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No Association between Psoriasis and Diabetes in the U.S. Population

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Abstract

Previous studies have found a positive association between psoriasis and diabetes/diabetes-related complications, but the association has not been studied in a nationally representative U.S. sample. Our analysis of NHANES data indicated that psoriasis was not associated with diabetes but was positively associated with hypertension, overweight/obesity and waist circumference.

Introduction

Psoriasis is an autoimmune disease affecting 7.5 million Americans(1). There is increasing evidence that psoriasis is associated with the prevalence and incidence of diabetes and diabetes-related complications(2–9). Prospective studies from several countries have found that the risk of developing diabetes is increased among those with psoriasis, especially among those with more severe psoriasis(10–13). Although the mechanism is unclear, the chronic inflammatory state of psoriasis may impact the development of diabetes, which is also associated with inflammatory processes(14).

To our knowledge, there are no nationally representative studies in the United States (U.S.) on the relationship between psoriasis and diabetes; the current study investigates the association between psoriasis and diabetes and diabetes-related complications in the National Health and Nutrition Examination Survey (NHANES).

Materials and Methods

NHANES is a stratified multistage probability survey conducted in the non-institutionalized U.S. population(15). Self-reported data on psoriasis were available in 2003–2006 and 2009–

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Conflicts of Interest

The authors have no conflicts of interest to disclose.

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2010. In 2003–2006, a dermatology questionnaire was implemented; participants were asked “Have you ever been told by a health care provider that you had psoriasis?” If participants answered “yes,” they were further queried on severity. Psoriasis was ascertained using the same question in 2009–2010 but the question was included as part of a list of medical conditions and participants were not asked about severity. To determine diabetes status, all participants were asked “Other than during pregnancy, have you ever been told by a doctor or health professional that you have diabetes?” The total study sample included 12,737 adults age ≥20 years (n=345 with psoriasis and n=1,084 with diabetes). Smoking status, history of cardiovascular disease (CVD) or stroke, and retinopathy were self-reported. Obesity was determined using measured height and weight to determine body mass index; waist circumference was measured. Blood pressure was determined based on the average of up to three measurements. High density lipoprotein (HDL) cholesterol was directly measured. Chronic kidney disease was determined using the Chronic Kidney Disease Epidemiology Collaboration equation(16). Participants with an albumin/creatinine ratio of 30–300 mg/g or >300mg/g were considered to have microalbuminuria or macroalbuminuria, respectively.

The unadjusted prevalences of diabetes and diabetes-related complications were determined by psoriasis status. Multivariable logistic regression (odds ratios, 95% confidence intervals) was used to evaluate the association of psoriasis with diabetes and diabetes-related complications in the total population and among those with diabetes. Models were initially adjusted for age, sex, race/ethnicity and then additionally adjusted for smoking and obesity. Data were analyzed using SUDAAN software (version 11.0; Research Triangle Institute, Research Triangle Park, North Carolina) to account for the complex sampling design.

Results

The mean age of participants was 46.9 years with women accounting for 51.9% of the study population. The majority of participants were non-Hispanic white (70.1%) and the prevalence of psoriasis was 3.3%.

The prevalence of self-reported diabetes was 8.1% among adults with psoriasis and 8.5% among those without psoriasis ($p = 0.05$) (Table 1). The prevalence of history of cardiovascular disease, hypertension, overweight and obesity, and high waist circumference were significantly higher among participants with compared to those without psoriasis. The prevalence of a history of stroke and retinopathy were lower among participants with compared to those without psoriasis.

Psoriasis was not associated with diabetes, CVD, stroke, or microvascular diseases in logistic regression models (Table 2). Those with psoriasis were significantly more likely to have hypertension, be overweight, and have a high risk waist circumference after adjusting for age, sex, race/ethnicity, smoking, and obesity.

Among participants with diabetes, those with psoriasis were significantly more likely to have a high waist circumference; they were less likely to have chronic renal disease after adjusting for age, sex, race/ethnicity, smoking, and obesity (Table 2).

Discussion

Although several studies have shown that psoriasis is associated with diabetes and its complications, results from the current study did not support previous findings. There was no association between psoriasis and diabetes in unadjusted models and after adjusting for demographic factors, obesity and smoking status. In addition, there was no association between psoriasis and CVD, stroke, and microvascular diseases.

However, there were associations between psoriasis and hypertension, obesity, and waist circumference which are risk factors for diabetes and CVD. Previous literature has documented these associations(6, 13, 17, 18). In this cross-sectional study it might be expected that there would be a stronger association with risk factors since they are more proximate in the natural history of disease than diabetes and CVD.

Previous studies have found associations between psoriasis and diabetes only among those with more severe psoriasis(3, 6, 10). NHANES had some information on severity, but too few participants reported having severe psoriasis and diabetes (n=5) to investigate the association by severity. In addition, participants may mistakenly include non-psoriasis skin lesions when self-reporting a diagnosis of the disease. To the authors' knowledge, the validity of self-reported psoriasis has not been documented.

Strengths of the study include data from a nationally representative sample and use of a data-rich survey. A limitation was that few people had both psoriasis and diabetes, which may have resulted in substantial random variability limiting the ability to detect a true association. However, the odds ratio for psoriasis and diabetes and cardiovascular disease was robust in unadjusted and adjusted models.

Despite no significant association between psoriasis and diabetes, there were several significant associations with comorbid risk factors, including hypertension and obesity. Further research is needed in large nationally representative samples with valid information on psoriasis diagnosis and severity to better assess the association of psoriasis with diabetes and diabetes-related complications in the general population.

Acknowledgments

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Table 1

Unadjusted prevalence of diabetes, diabetes comorbidities, and diabetes-related complications by the presence of psoriasis, NHANES 2003–2006 and 2009–2010

	Psoriasis	No Psoriasis
	% (SE)	% (SE)
Diabetes	8.1 (2.51)	8.5 (0.37)
History CVD	11.8 (2.38)	6.3 (0.41) *
History of Stroke	1.3 (0.61)	2.6 (0.20) *
Retinopathy [†]	7.2 (3.92)	18.0 (1.50) *
Chronic kidney disease	8.6 (1.48)	8.8 (0.68)
Microalbuminuria [‡]	11.6 (2.67)	8.6 (0.50)
Macroalbuminuria	0.8 (0.46)	1.4 (0.15)
Hypertension [§]	62.2 (4.39)	47.5 (1.35) *
Body mass index 25 kg/m ²	80.8 (3.19)	68.2 (0.75) *
Body mass index 30 kg/m ²	45.8 (3.48)	35.2 (0.95) *
High waist circumference	67.5 (3.32)	54.5 (0.99) *
Low HDL	37.6 (3.44)	31.9 (0.87)

* P-value<0.05 compared those with psoriasis

[†] Among people with diabetes

[‡] Microalbuminuria: Albumin creatinine ratio 30–300mg/g; Macroalbuminuria: Albumin creatinine ratio >300mg/g

[§] Blood pressure 140/80mmHg or currently taking blood pressure medication

Table 2

Odds ratios (95% confidence intervals) of diabetes comorbidities and diabetes-related complications associated with psoriasis, NHANES 2003–2006 and NHANES 2009–2010

	Total Population			Diabetes Population		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Diabetes	0.94 (0.46–1.90)	0.95 (0.46–1.99)	0.86 (0.39–1.88)			
Cardiovascular disease [†]	1.14 (0.86–1.51)	1.00 (0.75–1.35)	1.13 (0.65–1.98)	1.05 (0.35–3.14)	0.86 (0.27–2.73)	0.40 (0.10–1.59)
Stroke	0.48 (0.20–1.17)	0.46 (0.21–1.02)	0.50 (0.18–1.44)	0.15 (0.02–1.20)	0.14 (0.02–1.14)	[¶]
Retinopathy [‡]	0.35 (0.10–1.20)	0.38 (0.11–1.32)	0.24 (0.02–2.37)	0.35 (0.10–1.20)	0.38 (0.11–1.32)	0.24 (0.02–2.37)
Chronic kidney disease	0.97 (0.64–1.48)	1.03 (0.59–1.80)	0.99 (0.58–1.71)	0.35 (0.08–1.59)	0.29 (0.07–1.12)	0.17 (0.04–0.76)
Micro-/ Macroalbuminuria [§]	1.27 (0.74–2.17)	1.31 (0.75–2.28)	1.35 (0.76–2.38)	0.58 (0.12–2.70)	0.59 (0.14–2.53)	0.55 (0.10–2.85)
Hypertension	1.82 (1.28–2.60)	1.80 (1.20–2.71)	1.73 (1.11–2.68)	1.20 (0.21–6.71)	1.17 (0.19–7.29)	0.96 (0.16–5.68)
Body mass index 25 kg/m ²	1.97 (1.29–3.00)	2.03 (1.33–3.12)	2.06 (1.34–3.18)	2.93 (0.66–12.95)	2.79 (0.70–11.09)	2.84 (0.69–11.73)
Body mass index 30 kg/m ²	1.56 (1.15–2.11)	1.59 (1.16–2.17)	1.60 (1.17–2.19)	1.62 (1.29–2.04)	1.55 (0.46–5.24)	1.60 (0.48–5.37)
High waist circumference	1.73 (1.27–2.36)	1.74 (1.19–2.54)	1.74 (1.19–2.55)	3.74 (1.01–13.86)	3.42 (1.09–10.73)	3.44 (1.10–10.78)
Low HDL	1.28 (0.97–1.70)	1.29 (0.97–1.71)	1.09 (0.81–1.46)	2.60 (1.00–6.79)	2.56 (1.02–6.44)	2.25 (0.88–5.71)

Model 1: Unadjusted

Model 2: Adjusted for age, sex, race/ethnicity

Model 3: Adjusted for age, sex, race/ethnicity, obesity and smoking (obesity not included in models with body mass index, waist circumference, or obesity as the outcome)

[†] In NHANES, cardiovascular disease includes heart failure, coronary heart disease, angina, or heart attack

[‡] Among people with diabetes

[§] Microalbuminuria/macroalbuminuria: Albumin creatinine ratio 30mg/g

^{||} Blood pressure 140/80 mmHg or currently taking blood pressure medication

[¶] 1 case with both psoriasis and the outcome