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Racial disparities, risk factors, and clinical management practices for tinea capitis: An observational cohort study among US children with Medicaid

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Keywords

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To the Editor: Tinea capitis (TC), a common childhood scalp and hair dermatophytosis, is associated with lower socioeconomic status,[1] but national data on TC incidence and risk factors among children from lower income households are lacking to guide public health efforts and clinical care. We estimated incidence, assessed risk factors, and described clinical practices for TC among a large US cohort of Medicaid-insured children.

In the Merative MarketScan Multi-State Medicaid Database*, we identified TC cases among children <18 years, underlying conditions, and TC-related diagnostic testing† (Supplementary Table I, available via Mendeley at https://data.mendeley.com/datasets/7wz5p6bxk3/1). We calculated 1-year TC incidence overall and by race/ethnicity, age, and underlying health conditions. We used Poisson regression to assess associations between

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Note: This activity was reviewed by CDC and was conducted consistent with applicable federal law and CDC policy (eg, 45 C.F.R. part 46, 21 C.F.R. part 56; 42 U.S.C. §241(d); 5 U.S.C. §552a; 44U.S.C. §3501 et seq).

Conflicts of interest

Dr Lipner has served as a consultant for Hoth Therapeutics, BelleTorus Corporation, and Orthodermatologics. Dr Hennessee, Author Benedict, Dr Dulski, and Dr Gold have no conflicts of interest to declare.

*The MarketScan Multi-State Medicaid Database includes information on demographics and health care records from inpatient and outpatient services and prescription drug claims for Medicaid enrollees covered under fee-for-service and managed care plans in the United States. Although it is a convenience sample, numerous states are included and every region of the United States is represented. Information on Children's Health Insurance Enrollment and socioeconomic factors such as income and housing are not available in the data set.

†We included patients with ≥1 outpatient visit during July 1, 2016 to December 31, 2020 and continuous Medicaid insurance enrollment 180 days before and 365 days after the first outpatient visit. We identified TC cases, underlying conditions, and TC-related diagnostic testing using International Classification of Diseases, 10th Revision, codes and Current Procedural Terminology codes. To attempt to identify incident TC diagnoses, we excluded those with a TC diagnosis in the 180 days before or on the first outpatient visit.

risk factors and TC incidence and compared TC diagnostic and treatment patterns by race/ethnicity using χ^2 tests ($\alpha = 0.05$).

Among 4,148,385 Medicaid patients, 1-year TC incidence per 10,000 person-years was 59.1 (95% CI: 58.4–59.9) (Table I). Incidence was highest in children who were 3 to 5 years old (118.4, 95% CI: 116.0–120.8), male (71.2, 95% CI: 70.1–72.3), and non-Hispanic Black (Black) (129.6, 95% CI: 127.7–131.5). Adjusting for age, sex, and underlying health conditions, TC incidence rates were 6.7 times higher in Black vs non-Hispanic White children (95% CI: 6.5–7.0) (Supplementary Fig 1, available via Mendeley at https://data.mendeley.com/datasets/7wz5p6bxk3/1). Younger age, male sex, atopy, HIV infection, and immune-mediated inflammatory disease were independently associated with higher TC incidence.

Among 24,536 patients diagnosed with TC, 13.3% received diagnostic testing, most commonly fungal culture (10.7%) and direct microscopy (5.1%) (Table II). Testing was similar by race/ethnicity ($P = .12$). Overall, 83.2% of patients were prescribed an antifungal drug, with 68.2% and 47.2% receiving oral and topical antifungals, respectively; 15.0% received topical therapy alone.

In this Medicaid-insured cohort, Black children had higher TC incidence than other groups, with incidence rates ~7 times higher than White children, substantiating previously documented disparities.[2] This association persisted after adjusting for TC risk factors. Focused community or school-based interventions might help address racial disparities in TC burden.

Rates of confirmatory diagnostic testing among Medicaid-insured children were lower than those found in a previous study that included commercially insured children (13.3% vs 21.9%),[3] reflecting differential care potentially associated with limited time and resources for testing or limited access to dermatologists.[4] Lack of confirmatory laboratory testing could lead to misdiagnosis and inappropriate antifungal prescriptions, which is concerning given recent reports of antifungal drug-resistant dermatophytosis.[5] More than 30% of patients with TC did not receive systemic antifungal treatment, which is needed for effective treatment.[3]

This study relied on administrative data, which is subject to incomplete case ascertainment, undercoding, and disease misclassification. The database also lacked information on socioeconomic status, housing, geography, income, and other environmental factors, limiting our ability to assess underlying causes of racial disparities in TC incidence. Additional studies are needed to investigate these factors and guide targeted public health interventions to address TC disparities.

Overall, this study demonstrates high overall TC incidence and racial disparities among children with Medicaid, highlighting a need for tailored public health efforts and opportunities for improving clinical management.

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Table I.

One-year incidence rates of tinea capitis among a cohort of children aged <18 years with Medicaid insurance—United States, July 1, 2016 to December 31, 2021

Characteristic	TC cases/population at risk	Incidence per 10,000 person-years (95% CI)	Unadjusted IRR (95% CI)	Adjusted IRR (95% CI)
Overall	24,536/4,148,385	59.1 (58.4–59.9)	–	–
Age group, y				
0–2	4657/532,985	87.4 (84.9–89.9)	6.9 (6.4–7.4)	7.1 (6.6–7.7)
3–5	9086/767,637	118.4 (116.0–120.8)	9.3 (8.6–10.0)	9.5 (8.8–10.2)
6–8	6069/778,143	78.0 (76.1–80.0)	6.1 (5.7–6.6)	6.2 (5.8–6.7)
9–11	2740/773,180	35.4 (34.1–36.8)	2.8 (2.6–3.0)	2.8 (2.6–3.0)
12–14	1209/688,352	17.6 (16.6–18.6)	1.4 (1.3–1.5)	1.4 (1.3–1.5)
15–17 (ref)	775/608,088	12.7 (11.9–13.7)	–	–
Sex				
Male	15,047/2,113,517	71.2 (70.1–72.3)	1.5 (1.5–1.6)	1.5 (1.5–1.6)
Female (ref)	9489/2,034,868	46.6 (45.7–47.6)	–	–
Race/ethnicity				
Black, NH	17,408/1,343,360	129.6 (127.7–131.5)	6.8 (6.6–7.0)	6.7 (6.5–7.0)
Hispanic or Latino	847/384,192	22.0 (20.6–23.6)	1.2 (1.1–1.2)	1.1 (1.1–1.2)
Other, NH	557/169,503	32.9 (30.2–35.7)	1.7 (1.6–1.9)	1.7 (1.5–1.8)
White, NH (ref)	3605/1,891,009	19.1 (18.5–19.7)	–	–
Unknown race/ethnicity *	2119/360,321	58.8 (56.4–61.4)	–	–
IC conditions				
Atopy				
Yes	6041/673,549	89.7 (87.5–92.0)	1.7 (1.6–1.7)	1.3 (1.3–1.4)
No (ref)	18,495/3,474,836	53.2 (52.5–54.0)	–	–
HIV infection				
Yes	7/431	162.4 (77.4–340.7)	2.7 (1.3–5.8)	2.8 (1.4–6.0)
No (ref)	24,529/4,147,954	59.1 (58.4–59.9)	–	–
IMID				
Yes	50/6304	79.3 (60.1–104.6)	1.3 (1.0–1.8)	2.6 (1.9–3.5)
No (ref)	24,486/4,142,081	59.1 (58.4–59.9)	–	–

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Characteristic	TC cases/population at risk	Incidence per 10,000 person-years (95% CI)	Unadjusted IRR (95% CI)	Adjusted IRR (95% CI)
Diabetes mellitus				
Yes	40/13,076	30.6 (22.4–41.7)	0.5 (0.4–0.7)	1.0 (0.7–1.5)
No (ref)	24,496/4,135,309	59.2 (58.5–60.0)	–	–
Transplant[†]				
Yes	12/1550	77.4 (44.0–136.3)	1.3 (0.7–2.3)	1.7 (0.9–3.1)
No (ref)	24,524/4,146,835	59.1 (58.4–59.9)	–	–
Malignant neoplasm				
Yes	23/4707	48.9 (32.5–73.5)	0.8 (0.5–1.2)	1.1 (0.7–1.8)
No (ref)	24,513/4,143,678	59.2 (58.4–59.9)	–	–

IC, Immunocompromising; *IMID*, immune-mediated inflammatory disease; *IRR*, incidence rate ratio; *NH*, not Hispanic or Latino; *TC*, tinea capitis.

[*] Patients with unknown race/ethnicity were excluded from *IRR* calculations.

[†] Includes solid organ transplants or hematopoietic stem-cell transplants. Adjusted IRRs were from a full model including all demographic and underlying health condition variables.

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Table II.

Diagnostic and treatment practices for tinea capitis for a cohort of children with Medicaid insurance, by race/ethnicity—United States, July 1, 2016 to December 31, 2021 *

Characteristic	Overall (*N* = 24,536)	Black, NH (*n* = 17,408)	White, NH (*n* = 3605)	Hispanic or Latino (*n* = 847)	Other race, NH (*n* = 557)	Unknown race/ethnicity (*n* = 2119)	*P* value
Diagnostic testing	3255 (13.3)	2348 (13.5)	456 (12.6)	123 (14.5)	89 (16.0)	239 (11.3)	.12
Fungal culture	2630 (10.7)	1970 (11.3)	317 (8.8)	95 (11.2)	70 (12.6)	178 (8.4)	
Direct microscopy	1244 (5.1)	886 (5.1)	181 (5.0)	45 (5.3)	46 (8.3)	86 (4.1)	
Antifungal susceptibility testing	372 (1.5)	246 (1.4)	67 (1.9)	14 (1.7)	5 (0.9)	40 (1.9)	
Skin biopsy	36 (0.1)	24 (0.1)	6 (0.2)	1 (0.1)	1 (0.2)	4 (0.2)	
PCR	64 (0.3)	37 (0.2)	15 (0.4)	2 (0.2)	3 (0.5)	7 (0.3)	
Any antifungal drug	20,419 (83.2)	14,679 (84.3)	2873 (79.7)	680 (80.3)	463 (83.1)	1724 (81.4)	<.01
Oral	16,738 (68.2)	12,277 (70.5)	2164 (60.0)	544 (64.2)	372 (66.8)	1381 (65.2)	<.01
Griseofulvin	15,430 (62.9)	11,437 (65.7)	1904 (52.8)	475 (56.1)	335 (60.1)	1279 (60.4)	
Terbinafine	721 (2.9)	473 (2.7)	131 (3.6)	46 (5.4)	26 (4.7)	45 (2.1)	
Fluconazole	640 (2.6)	408 (2.3)	135 (3.7)	27 (3.2)	11 (2.0)	59 (2.8)	
Itraconazole	9 (0.0)	4 (0.0)	5 (0.1)	0 (0.0)	0 (0.0)	0 (0.0)	
Topical	11,579 (47.2)	8523 (49.0)	1475 (40.9)	321 (37.9)	251 (45.1)	1009 (47.6)	<.01
Ketoconazole	9038 (36.8)	6722 (38.6)	1076 (29.8)	232 (27.4)	205 (36.8)	803 (37.9)	
Clotrimazole	1532 (6.2)	1023 (5.9)	301 (8.3)	63 (7.4)	25 (4.5)	120 (5.7)	
Selenium sulfide	1343 (5.5)	1086 (6.2)	109 (3.0)	34 (4)	19 (3.4)	95 (4.5)	
Econazole	75 (0.3)	43 (0.2)	20 (0.6)	0 (0.0)	5 (0.9)	7 (0.3)	
Other topical antifungal	239 (1.0)	135 (0.8)	52 (1.4)	9 (1.1)	7 (1.3)	36 (1.7)	
Combination antifungal and corticosteroid creams	250 (1.0)	148 (0.9)	60 (1.7)	16 (1.9)	6 (1.1)	20 (0.9)	<.01
Oral therapy only	8840 (36.0)	6156 (35.4)	1398 (38.8)	359 (42.4)	212 (38.1)	715 (33.7)	<.01
Topical therapy only	3681 (15.0)	2402 (13.8)	709 (19.7)	136 (16.1)	91 (16.3)	343 (16.2)	< .01
Received testing and oral antifungal	1956 (8.0)	1427 (8.2)	273 (7.6)	76 (9.0)	56 (10.1)	124 (5.9)	.17

NH, Not Hispanic or Latino; *PCR*, polymerase chain reaction.

* Data are shown as no. (%). Patients with unknown race/ethnicity were excluded from χ^2 testing. Some patients received >1 diagnostic test type and >1 treatment type. Tinea capitis-related diagnostic tests were defined as those documented within 90 days before to 0 to 7 days after the tinea capitis diagnosis date. Antifungal drug prescriptions documented within 0 to 7 days after the incident tinea capitis visit date were considered tinea capitis-related.