

# Neonatal Dermatophytosis: Report of a Case and Review of the Literature

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**Abstract:** Tinea capitis is a common fungal infection in children but rare among neonates. We present a case of a 3-week-old infant with multiple scalp lesions for 1 week. A diagnosis of tinea capitis due to *Microsporum canis* was made based on clinical morphology, Wood's lamp, and biopsy with a positive PAS stain. She was effectively treated with oral griseofulvin and ketoconazole shampoo.

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## CASE REPORT

A 3-week-old female infant was brought to our clinic by her mother, an immigrant from Senegal, with a 1-week history of a widespread annular rash. The infant was born in the United States and had a normal delivery. She was breastfed and was otherwise thriving. Prenatal screening tests were all negative. No history of fever or other symptoms were confirmed for the infant. The infant was not exposed to any animals at home, and her mother and other household members were asymptomatic. The patient's mother reported a history of the same symptoms in her elder daughter when approximately the same age. The patient's elder sister was born in Senegal, and her symptoms resolved following the administration of an herbal remedy. The sister did not have clinical lesions upon the patient's presentation, nor during the follow-up visits.

Upon exam, the patient had multiple erythematous scaly, occasionally annular patches associated with hair loss over the scalp but no evidence of scarring (Fig. 1). Similar lesions were also seen on the face, trunk, and bilaterally on the extremities (Fig. 2). No other systemic symptoms were elicited from the patient or her mother.

The differential diagnosis included Langerhan's histiocytosis, neonatal lupus, secondary syphilis, seborrheic dermatitis, and erythema multiforme. Since neonatal lupus was strongly considered, a skin biopsy and serological testing from the mother were done on the initial visit. Given the patient's young age, the possibility of a dermatophyte infection was absent on our differential, and a potassium hydroxide (KOH) test was not done. Testing the mother for antiSM, RNP, SSA, SSB, SCL70, Jo-1, and rapid plasma reagin (RPR) was negative. Biopsy results surprisingly showed numerous noninvasive hyphae and spores overlying a mildly thickened

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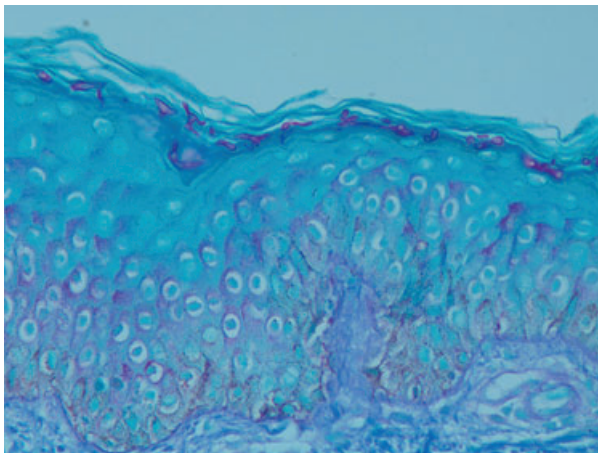
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**Figure 1.** Multiple well-defined scaly skin-colored patches of hair loss over the scalp.



**Figure 2.** Multiple circinate-like scaly erythematous to skin-colored plaques over the face and trunk.



**Figure 3.** Periodic acid-Schiff staining reveals numerous spores and hyphae within the stratum corneum.

corneal layer on periodic acid-Schiff (PAS) staining (Fig. 3). A fungal culture, Wood's light examination, and KOH smear were done at the follow-up visit. The Wood's light exam revealed a green fluorescence over the scalp lesions only. The KOH smear was negative. The culture was positive for mold 4 weeks afterwards. This was presumed to be a result of poor sampling. We considered the diagnosis of tinea capitis and corporis caused by *Microsporum canis*. The diagnosis was based on clinical morphology, Wood's light, and biopsy with a positive PAS stain.

On initial follow up, the infant was started on naftifine gel for a period of 2 weeks. Her mother, having experienced the same rash with her other daughter, also sought a home remedy from Senegal that was not effective. In view that the patient did not experience any change on the naftifin gel, she was started on oral griseofulvin 20 mg/kg/day together with a daily wash using ketoconazole 2% shampoo. The lesions cleared completely after 3 weeks of treatment.

## DISCUSSION

Tinea capitis, although common in children, has been seldom reported in neonates. In fact, one study reports a 0.8% incidence in children less than 1 year of age in a study of 240 childhood cases (1). The most common organism that causes tinea capitis in African Americans is *Trichophyton tonsurans*, and in Caucasians is *Microsporum canis* (2). *Microsporum canis* is a zoophilic fungus that is commonly acquired from cats. A history of a pet, family member, or friend with hair loss may be elicited (3). Healthcare workers may also unknowingly transmit the fungus. In fact, a nurse was responsible for an outbreak of *M. canis* in a newborn nursery that affected six infants (4). No similar history could be identified in this case, although staff and family members were not screened for possible carrier status, a potential pitfall to this study.

In a review of the literature of neonatal dermatophytoses occurring at age 6 weeks or less (Table 1), the most common organism cultured was *Trichophyton rubrum* (six cases), followed by *M. canis* (four cases), and then *T. tonsurans*, *Trichophyton mentagrophytes*, and *Microsporum audouinii* (one case each).

Some risk factors that contribute to increased susceptibility of tinea capitis in infants include a humid environment, broad-spectrum antibiotic use, trauma via indwelling catheters and tapes, epidermal immaturity, and immunosuppression (3). The immune system of neonates is relatively suppressed compared to that of adults. One study found that although antigen presentation in neonates is intact, T-cell function is still

**TABLE 1.** Summary of Cases of Neonatal Dermatophytosis in the Literature

Author	Age of presentation	Dermatophyte	Therapy	Reoccurrence	Resolution after:
Gilaberte et al (1)	4 mos	<i>M. audouinii</i>	Griseofulvin 15 mg/kg/day for 8 wks + 2% ketoconazole shampoo	None	8 wks
Snider et al (4)	16, 19, 21, 31, 58, 75	<i>M. canis</i> × 6	Clotrimazole	One infant had recurrence	4 wks, except for one infant
Battin et al (5)	6 days	<i>T. rubrum</i>	Fluconazole 6 mg/kg + miconazole cream	None	7 wks
Battin et al (5)	7 days	<i>T. rubrum</i>	Miconazole cream	X2	retreated twice with griseofulvin
Mosseri et al (6)	16 days	<i>M. canis</i>	Bifonazole 1%	None	8 wks
Chang et al (10)	19 days	<i>T. rubrum</i>	Itraconazole 25 mg/2.5 mL/day for 1 wk × 3 pulses and ketoconazole shampoo	None	8 wks
Ungar et al (7)	19 days	<i>T. rubrum</i> and <i>mentagrophytes</i>	Econazole cream + ketoconazole shampoo	X1	4-wk retreatment with griseofulvin 15 mg/kg/day
Mulholland et al (8)	45 days	<i>M. canis</i>	2% miconazole cream	X1	8 wks with miconazole
Aste et al (11)	40 days	<i>M. canis</i>	Terbinafine 62.5 mg daily for 1 mo	None	4 wks
Weston et al (12)	35 days	<i>T. tonsurans</i>	Griseofulvin 20 mg/kg/day	None	4 wks

inadequate to mount an appropriate immune response against fungal organisms (5). In general, a genetic immunodeficiency can also be considered in such cases. Immunodeficiencies that predispose infants to fungal infections may include DiGeorge's syndrome and syndrome of combined immunodeficiency (SCID).

Controversy remains on whether topical or systemic antifungals should be used to treat dermatophytoses in neonates. Griseofulvin therapy has been the gold standard, as it can penetrate the hair sheath in tinea capitis (6). Topical therapy is currently still used in some cases because it is felt to be safer for infants. Ironically, topical antifungal agents are proposed to work more effectively in infants due to the same risk factor that predisposes them to tinea infection: increased permeability due to an immature epidermis (6); however, in our literature review, we noted that use of topical antifungals compared to systemic agents was associated with a higher risk of reoccurrence. Ultimately, the patients who received topical therapy were more likely to require additional treatment with systemic antifungal agents (3,5,7,8). Additionally, the literature overwhelmingly supports that systemic therapy is superior to topical agents in neonates with widespread tinea infection or tinea capitis (8).

Griseofulvin is no longer the only FDA-approved antifungal agent for treatment of tinea capitis in children. However, griseofulvin continues to be the best treatment option for tinea capitis caused by *Microsporum canis*, in comparison to terbinafine, itraconazole, ketoconazole, and fluconazole. The newer agents appear to have advantages in tinea capitis due to trichophyton species, particularly when considering their shorter duration of treatment. However, Griseofulvin has the least potential

drug interactions, is the cheapest agent in tablet form, and is also available as a suspension. Periodic monitoring of renal, hematopoietic, and hepatic function is recommended. The side effects most commonly observed were gastrointestinal in nature. In one study, two out of 17 patients discontinued therapy due to nausea (9). Given its efficacy, cost, and safety profile, griseofulvin appears to be a much more definitive treatment for tinea capitis caused by *M. canis* in children.

In summary, this case report emphasizes the need to keep neonatal dermatophytosis in mind when presented with annular scaly lesions in a neonate.

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