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Examining the burden of psoriasis and psoriatic arthritis in a US adult cohort using the All of Us Research Program

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Keywords

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To the Editor:

Few US-based studies on psoriasis and psoriatic arthritis (PsA) have focused on recruiting underrepresented demographic and socioeconomic groups. We conducted a cross-sectional study to estimate the burden of psoriasis and PsA across underrepresented groups utilizing the All of Us Research Program, an ongoing prospective study of US adults.^{1,2}

After we linked data from electronic health records (EHRs), surveys, and physical measurements, we estimated the prevalence of psoriasis and PsA by demographic and socioeconomic factors among those with EHRs, as psoriasis diagnosis may not be available among those without EHR. Odds ratios and 95% confidence intervals were estimated with age-adjusted and multivariate logistic regression (Supplemental Methods).

The demographic distribution of study participants is summarized in Table I. Of participants with EHR, 6,367 (2.6%) were diagnosed with psoriasis. Nearly a quarter (n=1,364; 21.4%) of them also had PsA. Lower odds of psoriasis were observed among those with a high

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Patient consent: Not applicable.

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Supplement Materials hosted at: <https://data.mendeley.com/datasets/9p2tswhhz/1>

school (HS) degree and less than a HS degree compared to college graduates (Table II). Lower odds of psoriasis were observed among uninsured compared to insured. Odds of psoriasis were lower among Blacks and Hispanics compared to Whites. There was no difference in psoriasis prevalence by gender or income. The results regarding race/ethnicity and education remained robust in an analysis excluding uninsured (Supplemental Table I).

Lower odds of PsA were observed among those with less than a HS degree compared to those with a college degree. Lower odds were also observed among uninsured compared to insured. Analysis excluding uninsured similarly found lower rates of PsA among individuals with lower educational attainment (Supplemental Table I).

The prevalence of psoriasis and PsA among individuals with psoriasis in our study are similar to the psoriasis prevalence of 3.0% based on the National Health and Nutrition Examination Survey and PsA rate of 19.7% in a meta-analysis with European, Asian, American, and African studies.^{3,4} Lower rates of psoriasis have been reported in Blacks and Hispanics, which is consistent with our study.³ We found differences in psoriasis and PsA rates based on education and insurance status.³ These results may differ due to the higher proportion of underrepresented groups in our study. Our sensitivity analysis demonstrated that lack of insurance may not account for the differences in prevalence in people of color (POC) and education.

This study benefits from outcome data based on EHRs. Limitations include unavailability of psoriasis severity and diagnosis age data. Participants are not a random sample of the US population. While All of Us focuses on recruiting underrepresented groups, it is currently not as diverse as the US population. EHR data may be fragmented from algorithmic processing, potentially leading to missing diagnoses, and EHR completeness data was unavailable.

Our findings suggest potential underdiagnosed psoriasis and PsA among those without health insurance and with lower levels of education. Future research on access to specialty care, diagnostic bias, and genetic risk factors is warranted to discern the extent to which these contribute to rates of psoriasis and PsA in POC, less educated, and uninsured groups.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table I.

Demographic distribution for participants with psoriasis and psoriatic arthritis in the All of Us Research Program

	Enrolled	EHR Data Available	No Psoriasis	Psoriasis	Psoriatic Arthritis
	n (%)	n (%)	n (%)	n (%)	n (%)
Race/ethnicity					
White	193,052 (52)	124,892 (52)	120,416 (51)	4,476 (70)	992 (73)
Asian	12,085 (3)	6,290 (3)	6,156 (3)	134 (2)	23 (2)
Black	71,897 (19)	48,717 (20)	48,249 (21)	468 (7)	72 (5)
Hispanic	66,530 (18)	44,720 (19)	43,883 (19)	837 (13)	176 (13)
Other ^a	12,298 (3)	7,647 (3)	7,454 (3)	193 (3)	47 (3)
Age (years) ^b					
18–29	51,604 (14)	29,815 (12)	29,520 (13)	295 (5)	40 (3)
30–39	58,124 (16)	35,884 (15)	35,272 (15)	612 (10)	109 (8)
40–49	55,114 (15)	34,996 (15)	34,259 (15)	737 (12)	182 (13)
50–59	73,770 (20)	49,170 (20)	47,860 (20)	1,310 (21)	334 (24)
60–69	75,511 (20)	51,759 (22)	49,944 (21)	1,815 (29)	410 (30)
70+	55,155 (15)	39,010 (16)	37,412 (16)	1,598 (25)	289 (21)
Gender					
Female	219,020 (59)	144,742 (60)	141,009 (60)	3,733 (59)	848 (62)
Male	136,102 (37)	87,442 (36)	85,046 (36)	2,396 (38)	470 (34)
Other	14,156 (4)	8,450 (4)	8,212 (4)	238 (4)	46 (3)
Education					
Completed College	157,595 (43)	98,234 (41)	95,051 (41)	3,183 (50)	663 (49)
Completed High School	162,656 (44)	109,526 (46)	106,907 (46)	2,619 (41)	594 (44)
Less than High School Degree	34,056 (9)	23,610 (10)	23,256 (10)	354 (6)	67 (5)
Annual Household Income (\$)					
>35,000	213,695 (58)	135,703 (56)	131,484 (56)	4,219 (66)	918 (67)
35,000	78,844 (21)	52,279 (22)	51,263 (22)	1,016 (16)	210 (15)
N/A	76,739 (21)	52,652 (22)	51,520 (22)	1,132 (18)	236 (17)
Smoking Status					
Current	207,192 (56)	137,163 (57)	133,908 (57)	3,255 (51)	686 (50)
Former	61,180 (17)	41,084 (17)	40,304 (17)	780 (12)	155 (11)
Never	79,677 (22)	55,290 (23)	53,120 (23)	2,170 (34)	498 (37)
BMI (kg/m²)					
<18.5	4,390 (1)	3,232 (1)	3,165 (1)	67 (1)	14 (1)
18.5–24.9	79,088 (21)	59,673 (25)	58,392 (25)	1,281 (20)	247 (18)
25–29.9	90,259 (24)	70,101 (29)	68,254 (29)	1,847 (29)	367 (27)
30–34.9	60,664 (16)	48,141 (20)	46,748 (20)	1,393 (22)	288 (21)
35–39.9	34,155 (9)	27,360 (11)	26,497 (11)	863 (14)	223 (16)
40+	28,116 (8)	22,978 (10)	22,283 (10)	695 (11)	169 (12)

	Enrolled	EHR Data Available	No Psoriasis	Psoriasis	Psoriatic Arthritis
	n (%)	n (%)	n (%)	n (%)	n (%)
Insurance Status					
Yes	327,898 (89)	216,146 (90)	210,106 (90)	6,040 (95)	1,291 (95)
No	24,863 (7)	14,655 (6)	14,542 (6)	113 (2)	23 (2)

Abbreviations: BMI, body mass index; EHR, electronic health record; N/A, not applicable.

^aThis category consists of the following groups: participants who selected 'More than one population', 'Another single population', or 'None of these.'

^bAge refers to age at consent.

Subgroup sums may not equal each other due to missing values.

Table II.

Odds ratios (ORs) of prevalence of psoriasis and psoriatic arthritis in the All of Us Research Program

	Psoriasis		Psoriatic Arthritis	
	Age-Adjusted	Multivariate	Age-Adjusted	Multivariate
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Race/ethnicity				
White	Reference	Reference	Reference	Reference
Asian	0.74 (0.61–0.87)	0.84 (0.70–1.00)	0.57 (0.36–0.84)	0.73 (0.47–1.08)
Black	0.29 (0.27–0.32)	0.31 (0.28–0.35)	0.20 (0.16–0.25)	0.20 (0.16–0.26)
Hispanic	0.63 (0.59–0.69)	0.73 (0.67–0.79)	0.60 (0.51–0.71)	0.70 (0.59–0.84)
Age (years) ^a				
18–29	Reference	Reference	Reference	Reference
30–39	1.74 (1.51–2.00)	1.54 (1.33–1.78)	2.25 (1.58–3.27)	2.06 (1.43–3.02)
40–49	2.15 (1.88–2.47)	1.96 (1.70–2.25)	3.87 (2.78–5.53)	3.56 (2.53–5.15)
50–59	2.74 (2.42–3.12)	2.51 (2.20–2.86)	5.08 (3.70–7.15)	4.71 (3.40–6.73)
60–69	3.64 (3.22–4.12)	2.95 (2.59–3.36)	5.93 (4.34–8.33)	4.75 (3.43–6.77)
70+	4.27 (3.78–4.85)	3.00 (2.64–3.43)	5.52 (4.01–7.80)	3.82 (2.73–5.50)
Gender				
Male	Reference	Reference	Reference	Reference
Female	1.02 (0.97–1.08)	1.00 (0.95–1.06)	1.19 (1.06–1.33)	1.13 (1.01–1.28)
Other	1.09 (0.95–1.24)	1.14 (0.95–1.36)	1.05 (0.76–1.41)	1.03 (0.66–1.54)
Education				
College graduate or advanced degree	Reference	Reference	Reference	Reference
High school degree	0.80 (0.76–0.85)	0.90 (0.84–0.95)	0.88 (0.79–0.98)	0.97 (0.86–1.10)
Less than a high school degree or equivalent	0.50 (0.45–0.56)	0.71 (0.62–0.80)	0.46 (0.35–0.58)	0.66 (0.49–0.87)
Annual Household Income (\$)				
>35,000	Reference	Reference	Reference	Reference
35,000	0.71 (0.66–0.76)	0.95 (0.88–1.03)	0.67 (0.58–0.78)	0.94 (0.80–1.11)
Smoking Status				
Never	Reference	Reference	Reference	Reference
Current	0.84 (0.78–0.91)	1.12 (1.03–1.22)	2.08 (1.42–3.19)	1.66 (1.10–2.62)
Former	1.38 (1.30–1.46)	1.31 (1.23–1.38)	1.10 (0.74–1.72)	1.18 (0.79–1.87)
BMI (kg/m²)				
<18.5	1.04 (0.81–1.33)	1.14 (0.88–1.46)	1.13 (0.63–1.86)	1.26 (0.70–2.09)
18.5–24.9	Reference	Reference	Reference	Reference
25–29.9	1.13 (1.05–1.21)	1.15 (1.07–1.24)	1.15 (0.98–1.36)	1.18 (1.00–1.39)
30–34.9	1.25 (1.16–1.36)	1.33 (1.23–1.44)	1.34 (1.13–1.59)	1.39 (1.17–1.66)
35–39.9	1.45 (1.33–1.58)	1.57 (1.44–1.72)	1.91 (1.59–2.29)	1.97 (1.64–2.37)
40+	1.51 (1.37–1.65)	1.71 (1.55–1.88)	1.86 (1.53–2.26)	1.97 (1.61–2.41)
Insurance Status				
Health Insurance: Yes	Reference	Reference	Reference	Reference

	Psoriasis		Psoriatic Arthritis	
	Age-Adjusted	Multivariate	Age-Adjusted	Multivariate
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Health Insurance: No	0.33 (0.27–0.40)	0.46 (0.37–0.55)	0.32 (0.21–0.47)	0.46 (0.30–0.69)

Abbreviations: BMI, body mass index.

^aAge refers to age at consent.

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