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REVIEW

Scabies, crusted (Norwegian) scabies and the diagnosis of mite sensitisation

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Abstract Scabies is observed with relatively high frequency in Allergy and Dermatology clinics in developing countries where poor sanitary conditions are prevalent and increasingly in some areas of the world with increased immigrant populations. Since the immunological response to scabies mites includes the production of IgE class antibodies to *Sarcoptes scabiei* allergens which cross-react with *Dermatophagoides* major allergens Der p 1 and Der p 2, positive immediate-type skin tests to house dust mite extracts should be interpreted cautiously. Additionally, scabies should be included routinely in the differential diagnosis of itchy rashes in patients living in those areas.

Introduction

Scabies is a highly contagious skin disease of worldwide distribution caused by *Sarcoptes scabiei var. hominis*, characterised by generalised intense pruritus. Approximately 300 million cases of this ailment occur every year.[1] The infection occurs sporadically in developed countries where it is present as institutional outbreaks in hospitals, schools, nursing homes, prisons, and long-term care facilities. The recent upsurge of immigration from less developed areas into Europe, North America, and other industrialised countries carries the risk of an increase of scabies in those regions.

It is known that disadvantaged populations in which overcrowding and poverty are the rule, and immunologically compromised individuals (for example, HIV-infected patients) are particularly at risk. Scabies is endemic in developing and tropical areas of the world.[2] In resource-poor urban and rural communities its prevalence may be as high as 10% of the general population and 65% of the children.[3,4] It is transmitted by close personal contact or indirectly via fomites (clothing or bed sheets).[5]

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Figure 1 44-year-old male patient complained of an intensely itchy, predominantly nocturnal, rash on buttocks, scrotum, penis and thighs. After examination of skin scales crusted (Norwegian) scabies was diagnosed. In this photo, note abundant erythematous papules on buttocks and thighs.

The morbidity of scabies is enhanced by secondary bacterial infections of the skin, especially by Group A *Streptococcus* and *Staphylococcus aureus*, which are responsible for associated clinical pictures such as cellulitis, lymphangitis, lymphadenopathy, and post-streptococcal glomerulonephritis.[6]

Recently we received in our Allergy Clinics a male patient with a severe form of scabies, with numerous popular lesions in the skin and nodular lesions in the genitalia that met the clinical criteria of Norwegian scabies. After reviewing the current literature on scabies and crusted scabies we became aware of the interesting immunological interactions between scabies mites (SM) and domestic mites (HDM) and the importance of scabies infestations for the practicing clinician, especially those working in allergology and dermatology in areas of the world with endemic scabies.

In this article a review of the immunological response to *S. scabiei*, representing a confounding factor for the diagnosis of house dust mite (HDM) hypersensitivity is presented.

Clinical features and diagnosis

Adult female mites dig tunnel-like burrows within the stratum granulosum of the epidermis and lay approximately 2–3 eggs daily. An infested subject hosts approximately 10–15 adult female mites on the entire body. The life cycle of scabies mites is 10–14 days.

The burrows are typically located on the interdigital spaces, the flexural surface of the wrists, elbows, axillae, umbilicus, belt line, nipples, buttocks, and penile shaft.[1] They appear as short, wavy, threadlike scaling lines. The presence of erythematous papules or vesicles is attributed to a type IV hypersensitivity reaction to mite, eggs, and/or excrement antigens (Fig. 1), and the inflammatory response is characterised by the presence of lymphocytes, histiocytes, and polymorphonuclear leukocytes.[7]

Clinical features that suggest the diagnosis of scabies include a polymorphic, papulovesicular, eczematous or pustular rash, intense itch (especially nocturnal and after taking hot showers), and associated secondary bacterial infections with *S. aureus* or nephritogenic *Streptococcus*. Diagnostic guidelines that have been proposed for scabies include a history of diffuse itching, lesions in at least two typical skin areas, and a household member with pruritus.[8]

The definitive diagnosis is established by the identification of the mite, its eggs or faeces by microscopic examination of scales obtained by skin scraping.[9] Since this approach may not be satisfactory in some cases, other diagnostic methods with better sensitivity and specificity have been proposed, including Videodermatoscopy, Dermatoscopy, Reflectance Confocal Microscopy, and Optical Coherence Tomography.[10]

The differential diagnosis should take into account other pruritic skin conditions, including atopic dermatitis, contact dermatitis, papular urticaria, folliculitis, dermatitis herpetiformis, prurigo nodularis, impetigo, tinea, and bites from mosquitoes, fleas, bed bugs, and chiggers or other mites.

Crusted (Norwegian) scabies

This variety of disease is a severe, highly contagious, form of scabies in which mites multiply into the millions, causing extensive skin hyperkeratotic crusting. The histopathologic study of the lesions shows a dermal infiltrate of lymphocytes and histiocytes with or without neutrophils and eosinophils, and a denser infiltration in the nodular lesions (Fig. 2).

Crusted scabies can be treated with oral ivermectin 6 mg once per week for three weeks, plus crotamiton topical ointment (benzyl benzoate 30%). Alternative treatment, if there is no response or adverse effects occur, is with topical 1% gamma-benzene hexachloride ointment applied from the neck down once a week.[11]

Immunological features of scabies and relevance in allergology

Immune response to scabies

Scabies mites (SM) and HDM are phylogenetically-related arthropods. Since the HDM and the human SM have similar appearance and nutrition, it is not unlikely that they or

Figure 2 Same patient as in Fig. 1 with crusted (Norwegian) scabies. Abundant nodules are present on penis and scrotum.

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