ABC of Dermatology

P K BUXTON

FUNGAL AND YEAST INFECTIONS

Fungal infections

Tinea rubrum infection of the neck.

Animal ringworm.

Tinea cruris.

T mentagrophytes.

M canis.

Fungal infection of nail.

Fungal infections are commonly known as “ringworm”—a misnomer since most infections cause a scaling macule, not a ring, and the worm exists only in the imagination. It is true, however, that a superficial fungal infection can have a raised edge, and annular forms occur.

Fungi consist of thread like hyphae—which form tangled masses, or mycelia, in the common moulds. In superficial fungal infection of the skin, hair, and nails it is these hyphae that invade keratin and are seen on microscopic examination of keratin from infected tissues. Vegetative spores (conidia) develop in culture, and their distinctive shape helps to differentiate one species from another. “Dermatophyte” fungi include the common species that invade hair, skin, and nails.

Systemic, or deep, fungal infection is due to those species that invade other tissues. When the immune response is impaired superficial infections may invade the deeper tissues.

Yeasts are budding unicellular organisms that do not normally produce hyphae. The commonest infective species in man is *Candida albicans*.

Why should one suspect a lesion to be due to a fungus?

Clinical presentation

Fungal infections usually itch. Those due to zoophilic (animal) fungi produce a more intense inflammatory response with deeper indurated lesions than those due to anthropophilic (human) species. In those lesions with a raised scaling margin that extends outwards the fungal hyphae are invading the keratin layer in this area. The central area is relatively resistant to colonisation. Such lesions occur mainly on the trunk.

Children below the age of puberty rarely develop anthropophilic (human) fungal infection. In the countryside cattle ringworm (zoophilic) infects children in the autumn when the cows are brought into winter quarters. Pet mice can be a source of infection.

Adults—From adolescence onwards infection of the feet, not only in athletes, occurs. Tinea cruris in the groin is seen mainly in men.

Infection from cattle occurs in adults who have not had previous exposure, sometimes in unusual ways. A man who lived in an industrial area housing estate developed a curious indurated lesion on his chin from which *Trichophyton mentagrophytes* was isolated—transmitted by bites from midges who had been biting cows on a farm some miles away.

Infection from dogs and cats with a zoophilic fungus (*Microsporum canis*) to which humans have little immunity can occur at any age. A colleague's daughter returned from a skiing holiday with intensely itchy “eczema,” which refused to clear. A stray kitten, mewing outside in the dark, had been taken indoors, warmed in the party's sleeping bags, and infected the whole party with *M canis*.

Nail infections occur mainly in adults, usually in their toenails, especially when traumatised—for example, the big toes of footballers. The nails become thickened and yellow and crumble, usually asymmetrically. The changes occur *distally* and move back to the nailfold. In psoriasis of the nail the changes occur *proximally* and tend to be symmetrical and are associated with pitting and other evidence of psoriasis elsewhere. Chronic

Chronic paronychia.

Tinea pedis.

Tinea corporis.

Erythrasma.

Tinea incognita.

Actinomycosis.

paronychia occurs in the fingers of individuals whose work demands repeated wetting of the hands: housewives, barmen, dentists, nurses, and mushroom growers, for example. There is erythema and swelling of the nailfold, often on one side with brownish discoloration of the nail. Pus may be exuded. The cause is *Candida albicans* (a yeast) together with secondary bacterial infection. The hands should be kept as dry as possible, nystatin cream applied regularly, and, if necessary, a course of erythromycin prescribed.

Feet—It is not only athletes and the unhygienic who suffer from athletes' foot but increased sweating does predispose to infection. The hands may be affected, often through scratching the feet, hence the "right hand, left foot" syndrome in the right handed individual. The itching, macerated skin beneath the toes is familiar, but when a dry, scaling rash extends across the sole and dorsal surface of one foot the diagnosis may be missed. The condition needs to be differentiated from psoriasis and eczema.

Hands—Fungal infections often produce a dry, hot, rash on one palm. There may be well defined lesions with a scaling edge.

Trunk—Tinea corporis presents with erythema and itching and a well defined scaling edge. The infection may spread to the adjacent skin on the thighs and abdomen. Intense erythema and satellite lesions suggests a candida infection. In the axillae erythrasma due to *Corynebacterium minutissimum* is more likely. It does not respond to antifungal treatment but clears with tetracycline by mouth.

"Tinea incognita" is the term used for unrecognised fungal infection in patients treated with steroids (topical or systemic). The normal response to infection (leading to erythema, scaling, a raised margin, and itching), is diminished, particularly with local steroid creams or ointments. The infecting organism flourishes, however, because of the host's impaired immune response—shown by the enlarging, persistent skin lesions. The groins, hands, and face are sites where this is most likely to occur.

Deep fungal infection

Fungal infection of the deeper tissues is rare in the United Kingdom but is of course a feature of the acquired immune deficiency syndrome. The species that colonise the deep tissue, as in histoplasmosis, actinomycosis, and cryptococcosis, can also cause skin lesions. In any patient with chronic indurated inflammatory lesions the possibility of deep fungal infection should be considered.

Yeast infections

Candida albicans.

Candida infection may occur in the flexures of infants and elderly or immobilised patients, especially below the breasts and folds of abdominal skin. It needs to be differentiated from (a) psoriasis, which does not itch; (b) seborrhoeic dermatitis, the usual cause of a flexural rash in infants, and (c) contact dermatitis and discoid eczema, which do not have the scaling margin. It is symmetrical.

Yeasts, including *Candida albicans*, may be found in the mouth and vagina of healthy individuals. Clinical lesions may be produced by local trauma predisposing factors including: general debilitation, impaired immunity, diabetes mellitus, endocrine disorders, particularly Cushing's syndrome, corticosteroid treatment. Florid mucocutaneous lesions can occur in which mycelial forms of *Candida albicans* are found.

Tinea versicolor.

M audouinii.

Tinea versicolor affects the trunk, usually of fair skinned individuals exposed to the sun. It affects mainly the upper back, chest, and arms. Well defined macular lesions with fine scales develop which tend to be white in suntanned areas and brown on pale skin (hence "versicolor"—variable colour). It may be confused with seborrhoeic dermatitis, pityriasis rosea, and vitiligo.

In skin scrapings the causative organism, *Pityrosporum* spp—normally found in hair follicles—can be readily seen.

Scalp and face—The classic scalp ringworm of children due to *Microsporum audouinii* is rare. Favus, a scarring type of alopecia, caused by *Trichophyton schoenleinii*, and "black dot" ringworm, also from a trichophyton, are now seen only in children who have acquired the infection abroad. In all cases there is itching, hair loss, and some degree of inflammation. *M canis* from dogs and cats can affect the scalp.

Kerion—an inflamed, boggy, pustular lesion, is due to cattle ringworm and is fairly common in rural areas.

Principles of diagnosis and treatment

(1) Consider a fungal infection in any patient where isolated, itching, dry, and scaling lesions occur without any apparent reason—for example, if there is no previous history of eczema. Lesions due to fungal infection are often asymmetrical.

(2) Skin scrapings should be sent to the laboratory from any suspicious lesion and are easy to take. The skin scales should be removed by scraping the edge of the lesion with a scalpel at right angles to the skin on to a piece of folded black paper. A strip of sellotape applied to the lesion then stuck on a slide gives the laboratory more material for culture. Some laboratories supply mycology kits containing black paper, a slide with sellotape, and suitable plastic containers. Clippings can be taken from the nails.

(3) Lesions to which steroids have been applied are often quite atypical because the normal inflammatory response is suppressed—tinea incognita. The patient often states that the treatment controls the itch but the contagion lingers on, becoming worse when the steroid is stopped. This may also occur in eczema being treated with steroids.

(4) Wood's light (ultraviolet light filtered through special glass) can be used to show microsporum infections, which produce a green-blue fluorescence.

Treatment

The old fashioned treatment with Whitfield's ointment (benzoic acid ointment, compound *BPC*) is quite effective, but has been superseded by the new imidazole preparations, such as clotrimazole and miconazole. The polyenes, nystatin and amphotericin, do not affect fungal infection but are effective against yeast infection. For damp macerated skin dusting powders or painting with Castellani's paint (magenta paint *BPC*) is helpful.

Systemic treatment is with griseofulvin, which should be taken for an adequate length of time: three to four months for the trunk and scalp, six to eight months for finger nails, and at least a year for toenails, where it is often ineffective. It is important to confirm the diagnosis from scrapings before starting treatment. The dose is 500 mg daily for adults and 10 mg/kg for children (taken with food).

Contraindications to griseofulvin are pregnancy, liver failure, and porphyria. It interacts with the coumarin anticoagulants, and its effect is diminished with barbiturates. Ketoconazole is an effective second choice but side effects may occur and are still being assessed.

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What is the recommended quantity of fibre, expressed in grammes per 24 hours, which should be taken in the diet of a normal adult of average weight and height?

This is a topical but hard question to answer. Dietary fibre is a complex mixture, principally of polysaccharides with a range of chemical structures and physical properties. The physiological effects of a fibre source depend on its actual composition, so the recommended quantity would need to specify the type of dietary fibre and the effects that one would like, or hope, to follow from consuming that food or diet. Thus, if the aim was slow glucose absorption a source of viscous soluble polysaccharides would be required. The guidelines from the National Advisory Committee for Nutritional Education suggested a target for the end of the century of 30 g per person a day from mixed sources,¹ which was based on a limited number of observations on the effects of mixed sources of dietary fibre on colonic function in young men. The Canadian Health and Welfare Department's report also recommended intakes of this magnitude.² These intakes are

based on analytical values that include values for lignin and enzymatically resistant starch, whereas the recent Ministry of Agriculture, Fisheries and Food's guidelines for nutritional labelling recommended the use of lower, non-starch polysaccharide values for fibre in foods. If these values are used the recommendations are of the order of 20 g per person a day. It should be emphasised that these recommended intakes are estimates, based on many assumptions and not enough experimental data. Furthermore, we do not know how the recommendations should be adjusted for people with lower body weights or energy intakes, or both, especially children, women, and the elderly. I suspect that a body weight basis is most likely to emerge as the most appropriate one.—D A T SOUTHGATE, head, nutrition and food quality research, AFRC Institute of Food Research, Norwich.

1 National Advisory Committee for Nutrition Education. *Proposals for nutritional guidelines for health education in Britain*. London: Health Education Council, 1983.

2 Department of Health and Welfare. *Report of the expert advisory committee on dietary fibre to the health and protection branch*. Ottawa: Department of Health and Welfare, 1985.