Sarcoptes scabiei: a reemerging pathogen

Claudia I Menghi[1], Liliana E Arias[1] and Claudia L Gatta[1]

Authors details:
[1]Parasitology Division,
Clinical Microbiology,
Hospital de Clínicas,
Faculty of Pharmacy and
Biochemistry,
University of Buenos Aires,
Buenos Aires, Argentina

Corresponding author:
Claudia I Menghi[1]
Address: Teodoro García 2350,
7 A, Buenos Aires,
Argentina (1426)
Email: menghi.claudia@gmail.com

Abstract

Human scabies is an infestation of the skin by a mite called *Sarcoptes scabiei var. hominis*. Scabies is present all around the world and is prevalent in all age groups, mostly children and elderly people. This skin disease presents with severe itch and a papular rash, especially on the hands, feet and genitalia. Crusted scabies is a severe, highly contagious form of classic scabies. Delayed diagnosis and inadequate treatment can lead to worsening of the disease. The presumptive diagnosis is clinical and is confirmed by the visualization of the parasite, eggs or feces. Treatment includes topic therapy with permethrin or ivermectin, and systemic therapy with oral ivermectin. There are not many statistical reports about scabies. In Argentina, there are few case reports in the literature, but, nevertheless, scabies may be more common than reported. This article reports different aspects of the diagnosis, treatment and prophylaxis of the human itch mite.

Key words: *Sarcoptes scabiei*, noncrusted scabies, Norwegian scabies, reemerging pathogen, Argentina

Introduction

Scabies is an skin infection produced by *Sarcoptes scabiei* var. *hominis* or itch mite with increasing incidence in Europe and North America during the sixties; reaching pandemic levels during the eighties.Nearly 300 million people are affected worldwide. [1] *Sarcoptes scabiei* var. *hominis* inhabits the upper layers of the epidermis, where it makes a burrow and feeds on cells from chewed epithelium. The stage of *Sarcoptes* most commonly identified in humans is the adult female, which is about 350 to 450 µm in length by 250 to 350 µm in width. The males are slightly half the size of the females. The parasites copulate in their burrows where the females develop one or two eggs. The life span of a *Sarcoptes* female is about 6 to 8 weeks. *Sarcoptes* and the clinical lesions they produce are usually found in the skin of the hands and wrists in over 60% of cases, followed by the elbows, feet, penis, scrotum, and, to a lesser extent, the buttocks and armpits in 10% to 12%. [2] This mite is transmitted via person-to –person contact. The highest prevalence of scabies is in tropical areas, mainly in populations with co-existing poverty and overcrowding. Infection risk increases in habitats with higher levels of population density, in residential aged care facilities, prisons and refugee camps and in returned travellers to areas where scabies prevails. Children and older people are at highest risk of scabies.[3] Scabies in children sometimes show an atypical clinical presentation. Specific pediatric localizations are scalp and face in older children. In infants the most common sites are palms, soles and axillae.

Clinical findings

The symptoms of scabies infection are caused by the host allergic response to the mite.[3] The main clinical symptom of noncrusted (classical) scabies is itching on the skin of the finger webs, sides of the digits and the flexor surface of the wrist, usually at night. From the hands the lesions may extend to the elbows, buttocks, and upper thighs. There is a production of a maculopapular rash with occasional vesicles and scales with intense pruritus that worsens at night.[4] Scabies lesions are often secondarily infected with *Streptococcus pyogenes and/or Staphylococcus aureus* because of breaches in the skin barrier.[5] These mites have the potential to cause infections such as impetigo, cellulitis and abscesses, and can lead to potentially fatal bloodstream infections.[3] Noncrusted scabies is an ordinary dermatological condition acquired by direct, prolonged, skin-to-skin contact in otherwise healthy people. Sexual contact is a common means of transmission.[6] If the mite is found, several structures of the exoskeleton and the internal organs can be identified.[7]

Norwegian scabies

Norwegian scabies was described in 1848 by Danielssen and Boeck after having observed it in Norwegian lepers.[8] Norwegian or crusted scabies is an opportunistic disseminated disease with numerous exfoliating scales and a large number of mites. The disease occurs mainly in immunosuppressed hosts.[9, 10, 11, 12, 13, 14, 15, 16, 17] Norwegian scabies is characterized histologically by a massive orthokeratosis and parakeratosis with abundant mites, nymphs and eggs.[2] This infestation affects great cutaneous surfaces showing a thick-skinned aspect with multiple scales and grayish, concrete-like or yellowish crusts. [18] In contrast to classical scabies, crusted scabies may not be itchy. As this type of parasitosis is highly contagious, it is essential to extreme measures in order to avoid its dissemination. Those measures include

isolation of contacts, daily baths, clothes washing, general hygiene and adequate treatment of cohabitants.

Scabies in Argentina

In Argentina, prevalence of scabies is unknown, but practitioners assume that in the daily clinical practice it might be high. It is not a notifiable disease, and hence, that leads to a low record of cases. Nevertheless, the complaint should be made to the corresponding local sanitary authorities in order to facilitate the supply of drugs and clinical care. Some of the outbreaks became known by the mass media. In September 2013, one of the outbreaks of scabies was detected in Salta province among pupils in a Junior School and among police cadets. This event was published in El Tribuno, a local newspaper. In September 2014, the following news appeared on Clarin Newspaper. It was estimated that 25 % of children attended in "Ricardo Gutierrez Children´s Hospital" suffered from scabies.

In August 2015, fifteen cases were detected in Balnearia (Province of Cordoba).

In September 2016, at least thirty Call Center workers were infected by scabies in the city of Rosario (Province of Santa Fe). This news was published in the local newspaper "El Ciudadano". Recently, in June 2017, one case of scabies in a girl was confirmed and two more cases were being studied in La Rioja Province. This news was also published in a local newspaper. Between 1989 and 2009 nine rare varieties of scabies were reported at the Hospital for Infectious Diseases "F. Muñiz" in the City of Buenos Aires.[19]

In 2015, a 20 year-old man with Down Syndrome was diagnosed and treated for Norwegian scabies at Hospital San Roque, Province of Cordoba with an effective response to oral ivermectin.[8] In July 2016, an 84 year-old woman coming from a residential aged care facility was treated for scabies with generalized pruritus.[20] In February 2016, a 20 year-old male patient from the City of Buenos Aires was diagnosed and treated for noncrusted scabies at the University Hospital of Buenos Aires.[21] As regards treatment, lindane, previously used as an alternative therapy, has now been banned by the Administración Nacional de Medicamentos, Alimentos, y Tecnología Médica (ANMAT) (The Food, Drugs and Medical Technology National Administration) in Argentina. First-line treatments include 5% permethrin cream and oral ivermectin. Topic ivermectin, recently commercialized for lice treatment in Argentina, has also proved to be effective for treatment of scabies.[20]

Diagnosis

The presumptive diagnosis is clinical and is confirmed by the visualization of the parasite, its eggs or feces.[22] The standard method consists of epidermal scrapings and microscopic examination of the characteristic mite. Examination of epidermal scrapings rarely reveals the organisms because their number is low. In these cases, a response to empirical treatment supports the diagnosis. In histologic sections, the mites are identified on the basis of their chitinous exoskeleton, the presence of legs, and some internal structures.[7] Applying ink from a pen over a burrow entrance can confirm the mite´s presence as ink tracks along the burrow.[23] Dermatoscopy can be used to identify the "delta sign", that is the mouth-parts, and the "jet with contrail pattern" representing a mite and its burrow.[24] Multiple household members with itch should raise suspicion of scabies.

In Norwegian scabies, the number of *Sarcoptes* organisms is higher and they are

easy to demonstrate. Diagnosis in this case requires confirmation by skin scrapings. Possible differential diagnoses for Norwegian scabies include other conditions with extensive scales such as psoriasis and seborrheic dermatitis.[3]

Treatment

Treatment includes topic therapy with permethrin or ivermectin, and systemic therapy with oral ivermectin. Nowadays, both types of therapies are applied. Oral ivermectin has been approved by the FDA (Food and Drug Administration) and is given in one only dose of 0.2 mg /kg before meals. [19, 25] There is no definitive consensus on the optimal dosing regimen. Ivermectin is an effective drug of easy administration and particularly useful for the immunosuppressed patients. However, the appearance of eczematous cutaneous lesions induced by oral ivermectin has been reported.[26] Its use is not recommended in pregnancy, lactation and in patients with severe hepatic alterations. Moxidectin is considered a candidate for the treatment of human scabies. In-vitro assays showed that the concentration of moxidectin required to kill 50% of mites was lower compared to ivermectin (0.5 µM vs. 1.8 µM at 24 hours, $p< 0.0001$). [27] A delayed diagnosis and inappropriate treatment can lead to worsening of the condition.

Discussion

Scabies is an important health problem in hospitals and care centers. Clinical examination represents the backbone of diagnosis, although dermatoscopy and skin scrapings are useful aid techniques. Scabies presents with severe itch and a papular rash, and secondary bacterial infection may also be present.Infants and older people are the most affected.[3] Norwegian scabies is rare but highly infectious. There are no standardized reports about scabies, and occurrence rates vary from 0.271 to 46%.[28] Even though there is less information about deaths, these frequently occur due to secondary sepsis. [29] Scabies is relatively common in tropical regions and in developing countries because of poor hygiene, war, poverty and overcrowding that may lead to large epidemics. Scabies outbreaks can be a serious health problem especially in institutional settings, schools, prisons, hospitals, nursing homes and extended-care facilities. [30] Most of the outbreaks are caused by misdiagnosis or by a late diagnosis. Furthermore, lack of experience of the medical staff can contribute to a late diagnosis and thus, cause crusted scabies epidemics. [31, 32]

In addition to the patient´s treatment, the environment must be thoroughly cleaned to remove infective eggs and mites. Disinfection with pesticide sprays or fumigation is not recommended. In classical scabies, any bedding and clothes used for 3 days prior to treatment must be decontaminated using hot water and drying at the hottest cycle, as mites and eggs are killed at temperatures exceeding 50 ° C (122 °F) for 10 minutes. For cases of Norwegian scabies, floors, carpets and furniture must be vacuumed.[6]

Conclusion

An increased awareness of the incidence of scabies and a strong clinical suspicion by a dermatologist are necessary conditions for a laboratory diagnosis of scabies. Norwegian scabies is highly contagious because the lesions often contain large number of mites.In Argentina, scabies may be more common than reported. There are few case reports of scabies in the literature; most probably because most of the cases go underdiagnosed and unreported. The reason

for this maybe the fact that scabies is not a notifiable disease. Some of the known cases came to light only by means of the press, television and radio broadcasting. Treatment consists of isolating the patient, administration of topical permethrin and oral ivermectin (in severe cases), washing all bedding, towels, clothing and prophylactic treatment of contacts. While education and prompt action can prevent a scabies outbreak, a delay in diagnosis can lead to a severe disease. Although there has been a great advance in the knowledge of scabies, future investigations on the epidemiology, diagnosis, treatment and prevention of scabies are needed.

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