Comorbidities and Lifestyle Risk Factors Associated With Scabies Infestation

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PRACTICE **POINTS**

- Scabies infestation is caused by the human itch mite (*Sarcoptes scabiei* var *hominis*) and can be spread via sexual contact in adults.
- Crowded living conditions are associated with scabies infestation in countries with high human development indices, such as the United States.
- Patients with certain comorbid conditions or lifestyle risk factors should be screened for scabies infestation when presenting with pruritus and other characteristic clinical findings.

To the Editor:

Scabies infestation, which has been recognized as a neglected tropical disease by the World Health Organization since 2017, is caused by the human itch mite (*Sarcoptes scabiei* var *hominis*).[1] Infected individuals experience a pruritic papular rash when the mite burrows into the epidermis, where it lives and lays eggs.[2,3] Infected individuals also may develop bacterial superinfections if the skin barrier becomes compromised, leading to systemic complications and considerable morbidity.[3]

In countries with high human development indices, scabies outbreaks are linked to densely populated living conditions, such as those found in nursing homes or prisons.[3,4] Scabies also is transmitted via sexual contact in adults. Beyond immunosuppression, little is known about other comorbid conditions or lifestyle risk factors associated with scabies infestation.[2] Because scabies can mimic a range of other dermatologic conditions such as folliculitis, atopic dermatitis, and arthropod bites, misdiagnosis is common and can lead to delayed treatment and increased transmission risk.[4] In this study, we sought to examine comorbid conditions and/or lifestyle risk factors associated with scabies infestation.

A matched case-control study was performed using the Registered Tier dataset of the National Institutes of Health All of Us Research Program Curated Data Repository version 7, which includes more than 400,000 unique participants aged 18 years or older from across the United States. The All of Us Research Program excludes adults who are unable to consent independently as well as incarcerated populations and children younger than 18 years. Participants diagnosed with scabies were identified using SNOMED code 62752005 and compared to a control group matched 1:4 based on age, sex, and self-identified race. SNOMED codes also were used to identify various comorbidities and lifestyle risk factors, including depression, bipolar disorder, anxiety, schizophrenia, peripheral vascular disease (PVD), HIV, type 2 diabetes mellitus (T2DM), unsheltered status, tobacco use, difficulty with activities of daily living, insurance status, and any recent travel history. Logistic regression models were used to calculate odds ratios (ORs) and estimate effect sizes, with statistical significance set at $P<.05$.

We identified 691 cases of scabies infestation and 2073 controls. The average age of the patients diagnosed with scabies was 55.1 years. Seventy percent (481/691) identified as female and 32.4% (224/491) identified as Black or African American. Matched

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Rachel C. Hill and Fernando Vicente have no relevant financial disclosures to report. Dr. Lipner has served as a consultant for BelleTorus Corporation and Moberg Pharmaceuticals.

The eTables are available in the Appendix online at www.mdedge.com/cutis.

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Cutis. 2025 March;115(3):83-85, E1-E2. doi:10.12788/cutis.1179

controls were similar for all analyzed demographic characteristics (P=1.0)(eTable 1). Patients diagnosed with scabies were more likely to be unsheltered (OR, 2.33 [95% CI, 1.91-2.85]), use tobacco (OR 1.77 [95% CI, 1.48-2.11]) and have a comorbid diagnosis of HIV (OR, 3.08 [95% CI, 2.03-4.66]), T2DM (OR, 2.05 [95% CI, 1.57-2.66]) or PVD (OR, 2.06 [95% CI, 1.43-2.97]) compared with controls (P<.001). Psychiatric comorbidities were more common in the patients diagnosed with scabies, including depression (OR, 3.07 [95% CI, 2.54-3.72]), anxiety (OR, 2.48 [95% CI, 2.06-2.98]), bipolar disorder (OR, 3.08 [95% CI, 2.34-4.05]), and schizophrenia (OR, 4.68 [95% CI, 2.93-7.49])(P<.001). Difficulties with activities of daily living, including running errands alone (OR, 2.32 [95% CI, 1.43-3.76]) and concentrating (OR, 5.78; 95% CI, 3.86-8.64), were more prevalent in the scabies group compared to controls (both P<.05). In a multivariate logistic regression model including unsheltered status as a covariate, all associations remained statistically significant (P<.05)(eTable 2).

This large diverse study demonstrated an association between scabies infestation and unsheltered status. Previous studies have shown that unsheltered populations are at increased risk for many dermatologic conditions, perhaps due to decreased access to health care and social support, lack of access to hygiene facilities (eg, public showers), and increased prevalence of substance use and psychiatric disorders among this population.[5] In a cross-sectional analysis of hospitalized patients, 8.6% of unsheltered patients (n=197) had an ectoparasitic disease (including scabies) compared with 1.0% of patients with stable housing (n=1018), with a 9.43-fold increased risk for ectoparasitic infestation among unsheltered patients (95% CI, 3.79-23.47; P<.001).[6] Increased attention to public health initiatives among unsheltered populations—including access to hygiene facilities and increased dermatologic services—are needed, as ectoparasitic infections are both preventable and treatable, and these initiatives could reduce morbidity associated with superimposed bacterial infections for which unsheltered patients are at increased risk.[6]

Our results also showed that individuals diagnosed with scabies were more likely than the controls to have been diagnosed with HIV, T2DM, and PVD. Our findings are similar to those of a systematic review of immunosuppressive factors associated with crusted scabies (a severe form of scabies infestation) in which 10.2% and 15.7% of patients (n=683) had comorbid HIV and T2DM, respectively.[7] A functioning cell-mediated response to scabies mite antigens limits proliferation of the human itch mite; thus, infection with HIV/AIDS, which induces the destruction of CD4+ T cells, limits the immune system's ability to mount an effective response against these antigens. The association of scabies with T2DM likely is multifactorial; for example, chronic hyperglycemia may lead to immune system impairment, and peripheral neuropathy may reduce the itch sensation, allowing scabies mites to proliferate without removal by scratching.[7] In a descriptive epidemiologic study in Japan, 11.7% of patients with scabies (N=857) had comorbid PVD.[8] Peripheral vascular disease can lead to the development of ulcers, gangrene, and stasis dermatitis, all of which compromise the skin barrier and increase susceptibility to infection.[9] Notably, these associations remained even when unsheltered status was considered as a confounding variable. Because individuals with HIV, T2DM, and PVD may be at higher risk for serious complications of scabies infestation (eg, secondary bacterial infections, invasive group A streptococcal infections), prompt detection and treatment of scabies are crucial in curbing morbidity in these at-risk populations.

Our study also demonstrated that psychiatric comorbidities including depression, anxiety, bipolar disorder, and schizophrenia were associated with scabies infestation, even when controlling for unsheltered status, which may have a bidirectional relationship with mental health disorders.[10] In a cross-sectional study of 83 adult patients diagnosed with scabies, 72.2% (60/83) reported moderate to extremely large effect of scabies infestation on quality of life using the Dermatology Life Quality Index, and these scores positively correlated with increased Beck Depression Scale and Beck Anxiety Scale scores (r_s=0.448 and r_s=0.456, respectively; both P=.000). The results of this study suggest that scabies negatively impacts quality of life, which might increase symptoms of depression and anxiety.[11]

Studies are needed to assess whether patients with pre-existing depression and anxiety face increased risk for scabies infestation. In a retrospective case-control study using data from the National Health Insurance Research Database of Taiwan, 0.8% (58/7096) of patients with scabies (n=7096) and 0.4% of controls (n=28,375) were newly diagnosed with bipolar disorder over a 7-year period, indicating a 1.55-fold increased risk for bipolar disorder in patients with scabies compared to those without (95% CI, 1.12-2.09; P<.05).[12] Future studies are needed to determine whether the relationship between bipolar disorder and scabies is bidirectional, with pre-existing bipolar disorder evaluated as a risk factor for subsequent scabies infestation. Increased difficulties with activities of daily living, including running errands independently and concentrating, were associated with scabies. These difficulties may reflect sequelae of psychiatric illness or pruritus associated with scabies affecting daily living.

Physician awareness of comorbidities and lifestyle risk factors associated with scabies infestation may improve diagnosis and prevent treatment delays. In a retrospective study at a single dermatology outpatient clinic, 45.3% of patients with scabies (n=428) had previously been misdiagnosed with another dermatologic condition, and the most common erroneous diagnosis was atopic dermatitis.[13] Our study provides a framework of comorbidities and lifestyle risk factors associated with scabies infestation that dermatologists can use to stratify patients who

may be at greater risk for this condition, allowing dermatologists to select appropriate treatment when clinical signs are ambiguous.

Limitations of our study included the potential for miscoding in the database, lack of information about treatment regimens employed (if any), and lack of information about the temporal relationship between associations.

In summary, it is recommended that patients with pruritus and other characteristic clinical findings of scabies receive appropriate workup for scabies regardless of risk factors; however, the medical and psychiatric comorbidities and lifestyle risk factors identified in this study may help to identify at-risk patients. Our study showed that unsheltered patients are at increased risk for scabies, potentially due to unique dermatologic challenges and lack of access to health care and hygiene facilities. Positive correlations between scabies and HIV, T2DM, and PVD suggest that patients with chronic immunocompromising illnesses who live in group homes or other crowded quarters and present with symptoms could be evaluated for scabies infestation to prevent widespread and difficult-to-control outbreaks in these communities. Based on our findings, scabies also should be included in the differential diagnosis for patients with psychiatric illness and suggestive symptoms. Early identification and treatment of scabies infestation could prevent misdiagnosis and treatment delays.

Acknowledgements—The All of Us Research Program is supported by the National Institutes of Health, Office of the Director: Regional Medical Centers: 1 OT2 OD026549; 1 OT2 OD026554; 1 OT2 OD026557; 1 OT2 OD026556; 1 OT2 OD026550; 1 OT2 OD 026552; 1 OT2 OD026553; 1 OT2 OD026548; 1 OT2 OD026551; 1 OT2 OD026555; IAA #: AOD 16037; Federally Qualified Health Centers: HHSN 263201600085U; Data and Research Center: 5 U2C OD023196; Biobank: 1 U24 OD023121; The Participant Center: U24 OD023176; Participant Technology Systems Center: 1 U24 OD023163; Communications and Engagement: 3 OT2 OD023205; 3 OT2 OD023206; and Community Partners: 1 OT2 OD025277; 3 OT2 OD025315; 1 OT2 OD025337; 1 OT2 OD025276. In addition, the All of Us Research Program would not be possible without the partnership of its participants. We gratefully acknowledge All of Us participants for their contributions, without whom this research would not have been possible. We also thank the National Institutes of Health's All of Us Research Program for making available the participant data examined in this study.

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APPENDIX

eTABLE 1. Demographic Characteristics of Individuals With Scabies Infestation vs Matched Controls[a]

Characteristic	Matched controls (n=2073)	Scabies cases (n =691)	*P* value[b]
Mean age, y (SD)	55.1 (14.4)	55.1 (14.4)	1.0
Sex assigned at birth, n (%)			1.0
Male	795 (38.0)	265 (38.0)	
Female	1254 (60.0)	418 (60.0)	
Other/unspecified	24 (1.2)	N/A	
Self-reported race/ethnicity, n (%)			1.0
White	1260 (60.8)	420 (60.8)	
Black	672 (32.4)	224 (32.4)	
Other	141 (6.8)	47 (6.8)	

Abbreviation: N/A, not available.

[a]The control group was matched based on age, sex, and self-reported race in the National Institutes of Health All of Us Research Program Curated Data Repository version 7.

[b]Statistical significance was set at $P<.05$.

eTABLE 2. Association of Scabies Infestation With Comorbidities and Lifestyle Factors

Comorbidity or lifestyle factor	Concept ID code[a]	Control group, n (%) (n=2073)	Scabies group, n (%) (n=691)	Not including unsheltered status as a covariate		Including unsheltered status as a covariate	
				OR (95% CI)	*P* value[b]	OR (95% CI)	*P* value[b]
Depression	440383	371 (17.9)	274 (39.7)	3.07 (2.54-3.72)	<.001	2.98 (2.46-3.62)	<.001
Bipolar disorder	436665	124 (6.0)	112 (16.2)	3.08 (2.34-4.05)	<.001	2.73 (2.07-3.61)	<.001
Anxiety	442077	539 (26.0)	316 (45.7)	2.48 (2.06-2.98)	<.001	2.40 (2.00-2.89)	<.001
Schizophrenia	435783	31 (1.5)	45 (6.5)	4.68 (2.93-7.49)	<.001	4.57 (2.84-7.37)	<.001
PAD	321052	80 (3.9)	52 (7.5)	2.06 (1.43-2.97)	.002	2.11 (1.46-3.05)	<.001
HIV	439727	52 (2.5)	48 (6.9)	3.08 (2.03-4.66)	<.001	2.85 (1.87-4.35)	<.001
T2DM	201826	180 (8.7)	109 (15.8)	2.05 (1.57-2.66)	<.001	2.11 (1.61-2.76)	<.001
Unsheltered	1585886	375 (18.1)	229 (33.1)	2.33 (1.91-2.85)	<.001	N/A	N/A
Tobacco use[c]	1585857	910 (43.9)	397 (5.7)	1.77 (1.48-2.11)	<.001	1.56 (1.3-1.87)	<.001
Difficulty dressing or bathing	903577	36 (1.7)	N/A	1.46 (0.79-2.7)	1.00	1.25 (0.66-2.35)	.97
Difficulty running errands alone	903578	49 (2.4)	31 (4.5)	2.32 (1.43-3.76)	.01	1.95 (1.18-3.21)	.04
Difficulty concentrating	903575	61 (2.9)	72 (10.4)	5.78 (3.86-8.64)	<.001	5.15 (3.40-7.81)	<.001
Insurance coverage	1585386	1964 (94.7)	644 (93.2)	0.76 (0.53-1.08)	.86	0.92 (0.64-1.33)	.97
History of travel within past 6 mo	1585815	198 (9.6)	36 (5.2)	0.51 (0.35-0.74)	.007	0.58 (0.40-0.85)	.02

Abbreviations: N/A, not available; PAD, peripheral artery disease, T2DM, type 2 diabetes mellitus.

[a]Concept ID in the National Institutes of Health All of Us Research Program Curated Data Repository version 7 refers to a unique, standardized code assigned to a medical concept such as a condition, medication, or measurement found within a patient's electronic health record.

[b]Statistical significance was set at $P<.05$.

[c]Defined as more than 100 cigarettes in lifetime.