



Published in final edited form as:

J Am Acad Dermatol. 2025 May ; 92(5): 1148–1151. doi:10.1016/j.jaad.2025.01.053.

Analysis of epidemiology and health care utilization for tinea nigra, white piedra, and black piedra among 39.4 million commercially insured outpatients, United States

Jeremy A. W. Gold, MD, MS^a, Kaitlin Benedict, MPH^a, Shari R. Lipner, MD, PhD^b

^aMycotic Diseases Branch, Centers for Disease Control and Prevention, Atlanta, Georgia

^bDepartment of Dermatology, Weill Cornell Medicine, New York, New York.

Keywords

biopsy; black piedra; culture; direct microscopy; epidemiology; fluconazole; griseofulvin; histopathology; itraconazole; ketoconazole; polymerase chain reaction; selenium sulfide; terbinafine; tinea nigra; treatment; United States; white piedra

To the Editor:

The superficial dermatomycoses tinea nigra (TN), white piedra (WP), and black piedra (BP) are most often caused by *Hortaea werneckii*, *Trichosporon* spp., and *Piedraia hortae*, respectively, and typically diagnosed in tropical regions.¹ Globally, the largest studies include only 50 TN, 131 WP, and 74 BP cases.^{2–4} Updated epidemiologic and clinical data might help prevent misdiagnosis (eg, TN vs melanoma) and support timely treatment.¹ Therefore, we analyzed TN, WP, and BP in a large health insurance database.

Using the 2019–2023 Merative MarketScan Commercial databases, we identified outpatients with TN, WP, or BP diagnosis codes (Supplementary Material, available via Mendeley at <https://data.mendeley.com/datasets/k7tyvj82sy/1>). We estimated 5-year prevalence, stratifying by demographic characteristics, and described previous diagnoses and underlying medical conditions, laboratory testing, outpatient antifungal prescriptions, and specialty types seen.

Among 39,388,096 outpatients, 879 had TN (prevalence [per 1 million]:22.3), 317 WP (8.0), and 47 BP (1.2) (Table I). BP was not further analyzed given small numbers. TN

Correspondence to: Jeremy A.W. Gold, MD, MS, 1600 Clifton Rd NE, Atlanta, GA 30329, JGold@cdc.gov.

Conflicts of interest

Dr Lipner has served as a consultant for Moberg Pharmaceuticals and Belle Torus Corporation. Dr Gold and Author Benedict have no conflicts of interest to declare.

Patient consent: Not applicable.

IRB approval status: Not required.

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the CDC.

Note: This activity was reviewed by CDC and was conducted consistent with applicable federal law and CDC policy (for example, 45 CFR. 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).

prevalence was highest for patients ≥ 65 years (28.1) and lowest for < 18 years (19.4); WP prevalence was similar for patients ≥ 65 years (10.3) and < 18 years (11.2) and lowest for 18–44 years (6.5). For both conditions, prevalence was similar for male vs female patients (TN:21.5 vs 23.0, WP:8.5 vs 7.6), highest in the South (TN:26.1, WP:9.2) or Northeast (TN:23.8, WP:10.8), and lowest in the West (TN:15.1, WP:5.3).

For TN and WP patients, a similar percentage had diabetes mellitus (TN:9%, WP:9%), hyperhidrosis (TN:1%, WP: $< 1\%$ [$n = 1$]), and immunocompromising conditions (TN:5%, WP:6%) (Table II). Among TN patients, 3 ($< 1\%$) were previously diagnosed with melanoma. Laboratory testing was documented in 14% of TN and 6% of WP patients, most frequently biopsy/histopathology (TN:9%, WP:5%). Most patients received antifungals (TN:56%, WP:56%), primarily topical (TN:47%, WP:44%), most frequently ketoconazole (TN:23%, WP:23%). Nine percent of TN and 11% of WP patients received an oral antifungal, most frequently fluconazole (TN:5%, WP:7%). The most common specialty types seen for TN were dermatology (40%) and general practice (24%) and for WP were general practice (34%) or pediatrics (19%).

To our knowledge, this is the largest published study of TN and piedra. These conditions were rare (each diagnosed in < 25 per million US outpatients during 2019–2023) and affected generally healthy persons, consistent with limited previous literature.^{1,5} Awareness of TN epidemiology is particularly important given the potential to avoid biopsies (received by 9% of TN patients) for suspected melanoma and to ensure proper treatment. Previous reports emphasize TN and WP in tropical climates, particularly among female children and hyperhidrosis patients.^{1,5} We found similar TN and WP prevalence across sexes and higher (TN) or similar prevalence (WP) in older adults vs children. Cases occurred across US regions (with Southern prevalence similar to Northeastern), potentially reflecting travel or migration, and hyperhidrosis was infrequently documented.

Our study lacked information on non-commercially-insured patients, over-the-counter treatments, treatment response, utilization of special stains, and dermoscopy, a useful diagnostic tool for TN.²

Our analysis highlights the presence of TN, WP, and BP in the United States, emphasizing the importance of physician awareness to ensure prompt recognition and treatment.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

REFERENCES

1. Gupta AK, Chaudhry M, Elewski B. Tinea corporis, tinea cruris, tinea nigra, and piedra. *Dermatol Clin*. 2003;21(3):395–400. v. [PubMed: 12956194]
2. Piliouras P, Allison S, Rosendahl C, Buettner PG, Weedon D. Dermoscopy improves diagnosis of tinea nigra: a study of 50 cases. *Australas J Dermatol*. 2011;52(3):191–194. [PubMed: 21834814]
3. Guerrero-Ponce AE, Araiza J, Tirado-Sánchez A, Bonifaz A. Review article white piedra: review of 131 cases. *Mycoses*. 2024;67(1):e13668. [PubMed: 37907831]

4. Coimbra Júnior CE, Santos RV. Black piedra among the Zoró indians from Amazônia (Brazil). *Mycopathologia*. 1989;107(1):57–60. [PubMed: 2811983]
5. Kiken DA, Sekaran A, Antaya RJ, Davis A, Imaeda S, Silverberg NB. White piedra in children. *J Am Acad Dermatol*. 2006;55(6):956–961. [PubMed: 17097391]

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 1. Five-year prevalence of tinea nigra and piedra* in a large commercially insured population, United States, 2019–2023

Characteristic	Tinea nigra		White piedra	
	n (% col.)	Prevalence per 1 million outpatients	n (% col.)	Prevalence per 1 million outpatients
All	879 (100)	22.3	317 (100)	8.0
Age group (y)				
<18		19.4		11.2
18–44	176 (20)		102 (32)	
45–64	373 (42)	22.8	106 (33)	6.5
≥65	262 (30)	22.7	84 (26)	7.3
Sex	68 (8)	28.1	25 (8)	10.3
Male	393 (45)	21.5	156 (49)	8.5
Female	486 (55)	23.0	161 (51)	7.6
Urban/rural classification of primary beneficiary's residence				
Nonrural	599 (68)	21.3	208 (66)	7.4
Rural	66 (8)	16.0	30 (9)	7.3
Unknown	214 (24)	29.9	79 (25)	11.0
US census region of primary beneficiary's residence				
Northeast	160 (18)	23.8	73 (23)	10.8
Midwest	159 (18)	19.7	47 (15)	5.8
South	432 (49)	26.1	153 (48)	9.2
West	103 (12)	15.1	36 (11)	5.3
Unknown	25 (3)	21.1	8 (3)	6.8

* Black piedra is not displayed in the table because of low prevalence ($n = 47$ patients during 2019–2023, 5-year prevalence: 1.2 per 1 million outpatients). The dataset included a total of 39,388,096 commercially insured patients with at least one outpatient visit during 2019–2023. Overall, 23% were <18 years, 42% were <18–44 years, 29% were 45–64 years, and 6% were ≥65 years; 46% were male and 54% were female; 71% were nonrural, 10% were rural, 18% were missing urban-rural status; and 17% were from the Northeast, 21% from the Midwest, 42% from the South, 17% from the West, and 3% from an unknown/missing region.

Table II.

Diagnoses, testing, treatment, and health care utilization associated with tinea nigra (TN) and white piedra (WP), United States, 2019–2023*

Characteristics	TN (n = 733)	WP (n = 254)
Underlying conditions (0–180 d before TN or WP diagnosis)		
Diabetes mellitus	64 (9)	24 (9)
Hyperhidrosis	7 (1)	1 (0)
Immunocompromising conditions	39 (5)	16 (6)
HIV infection	2 (0)	1 (0)
Immune mediated inflammatory diseases	24 (3)	6 (2)
Solid organ or hematopoietic stem cell transplantation	2 (0)	1 (0)
Malignant neoplasm (excludes skin cancer)	12 (2)	8 (3)
Previous melanoma (1–180 d before TN diagnosis)	3 (0)	Not applicable
Diagnostic laboratory testing (7 d before, on, or after TN or WP diagnosis)	106 (14)	16 (6)
Biopsy/histopathology	63 (9)	13 (5)
Direct microscopy	32 (4)	2 (1)
Fungal culture	12 (2)	5 (2)
Polymerase chain reaction	9 (1)	0 (0)
Antifungal therapy (0–7 d after TN or WP diagnosis)	410 (56)	142 (56)
Oral	69 (9)	29 (11)
Fluconazole	40 (5)	18 (7)
Terbinafine	22 (3)	5 (2)
Ketoconazole	3 (0)	2 (1)
Other oral antifungals	4 (1)	4 (2)
Topical	341 (47)	113 (44)
Ketoconazole	166 (23)	59 (23)
Econazole	46 (6)	5 (2)
Ciclopirox	25 (3)	8 (3)
Nystatin	21 (3)	14 (6)
Clotrimazole	19 (3)	4 (2)
Other topical antifungal monotherapy	17 (2)	7 (3)
Combination antifungal-corticosteroids	47 (6)	16 (6)

Characteristics	TN (n = 733)	WP (n = 254)
Clotrimazole-betamethasone	39 (5)	12 (5)
Nystatin-triamcinolone	8 (1)	4 (2)
Most frequent specialty type(s) seen (d of TN or WP diagnosis)		
Dermatology	294 (40)	33 (13)
Family practice or internal medicine (general practice)	178 (24)	87 (34)
Laboratory	82 (11)	27 (11)
Pediatrician	67 (9)	48 (19)
Nurse practitioner or physician assistant	58 (8)	22 (9)
Podiatry	32 (4)	3 (1)
Acute care hospital	29 (4)	41 (16)

TN, Tinea nigra; WP, white piedra.

* Data shown as no. (% column). Patients had continuous insurance enrolment in the 180 days before through 7 days after incident TN, WP, or BP diagnosis and could receive more than one diagnosis, test type, or prescription. Patients could see more than one specialty type on the same day.