

Scabies

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NURS 6229 Health Promotion of Adults

February 24, 2019

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Scabies, occurring worldwide, is an infestation of human skin caused by the ectoparasite, *Sarcoptes scabiei*. Experiments have concluded that the mites possess host-seeking behaviors and may be attracted to stimuli such as body odor, body heat, or carbon dioxide in exhaled breath. The ectoparasite, or mite, is oval shaped with, spur-like claws or its short, stubby legs. The life cycle of the *S. scabiei* consist of an egg, larva, protonymph, tritonymph and adult. Scabies infestation occurs when newly fertilized female mites seek new burrows to lay eggs. Larvae hatch within 2-4 days; maturing into adult mites within 10-14 days. Hosts become infectious within 10-14 days after exposure. Successful transmission occurs often from skin-to-skin contact of approximately twenty minutes, or contact with infected fomites. *Sarcoptes*

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scabiei can live outside of a host 24-36 hours. Mites have been located in bedding, toys, clothing, and furniture. Mites have been observed, in all stages of life, leaving their burrows to wander upon the skin.

Epidemiology

This common, highly contagious skin parasite, observed sporadically, or as institutional outbreaks in schools, hospitals, nursing homes prisons, retirement homes, and long-term care facilities within industrialized nations. Other vulnerable populations include those that experience poverty, overcrowding, and marginalization. Population displacement, due to war or disasters, results in poor hygiene, low economic status, limited resources, and healthcare disparities contributing to transmission among other causative factors.

Most common locations of burrows are between fingers, the wrist, axillae, umbilicus, beltline, nipples, buttocks, and the shaft of the penis (Thomas et al., 2017). While it is uncertain why infestation occurs in these specific areas, distribution patterns suggest that the mites prefer these areas due to their lipid composition and other factors. Symptoms may include intense pruritic rash, which worsens at night, causing intense scratching. Itching may begin as early as 24 hours for those experiencing subsequent exposures; or, as long as 4-6 weeks for those experiencing their first episode. Persistent and severe pruritis is debilitating and unpleasant, causing disturbance in sleep, affecting school and work. Clinical signs observed include tunnel-like burrows dug within superficial layers of the epidermis, by adult female mites, where they lay 2-3 eggs daily. On average, a host may harbor 10-15 adult female mites.

Infants, young children, the elderly, and those with compromised immune systems are especially vulnerable. (Thomas et al., 2017) High prevalence of skin disorders and varying presentation creates delays in identification in the older population (Head et al., 2017). Scabies

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infestation may cause confusion as it may present similarly to pruritic rashes, impetigo, tinea corporis or psoriasis (Banerji et al., 2015). The mites, whose wastes promotes bacterial growth, causing impetigo, cellulitis, abscesses and systemic infections often introduce *Streptococcus pyrogens* or *Staphylococcus aureus* into the skin. Secondary bacterial infections commonly occur, frequently caused by scratching (Banerji et al., 2015). Secondary sepsis may occur, increasing mortality, if untreated. Other complications may affect the renal and cardiovascular systems (Thomas, et al., 2017), causing poststreptococcal glomerulonephritis, and cardiac disease (Banerji et al., 2015). Moreover, scabies results in significant financial costs, insomnia, depression, and stigmatization (Banerji et al., 2015).

Immunosuppressed or malnourished hosts may develop Norwegian (crusted) scabies, which manifests as a hyperinfestation with thousands to millions of mites. This results in scaling and crusting over most of the body without significant itching. Crusted scabies may also appear as severe inflammation and hyperkeratotic reactions. Likewise, crusted scabies is commonly misdiagnosed as eczema and is more difficult to treat than classic scabies. Due to the increased burden of the mites, crusted scabies is more contagious and may cause a significant outbreak. Nearly 50% of patients with the crusted infection do not report itching. Healthy human hosts are not immune from Norwegian infestation (Banerji, et al., 2015).

Disease History & Evolution

Scabies, recognized for at least 3000 years, as a disease in humans. In the 4th century, Aristotle described it as “lice of the flesh”. Bonomo and Cestoni identified the scabies mites as the causative agent of the infestation in 1687. An accurate description of the parasite, in 1778, by Swede Charles de Geer led to the parasite name of *Acarus scabiei* de Geer, before the identification of the genus *Sarcoptes*. Scabies is believed to be the first disease identified with a

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known cause in humans. During the Neopolenoic wars, scabies labeled the “seven-year itch”; likewise, during the American Civil War the term “camp itch” was utilized. Infestations become more prevalent during civil unrest; a health concern in the armed forces (Thomas et al., 2017). Today, scabies continue to plague humans.

Disease Prevalence, Incidence, Mortality & Morbidity

Scabies, classified as endemic, however, in developing, third-world countries, tropical and subtropical areas. According to Thompson et al. (2016), scabies is under diagnosed disease with a considerable global disease burden, affecting approximately 100 million. Head, et al. (2015), estimated prevalence worldwide is 300 million annually, a major health concern in many developing countries. Globally, scabies is estimated to affect more than 200 million people at any time. Prevalence estimates range from 0.2% to 71%. Endemic in impoverished tropical locations, the estimated prevalence in children is 5-10%, with common recurrent infections. Scabies prevalence varies globally, which may be due to the mixture of outbreak studies or endemic disease status. The incidences of scabies have appeared cyclic with large epidemic or pandemics occurring in 30-year cycles. Overcrowding, war, and climate change have modified the prevalence of scabies from a cyclic to an epidemic pattern. Confined settings have generated epidemics, when peak prevalence may reach over 70% (Thompson et al., 2017).

Scabies accounted for the 0.21% of disability-adjusted life-years (DALY) from all conditions globally in 2015. Documentation of global morbidity is timely; therefore, the mortality is not clearly identified. Sepsis, a life-threatening complication of scabies, has been identified in severe or crusted scabies. According to a ten-year study in Australia, *Staphylococcus aureus* bacteremia (SAB) carried a 7% 30-day mortality rate when scabies is

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present. A one-year mortality rate was identified in patients with SAB (26%) and without SAB (8%).

Prevention & Treatment

Prevention begins with comprehending infestation and mitigating the spread by early detection and treatment. Educating the infected individual and their families is a significant piece of prevention and treatment. In the home, avoiding direct skin-to-skin contact with an infected person, their clothing or bedding is another option in prevention. Individuals living within close quarters should receive treatment at the same time as the infected individual to prevent the recurrence of exposure and infestation. Bedding and clothing worn prior to treatment should be washed in hot water and dried on high-heat; or dry-cleaned. Due to the limited time that scabies can survive without host, items that cannot be laundered can be placed in securable plastic bags for approximately a week. In an institutional setting, the additional implementation of appropriate isolation procedures and infection control practices are essential in preventing outbreaks. Incorrect or incomplete treatment of the housing area results in treatment failure. Screening of employees and new patients should occur. The infestation of an employee should yield high suspicion that scabies may be undetected in a patient.

Treatment includes killing the mites and controlling dermatitis, which can be persistent. Permethrin 5% cream is a safe, highly effective medication to manage scabies. One application, massaged into the skin from head to soles of feet, for 8-14 hours, then rinsed off. An alternative regimen includes applying lindane 1 oz (lotion) or 30 grams (cream) to entire body for 8 hours, then thoroughly wash it off. This medication may be repeated in 14 days, if needed. Itching may

persist for several weeks after treatment. Triamcinolone 0.1% cream is recommended to resolve dermatitis.

Infestation with crusted or Norwegian scabies, especially in the immunocompromised population should be treated with ivermectin in a 200 mcg/kg dose, which can be repeated in two weeks, if necessary. The addition of topical permethrin is recommended. Oral ivermectin is beneficial in mass treatment of institutions or villages. Antibiotics are prescribed to treat secondary infections. Mid- to high-potency corticosteroids are prescribed for persistent pruritic papules.

Conclusion

Technological advances in the identification of *Sarcoptes scabiei* may lead to prompt recognition and diagnosis of infection. Currently, diagnosis is made by microscopic identification of the mite, ova, and feces obtained during painful skin scraping.

Videodermatoscopy, dermoscopy, reflectance confocal microscopy, and optical coherence tomography show promise in non-invasive identification; however, the videomicroscope yielded high specificity and sensitivity for only \$30 (Micali et al., 2016).

The World Health Organization has scabies listed as a neglected tropical disease with promise to find solutions to various obstacles to treatment and prevention experienced globally.

Unfortunately, this mite may never cease to exist as long as war, poverty, and stigmatization continue.

References