

Tinea of Skin and Nails

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Synonyms: Ringworm, 'jock itch' (groin), athlete's foot (feet).

Tinea of the skin and nails is a major problem in remote communities of the Top End. Green³ estimates that point prevalence in classes of school children may reach up to 15%. The condition is of concern to the affected person due to its appearance cosmetically. However, tinea of nails and skin also predisposes to streptococcal and other skin infections. Serious complications from streptococcal infections include acute rheumatic fever and post-streptococcal glomerulonephritis.¹ Skin infections and its complications are of special concern in diabetic patients who are more predisposed to infections in general. Anthropophilic tinea is transmitted between people who live together in a household², and this is an important factor in communities where overcrowding is a major problem. This has implications for re-infection of successfully treated patients. Little data has been collected on the epidemiology of tinea in the Top End. The last extensive studies characterising tinea in the NT were in the 1970s.^{4,8}

Tinea corporis

This predominantly affects trunk, limbs and groin. Less commonly the face is involved (tinea faciei). Often tinea occurs as asymmetrical, solitary lesions (60%), but can be bilateral and multiple.

Typically tinea begins under the posterior beltline with scaling the earliest sign. Frequently it then extends above the beltline, and often down onto buttocks. Tinea can be itchy, especially in areas of increased sweating such as the groin (tinea cruris).

Clinically tinea is a scaly plaque with a spreading edge. There is increased pigmentation and often increased skin markings (lichenification from scratching). There may be thickened darker papules. Scaling may be marked or minimal.

Inflammation with blisters and weeping is uncommon in Aboriginal populations unless there is secondary bacterial infection. Tinea can be more inflammatory in Caucasians², though this may be because you can see it more clearly on fair skin.

Tinea tends to be chronic, with the incidence of secondary bacterial infection often underestimated.²

Tinea is endemic in tropical regions including the Top End of the NT. Children, adolescents and adults are all commonly affected.² Transmission is usually person-to-person (anthropophilic).²

Usually anthropophilic fungi cause tinea corporis.

- *Trichophyton rubrum* is the most common type in northern Australia^{2,4}

- *Trichophyton violaceum* and *T. tonsurans* are more commonly found on culture in central and southern Australia^{2,4}
- *Epidermophyton floccosum* often affects skin folds (e.g. groin) and between toes (*tinea pedis*)²

The high prevalence of anthropophilic infection in Aboriginal populations probably relates to poor living conditions and overcrowding in communities.²

Tinea pedis/tinea manuum

This usually presents as an asymmetrical (but sometimes bilateral) scaling on the feet. Scaling and maceration also may occur between the toes. Often *tinea pedis* is asymptomatic but may be itchy, blistering and inflammatory. Tinea from the feet may spread to other parts of the body. Involvement of the palms (*tinea manuum*) is less common, but presents in a similar fashion. In Aboriginal populations anthropophilic dermatophytes such as *Epidermophyton floccosum* are the commonest cause.²

Diagnosing tinea of the skin

When practical, patients should be told not to use any antifungal topical treatment for at least two to seven days before any skin scrapings are taken.

Skin scrapings for microscopy and fungal culture

Using a disposable scalpel; scrape the raised edge of the scaly plaque to collect as much scale as possible. This is where hyphae are likely to be numerous. This can be collected in a folded black cardboard (pathology companies usually make these up, with stickers on the side to seal them; much easier to use than plastic jar as skin doesn't stick to the side) or a plastic specimen jar.

Generally, scraping should not produce bleeding. If more than one site is affected separate specimens should be taken using a new scalpel blade.

Dermatophytes in skin will remain viable for about 30 days, however, delay between specimen collection and processing increase the chance of possible deterioration and contamination. Specimens should be kept in a cool dark place, i.e. less than 30°C, not refrigerated.

Tinea unguium/onychomycosis

This presents as thickening or irregularity of the nails (fingers and toes). The nails are white and lift up from the underlying nail bed (onycholysis) with marked amounts of chalky material under the nail (subungual hyperkeratosis). Usually nail tinea is associated with tinea elsewhere on the skin. Nail involvement can be unilateral or bilateral and toenails are more commonly affected than fingernails. Nail tinea is usually caused by anthropophilic dermatophytes such as *Trichophyton rubrum* and *T. tonsurans* in Aboriginal populations.²

Diagnosing tinea of nails

Taking specimens from affected nails that are thickened and dystrophic can be difficult. The nail should be clipped back until the crumbling portion of the nail is reached. Chalky debris from under the nail should be scraped and collected.

Tinea capitis

This usually presents as areas of poorly defined scale on the scalp with varying degrees of hair loss. Scale may be defined or diffuse, fine (dandruff-like) or thick and adherent. Kerion of the scalp (inflammatory boggy folliculitis) is rare in Aboriginal populations.²

Tinea capitis can be secondarily infected with bacteria. Tinea capitis is caused by:²

Anthropophilic fungi	Trichophyton violaceum, T. tonsurans T. rubrum is an unusual cause of tinea capitis
Zoophilic fungi (from animals)	Microsporum canis, (from cats, dogs; common in children.) T. verrucosum (cattle: less common) T. mentagrophytes (kangaroos)
Geophilic fungi (from soil)	M. gypseum

Diagnosing scalp tinea

Using a Wood's lamp (black light) Microsporum canis infection fluoresces green/yellow.

Skin scrapings and pulled hair specimens for fungal microscopy and culture should be collected.

Hair microscopy can help with diagnosis.

M. canis	small spores, ectothrix (spores form sheath around surface of hair shaft)
T. tonsurans, T violaceum	large spores, endothrix (hyphae penetrate the inside of the hair shaft and break up into parallel chains)
T. rubrum	ecto-endothrix (spores occur both on the outside and inside of the hair shaft)

Treatment of tinea

Griseofulvin has been the mainstay of oral antifungal treatment in the past. Griseofulvin is fungistatic (fungus is inactivated but not killed) and therefore necessitates long treatment schedules for control of disease. This long duration of treatment is particularly of concern in the treatment of tinea nail infection (onychomycosis) where treatment is longer due to the natural slow growth of new nails (3mths for fingernails, 6mths for toenails to fully grow out).

The newer antifungal agents itraconazole, terbinafine and fluconazole are now used to treat onychomycosis. In the last 10 years these agents have superseded griseofulvin as the agent of choice for onychomycosis. Unlike griseofulvin, the new agents have a broad spectrum of action that includes

dermatophytes, *Candida* species and nondermatophyte moulds. These agents are generally well tolerated with drug interactions that are usually predictable.⁶

Itraconazole and fluconazole are not PBS listed for treating onychomycosis and therefore are very expensive. Fluconazole can be obtained on Section 100 prescription. Terbinafine can be obtained on authority prescription if positive microscopy or fungal culture is determined by a recognised laboratory.

Daily oral terbinafine (Lamisil) has been increasingly used in remote communities for the treatment of extensive tinea. Although more expensive, duration of treatment with terbinafine is shorter compared to older treatments such as griseofulvin. This enhances compliance and is therefore potentially more cost-effective. Terbinafine is fungicidal (fungus is killed), especially with *Trichophyton* species that cause tinea in the Top End. There are no formal studies in the NT regarding griseofulvin use, but anecdotally it is reported to be poorly tolerated in extended treatment regimes, and compliance is therefore poor. Studies in the UK show higher success rates with terbinafine compared to griseofulvin in treating fingernail and toenail onychomycosis (terbinafine 78% versus griseofulvin 18% for toenails, 95% terbinafine versus griseofulvin 60% for fingernails) with total days of therapy being fewer for terbinafine (102 days versus 211 for griseofulvin).⁷

Comparative studies have shown that terbinafine is more effective than griseofulvin, fluconazole or itraconazole in the treatment of onychomycosis, providing a cure rate of 70-80% and an excellent tolerability profile. Terbinafine is also the most cost-effective agent. In cases where there is treatment failure, nail debridement may need to precede drug therapy in order to maximise the prospects of cure.¹⁰

I am conducting a prospective study looking at the efficacy of oral terbinafine in managing skin and nail tinea in remote Aboriginal communities in 2001.

Topical terbinafine is also effective in treating skin tinea. One study showed 84.6% of patients in a terbinafine-treated group were culture negative after one week, compared with only 55.8% in the clotrimazole (Canestan) group. The study showed that terbinafine achieves mycological cure more rapidly than clotrimazole.⁹

Other Treatments

Itraconazole: pulse therapy with the oral drug being administered for one week with three weeks off treatment between successive pulses (200 mg twice daily for one week per month x three pulses).

Fluconazole: once-weekly treatment. 150 mg/wk until the abnormal-appearing nail plate has grown out, typically over a period of nine to 18 months.

Sequential pulse treatment with itraconazole and terbinafine: one study proposed sequential pulse therapy (IIT) with two pulses of itraconazole followed by one or two pulses of terbinafine (itraconazole pulse is 200 mg twice daily for one week and terbinafine pulse is 250 mg twice daily for one week) versus three or four pulses of terbinafine (TTT). At week 72, in the IIT versus TTT groups, the mycologic cure rate was 54 of 75 (72.0%) versus 44 of 90 (48.9%), clinical cure rate was 42 of 75 (56.0%) versus 35 of 90 (38.9%), effective therapy 49 of 75 (65.3%) versus 41 of 90 (45.6%), and complete cure 39 of 75 (52.0%) versus 29 of 90 (32.2%), respectively. This protocol was well tolerated.⁴

I recommend daily oral terbinafine for extensive tinea corporis or tinea unguium. It is well tolerated and serious side effects are few and uncommon.^{7,10}

Some practitioners prefer pulse treatment, others prefer continuous treatment. Finding a medication regimen with a dosing schedule which increases compliance depends on the individual.

References

1. Currie BJ, Carapetis JR. Skin infections and infestations in Aboriginal communities in northern Australia, *Australas J Dermatol*, August 2000; 41(3):139-43 quiz 144-5.
2. Green A. A handbook of skin conditions in Aboriginal populations of Australia: 2001 Blackwell Science Asia Pty Ltd pp 20-24, 54-57, 80-82, 130-132.
3. Green, A. Australian Aborigines and ringworm (tinea) *Australas J Dermatol* 1998; 59:192-194.
4. Green A, Kaminski G. Australian Aborigines and their dermatophytes *Australas J Dermatol* Dec 1977; 18(3):132-6.
5. Gupta AK, Lynde CW, Konnikov N. Single-blind, randomized, prospective study of sequential itraconazole and terbinafine pulse compared with terbinafine pulse for the treatment of toenail onychomycosis. *JAAD* Mar 2001; 44:485-91.
6. Gupta AK, Shear NH. A risk-benefit assessment of the newer oral antifungal agents used to treat onychomycosis *Drug Saf* 2000 Jan; 22(1):33-52.
7. Humphrey KM, Cork, MJ, Haycox A. A retrospective cost-effectiveness analysis of the treatment of onychomycosis in general practice; *Br J Derm* 1998; 139:660-4.
8. Kaminski G, Green A. Tinea Capitis in Aboriginal children at Maningrida, NT, Australia; *Australas J Dermatol* Aug 1977; 18(2):88-97.
9. Patel A, Brookman SD, Bullen MU, Marley J, Ellis DH, Williams T, Barnetson RS. Topical treatment of interdigital tinea pedis: terbinafine compared with clotrimazole. *Australas J Dermatol* 1999 Nov; 40(4):197-200.
10. Roberts DT. Onychomycosis: current treatment and future challenges *Br J Derm* 1999 Nov; 141(Suppl)56:1-4.