

# Association Between Psoriasis and Obesity Among US Adults in the 2009-2014 National Health and Nutrition Examination Survey

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## PRACTICE POINTS

- There are many comorbidities that are associated with psoriasis, making it crucial to evaluate for these diseases in patients with psoriasis.
- Obesity may be a contributing factor to psoriasis development due to the role of IL-17 secretion.

To the Editor:

Psoriasis is an immune-mediated dermatologic condition that is associated with various comorbidities, including obesity.<sup>1</sup> The underlying pathophysiology of psoriasis has been extensively studied, and recent research has discussed the role of obesity in IL-17 secretion.<sup>2</sup> The relationship between being overweight/obese and having psoriasis has been documented in the literature.<sup>1,2</sup> However, this association in a recent population is lacking. We sought to investigate the association between psoriasis and obesity utilizing a representative US population of adults—the 2009-2014 National Health and Nutrition Examination Survey (NHANES) data,<sup>3</sup> which contains the most recent psoriasis data.

We conducted a population-based, cross-sectional study focused on patients 20 years and older with psoriasis from the 2009-2014 NHANES database. Three 2-year cycles of NHANES data were combined to create our 2009 to 2014 dataset. In the Table, numerous variables including age, sex, household income, race/ethnicity, education, diabetes status, tobacco use, body mass index (BMI), waist circumference, and being called overweight by a health care provider were analyzed using  $\chi^2$  or *t* test analyses to evaluate for differences among those with and without psoriasis. Diabetes status was assessed by the question “Other than during pregnancy, have you ever been told by a doctor or health professional that you have diabetes or sugar diabetes?” Tobacco use was assessed by the question “Have you smoked at least 100 cigarettes in your entire life?” Psoriasis status was assessed by a self-reported response to the question “Have you ever been told by a doctor or other health care professional that you had psoriasis?” Three different outcome variables were used to determine if patients were overweight or obese: BMI, waist circumference, and response to the question “Has a doctor or other health professional ever told you that you were overweight?” Obesity was defined as having a BMI of 30 or higher or waist circumference of 102 cm or more

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The eTable is available in the Appendix online at [www.mdedge.com/dermatology](http://www.mdedge.com/dermatology).

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## Characteristics of US Adults With and Without Psoriasis<sup>a</sup> in NHANES 2009-2014 (N=15,893)

Characteristic	Psoriasis	No psoriasis	P value
Mean age (SD), y	50.32 (13.25)	46.80 (14.54)	.0004 <sup>b</sup>
Sex, n (weighted % <sup>c</sup> )			
Male	215/437 (49.4)	7534/15,456 (48.5)	.7
Female	222/437 (50.6)	7922/15,456 (51.5)	
Annual household income, <sup>d</sup> n (weighted % <sup>c</sup> )			
≥\$20,000	312/418 (83.6)	11,531/14,748 (85.0)	.4
<\$20,000	106/418 (16.4)	3217/14,748 (15.0)	
Race/ethnicity, n (weighted % <sup>c</sup> )			
Non-Hispanic White	253/437 (79.3)	6551/15,456 (66.5)	<.0001 <sup>b</sup>
Non-Hispanic Black	49/437 (5.3)	3303/15,456 (11.3)	
Other Hispanic/Mexican American	82/437 (9.4)	3741/15,456 (14.5)	
Other race/multiracial	53/437 (6.0)	1861/15,456 (7.6)	
Education, <sup>e</sup> n (weighted % <sup>c</sup> )			
Did not graduate high school	94/437 (15.4)	3758/15,440 (16.7)	.9
High school graduate	99/437 (21.2)	3410/15,440 (21.5)	
Some college	136/437 (32.9)	4599/15,440 (31.8)	
College graduate	108/437 (30.5)	3673/15,440 (30.0)	
Diabetes status, <sup>f,g</sup> n (weighted % <sup>c</sup> )			
Yes	74/437 (12.8)	1806/15,447 (8.8)	.01 <sup>b</sup>
No	363/437 (87.2)	13,641/15,447 (91.2)	
Tobacco use, <sup>h,i</sup> n (weighted % <sup>c</sup> )			
Yes	253/437 (58.0)	6771/15,450 (43.7)	<.0001 <sup>b</sup>
No	184/437 (42.0)	8679/15,450 (56.3)	
Mean BMI (SD)	29.42 (5.66)	28.78 (5.80)	.1
Mean waist circumference (SD), cm	101.26 (13.37)	98.72 (14.13)	.009 <sup>b</sup>
Classified as overweight by health care provider, <sup>j</sup> n (weighted % <sup>c</sup> )			
Yes	220/437 (50.6)	5168/15,456 (33.9)	<.0001 <sup>b</sup>
No	217/437 (49.4)	10,288/15,456 (66.1)	

Abbreviations: BMI, body mass index (calculated as kilograms divided by meters squared); NHANES, National Health and Nutrition Examination Survey.

<sup>a</sup>Psoriasis status was assessed by the question "Have you ever been told by a doctor or other health care professional that you had psoriasis?"

<sup>b</sup>Statistically significant (2-sided  $P < .05$ ).

<sup>c</sup>Weighted percentages will not reflect raw numbers, as they were calculated using NHANES survey design parameters.

<sup>d</sup>Patients missing: 727.

<sup>e</sup>Patients missing: 16.

<sup>f</sup>Diabetes status was assessed by the question "Other than during pregnancy, have you ever been told by a doctor or health professional that you have diabetes or sugar diabetes?"

<sup>g</sup>Patients missing: 9.

<sup>h</sup>Tobacco use was assessed by the question "Have you smoked at least 100 cigarettes in your entire life?"

<sup>i</sup>Patients missing: 6.

<sup>j</sup>Being overweight was assessed by the question "Has a doctor or other health professional ever told you that you were overweight?"

in males and 88 cm or more in females.<sup>4</sup> Being overweight was defined as having a BMI of 25 to 29.99 or response of Yes to “Has a doctor or other health professional ever told you that you were overweight?”

Initially, there were 17,547 participants 20 years and older from 2009 to 2014, but 1654 participants were excluded because of missing data for obesity or psoriasis; therefore, 15,893 patients were included in our analysis. Multivariable logistic regressions were utilized to examine the association between psoriasis and being overweight/obese (eTable). Additionally, the models were adjusted based on age, sex, household income, race/ethnicity, diabetes status, and tobacco use. All data processing and analysis were performed in Stata/MP 17 (StataCorp LLC).  $P < .05$  was considered statistically significant.

The Table shows characteristics of US adults with and without psoriasis in NHANES 2009–2014. We found that the variables of interest evaluating body weight that were significantly different on analysis between patients with and without psoriasis included waist circumference—patients with psoriasis had a significantly higher waist circumference ( $P = .009$ )—and being told by a health care provider that they are overweight ( $P < .0001$ ), which supports the findings by Love et al,<sup>5</sup> who reported abdominal obesity was the most common feature of metabolic syndrome exhibited among patients with psoriasis.

Multivariable logistic regression analysis (eTable) revealed that there was a significant association between psoriasis and BMI of 25 to 29.99 (adjusted odds ratio [AOR], 1.34; 95% CI, 1.02–1.76;  $P = .04$ ) and being told by a health care provider that they are overweight (AOR, 1.91; 95% CI, 1.44–2.52;  $P < .001$ ). After adjusting for confounding variables, there was no significant association between psoriasis and a BMI of 30 or higher (AOR, 1.00; 95% CI, 0.73–1.38;  $P = .99$ ) or a waist circumference of 102 cm or more in males and 88 cm or more in females (AOR, 1.15; 95% CI, 0.86–1.53;  $P = .3$ ).

Our findings suggest that a few variables indicative of being overweight or obese are associated with psoriasis. This relationship most likely is due to increased adipokine, including resistin, levels in overweight individuals, resulting in a proinflammatory state.<sup>6</sup> It has been suggested that BMI alone is not a definitive marker for measuring fat storage levels in individuals. People can have a normal or slightly elevated BMI but possess excessive adiposity, resulting in chronic inflammation.<sup>6</sup> Therefore, our findings of a significant association between psoriasis

and being told by a health care provider that they are overweight might be a stronger measurement for possessing excessive fat, as this is likely due to clinical judgment rather than BMI measurement.

Moreover, it should be noted that the potential reason for the lack of association between BMI of 30 or higher and psoriasis in our analysis may be a result of BMI serving as a poor measurement for adiposity. Additionally, Armstrong and colleagues<sup>7</sup> discussed that the association between BMI and psoriasis was stronger for patients with moderate to severe psoriasis. Our study consisted of NHANES data for self-reported psoriasis diagnoses without a psoriasis severity index, making it difficult to extrapolate which individuals had mild or moderate to severe psoriasis, which may have contributed to our finding of no association between BMI of 30 or higher and psoriasis.

The self-reported nature of the survey questions and lack of questions regarding psoriasis severity serve as limitations to the study. Both obesity and psoriasis can have various systemic consequences, such as cardiovascular disease, due to the development of an inflammatory state.<sup>8</sup> Future studies may explore other body measurements that indicate being overweight or obese and the potential synergistic relationship of obesity and psoriasis severity, optimizing the development of effective treatment plans.

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## APPENDIX

**eTABLE.** Association Between Psoriasis and Being Overweight/Obese in Adults in NHANES 2009-2014 Utilizing Multivariable Logistic Regression

Variable	Weighted % <sup>a</sup>		OR (95% CI)		P value	
	Psoriasis	No psoriasis	Unadjusted	Adjusted	Unadjusted	Adjusted
BMI ≥30	36.8	35.9	1.04 (0.78-1.39)	1.00 (0.73-1.38)	.8	.99
BMI 25–29.99	39.2	33.3	1.29 (1.01-1.65)	1.34 (1.02-1.76)	.04 <sup>b</sup>	.04 <sup>b</sup>
Classified as overweight by health care provider <sup>c</sup>	50.6	33.9	2.00 (1.50-2.65)	1.91 (1.44-2.52)	<.001 <sup>b</sup>	<.001 <sup>b</sup>
High waist circumference <sup>d</sup>	60.9	55.6	1.24 (0.98-1.59)	1.15 (0.86-1.53)	.08	.3

Abbreviations: BMI, body mass index (calculated as kilograms divided by meters squared); NHANES, National Health and Nutrition Examination Survey; OR, odds ratio.

<sup>a</sup>Weighted percentages will not reflect raw numbers, as they were calculated using NHANES survey design parameters.

<sup>b</sup>Statistically significant (2-sided  $P < .05$ ).

<sup>c</sup>Being overweight was assessed by the question "Has a doctor or other health professional ever told you that you were overweight?"

<sup>d</sup>High waist circumference was defined as ≥102 cm in males and ≥88 cm in females.