

Ian F. Burgess, MSc, MPhil, BSc, FRES, is director, Insect Research and Development Limited, Fulbourn, Cambridge

Understanding scabies

Increased incidence of scabies in older people has highlighted difficulties of diagnosis and treatment. Ian Burgess describes the life cycle of the scabies mite, transmission of the infection, diagnosis and treatment

KEY WORDS

**Crusted scabies
Life cycle
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In developed countries scabies infestation has shown periodic epidemics at regular intervals of 15–20 years for the past century. In some communities in the developing world the infestation can be hyperendemic, and is a typical symptom of chronic poverty. The presentation of scabies, particularly in industrialised western countries, is often atypical and has been mistaken for numerous other infections, as well as autoimmune conditions (Burgess, 1994).

Scabies is often mistakenly referred to as an itchy, allergic condition resulting from long-term infestation of the stratum corneum by the scabies mite, *Sarcoptes scabiei* (Fig 1). For most people the intense itch that accompanies infestation, particularly when in bed at night, is due to a delayed hypersensitivity reaction to mite faeces, egg fragments, and dead mites.

The only people who have a true allergic reaction with detectable circulating and fixed immunoglobulin-E are those who already show an allergic response to house dust mites (Falk and Bolle, 1980), because scabies mites and house dust mites share several cross-reacting antigens. These people may develop symptoms more rapidly following initial infection. People who have been cured of scabies and are subsequently exposed to dust mites may continue to show an itch reaction that may lead to a false conclusion that the treatment has failed.

Life cycle of the scabies mite Only the fertilised adult female mites are truly parasitic. After mating they burrow to the base of the stratum corneum, where they feed. Each mite lays about three eggs each day, which take about three days to hatch. The six-legged larval mites that emerge move to the skin surface where they find vellus hair follicles. Here they feed on skin debris and burrow out a small pocket where they moult to the next stage, the eight-legged protonymphs. These develop into tritonymphs and subsequently into adults. Each of these developmental stages lasts about three days.

The newly moulted adult female mite then digs a short burrow just deep enough to cover its body where it waits for a male. The male mite climbs into the burrow and mates with the female, which then burrows down to the base of the stratum corneum from where she never again emerges (Arlan and Vyszynski-Moher, 1988).

Transmission Transmission of classical scabies is by skin-to-skin contact. Fomites are only rarely involved in the transmission of hyperkeratotic scabies. There is little experimental evidence on how transmission occurs but it is most likely to happen when immature mites crawl from one person to another (Mellanby, 1944). Mortality of



Fig 1. The female scabies mite burrows into the base of the stratum corneum where they feed

immature mites is high so many potentially infective contacts do not result in transmission.

Some people who are frequently exposed to scabies develop a diffuse, itchy, macula rash on exposed surfaces that can be mistaken for active scabies. This is common in care workers in institutions where scabies outbreaks occur. However, people showing this reaction seem to rarely develop the disease and it appears that the immune response to immature mites helps to protect against other mites establishing a true infection.

Contact tracing of scabies infection can be difficult because in most people there is a delay of two to six weeks between the infective contact and presentation of symptoms (Mellanby, 1972).

Epidemiology A reporting scheme in Denmark over 100 years showed that scabies principally infect teenagers and primary school children (Christophersen, 1978). These findings have been corroborated by a community study involving about 6,000 families in the Czech Republic (Palicka, 1982) and a smaller one in the UK (Church and Knowlesden, 1974).

In countries where scabies is treated infrequently, due to prevailing conditions of chronic poverty, a similar pattern of incidence occurs. Continuing infestation of individuals results in a broader spread of infection across age ranges and also provides more opportunities for transmission to older household members, especially in large families (Wakhlou et al, 1988; Sharma et al, 1984). However, even these circumstances result in a surprisingly low level of onward transmission within large crowded households (Sharma et al, 1984).

In recent years the underlying pattern of community transmission appears to have remained unchanged in Britain (Royal College of General Practitioners, 2001), but people aged 65 and over now form a substantial



Fig 2. Scabies presents as an itchy rash, which can often be found on finger webs

proportion of new cases. Almost all these infections occur among people in care homes, where infestation may spread for some time before being diagnosed.

Scabies in people with an incomplete immune response for example, older people and those with diabetes, may not develop normal symptoms and mite numbers may not be limited due to the reduced immune response. This results in a condition in which mites proliferate and the stratum corneum becomes hyperkeratotic. The crusted skin lesions of this condition usually harbour hundreds of mites and may be infective if they become detached. In some cases, institutional outbreaks may be exacerbated by undiagnosed cases of crusted scabies, especially if treatment regimens are less than thorough in the first instance (Burns, 1987).

As scabies seems to be relatively difficult to contract there is no need for isolation measures in hospitals and care home facilities, except in cases of crusted scabies. Secondary bacterial infections usually only occur after months without treatment. Most lesions resolve spontaneously but occasionally antibiotics may be required in addition to acaricides.

Diagnosis Scabies can be diagnosed from clinical signs of intense nocturnal itch; a transient, itchy rash that principally affects the insides of the thighs and the midriff; and a more persistent rash, and vesicular and papular lesions where female mites form burrows. These appear on finger webs (Fig 2), wrists, navel, elbows, axillae, buttocks, scrotum, breasts and ankles.

It is often difficult, if not impossible, to find burrows on most patients. This may be because in western society increased levels of personal hygiene encourage more rapid desquamation of the stratum corneum so that burrows are now shorter than they would have been half a century ago, when most descriptions were written.

Various methods for identifying burrows have been described (Burgess, 1994), however, it is often easier to make a positive diagnostic examination by finding mites or mite products (egg, eggshells, or mite faeces known as scybala). This can be done relatively easily by skin scraping between the papular lesions that might be found in the vicinity of burrows on finger webs. If mites or mite products are present they can be easily seen using the low power of a microscope (Burgess, 1993).

Treatment Treatment must be thorough and should include all household and other close contacts over the previous few weeks. Compliance with a thorough treatment regimen, including reapplying treatment to hands if washed during the treatment period, is the most important aspect of scabies management.

A systematic review of treatments (Walker and Johnstone, 2001) found that evidence for the use of five per cent permethrin is better than for other active ingredients but in most studies a single application is not successful in all cases. A second application of treatment after seven days is now recommended for all anti-scabies agents (Roberts, 1998).

Application of scabies treatment should be made over the whole skin surface, paying particular attention to the skin under the nails. Benzyl benzoate, which has been in use since the 1940s, may be a useful alternative if applied up to three times over a period of one week.

Traditional recommendation for treatment has excluded the head and neck except in infants and those with a compromised immune system. However, there have been increasing numbers of case reports of scabies spreading above the neck, and practitioners who automatically include treatment of the head for all patients have proved successful. Taplin et al (1991) suggest that it would be advantageous to treat all skin surfaces in all cases. In the case of patients with crusted scabies, it may be necessary to increase the number and frequency of applications of treatment in order to eliminate all mites, and additional treatment using keratolytics to break up hyperkeratotic crusts may be necessary in some cases.

Some practitioners treating difficult cases of crusted scabies have used orally administered ivermectin on a named-patient basis. This is an anti-scabies agent not yet licensed for this application in the UK for which limited controlled clinical trial evidence is available. However, studies evaluated by Walker and Johnstone (2001) showed that it was incompletely effective with a single dose. Case studies have indicated that ivermectin in combination with topical therapy is more effective than either of them given alone. ■

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