Perspective Piece

Ignoring the “Itch”: The Global Health Problem of Scabies

Lola V. Stamm^{1*} and Lindsay C. Strowd²

¹Department of Epidemiology, Gillings School of Global Public Health, University of North Carolina, Chapel Hill, North Carolina; ²Department of Dermatology, School of Medicine, Wake Forest University, Winston-Salem, North Carolina

Abstract. Infestation with *Sarcoptes scabiei* var. *hominis* is a common human parasitic affliction endemic in tropical developing countries. Scabies is transmitted by close person–person contact, and outbreaks have been reported in reception centers for asylum seekers. Scabies presents clinically as extremely pruritic excoriated papules and linear burrows in the skin. This infestation predisposes to bacterial skin infections that can result in serious complications affecting the kidneys and possibly the heart. Treatment of individuals with scabies and their close contacts involves the use of antiparasitic agents. First-line treatment is topical 5% permethrin cream. Community mass drug administration, followed by active case finding with targeted treatment, is a promising approach that can reduce the prevalence of both scabies and bacterial skin infections. Organizations such as the International Alliance for the Control of Scabies are advocating for the development of integrated disease control strategies in an effort to decrease scabies infestation worldwide.

Scabies, sometimes called the “itch,” is a skin disease of humans caused by infestation with *Sarcoptes scabiei* var. *hominis*, a tiny, obligate ectoparasitic mite.¹ Although conservatively estimated to affect more than 100 million persons at any time, scabies is remarkably absent from the global health agenda. The highest burden of this neglected disease is found in young children living in resource-poor countries with tropical climates.^{1–3} However, because scabies moves with people, mass migration due to political and socioeconomic factors can promote the spread of scabies, as seen recently with the influx of asylum seekers arriving in Western Europe from home countries where scabies is highly prevalent.^{4–6} Outbreaks of scabies have occurred in some reception centers because of overcrowded conditions that resulted in close contact with infested persons.⁶

Scabies can present clinically in different forms, but the most frequent are common scabies and crusted or Norwegian scabies.¹ Common scabies typically manifests as erythematous papules with small burrows under the skin that are thread-like, serpiginous tunnels in which female mites lay their eggs. The host’s immune response to the mites, their eggs, and feces accounts for the severe pruritus that is more intense at night, disturbing sleep and affecting quality of life. Symptoms of common scabies can take 2–6 weeks to appear with primary infestation, whereas reinfestation can trigger a swift allergic reaction. Common scabies can affect several skin sites but is present predominately between the fingers and on the wrists, elbows, shoulders, buttocks, lower legs and ankles, external genitalia, and breasts. Adults are rarely infested above the neck. In young children, especially infants, infestation can occur on the head, face, neck, palms, and soles where pustules or vesicles may be present. Crusted scabies is characterized by hyperkeratotic crusted plaques that can be localized or extensive. This form of scabies usually occurs in persons who are immunocompromised because of immunosuppressive therapy or other conditions such as

diabetes, HIV infection, or old age.^{1,7} Persons with crusted scabies typically have less pruritus than those with common scabies. Whereas the number of mites found in the skin is usually low (i.e., 10–15) for common scabies, the mite burden is very high (i.e., thousands to millions) for crusted scabies, making it extremely contagious and difficult to treat.

Complications of scabies are underappreciated.^{1,8} Epidermal barrier dysfunction from scratching provides a portal of entry for opportunistic microbes. Protein molecules secreted by the *Sarcoptes* mites inhibit the complement-mediated innate immune response.⁹ Mite infestation has been reported to alter the resident skin microbiota, promoting the growth of pathogenic bacteria.¹⁰ Epidemiologic studies have shown an increased incidence of impetigo, usually caused by *Streptococcus pyogenes* or *Staphylococcus aureus*.^{1,2} Skin infection with *S. pyogenes* can lead to acute poststreptococcal glomerulonephritis and acute rheumatic fever.¹¹ In resource-poor countries, outbreaks of acute poststreptococcal glomerulonephritis coincide with outbreaks of scabies and may contribute to development of chronic kidney disease and subsequent renal failure.⁸

Early diagnosis of scabies is critical to avoid complications, prevent exposure to unnecessary treatments, and minimize psychosocial impact.^{1,12} Diagnosis is difficult because of low mite burdens, atypical manifestations, and the potential for confusion with other skin diseases, particularly for persons from countries where neglected tropical skin diseases (NTSDs) are coendemic. Presumptive diagnosis of scabies is usually based on clinical symptoms and signs and a history of exposure to close contacts with pruritus. Definitive diagnosis is based on direct visualization via microscopy of *Sarcoptes* mites and/or their eggs in skin scrapings collected from areas of active infection. Dermoscopy, which is performed with a handheld dermoscope that allows for ×10 magnification, is a noninvasive technique that aids in the detection of characteristic burrows and/or mites in the stratum corneum.¹³

The standard approach to scabies control is treatment of infested persons and all of their close contacts.^{1,8} Although individual treatment has a limited impact on the prevalence of scabies in highly endemic communities, an alternative approach, mass drug administration (MDA), can substantially

* Address correspondence to Lola V. Stamm, Department of Epidemiology, Gillings School of Global Public Health, University of North Carolina at Chapel Hill, 3302 Hooker Research Center, S. Columbia St., Chapel Hill, NC 27599-7435. E-mail: lstamm@email.unc.edu

reduce scabies and impetigo prevalence in these communities.^{14,15} The first-line treatment of scabies is topical application of 5% permethrin cream, which must be applied to the entire body, left on for 8–12 hours, and then rinsed off. This protocol is usually repeated 1 week later to address the possibility of insufficient application during initial treatment. Topical permethrin is effective, but there can be barriers to appropriate use, particularly in resource-limited settings. Currently, there is no evidence demonstrating permethrin resistance of *Sarcoptes* mites that infest humans. However, there are anecdotal reports of treatment failures, which may be due to improper permethrin application, poor compliance with topical treatment regimens, or increasing tolerance of mites to permethrin.¹⁶ Ivermectin, which is used for the treatment of some other neglected tropical diseases (NTDs), is the only oral drug currently used for scabies.¹⁶ Ivermectin is not widely approved for this purpose and is not recommended for use in young children (aged < 5 years) or pregnant women because of limited safety data. For maximal efficacy, ivermectin, which is not ovicidal, must be taken as two doses (200 µg/kg per dose) about 7–14 days apart to kill any adult mites that may have hatched after the first dose. Treatment failures in patients with crusted scabies have been documented because of resistance of *Sarcoptes* mites to ivermectin.¹⁷ Moxidectin, which is similar to ivermectin, is a promising alternative oral drug for scabies treatment.¹⁶ The superior bioavailability of moxidectin (i.e., half-life > 20 days for moxidectin versus 14 hours for ivermectin) and the superior tissue distribution/retention of moxidectin compared with ivermectin may allow for its use as a single-dose regimen, which would enhance treatment compliance and benefit MDA programs.¹⁶

The direct effect of scabies and its secondary effects on children, families, and communities worldwide is a strong impetus to advance the agenda for global control of scabies.^{8,18} The World Health Organization's Department of Control of NTDs plans to promote a strategy for the integrated control and management of NTSDs. Although scabies was recently added to the World Health Organization's list of NTDs, it is not on the target list of seven NTSDs that were proposed by an informal panel established to provide guidance in support of the World Health Organization's new strategic direction.¹⁹ Inclusion of scabies with these NTSDs is warranted because of its geographic overlap and similar control and management strategy. Notably, MDA programs that used ivermectin for treatment of some other NTSDs (i.e., onchocerciasis or lymphatic filariasis) in communities where scabies was endemic, but not specifically targeted, showed a concomitant decrease in the prevalence of scabies, demonstrating the feasibility of scabies control via an integrated treatment strategy.¹⁸ Moreover, a prospective follow-up of five Solomon Islands communities that received ivermectin MDA, in combination with active case finding, reported that the resultant low prevalence of both scabies and impetigo was maintained 15 years after cessation of the program, suggesting that long-term control of scabies is achievable and can promote improved skin health.¹⁴ Moving forward with the agenda for global control of scabies requires establishing a worldwide network of dedicated partners with different skills as well as influence. An important advocate for this endeavor is the International Alliance for the Control of Scabies (IACS), which includes a diverse range of professionals from across the globe (e.g., clinicians from high-prevalence areas, public

health physicians, policy makers, and researchers).⁸ The IACS is committed to advancing the agenda for global control of scabies by promoting ideas exchange and developing an action plan for priority areas of advocacy, epidemiology, control strategies, and biologic research. The IACS and others, such as the *Sarcoptes*-World Molecular Network, have focused much needed attention on scabies as a global public health problem.^{8,20,21} Hopefully, their efforts will act as a catalyst to attract financial and programmatic support for integration of scabies into control and management programs for other NTSDs. This step is a critical one on the long path for global control of scabies.

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Authors' addresses: Lola V. Stamm, Department of Epidemiology, Gillings School of Global Public Health, University of North Carolina at Chapel Hill, Hooker Research Center, Chapel Hill, NC, E-mail: lstamm@email.unc.edu. Lindsay C. Strowd, Department of Dermatology, Wake Forest University, Winston-Salem, NC, E-mail: lchaney@wakehealth.edu.

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