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Pityriasis versicolor epidemiology, disease predictors, and health care utilization: Analysis of 32,679 cases in a large commercial insurance database

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Keywords

antifungal stewardship; culture; direct microscopy; epidemiology; fluconazole; griseofulvin; itraconazole; ketoconazole; pityriasis versicolor; polymerase chain reaction; selenium sulfide; terbinafine; tinea versicolor; treatment; United States

To the Editor: Pityriasis versicolor (PV) is a common, generally mild dermatomycosis caused by *Malassezia*.¹ Detailed epidemiologic studies are limited. Large, robust studies might help improve diagnostic and treatment practices, which is necessary given antifungal stewardship's growing importance.² We assessed incidence, predictors, and health care utilization for US patients diagnosed with PV.

Using Merative MarketScan Commercial Databases, we identified outpatient PV cases diagnosed in 2022 and calculated incidence by demographic characteristics and underlying conditions. We performed multivariable logistic regressions adjusting for age, sex, and region to evaluate associations between PV and underlying conditions in a case-control study (Supplementary Material, available via Mendeley at <https://data.mendeley.com/datasets/w2rbzx7p3f/1>). We examined PV-related diagnostic and treatment practices by specialty.

During 2022, 32,679/11,805,800 outpatients had a new PV diagnosis (incidence: 2.8/1000 person-years) (Table I). Incidence was greatest among 18- to 24-year-olds (5.0), males (3.2), Northeast residents (3.5), and those with acne (8.5), rosacea (5.9), anorexia nervosa (5.4), or hidradenitis suppurativa (4.3). In adjusted analyses, conditions associated with the greatest PV odds were acne (odds ratio: 2.61, 95% CI: 2.52-2.71), rosacea (2.44, 2.27-2.63), anorexia nervosa (1.48, 1.10-1.99), hidradenitis suppurativa (1.29, 1.06-1.56),

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This activity was reviewed by CDC and was conducted consistent with applicable federal law and CDC policy (for example, 45 C.F.R. part 46, 21 C.F.R. part 56; 42 U.S.C. §241(d); 5 U.S.C. §552a; 44 U.S.C. §3501 et seq). The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the CDC.

Conflicts of interest

Dr Lipner has served as a consultant for Ortho-Dermatologics, Eli Lilly, Moberg Pharmaceuticals, and Belle Torus Corporation. Drs Gold and Benedict have no conflicts of interest to declare.

and immunocompromising conditions (1.24, 1.18-1.30); hypothyroidism (0.93, 0.88-0.98), and diabetes mellitus (0.78, 0.74-0.82) were inversely associated with PV.

Among patients with PV, 44.9% saw dermatology, 21.9% general practitioners, 15.4% nurse practitioners/physician assistants, 12.1% other/missing specialty types, and 5.7% pediatricians (Table II). Across specialties, 8.5% had diagnostic testing, most often biopsy (5.5%). Testing frequency was highest for those seen by dermatologists (13.5%) and lowest for those seen by pediatricians (0.7%). Overall, 67.7% were prescribed an antifungal; those seen by dermatologists most frequently received antifungals (71.9%). Over half (56.3%) received a topical, most often ketoconazole (47.9%), selenium sulfide (4.0%), or ciclopirox (3.3%); 23.7% received an oral, most often fluconazole (18.6%), then ketoconazole (3.0%), and terbinafine (1.2%).

We present the largest US PV epidemiologic study to date. PV occurred most often in young men and was associated with greater odds of acne and lower odds of diabetes mellitus and hypothyroidism; these findings corroborate a smaller case-control study among a convenience sample of US patients and may reflect increased sebum production in young men and patients with acne and lower production in patients with diabetes and hypothyroidism.³ Rosacea, a condition associated with sebaceous gland hyperplasia,⁴ was the next strongest predictor of increased PV (>2× increased odds).

American Academy of Dermatology guidelines encourage diagnostic testing for PV when considering systemic antifungals.⁵ Testing was infrequent (8.5%), despite 23.7% of patients with PV receiving an oral antifungal, and may help distinguish PV from similar-appearing eruptions. We also found that 3.0% of patients received oral ketoconazole, which is generally discouraged due to hepatotoxicity. Likewise, 1.2% of patients received oral terbinafine, which is discouraged for PV due to inefficacy.¹

Study limitations include potential disease misclassification, particularly given low testing rates and lack of information on race/ethnicity, testing results, noncommercially insured patients, potential COVID-19 pandemic-related effects on health care utilization, and over-the-counter antifungal use. Our study updates current PV epidemiology and suggests potential opportunities to increase testing and improve antifungal selection.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Demographic features and underlying medical conditions associated with pityriasis versicolor diagnosis in a large, commercially insured population—United States, 2022 *

Table 1.

Characteristic	PV diagnosis		No PV diagnosis		Population	PV incidence	aOR (95% CI)
	n	% col	n	% col			
Overall	32,679	100.0	11,773,121	100.0	11,805,800	2.8	
Age group (y)							
<5	176	0.5	477,037	4.1	477,213	0.4	ref
5-12	1156	3.5	1,134,128	9.6	1,135,284	1.0	2.77 (2.36-3.25)
13-17	3366	10.3	846,858	7.2	850,224	4.0	10.85 (9.32-12.63)
18-24	5436	16.6	1,083,164	9.2	1,088,600	5.0	13.90 (11.96-16.16)
25-44	12,861	39.4	3,076,241	26.1	3,089,102	4.2	11.59 (9.98-13.45)
45-54	8908	27.3	4,141,621	35.2	4,150,529	2.1	5.89 (5.07-6.84)
≥65	776	2.4	1,014,072	8.6	1,014,848	0.8	2.17 (1.84-2.56)
Male	17,419	53.3	5,416,026	46.0	5,433,445	3.2	1.38 (1.35-1.41)
US census region							
Northeast	6149	18.8	1,764,278	15.0	1,770,427	3.5	1.52 (1.47-1.58)
South	15,654	47.9	5,264,368	44.7	5,280,022	3.0	1.25 (1.21-1.29)
West	4749	14.5	1,927,171	16.4	1,931,920	2.5	1.03 (0.99-1.07)
Midwest	6073	18.6	2,794,697	23.7	2,800,770	2.2	ref
Unknown/missing [†]	54	0.2	22,607	0.2	22,661	2.4	NA
Underlying conditions within 365 days before PV diagnosis							
Acne	3609	11.0	422,776	3.6	426,385	8.5	2.61 (2.52-2.71)
Acromegaly	1	0.0	763	0.0	764	1.3	0.51 (0.07-3.63)
Adrenal cortical hypofunction	35	0.1	10,975	0.1	11,010	3.2	1.34 (0.96-1.86)
Anorexia nervosa	44	0.1	8163	0.1	8207	5.4	1.48 (1.10-1.99)
Diabetes	1799	5.5	1,063,346	9.0	1,065,145	1.7	0.78 (0.74-0.82)
Immunocompromising conditions	1964	6.0	727,019	6.2	728,983	2.7	1.24 (1.18-1.30)
HIV infection	121	0.4	27,139	0.2	27,260	4.4	1.37 (1.15-1.64)
Immune-mediated inflammatory conditions [‡]	1227	3.8	345,990	2.9	347,217	3.5	1.43 (1.35-1.52)
Transplant	93	0.3	22,660	0.2	22,753	4.1	1.72 (1.40-2.11)

Characteristic	PV diagnosis		No PV diagnosis		Population	PV incidence	aOR (95% CI)
	n	% col	n	% col			
Malignant neoplasm	596	1.8	361,418	3.1	362,014	1.6	0.90 (0.83-0.98)
Hidradenitis suppurativa	102	0.3	23,677	0.2	23,779	4.3	1.29 (1.06-1.56)
Hypothyroidism	1711	5.2	864,630	7.3	866,341	2.0	0.93 (0.88-0.98)
Parkinson's disease	29	0.1	18,559	0.2	18,588	1.6	1.25 (0.86-1.80)
Polycystic ovarian syndrome	305	0.9	79,632	0.7	79,937	3.8	1.08 (0.97-1.21)
Pituitary adenoma	46	0.1	16,007	0.1	16,053	2.9	1.07 (0.80-1.43)
Rosacea	773	2.4	130,210	1.1	130,983	5.9	2.44 (2.27-2.63)

aOR, Adjusted odds ratio; PV, pityriasis versicolor.

* Incidence was calculated per 1000 population years. For aOR, patients with vs without a PV diagnosis in 2022 were compared; aORs for each underlying condition were calculated in separate multivariable models that included age group, sex, and region along with the condition of interest.

[†] These missing data were excluded from adjusted odds ratio calculations.

[‡] Includes ankylosing spondylitis, Behçet's disease, dermatopolymyositis, inflammatory bowel disease, juvenile arthritis, psoriasis, Reiter's disease, rheumatoid arthritis, and systemic lupus erythematosus.

Diagnostic testing and treatment practices by specialty for patients diagnosed with pityriasis versicolor in a large commercially insured population—United States 2022

Table II.

Characteristic *	Overall n = 32,679	Dermatologist n = 14,678	GP n = 7153	NP/PA n = 5026	Pediatrician n = 1856	Other or unknown [†] n = 3966	P values [‡]
Diagnostic testing	2772 (8.5)	1976 (13.5)	97 (1.4)	352 (7.0)	13 (0.7)	334 (8.4)	<.001
Outpatient antifungal drug prescriptions	22,114 (67.7)	10,552 (71.9)	4412 (61.7)	3578 (71.2)	1002 (54.0)	2570 (64.8)	<.001
Topical	18,393 (56.3)	9285 (63.3)	3053 (42.7)	3054 (60.8)	922 (49.7)	2079 (52.4)	<.001
Ketoconazole	15,657 (47.9)	8181 (55.7)	2436 (34.1)	2652 (52.8)	654 (35.2)	1734 (43.7)	<.001
Selenium sulfide	1309 (4.0)	413 (2.8)	363 (5.1)	192 (3.8)	185 (10.0)	156 (3.9)	<.001
Ciclopirox	1083 (3.3)	679 (4.6)	97 (1.4)	179 (3.6)	18 (1.0)	110 (2.8)	<.001
Econazole	673 (2.1)	407 (2.8)	46 (0.6)	111 (2.2)	27 (1.5)	82 (2.1)	<.001
Other topical antifungal	607 (1.9)	169 (1.2)	196 (2.7)	94 (1.9)	56 (3.0)	92 (2.3)	<.001
Oral	7742 (23.7)	3580 (24.4)	1829 (25.6)	1234 (24.6)	124 (6.7)	975 (24.6)	<.001
Fluconazole	6093 (18.6)	2992 (20.4)	1199 (16.8)	1036 (20.6)	93 (5.0)	773 (19.5)	<.001
Ketoconazole	975 (3.0)	408 (2.8)	337 (4.7)	99 (2.0)	11 (0.6)	120 (3.0)	<.001
Terbinafine	381 (1.2)	127 (0.9)	153 (2.1)	56 (1.1)	3 (0.2)	42 (1.1)	<.001
Itraconazole	286 (0.9)	62 (0.4)	136 (1.9)	44 (0.9)	9 (0.5)	35 (0.9)	<.001
Griseofulvin	30 (0.1)	1 (0.0)	11 (0.2)	4 (0.1)	8 (0.4)	6 (0.2)	<.001
Both	4021 (12.3)	2313 (15.8)	470 (6.6)	710 (14.1)	44 (2.4)	484 (12.2)	<.001

GP, General practitioner; NP, nurse practitioner; PA, physician assistant.

* Data shown as number (% column). Patients could receive more than one type of diagnostic test and more than one type of treatment. Diagnostic tests were considered pityriasis versicolor-related if they were documented within 7 days before or after the incident pityriasis versicolor visit date. Antifungal drug prescriptions were considered pityriasis versicolor-related if they were documented within 0 to 7 days after the incident pityriasis versicolor visit date.

[†] Unknown for 365 patients.

[‡] P-values were calculated using χ^2 -square tests to compare practices among specialties.