ORIGINAL REPORT

Prevalence and Incidence of Psoriatic Arthritis among Patients with Psoriasis and Risk Factors for Psoriatic Arthritis in Republic of Korea: A Nationwide Database Cohort Study

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Population-based epidemiological studies on disease burden and risk factors for psoriatic arthritis (PsA) in patients with psoriasis (PsO) are limited, especially in Asian populations. Therefore, the aim was to determine the prevalence and incidence of PsA among PsO patients in Korea, and examine associated clinical factors. A cohort study was performed to determine the annual prevalence and incidence of PsA among PsO patients between 2008 and 2020 using nationwide claims data in Korea. Risk factors for PsA development were also examined using logistic regression among matched PsA cases and controls. An increasing trend in PsA prevalence per 1,000 patients was observed; prevalence was 6.17 (95% confidence interval [CI] 5.73–6.65) in 2008 and 19.03 (95% CI 18.39–19.70) in 2020. Similarly, the PsA incidence rate per 1,000 patient-years increased from 3.35 (95% CI 3.01–3.72) in 2008 to 5.01 (95% CI 4.68–5.36) in 2020. Patients with plaque PsO, moderate-to severe PsO, receiving oral systemic therapy or phototherapy, with a higher burden of comorbidities, and concomitant autoimmune diseases had a higher risk of PsA. The results provide insight into the burden of PsA among PsO patients in Korea and risk factors associated with developing PsA.

Key words: epidemiology; incidence; prevalence; psoriasis; psoriatic arthritis; risk factor.

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Psoriatic arthritis (PsA) is a prevalent comorbidity occurring in psoriasis (PsO) patients, an immune-mediated skin disease characterized by erythematous and scaly plaques. PsA is a progressive disease that causes symptoms such as pain, swelling, and stiffness in various joints, which often leads to permanent joint damage, disability, and reduced quality of life (1). While PsA is known to affect 0.1% to 1% of the general population, the prevalence of PsA in PsO patients generally increases with time, reaching as high as 30% (2, 3).

SIGNIFICANCE

We observed an increase in prevalence and incidence of psoriatic arthritis among psoriasis patients over time in Korea and examined associated risk factors for psoriatic arthritis development. These data help understand the increasing burden of psoriatic arthritis in Korean psoriasis patients and identify patients at higher risk for psoriatic arthritis.

Although several studies have reported a trend of increasing burden of PsA among PsO patients, findings may vary depending on the study settings. The few population-based studies that have investigated the epidemiology of PsA, particularly among patients with underlying PsO, have yielded inconsistent results (4), with incidence rates ranging from 2.3 to 3.9 per 1,000 patient-years (5, 6). Moreover, there are limited population-based studies to understand the epidemiology of PsA in Asian patients who are previously reported to have the lowest prevalence of PsA across geographic regions (7–10). With the increasing burden of disease, it is imperative to identify patients at higher risk of developing PsA to improve clinical outcomes and prevent long-term complications through timely detection and treatment (9). Therefore, we aimed to enhance our understanding of the epidemiological landscape of PsA in the Korean population in a real-world setting by investigating the prevalence and incidence of PsA over time and to identify potential risk factors associated with the development of PsA in PsO patients.

MATERIALS AND METHODS

Data source

We used claims data in 2007–2020 from the Health Insurance Review and Assessment Service (HIRA) research data in the Republic of Korea. HIRA is a government-affiliated organization created to build an accurate claims review and medical quality assessment system. The HIRA claims database contains complete medical and pharmacy claims including diagnosis, demographic information, medical procedures for diagnosis and treatment (surgical history, inpatient and outpatient healthcare services), and prescribed medications of approximately 50 million patients. The Republic of Korea has a single-payer, universal, and compulsory health insurance system, which covers approximately 98% of the entire Korean population (11).

Study population 1: Prevalent psoriasis patients

Patients 18 years of age or older with at least 1 diagnosis code of PsO (International Classification of Disease [ICD-10]: L40.x excluding L40.5) between 1 January 2008 and 31 December 2020 (i.e., index period) were designated as prevalent PsO patients (study population 1), and were used for estimations of prevalence and incidence.

Study population 2: Matched psoriatic arthritis cases and controls

Among prevalent PsO patients (study population 1), we identified newly diagnosed PsO patients without a history of PsA by excluding those with any claim for PsO and any claim for PsA (ICD-10: L40.5; M07.0–M07.3) between 1 January 2007 and the first PsO diagnosis date during the index period. Among these, patients newly diagnosed with PsA were identified as cases first and controls without development of PsA. Controls were matched to cases for age, sex, PsO diagnosis date (±5 days), and duration of PsO (±5 days) (i.e., time to PsA development from the PsO diagnosis date for cases) to a 1:4 ratio without replacement. We included 4 controls per case to secure statistical power while balancing a bias-variance trade-off (12, 13).

Annual prevalence of psoriatic arthritis among psoriasis patients

The annual prevalence of PsA was calculated as the number of prevalent PsA patients divided by the number of PsO patients at the mid-year time point in the year of interest between 2008 and 2020. Prevalent PsA patients were defined as those with at least 1 PsA claim during the year of interest among the prevalent PsO patients who had at least 1 PsO claim with prescription (Appendix S1) in the year of interest. The PsO mid-year population was defined as patients identified as prevalent PsO population before 1 July.

Annual incidence rate of psoriatic arthritis among psoriasis patients

The annual incidence rate was calculated as the number of newly diagnosed PsA patients divided by the sum of patient-years of PsO patients with no history of PsA in the year of interest. Newly diagnosed PsA patients were defined as those with at least 1 PsA claim during the year of interest but with no prior claim for PsA among the prevalent PsO patients who had at least 1 PsO claim with prescription (Appendix S1) in the year of interest. Patient-year was defined as the time from 1 January of the year of interest (or PsO diagnosis date if diagnosed with PsO within that year) to the earliest of death, PsA development, or the year end.

Risk factors associated with psoriatic arthritis development

Among the matched PsA cases and controls (study population 2), risk factors for PsA development were assessed using logistic regression and presented as crude odds ratio (cOR) and adjusted odds ratio (aOR). Potential risk factors were selected based on the previous studies examining the risk for PsA, physicians' opinion, and statistical significance in unconditional logistic regression. Type of PsO (plaque PsO, guttate PsO, palmoplantar pustulosis, generalized pustular PsO), severity of PsO (mild, moderate-to-severe, moderate-to-severe PsO registered with the Individual Copayment Beneficiaries Program (ICBP), modified Charlson comorbidity index (mCCI) (14, 15), autoimmune diseases including uveitis, ankylosing spondylitis, and rheumatoid arthritis, cardiovascular disease, metabolic syndrome, fatty liver disease, and concomitant therapy including topical therapy, oral systemic therapy, phototherapy, and time to biologics and modern small molecules including tofacitinib (referred to as biologics from here on) were included as potential risk factors in this analysis. Detailed operational definition of the factors is described in Appendix S1.

Statistical analysis

All statistical tests were two-sided with a significance level of 0.05; 95% CI for prevalence and incidence was estimated assuming a Poisson distribution. The statistical analysis was performed using SAS® 9.4 software (SAS Institute, Cary, NC, USA) via SAS Enterprise Guide version 6.1 and R version 3.5.2 (R Core Team 2017; R Foundation for Statistical Computing, Vienna, Austria).

RESULTS

Annual prevalence of psoriatic arthritis among psoriasis patients

Among PsO patients between 2008 and 2020 (n=965,063) (**Fig. 1**), the prevalence of PsA gradually increased over time, mostly from 2014 to 2020 (**Fig. 2**). The prevalence of PsA per 1,000 PsO patients was 6.17 (95% confidence interval [CI] 5.73–6.65) in 2008, and increased to 8.33 (95% CI 7.90–8.79) in 2014 and 19.03 (95% CI 18.39–19.70) in 2020 (Table I). Similar trends were observed using age- and sex-standardized prevalence (Table SI, Fig. S1).

The standardized prevalence of PsA per 1,000 patients with PsO was 6.17 (95% CI 5.73–6.65) in 2008 and increased to 8.30 (95% CI 7.79–8.85) in 2014 and 18.98 (95% CI 18.19–19.80) in 2020 (Table SI, Fig. S1).

Annual incidence rate of psoriatic arthritis among psoriasis patients

The incidence rate of PsA among PsO patients remained constant between 2008 and 2016, but increased steeply thereafter (Fig. 2). The incidence rate per 1,000 patient-years was 3.35 (95% CI 3.01–3.72) in 2008, 3.59 (95% CI 3.31–3.90) in 2014, 3.33 (95% CI 3.07–3.62) in 2016, and then 5.01 (95% CI 4.68–5.36) in 2020 (**Table I**). Similar trends were observed in the incidence ratio and age- and sex-standardized incidence ratio (Table SII, Fig. S1).

The incidence ratio of PsA among patients with PsO remained constant between 2008 and 2016 and increased thereafter (Fig. S2). The crude incidence ratio per 1,000 patients with PsO was 3.13 (95% CI 2.82–3.48) in 2008, 3.57 (95% CI 3.29–3.87) in 2014, 3.32 (95% CI 3.06–3.61) in 2016 and increased to 4.99 (95% CI 4.66–5.34) in 2020 (Table SII).

Similar trends were observed using age- and sex-standardized incidence ratio of PsA (Fig. S1). The crude incidence ratio per 1,000 patients with PsO was 3.13 (95% CI 2.82–3.48) in 2008, 2.97 (95% CI 2.67–3.31) in 2014, 3.33 (95% CI 3.01–3.69) in 2016, and increased to 4.97 (95% CI 4.58–5.41) in 2020 (Table SII).

Risk factors associated with psoriatic arthritis development

Among patients newly diagnosed with PsO between 2008–2020 (n=856,583), we identified 6,427 patients

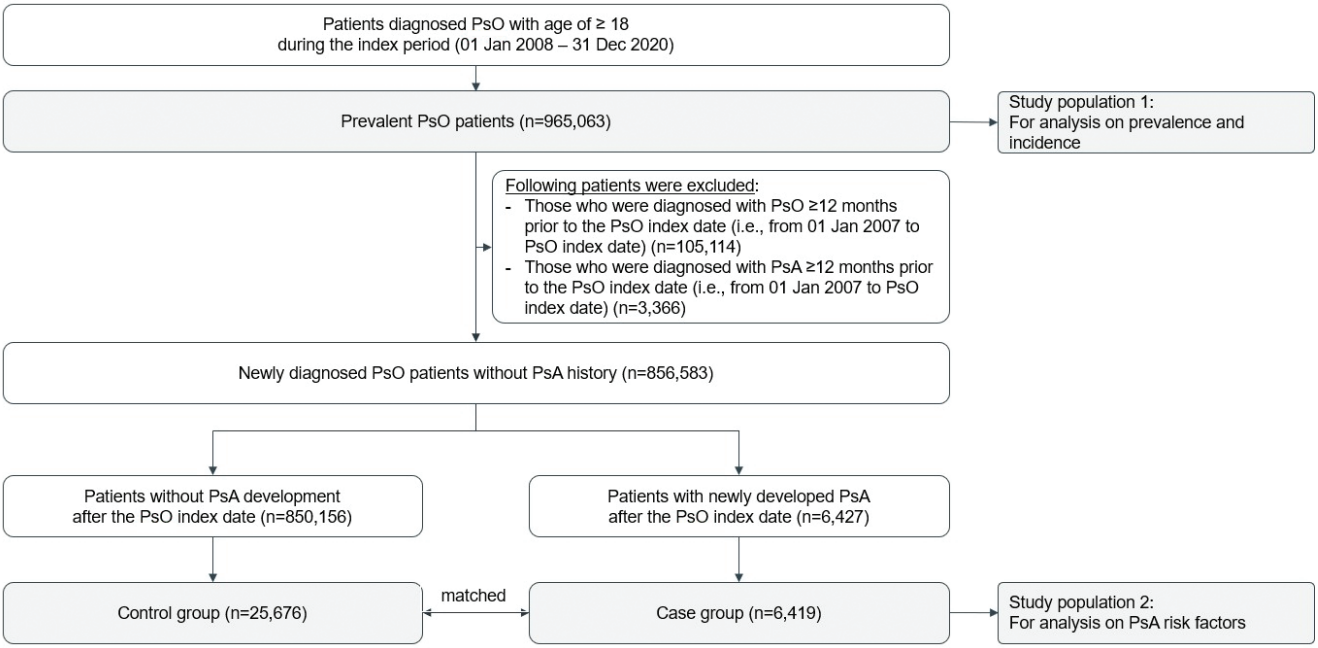

Fig. 1. Flow diagram of study population selection.

who subsequently were newly diagnosed with PsA during the study period. Median time to PsA diagnosis was 3.07 years and cumulative incidence was 0.20% at 1 year, 0.50% at 5 years, and 0.65% at 8 years since PsO diagnosis. Overall, 6,419 PsA cases were matched with 25,676 controls (Fig. 1, Table SIII).

After matching, the distribution of matching variables including age, sex, and time to PsA index date were not different between PsA cases and controls (p-values for the comparison of age, sex, and time to PsA index date: 1.000, 1,000, and 0.996, respectively) as presented in Table SIII.

After adjustments were made, type of PsO, use of concomitant therapy (including topical therapy, oral systemic therapy, and phototherapy), mCCI, autoimmune disease (including uveitis, ankylosing spondylitis, and rheumatoid arthritis), and fatty liver disease were significantly associated with PsA development (**Table II**).

Compared with plaque PsO, the risk of PsA was significantly lower among guttate PsO (aOR = 0.54, 95% CI 0.40–0.74, $p = 0.0001$) and palmoplantar pustulosis cases (aOR = 0.49, 95% CI 0.44–0.55, $p < 0.0001$), while no significant association with generalized pustular PsO was

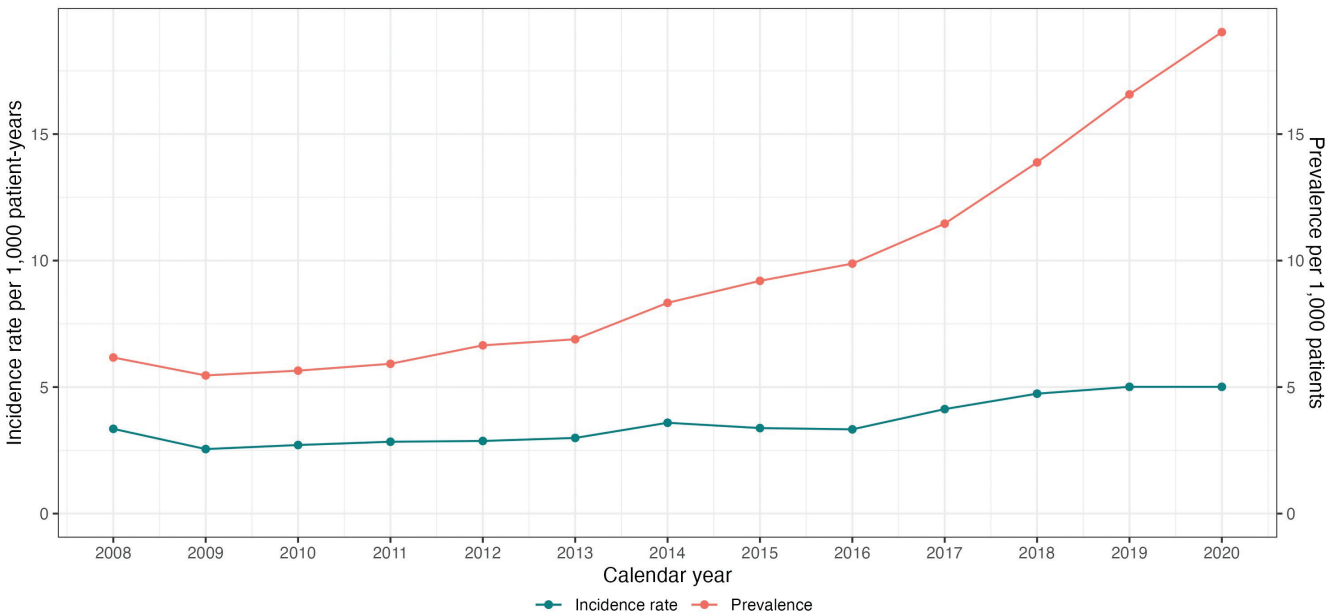

Fig. 2. Temporal trend of prevalence and incidence rates of psoriatic arthritis (PsA) in patients with psoriasis (PsO) between 2008 and 2020.

Table I. Annual prevalence and incidence rates of psoriatic arthritis (PsA) among patients with psoriasis (PsO) from 2008 to 2020

Calendar years	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Annual prevalence													
Prevalence per 1,000 patients (95% CI)	6.17 (5.73–6.65)	5.46 (5.07–5.87)	5.65 (5.27–6.06)	5.92 (5.54–6.33)	6.65 (6.25–7.08)	6.89 (6.49–7.31)	8.33 (7.90–8.79)	9.20 (8.75–9.67)	9.88 (9.42–10.37)	11.46 (10.96–11.97)	13.88 (13.34–14.45)	16.57 (15.98–17.19)	19.03 (18.39–19.70)
Number of mid-year PsO population[a]	112,023	130,256	138,840	145,372	151,100	157,490	162,337	166,334	169,554	172,134	171,662	174,325	169,705
Number of patients with PsA[b]	691	711	785	861	1,005	1,085	1,353	1,530	1,676	1,972	2,383	2,889	3,230
Annual incidence rate													
Incidence rate per 1,000 patient-year (95% CI)	3.35 (3.01–3.72)	2.55 (2.29–2.85)	2.71 (2.44–3.00)	2.84 (2.58–3.13)	2.87 (2.61–3.16)	2.99 (2.73–3.28)	3.59 (3.31–3.90)	3.38 (3.11–3.67)	3.33 (3.07–3.62)	4.13 (3.84–4.45)	4.74 (4.42–5.08)	5.01 (4.68–5.36)	5.01 (4.68–5.36)
Number of prevalent PsO population at risk[c]	161,937	168,512	174,770	178,809	182,647	188,611	191,725	195,769	197,881	198,119	194,214	196,527	187,532
Patient-year	104,331	127,295	136,341	142,580	148,579	154,310	158,977	163,117	165,943	167,702	166,750	169,111	164,103
Number of patients with PsA[d]	349	325	369	405	427	462	571	551	553	693	790	847	822

[a]Defined as patients who had ≥ 1 prescription with any diagnosis of PsO before 1 July of each year. [b]Defined as patients who had ≥ 1 prescription with any diagnosis of PsA and ≥ 1 prescription with any diagnosis of PsO before 31 December of each year. [c]Defined as patients who had ≥ 1 prescription with any diagnosis of PsO with no history of PsA in each year. [d]Defined as patients who had ≥ 1 prescription with newly diagnosed PsA with ≥ 1 prescription with any diagnosis of PsO before 31 December of each year.
CI: confidence interval.

Table II. Crude and adjusted odds ratios (ORs) of psoriatic arthritis (PsA) development for selected variables

Variables	Crude OR (95% CI)	*p*-value	Adjusted OR* (95% CI)	*p*-value
Type of PsO				
Plaque PsO	Reference		Reference	
Guttate PsO	0.47 (0.35–0.63)	< 0.0001	0.54 (0.40–0.74)	0.0001
Palmoplantar pustulosis	0.47 (0.42–0.52)	< 0.0001	0.49 (0.44–0.55)	< 0.0001
Generalized pustular PsO	0.76 (0.62–0.96)	0.0205	0.82 (0.64–1.05)	0.1105
Severity of PsO				
Mild PsO	Reference		Reference	
Moderate-to-severe PsO	3.47 (3.26–3.69)	< 0.0001	1.00 (0.89–1.13)	0.9651
Moderate-to-severe PsO registered to ICBP	38.40 (22.86–64.49)	< 0.0001	NA†	NA†
Modified Charlson Comorbidity Index				
0, 1	Reference		Reference	
2	1.48 (1.36–1.61)	< 0.0001	1.21 (1.10–1.33)	0.0001
3	1.66 (1.52–1.81)	< 0.0001	1.42 (1.29–1.57)	< 0.0001
≥ 4	2.18 (1.99–2.39)	< 0.0001	1.49 (1.33–1.66)	< 0.0001
Uveitis				
No	Reference		Reference	
Yes	2.06 (1.66–2.55)	< 0.0001	1.50 (1.16–1.94)	0.0023
Ankylosing spondylitis				
No	Reference		Reference	
Yes	12.26 (9.20–16.33)	< 0.0001	5.82 (4.17–8.13)	< 0.0001
Rheumatoid arthritis				
No	Reference		Reference	
Yes	4.65 (4.18–5.18)	< 0.0001	3.10 (2.74–3.51)	< 0.0001
Any cardiovascular disease				
No	Reference		Reference	
Yes	1.26 (1.14–1.38)	< 0.0001	1.05 (0.94–1.18)	0.3963
Any metabolic syndrome				
No	Reference		Reference	
Yes	1.35 (1.26–1.45)	< 0.0001	1.08 (1.10–1.18)	0.0601
Fatty liver disease				
No	Reference		Reference	
Yes	1.61 (1.42–1.82)	< 0.0001	1.30 (1.12–1.50)	0.0006
Topical therapy				
No	Reference		Reference	
Yes	0.71 (0.63–0.79)	< 0.0001	0.49 (0.43–0.55)	< 0.0001
Oral systemic therapy				
No	Reference		Reference	
Yes	4.87 (4.56–5.19)	< 0.0001	3.61 (3.26–3.99)	< 0.0001
Phototherapy				
No	Reference		Reference	
Yes	3.06 (2.86–3.26)	< 0.0001	2.13 (1.93–2.35)	< 0.0001
Time to biologics				
< 3.8 years	Reference		Reference	
≥ 3.8 years	1.64 (0.89–3.01)	0.1104	1.90 (0.97–3.72)	0.0619
Non-user	0.09 (0.06–0.14)	< 0.0001	0.39 (0.25–0.60)	< 0.0001

The variables were obtained using data from psoriasis (PsO) index date to PsA index date.
*Estimated using multivariable logistic model including type of PsO, severity of PsO, modified Charlson Comorbidity Index, uveitis, ankylosing spondylitis, rheumatoid arthritis, cardiovascular disease, metabolic syndrome, fatty liver disease, topical therapy, oral systemic therapy, phototherapy, and time to biologics. †The OR comparing moderate-to-severe PsO registered to Individual Copayment Beneficiaries Program (ICBP) was not estimated due to the small number.
CI confidence interval; SD: standard deviation.

observed (aOR = 0.82, 95% CI 0.64–1.05). The odds of developing PsA were lower among patients who used topical therapy (aOR = 0.49, 95% CI 0.43–0.55, $p < 0.0001$) but higher among those who used oral systemic therapy (aOR = 3.61, 95% CI 3.26–3.99, $p < 0.0001$), and phototherapy (aOR = 2.13, 95% CI 1.93–2.35, $p < 0.0001$). Compared with those who initiated use of biologics within 3.8 years since PsO diagnosis (median time), patients who had never used a biologic had significantly lower odds of developing PsA (aOR = 0.39, 95% CI 0.25–0.60, $p < 0.0001$) and those who initiated use of a biologic after 3.8 years showed a non-significant trend towards higher odds of developing PsA (aOR = 1.90, 95% CI 0.97–3.72, $p = 0.0619$). Higher mCCI score (≥4) was associated with a 49% higher risk of developing PsA compared with a score of 0–1 (aOR = 1.49, 95% CI 1.33–1.66, $p < 0.0001$). The risk of PsA was significantly higher among patients with fatty liver disease (aOR = 1.30, 95% CI 1.12–1.50, $p = 0.0006$), uveitis (aOR = 1.50, 95% CI 1.16–1.94, $p = 0.0023$), ankylosing spondylitis (aOR = 5.82, 95% CI 4.17–8.13, $p < 0.0001$), and rheumatoid arthritis (aOR = 3.10, 95% CI 2.74–3.51, $p < 0.0001$).

DISCUSSION

Using the Korean universal national healthcare claims database, this study determined that both prevalence and incidence of PsA increased among Korean PsO patients between 2008 and 2020 (16). We observed that the PsA prevalence per 1,000 PsO patients increased from 6.17 in 2008 to 8.33 in 2014 and 19.03 in 2020; the PsA incidence rate was 3.35 in 2008, 3.59 in 2014, and 5.01 in 2020 per 1,000 patient-years.

Of note, these results are not consistent with those from a number of previous studies, as estimates for both prevalence and incidence of PsA among PsO patients were relatively lower in the Korean population in our study. According to a systematic review including available articles as of November 2017 (10), PsA prevalence among PsO patients ranged from 70 to 260 per 1,000 patients and the pooled PsA prevalence across 266 studies including 976,408 patients was 197 per 1,000 patients (95% CI 185–209); the incidence rate of PsA among PsO patients ranged from 2.7 to 27 per 1,000 patient-years. Of note, previous studies used data that likely included more severe PsO patients who visited PsO clinics or tertiary hospitals, contributing to the discrepancy with our results derived from analyses of a national healthcare claims data source. Compared with our current study (19.03 per 1,000 patients in 2020), higher PsA prevalence was reported in Korea in a previous study based on data from patients followed at tertiary hospitals (90 per 1,000 patients in 1997) (17), where more severe PsO patients would have received care (18).

Also, differences in PsA prevalence and incidence between studies may have been affected by study design; the pooled prevalence estimates from clinical trials (229 per 1,000 patients, 95% CI 207–252) were higher than prevalence rates in observational studies (207 per 1,000 patients, 95% CI 183–232) and population-based studies (156 per 1,000 patients, 95% CI 137–177) (10) In addition, the PsA prevalence in our study may have been underestimated due to potential misclassification of PsO patients with undiagnosed PsA (2) given that claims data were used in these analyses. It has been reported that the prevalence of undiagnosed PsA was over 10% in epidemiological studies (8), supporting the idea that the incidence of PsA may also have been underestimated in our study (19).

Importantly, PsA prevalence and incidence may vary by geographical region, with the highest rates reported in the European population and the lowest in the Asian population (10). A study using national claims data from Taiwan (20) reported that the prevalence and incidence of PsA in the general population in 2017 were 0.8 per 1,000 persons and 0.05 per 1,000 person-years, respectively. Our study provides additional evidence on the prevalence and incidence of PsA specifically among PsO patients in an Asian population, which is similar to findings from a study (21) using national claims data from Japan (prevalence 19 per 1,000 patients between 2010 and 2011).

In our study, both the prevalence and incidence rates of PsA showed increasing trends from 2008 to 2020, which was comparable to those reported in other countries (22). In the previously discussed study conducted using data from the general population in Taiwan, the prevalence and incidence of PsA also significantly increased from 2002 to 2016 (prevalence: 0.08 to 0.33 per 1,000 persons; incidence 0.04 to 0.05 per 1,000 persons). The observed trend in increasing prevalence of PsA may reflect, in part, accumulating numbers of PsA patients over time, given that PsA is a chronic and life-long condition (16), and the overall trend in increased life expectancy (23). Furthermore, increased awareness of PsA as a clinical entity and a better understanding of its development, which is most commonly in progression from PsO, may also contribute to better medical care-seeking behavior among PsO patients (24). From a clinical perspective, the increased prevalence of obesity in the decade (25) may contribute to the higher prevalence of PsA over time as obesity is known to be associated with a pre-inflammatory condition (26), which may lead to an increase in the risk of developing PsA in patients with PsO.

We also explored potential clinical factors that may be associated with PsA development. Severity of PsO was observed to be associated with higher risk of developing PsA (cOR = 3.47, 95% CI 3.26–3.69), which is consistent with previous reports (17, 27, 28), However, after adjustment, this association did not remain significant, likely because severity of PsO in our study was defined based on treatment for PsO (Appendix S1).

Biologic treatment for PsO was reported to reduce risk of PsA development in a previous study with 10 years of patient follow-up (29, 30); however, in our study, we observed that patients who ever received biologic treatment for PsO had higher odds of developing PsA. This finding of an "inverse association" likely derives from the cross-sectional design of our study and that patients with moderate-to-severe PsO are likely to use biologics at some timepoint before PsA development. In addition, we observed that patients who initiated use of a biologic 3.8 years after PsO diagnosis or later had 1.9 times greater odds of having PsA compared with those who initiated biologic therapy within 3.8 years of PsO diagnosis. Although this observation did not reach statistical significance, it is consistent with the evolving evidence of the benefit of early biologics use for preventing or delaying progression to PsA (31, 32). Further studies are needed to investigate the relationship between early use of biologics for PsO and the risk of PsA development.

Our analysis also examined the potential for association of different subtypes of PsO with PsA. Of note, we observed a significantly lower risk of PsA among patients with guttate PsO and palmoplantar pustulosis compared with plaque PsO. Although guttate PsO may become a chronic condition, some cases typically are self-limiting and resolve within several months. Therefore, patients with guttate psoriasis are likely to have a shorter period of exposure to inflammation condition compared with those with plaque PsO, which may lead to a lower risk of developing PsA among patients with guttate PsO compared with those with plaque PsO. It is known that palmoplantar pustulosis might be one of the risk factors for PsA (33). However, there is limited evidence comparing the risk of developing PsA between patients with palmoplantar pustulosis and those with plaque PsO. Patients with palmoplantar pustulosis often suffer from plaque PsO. Also, Andersen et al. (34) observed that palmoplantar pustulosis with PsO was associated with a higher risk of PsA compared with palmoplantar pustulosis without PsO. In this study, patients with both palmoplantar pustulosis and plaque PsO were classified as having plaque PsO based on the operational definitions applied. For example, classifying the type of PsO for patients with both diagnosis codes for plaque PsO and palmoplantar pustulosis during the baseline period as plaque PsO may have contributed to the observed connection between plaque PsO and an increased risk of PsA. Kim et al. also reported a lower risk of PsA among patients with palmoplantar pustulosis compared with plaque PsO using the same database in Korea (35).

It is well known that comorbidities including hypertension, metabolic syndrome, obesity, hyperlipidaemia, and cardiovascular disease are prevalent among patients with psoriatic disease (36). Our results showed that the risk of PsA is higher among patients with an mCCI score of 4 or higher compared with those with a lower score of 0–1. Furthermore, given its nature as a chronic systemic inflammatory disorder and shared genetic risk factors and immunopathological mechanisms, PsA is expected to be associated with other comorbid autoimmune conditions (37). We observed that patients with autoimmune diseases, including uveitis, ankylosing spondylitis, and rheumatoid arthritis, were more likely to have PsA compared with those without autoimmune disease. Taken together, these findings support the hypothesis that PsO patients with a higher burden of comorbid and associated autoimmune conditions, and presumably a higher burden of systemic inflammation, have a significantly increased risk of developing PsA.

Due to the nature of claims data, the following limitations to this analysis should be considered. First, the operational definitions using diagnosis codes and/or prescription were used to define target patients and events. Therefore, voluntary or involuntary miscoding behaviour may have led to misclassification. However, the validation studies reported that approximately 70% of primary, secondary, or tertiary diagnosis codes from the Korean national health insurance service claims records coincided with those from medical records (38). Second, given the delayed diagnosis of PsA in clinical practice, the use of biologics in response to symptoms related to PsA among patients without any previous confirmed PsA diagnosis may have led to the observed results in this study, where the use of biologics was associated with diagnosed PsA (39–41). Third, prevalence and incidence of PsA may have been underestimated as PsO patients with undiagnosed PsA cannot be identified and, therefore, may be misclassified as not having PsA (2). Lastly, unlike randomized clinical studies, relevant patient- and disease-related clinical data, such as PsO Area and Severity Index, smoking, and body mass index, had limited availability or were not obtainable from the database.

In summary, using data derived from the Korean national claims database, we observed increasing prevalence and incidence for PsA among PsO patients in the Korean population. We determined that the risk of PsA was higher among patients with plaque PsO, a history of oral systemic therapy, phototherapy, or biologics use, a higher burden of comorbid conditions, and autoimmune diseases. Therefore, these factors should be considered in the context of clinical practice to identify patients at higher risk of PsA development to achieve improved outcomes (27, 42).

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