

A high level of formal education was associated with numerically lower PsA prevalence, according to both crude and age- and sex-standardized estimates (Table 3). Crude and age- and sex-standardized prevalence estimates stratified by healthcare region were quite homogeneous—at around 0.40%—across Sweden, with the exception of the Stockholm region where a clearly numerically lower prevalence of PsA was found (Table 3).

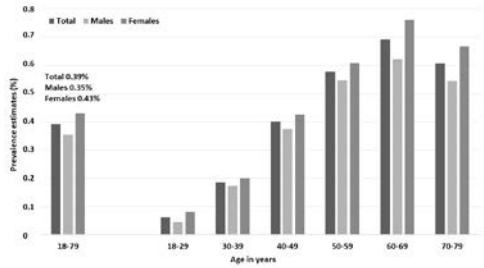

Figure 2. The national prevalence of clinically diagnosed psoriatic arthritis in adults (18-79 years) in Sweden in 2017, according to the base case definition, stratified by sex and age.

Table 3. National prevalence of clinically diagnosed PsA in Sweden in 2017.

	Crude Prevalence[a], %	Standardized Prevalence[a,b], % (95% CI)
Level of education[c], yrs		
≤ 9	0.54	0.49 (0.48-0.51)
10-12	0.56	0.55 (0.54-0.59)
> 12	0.38	0.40 (0.40-0.41)
Healthcare region		
Northern	0.43	0.41 (0.40-0.43)
Uppsala-Örebro	0.44	0.43 (0.42-0.44)
Stockholm	0.29	0.30 (0.29-0.31)
Western	0.41	0.41 (0.40-0.43)
Southeastern	0.40	0.40 (0.38-0.41)
Southern	0.43	0.43 (0.42-0.44)

[a] Crude and standardized prevalence estimates of PsA in adults in Sweden in 2017, according to the base case definition, stratified on levels of education and healthcare regions. [b] Standardized to age and sex. [c] Estimates for people aged 30-79 years, as people aged < 30 years may not have completed their education yet (n = 28,379). PsA: psoriatic arthritis.

Use of pharmacological treatment. During 2017, NSAIDs and oral GCs were used by 41.75% and 18.70%, respectively, of the patients with PsA according to the BC definition; these were used more frequently among females (42.89% and 20.50%) vs males (40.40% and 16.56%; Table 2). Overall, 23.04% of cases meeting the BC definition were treated with either bDMARDs or tsDMARDs during 2017, with or without concomitant use of csDMARDs, while an additional 29.67% received csDMARDs only. Both the use of bDMARDs/tsDMARDs and the sole use of csDMARDs were numerically more common among males (25.45% and 32.30%) vs females (21% and 27.46%; Table 2). Methotrexate was the most frequently used csDMARD, and tumor necrosis factor inhibitors were most common among the bDMARDs (Table 2). Among the 18,097 PsA cases in contact with specialized rheumatology care between 2015 and 2017 (61.64% of all PsA cases by the BC definition), the proportion treated with any type of DMARD during 2017 was 72%, which was still numerically higher among males. In total, 31.68% of such PsA cases were treated with either a bDMARD or a tsDMARD, with or without concomitant use of csDMARDs, and 40.48% were treated with csDMARDs only (Figure 3).

DISCUSSION

In this nationwide register-based study, the national prevalence of clinically diagnosed PsA in the adult (18-79 years) Swedish population in 2017 was estimated at around 0.35% (0.39% according to the BC definition, 0.34% according to the validation-adjusted BC definition, and 0.32%-0.50% across sensitivity analyses). The prevalence was slightly lower in men and in those with the highest level of education. Among the 62% of PsA cases, according to the BC definition, who were seen in specialized rheumatology care for PsA during the last 3 years of our study period (2015-2017), almost 75% received DMARD therapy in 2017.

Our national PsA prevalence estimates are among the highest reported. Higher estimates derive mainly from population-based studies, using self-reported questionnaire data or telephone interviews, from Italy (0.42% in 2005), Norway (0.67% in 2008), and Spain (0.42% in 2016).[15-17] Although a direct comparison to our study is complicated by the different study designs, a higher risk for misclassification of other diagnoses as PsA and overestimation of the prevalence is usually expected from studies with such a design. Lower PsA prevalence estimates derive from previous register-based studies.[18-23] In Canada and in Israel, the PsA prevalence in 2015, based on health administrative register data, was estimated at 0.15%.[18,19] The national prevalence of PsA in adults in Denmark was estimated by a register-based study at 0.28% in 2012.[23] The prevalence of PsA in Sweden has been previously assessed by 3 studies based on the Skåne Health Care Register, which holds information about primary and specialized healthcare utilization in the southernmost county of Sweden.[20-22] Haglund et al[20] reported a prevalence of PsA leading to a physician consultation at 0.25% in 2007. Löfvendahl et al[21] estimated the prevalence of clinically diagnosed PsA with a coexisting psoriasis diagnosis at 0.21% in 2010, whereas the prevalence of PsA leading to at least 1 physician consultation was estimated by Jordan et al[22] at 0.30% in 2010. The corresponding PsA prevalence estimate from the Southern region of Sweden in our study—encompassing not only Skåne, but also some other counties—was 0.43%. Although our assessment was limited to adults 18 to 79 years of age, the above-mentioned studies did not use the same age restrictions: 3 studies used individuals of all ages,[21-23] and 1 study used individuals 15 years and older.[20] Low prevalence in the youngest and oldest age groups, as demonstrated previously,[18,20,23] may have contributed to lower total prevalence estimates in the previous studies. Further, the higher estimates in our study may reflect the much wider case identification period used (ie, 49 years in our study vs 4-7 years in previous Swedish studies),[20-22] extending all the way back to 1968. This may result in inclusion of PsA cases with limited contact with the specialized healthcare system during the years leading up to 2017. Indeed, the prevalence estimate of PsA in our study dropped to 0.24%, more analogous to the previous estimates, when only cases seen in specialized rheumatology care between 2015 and 2017 were included. Finally, an increasing prevalence of PsA over time, indicated in some studies,[18,19,24] may have contributed to a higher estimate in the current study.

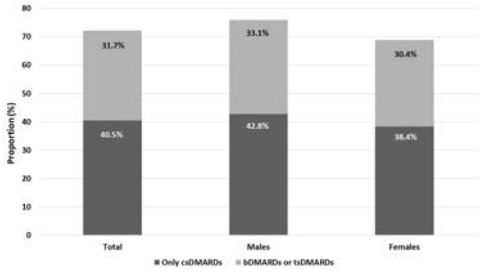

Figure 3. The proportion of prevalent PsA cases (18-79 years) with current contact with specialized rheumatology care (2015-2017) treated with DMARDs during 2017. A case with current contact is defined as ≥ 1 main ICD diagnosis of PsA from a rheumatology or internal medicine department in the NPR or ≥ 1 visit in the SRQ between 2015 and 2017, and constitutes 62% of all patients with prevalent PsA according to the base case definition. csDMARDs include sulfasalazine, leflunomide, cyclosporine, azathioprine, methotrexate, sodium aurothiomalate, auranofin, chloroquine, and hydroxychloroquine. bDMARDs include adalimumab, certolizumab pegol, etanercept, golimumab, infliximab, abatacept, secukinumab, and ustekinumab. tsDMARDs include apremilast. bDMARD: biologic disease-modifying antirheumatic drug; csDMARD: conventional synthetic DMARD; ICD: International Classification of Diseases; NPR: National Patient Register; PsA: psoriatic arthritis; SRQ: Swedish Rheumatology Quality Register; tsDMARD: targeted synthetic DMARD.

In our study, the prevalence of clinically diagnosed PsA was slightly numerically higher in women than in men. Although some previous studies support this observation,[16,20,21,23,25] there is inconsistency among prior results, and a previous metaanalysis indicated no gender differences.[2] Moreover, the prevalence estimates in our study peaked in the 60- to 69-year age group, which is in accordance with previous observations from Denmark and Canada.[18,23]

The present study also suggests a lower PsA prevalence among individuals with a high level of formal education, traditionally used as a proxy for the individual's socioeconomic status (SES). This observation is in contrast to the findings of an Israeli study, which indicated that PsA was most frequent in people with a higher SES.[19] The validity of our results is enhanced by the use of a more generally accepted individual-based rather than area-based proxy for the SES, as the latter may underestimate associations between SES and health outcomes.[26] Moreover, such an inverse relationship has also been shown previously for other chronic inflammatory diseases, such as RA and AS, and for chronic diseases in general.[27-29] Our observation may indicate that environmental factors and exposures related to lower SES may play a role in PsA development. However, further studies are needed in order to assess this hypothesis.

No clear geographic pattern regarding PsA prevalence was seen in our study. Prevalence estimates were quite homogeneous across Sweden, with the exception of the Stockholm region, where a lower prevalence of PsA was found. It appears unlikely that this finding would stem from discrepancies in population genetics between Stockholm and the rest of the country. Environmental exposures or factors related to SES may play a role. Referral patterns may also differ because of a higher availability of private caregivers operating in Stockholm, all of whom may not report ICD codes to the NPR, compared to other parts of Sweden, resulting in lower registration of PsA cases in the NPR.

In our study, 53% of all PsA cases were treated with any type of DMARD during 2017 (23.04% bDMARDs or tsDMARDs), a proportion that increased to 72% (31.68% bDMARDs or tsDMARDs) when assessing PsA cases with active contact with specialized rheumatology care during the last 3 years of the study. These results are analogous with those shown for patients with PsA with established disease from a large international PsA database.[30] Some sex differences were also observed regarding treatment, with more frequent use of NSAIDs and oral GCs among females and more frequent use of any DMARDs among males. Considering the previously described higher disease burden (eg, pain, disability, and fatigue) as well as higher disease activity and persistent polyarticular disease in women,[31,32] our findings may indicate sex differences in the management of PsA or differences in other factors that may influence treatment decisions.

*Strengths and limitation*s. The present study is one of only a few available nationwide prevalence studies on clinically diagnosed PsA.[17,23] The national register-based approach, the uniform case ascertainment, and the large sample size enabled the assessment of potential sex, age, geographical, and socioeconomic variations in disease occurrence and the sex-specific description of pharmacological treatment penetrance. Moreover, the large number of sensitivity analyses enhances the precision of our results.

However, despite the almost complete national coverage of the NPR, a selection bias may exist, as cases with a mild disease course who do not seek health care are not detected. Although this could lead to underestimation of the real PsA prevalence, the aim of our study was to assess the prevalence of clinically diagnosed PsA (ie, PsA that poses a burden on the healthcare system).

An underestimation of the prevalence of clinically diagnosed PsA may also be expected, as the NPR does not capture PsA cases managed exclusively in primary care and records, to a lesser extent, those managed exclusively in a private specialized care setting. The proportion of individuals with only primary care health contacts for PsA has been estimated at 26.7% and 8.5%, respectively, in 2 studies prior to 2010 from Southern Sweden.[21,22] The exact size of underestimation for our study is difficult to gauge. However, in the latter of the 2 previous studies, only 18% to 24% of the PsA cases with a diagnosis deriving exclusively from primary care were found to fulfill established PsA classification criteria.[21] Further, the proportion of PsA cases exclusively followed in primary care is expected to be lower in 2017, considering the diagnostic and therapeutic advances in PsA. The number of PsA cases exclusively followed in private specialized care is expected to differ regionally depending on the availability of private caregivers. However, patients followed at such units might occasionally also consult public rheumatology departments. The small number of PsA cases meeting the BC definition that was derived exclusively from the SRQ offers some approximation of the proportion of PsA cases followed exclusively by private caregivers (data not shown).

The validity of the ICD-based PsA diagnoses may also be questioned. To address this issue, the validity of clinical ICD-10

codes for PsA in the NPR was assessed in a separate study and has been shown to be good, with a PPV of 86% for fulfillment of established PsA classification criteria.[10] Based on this, to account for such potential misclassification, a validation-adjusted BC definition was included among the current sensitivity analyses of PsA prevalence.

In conclusion, in this nationwide register-based study, the contemporary estimate of the prevalence of clinically diagnosed PsA in Sweden was around 0.35%. The results, including the description of pharmacological treatment penetrance, illustrate the burden that PsA places on the healthcare system and can support future discussions on healthcare planning and treatment algorithms. Moreover, the interesting sociodemographic variations in disease occurrence may provide clues as to the etiopathogenesis of PsA.

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ONLINE SUPPLEMENT

Supplementary material accompanies the online version of this article.

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