

Cardiovascular Health in People with Psoriasis: A Population-Based Study in the United States

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TO THE EDITOR

Psoriasis is associated with an increased risk of cardiovascular (CV) risk factors, CV disease, and mortality (Abuabara et al., 2010; Elmetts et al., 2019; Gelfand et al., 2006), but many patients with psoriasis do not see primary care regularly (Barbieri et al., 2021) and have undertreated CV risk factors (Takeshita et al., 2015).

There are few studies of aggregate measures of CV health (CVH) in patients with psoriasis (Sleutjes et al., 2022). Life's Essential 8 (LE8) was published by the American Heart Association as an update to its 2010 algorithm Life's Simple 7, a method for quantifying holistic CVH predictive of CV events and CV mortality (Lloyd-Jones et al., 2022a). LE8 aggregates into a score the degree of health metric control for the following domains: diet, physical activity, nicotine exposure, sleep duration, body mass index, lipids, blood glucose, and blood pressure. This score adds sleep to its metrics and is redefined on a continuous scale, better reflecting current practice guidelines. Lower LE8 scores are associated with incident major adverse CV events, especially heart failure (Petermann-Rocha et al., 2023).

To assess a composite measure of CV risk (i.e., LE8) in people with psoriasis that includes both objective physician and laboratory measures and patients behaviors, we conducted a cross-sectional analysis of the National Health and Nutrition Examination Survey in years psoriasis was assessed (2005–2006 and 2009–2014). The National Health and Nutrition Examination Survey is a biennial, United States population-based study collecting health information using participant questionnaires, physical examinations,

and laboratory data (Centers for Disease Control and Prevention, 2023). Individuals with a self-reported history of psoriasis were included, an approach validated in previous population-based studies and routinely used in psoriasis epidemiological research (Modalsli et al., 2016).

For each individual, each of the eight CVH components (diet, physical activity, smoking, sleep, body mass index, blood lipids, blood glucose, and blood pressure) was scored from 0 to 100 points and averaged to give the final LE8 score according to Lloyd-Jones et al. (2022b). Dietary scores were scored according to adherence to a DASH (Dietary Approaches to Stop Hypertension) diet, a dietary approach to lower hypertension by limiting sodium, sugar, and fat intake (Lloyd-Jones et al., 2022b). LE8 score was further categorized as low (<50 of 100) or high (≥ 80 of 100), as validated (Lloyd-Jones et al., 2022b). Analysis utilized Stata 17's SVYSET command to include sample weights. Multivariate logistic regressions were used for dichotomous variables and multivariable linear regressions for continuous variables and were adjusted for age, self-reported gender, self-reported race/ethnicity, and poverty index. Missing data for LE8 components (<10% each), psoriasis status (4.8%), and poverty index (6.0%) were imputed through multiple imputation by chained equations.

Individuals were excluded if incompletely interviewed ($n = 1,462$), aged <20 years ($n = 17,615$) or ≥ 80 years ($n = 1,412$), or pregnant or breastfeeding ($n = 515$) (Lloyd-Jones et al., 2022b). A total of 18,662 people were included in the analysis (representing 197,630,325 United States individuals), including 523 people with psoriasis

(representing 6,041,306 United States individuals with psoriasis) and 18,139 people without psoriasis (representing 191,589,019 United States individuals without psoriasis). Older age, non-Hispanic White, and higher income groups were more prevalent among those with psoriasis than among those without psoriasis. A total of 58% of those with psoriasis self-reported having mild psoriasis (covered by 1–2 palms of the hand), whereas 15% reported moderate-or-severe psoriasis (three or more palms) (Table 1).

People with psoriasis had a higher prevalence of worse LE8 scores (LE8 < 50 of 100) and a lower prevalence of better LE8 scores ≥ 80 than those without psoriasis (Table 1). When adjusted for age, gender, race/ethnicity, and socioeconomic status, people with psoriasis had higher odds of having worse LE8 scores (OR = 1.30, 95% confidence interval [CI] = 1.00–1.68) and lower odds of having better LE8 scores (OR = 0.68, 95% CI = 0.48–0.96) than those without psoriasis (Table 2).

LE8 scores were different by two points (coefficient = -1.99 , 95% CI = -3.50 to -0.47) between those with psoriasis and those without psoriasis, driven predominantly by body mass index (coefficient = -4.72 , 95% CI = -8.27 to -1.17). Although a poor blood pressure score (coefficient = -5.24 , 95% CI = -8.82 to -1.66) was associated with psoriasis in unadjusted analysis, this did not remain significant after adjustment for age, gender, race/ethnicity, and poverty index (coefficient = -3.15 , 95% CI = -6.41 to 0.12). Those with psoriasis also had lower (worse) scores in five other components (cholesterol, blood sugar, physical activity, sleep health, and smoking status), with the largest differences in physical activity (coefficient = -3.32 , 95% CI = -8.76 to 2.12) and smoking (coefficient = -2.04 , 95% CI = -5.81 to 1.72); however, these differences were not statistically significant. There was also a trend toward better dietary scores in the

Abbreviations: CI, confidence interval; CV, cardiovascular; CVH, cardiovascular health; LE8, Life's Essential 8

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Table 1. Survey-Weighted Baseline Characteristics of Individuals with Psoriasis Versus Individuals without Psoriasis

Characteristics	People with Psoriasis (n = 523) (Represents 6,041,306 US Individuals)		People without Psoriasis (n = 18,139) (Represents 191,589,019 US Individuals)	
	All psoriasis	Mild	Moderate/severe	No psoriasis
Age, mean (SE)	47.7 (0.79)		44.6 (0.27)	
Gender, n (survey-weighted %)				
Male	252 (48.1)		8,980 (49.5)	
Female	271 (51.9)		9,150 (50.5)	
Race and Ethnicity, n (%)				
Non-Hispanic White	308 (80.0)		7,435 (66.1)	
Non-Hispanic Black	68 (5.9)		4,141 (12.0)	
Mexican American	44 (4.0)		2,885 (9.0)	
Other Hispanic	46 (4.3)		1,648 (5.5)	
Non-Hispanic Asian	38 (2.5)		1,299 (2.9)	
Other race	19 (3.4)		731 (3.4)	
Poverty index, n (%)				
<100% poverty threshold	111 (13.0)		3,863 (14.6)	
100–200% poverty threshold	122 (18.1)		4,222 (18.5)	
200–300% poverty threshold	61 (13.6)		2,321 (13.7)	
300–400% poverty threshold	55 (12.3)		1,934 (13.0)	
400–500% poverty threshold	36 (9.3)		1,324 (9.5)	
>500% poverty threshold	103 (28.6)		3,056 (24.6)	
Missing	35 (5.2)		1,419 (6.0)	
Severity of psoriasis, n (%)				
Mild	280 (57.9)		N/A	
Moderate/severe	72 (14.8)		N/A	
Missing	171 (27.3)		N/A	
Life's Essential 8 score (survey-weighted %)	All psoriasis	Mild	Moderate/severe	No psoriasis
Low	16.9	16.2	13.5	14.2
High	12.7	14.6	7.8	17.5
Missing	13.8	12.2	16.1	12.7
Total CVH score, mean (SE)	63.6 (0.9)	65.1 (1.2)	62.4 (2.0)	65.5 (0.3)
DASH diet score	44.9 (1.9)	47.1 (2.8)	39.7 (3.4)	41.5 (0.5)
Physical activity score	47.7 (3.1)	52.0 (3.8)	42.3 (6.6)	51.4 (0.8)
Tobacco or nicotine exposure score	66.4 (1.9)	70.8 (2.4)	70.5 (4.9)	68.9 (0.6)
Sleep health score	81.3 (1.4)	82.3 (1.9)	79.9 (3.6)	82.1 (0.3)
BMI score	56.4 (1.9)	56.4 (2.6)	54.4 (7.9)	61.1 (0.5)
Blood lipids (non-HDL cholesterol) score	62.4 (1.7)	61.1 (2.5)	67.2 (4.4)	64.5 (0.4)
Blood glucose score	78.8 (1.3)	80.3 (1.5)	75.5 (4.7)	81.3 (0.3)
BP score	67.0 (1.8)	65.7 (2.8)	66.4 (4.4)	71.5 (0.4)

Abbreviations: BMI, body mass index; BP, blood pressure; CVH, cardiovascular health; DASH, Dietary Approaches to Stop Hypertension; HDL, high-density lipoprotein; N/A, not applicable; SE, standard error; US, United States.

psoriasis cohort, which was not statistically significant (coefficient = 1.06, 95% CI = -2.38 to 4.50). Notably, comparing participants in 2009–2014 with those in 2005–2006 showed no significantly different change in LE8 scores in unadjusted (coefficient = -0.67, 95% CI = -2.13 to 0.78) or adjusted (coefficient = -0.25, 95% CI = -1.42 to 0.92) models.

In summary, people with psoriasis have lower overall scores of CV health than those without psoriasis, with a 30% higher chance of having worse (LE8 < 50) scores and a 34% lower

chance of having better (LE8 ≥ 80) scores. Despite trending toward better adherence to the DASH diet, people with psoriasis continued to have worse body mass indices and trended toward worse blood pressure.

Previous population-based data on the relationship between psoriasis and sleep, diet, and physical activity has been limited. Existing studies on patients with psoriasis report increased rates of sleep disorders such as obstructive sleep apnea and restless legs syndrome as well as poor sleep quality because of pruritus, depression,

and pain (Halioua et al., 2022). As such, our results on sleep health should be interpreted with caution because the LE8 score utilizes sleep duration rather than sleep quality to determine sleep health. Existing studies on diet and psoriasis focus on specific nutritional intake; a study of 2003–2006 National Health and Nutrition Examination Survey data showed decreased sugar intake in people with psoriasis (Johnson et al., 2014), which may explain the trend toward improved DASH adherence with psoriasis in our study. Finally, data on physical activity and psoriasis

Table 2. Analysis of LE8 Scores and Components

Variable	Unadjusted Estimates for Psoriasis (95% CI)	Adjusted ¹ Estimates for Psoriasis (95% CI)
Low CVH (Dichotomized)	OR = 1.32 (1.05–1.66), <i>P</i> = 0.02	OR = 1.30 (1.00–1.68), <i>P</i> = 0.05
High CVH (dichotomized)	OR = 0.68 (0.49–0.95), <i>P</i> = 0.02	OR = 0.68 (0.48–0.96), <i>P</i> = 0.03
CVH score (continuous)	Coefficient = –2.28 (–3.76 to –0.80), <i>P</i> = 0.003	Coefficient = –1.99 (–3.50 to –0.47), <i>P</i> = 0.01
LE8 Components ¹		
BMI	–4.71 (–8.38 to –1.04), <i>P</i> = 0.01	–4.72 (–8.27 to –1.17), <i>P</i> = 0.01
Blood pressure	–5.24 (–8.82 to –1.66), <i>P</i> = 0.005	–3.15 (–6.41 to 0.12), <i>P</i> = 0.06
Cholesterol	–2.09 (–5.4 to 1.29), <i>P</i> = 0.22	–0.34 (–3.73 to 3.05), <i>P</i> = 0.84
Blood sugar	–2.46 (–5.19 to 0.27), <i>P</i> = 0.08	–1.62 (–4.24 to 1.01), <i>P</i> = 0.22
Physical activity	–3.66 (–9.28 to 1.96), <i>P</i> = 0.20	–3.32 (–8.76 to 2.12), <i>P</i> = 0.23
Sleep health	–1.03 (–3.73 to 1.67), <i>P</i> = 0.45	–1.77 (–4.47 to 0.92), <i>P</i> = 0.19
Smoking status	–2.32 (–5.99 to 1.340), <i>P</i> = 0.21	–2.04 (–5.81 to 1.72), <i>P</i> = 0.28
Dietary health	3.28 (–0.24 to 6.80), <i>P</i> = 0.07	1.06 (–2.38 to 4.50), <i>P</i> = 0.54

Abbreviations: BMI, body mass index; CI, confidence interval; CVH, cardiovascular health; LE8, Life's Essential 8; MICE, multiple imputation by chained equations.

Missing data for LE8 score was 15.1% and was imputed through MICE. Missing data for each component was below 10%.

¹Adjusted for age, gender, race/ethnicity, and poverty index.

have been mixed; some studies found impaired physical activity with severe psoriasis (Torres et al., 2014), whereas others showed no difference (Do et al., 2015). Our study may not capture trends of worse physical activity with moderate-or-severe psoriasis owing to the small sample size.

Our study is limited by a small sample size, particularly for moderate/severe psoriasis, which may have led to insufficient statistical power for some of our comparisons. However, we do show that psoriasis is associated with lower aggregate measures of CVH, mostly driven by obesity and hypertension. The clinical significance of a two-point decrease in LE8 is not defined, but for context, one study found that a six-point increase in LE8 was associated with an 11–23% lower risk of incident heart failure, myocardial infarction, or stroke (Petermann-Rocha et al., 2023). Importantly, despite increased awareness of the CV risk associated with psoriasis, CVH scores show no changes over time. Future studies are needed to study optimal screening and treatment approaches for CV risk factors in patients with psoriasis.

Data availability statement

Datasets related to this article can be found on the Centers for Disease Control and Prevention website at <https://www.cdc.gov/nchs/nhanes/default.aspx> (Centers for Disease Control and Prevention, 2023). The years of data

used were 2005–2006, 2009–2010, 2011–2012, and 2013–2014.

Ethics statement

The study was granted exemption from the University of Pennsylvania Institutional Review Board owing to the use of fully deidentified data.

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CONFLICT OF INTEREST

TB is currently a principal investigator for studies being sponsored by AbbVie, Castle, CorEvitas, Dermavant, and Pfizer. She has additional research funding from Novartis and Regeneron. She has served as an advisor for AbbVie, Arcutis, Boehringer Ingelheim, Bristol-Myers Squibb, Janssen, Leo, Lilly, Pfizer, Novartis, Sun, and UCB. MSG is a consultant for AbbVie and Horizon Therapeutics. JMG is a consultant for AbbVie, Bristol-Myers Squibb, Boehringer Ingelheim, Janssen Biologics, Novartis, and UCB (DSMB); has grants (to the Trustees of the University of Pennsylvania) from Amgen and Pfizer; is Deputy Editor for the *Journal of Investigative Dermatology* and receives honoraria from the Society for Investigative Dermatology; and is Chief Medical Editor for Healo Psoriatic Disease (receiving honoraria). The remaining authors state no conflict of interest.

AUTHOR CONTRIBUTIONS

Conceptualization: SW, JMG; Formal Analysis: SW, DBS, JMG; Supervision: JMG; Writing – Original Draft Preparation: SW; Writing – Review and Editing: SW, DBS, TB, MSG, JMG

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