



## Assessment and Management of Scabies in Primary Care Settings

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### Abstract

Scabies is an overlooked tropical illness that yet has significant worldwide effects and lasting health repercussions. The condition is caused by the mite *Sarcoptes scabiei* var. *hominis*, which is a parasitic organism that dwells on the outer layer of the human skin. Scabies is prevalent in impoverished neighborhoods as a result of the high population density in locations such as nursing homes, correctional facilities, and among homeless and displaced children. Nevertheless, modern nations are also prone to scabies infestations, particularly in cases of institutional outbreaks or mini epidemics occurring after conflict or natural calamities. Scabies diagnosis can be aided by both invasive and noninvasive techniques. This paper reviews assessment diagnosis, and management of scabies in primary health care settings.

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## Introduction:

Scabies is a prevalent skin infestation that causes itching, and it is caused by the female mite *Sarcoptes scabiei*. Scabies can afflict individuals of all age groups, although youngsters, older individuals, and immunocompromised individuals are most susceptible to infestation. This is especially true for those residing in low socioeconomic regions. The global annual prevalence of scabies is estimated to be 300 million. Scabies is a significant health issue in numerous underdeveloped nations. In 2009, the World Health Organization officially classified it as a neglected skin condition [1-3].

The pruritic skin rash that is commonly seen in scabies may not appear until several weeks after the first infestation. This rash is caused by a delayed type IV hypersensitivity reaction to the eggs, feces, and saliva of the mites. Typically, scabies transmission has already taken place by the time the patient starts experiencing symptoms. Timely intervention is thus crucial in order to halt the continued spread. After receiving treatment for scabies, certain individuals may encounter enduring itch, a subsequent rash such as dermatitis, or acquire a secondary bacterial infection due to excessive excoriation [4].

Scabies has three primary manifestations: Classic scabies is the predominant type, characterized by a small number of mites (about 5 - 15) and frequently accompanied by an itchy skin rash that initially appears on the extremities (such as palms, soles, fingers, and toes) and then spreads to the torso and limbs. Nodular scabies is a manifestation of long-lasting infection of the common form of scabies. It is characterized by groups of itchy, inflamed bumps and little raised areas on the folds of the armpits and the genital regions, such as the penis, scrotum, and buttocks. Even after successful treatment for classic scabies, nodules might still remain present. Crusted scabies, which is a rare condition, occurs when there is an excessive infestation of mites, numbering in the thousands to millions. This leads to the formation of thick, crusted plaques on the skin, along with hyperkeratosis. Crusted scabies is highly transmissible compared to classic scabies and primarily affects individuals with compromised immune systems, neurological disorders resulting in diminished feeling or mobility, elderly individuals, and those residing in institutional settings [5,6].

Diagnosing scabies can be a challenge even for highly skilled doctors, as the physical signs during examination might be minor and patients may not mention important historical indicators such as intense itching that worsens at night, close contacts with similar symptoms, and a history of exposure [2]. The examination reveals the presence of serpiginous white lines, which are a clear sign of mite burrowing. These lines are typically found in the gaps between the fingers and toes, the areas around the nipples in females, or the male genitalia, although they can also appear on other parts of the body. Utilizing dermoscopy to visualize burrows or the mite can aid in the diagnosis. A diagnosis that is considered the most reliable and accurate involves utilizing light microscopy to observe the eggs, excrement, or the mites themselves [7,8]. If there is ambiguity in making a diagnosis, a skin biopsy may be conducted. Visualizing the mite present in the outermost layer of the skin, known as the stratum corneum can further facilitate the identification of scabies [2].

Scabies is primarily transmitted by extended (e.g. 20 minutes) direct contact between the skin of an individual and someone who is infected with scabies. Transmission of crusted scabies can occur through brief contact with an individual who has a large number of mites. Scabies mites can be transmitted readily among individuals living in the same household, engaging in sexual activities, or participating in other forms of intimate contact, such as hand holding. Infrequently, mites can be transmitted by the exchange of materials or fomites, such as clothing, towels, beds, and other items. This type of indirect transmission is primarily observed in cases of crusted scabies [9].

Scabies is not caused by inadequate hygiene. Factors influence the chance of acquiring a scabies infestation and its transmission: Residing in regions with elevated temperatures and increased levels of humidity. Residing in regions with a large concentration of people (poverty and excessive population). Residing or working in surroundings with frequent interpersonal contact or institutional care facilities, such as hospitals, educational or residential care facilities, and prisons. Possible causes of weakened immune system include underlying immunodeficiency or immunosuppression, such as HIV infection or prolonged use of oral corticosteroids. Transmission occurs by contact with contaminated fomites, such as sharing clothing and items. Traveling to regions abroad that are prone to specific diseases, such as underdeveloped nations with warm and moist climates [10].

## Assessment Techniques for Scabies in Primary Care:

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Diagnosis relies on the contact history of patients, healthcare personnel, or even family members. The diagnosis is confirmed by the presence of pruritic eruptions, distinctive lesions and their distribution, as well as the detection of mites, eggs, or feces on skin scrapings.

Typically, burrows are frequently destroyed by activities like as bathing, scratching, the development of crusts, or the occurrence of superinfection. The visibility of burrows can be enhanced using an ink burrow test, in which burrows absorb ink and become easily noticeable as ink-filled undulating lines within the stratum corneum, indicating the path of the mite's tunneling [11].

### ***Non-invasive techniques***

Video dermatoscopy is an appropriate method for definitively establishing a diagnosis in children. By utilizing a magnification of up to 600 times, it becomes possible to accurately identify mites and their tunnels. Proficiency in identifying the characteristic "jet with condensation trail" pattern is necessary to effectively utilize a handheld dermatoscope. Dermatoscopy, when conducted by a skilled professional, offers a high level of precision in the diagnosis of scabies [12].

Dermoscopy, utilizing a magnification of  $\times 10$ , has been deemed a valuable instrument for the diagnosis of scabies by the observation of scabies burrows. The "delta wing jet" (also known as "delta glider" or "jet with contrail") sign in dermoscopy indicates the presence of scabies burrows. These tunnels appear as a white line without any distinct structure, with a dark brown triangular structure at the end. This triangular structure corresponds to the head and front legs of the scabies mite. Furthermore, eggs can be identified as diminutive oval formations located inside the burrow [13].

The dermoscopy technique has revealed the presence of the "mini triangle" indication, which indicates the presence of the developing larva within the scabies egg. Identifying the scabies mite with dermoscopy is challenging in individuals with darker skin tones, hairy body parts, and when there are difficulties caused by scratching, such as skin abrasions, bleeding, crusts, or tiny debris. Dermoscopy of crusted scabies shows many burrows and a hyperkeratotic look [14].

Reflectance confocal microscopy. RCM is a noninvasive diagnostic technique that use a laser beam reflected off the skin to examine its different layers. RCM enables a comprehensive *in vivo* assessment of adult mites, larvae, eggs, and excrement. It offers a glimpse into the genuine behavior of the mites and showcases their live movement within the burrow. The burrows are observed as a linear section within the adjacent epidermis, which has a distinct "honeycomb" pattern. The limited accessibility, time-intensive nature (requiring around 10 minutes for each lesion), and exorbitant expense of RCM hinder the widespread use of this technique [15].

Optical coherence tomography (OCT). OCT is a noninvasive method that employs reflected near-infrared beams, similar to ultrasonography, but with superior resolution and the ability to visualize the primary constituents of the skin. This approach can be used to identify mites, eggs, feces, and burrows. OCT can rapidly and precisely diagnose scabies in living organisms by effectively detecting the mite in both vertical and horizontal dimensions. Furthermore, OCT can be advantageous for investigating mite biology and assessing the efficacy of treatment [16].

The Burrow Ink Test (BIT) is a method used to assess the quality and performance of ink. The Burrow Ink Test (BIT) is a method that enables the visibility of a typical curvilinear burrow structure. This is achieved by putting ink to the visible burrows on the skin and subsequently cleaning the excess ink using alcohol.

BIT is confirmed as positive when a distinct and irregular line is observed without the aid of any magnifying device, following the removal of ink by using alcohol. However, this treatment offers a limited diagnostic and is unable to differentiate between old and new lesions [14].

Adhesive tape examination. The adhesive tape test involves applying adhesive tape to potentially worrisome skin lesions. Once the sticky tape is applied to the skin, it is promptly removed and transferred directly onto a slide for microscopic examination to detect any evidence of scabies [17].

### ***Invasive techniques***

Skin samples are often obtained by means of skin scraping. For this technique, it is preferable to apply oil on the scalpel since it aids in maintaining the adherence of the scraped material to the blade. To obtain many superficial skin samples from typical lesions, scrape the skin laterally with caution to prevent bleeding. The scrapings are subsequently placed onto a slide that is coated, allowing for direct microscopic observation [1].

Skin biopsy: A procedure involving the removal and examination of a small piece of skin tissue. The histopathology-based diagnosis of scabies is often regarded as one of the most reliable tests. A skin biopsy

performed at the site of a burrow will expose the mite and its secretions. Histopathology is not typically included in the standard diagnostic process for scabies. It is reserved for confirming unusual presentations of the condition. Nevertheless, this operation is very laborious and costly, and often takes anywhere from 2 to 7 days to yield a result through standard fixation methods [18].

**Serology:** Study of blood serum and its components. Standardized laboratory tests for diagnosing scabies are currently unavailable. Despite the evaluation of multiple candidate antigen and antibody immunoassays, none have gained widespread acceptance due to their unsatisfactory performance [19].

The enzyme-linked immunosorbent assay (ELISA) identifies the antibodies of *S scabiei*, which are generated before the appearance of clinical signs. Furthermore, scabies patients exhibited elevated IgE levels, as determined via inhibitory ELISA. ELISA is a highly sensitive and precise diagnostic method. However, it has drawbacks such as being time-consuming, currently unavailable, and necessitating a microplate reader. The tyrosine kinase of *S scabiei*, mostly located in the oral cavity of scabies mites, is a cloned protein that has also been studied for scabies diagnosis. It has the capability to detect infection at an early stage [20].

**New molecular techniques.** The DNA of *S scabiei* can be obtained by different methods, including collecting swab specimens or doing skin biopsies.

A polymerase chain reaction (PCR) experiment. The utilization of Nested-PCR, which relies on the C-oxidase subunit (*cox1*) gene of *S scabiei*, is regarded as a remarkably sensitive method for diagnosing scabies. PCR, while acknowledged for its specificity and sensitivity, necessitates sophisticated equipment. Furthermore, it cannot identify genes in instances where the DNA of the mite is not present in the affected skin region. Nevertheless, PCR assays are deemed unfeasible due to the absence of testing in several manifestations of scabies, such as elderly patients and crusted scabies. This might potentially be employed as a diagnostic tool for identifying scabies cases during epidemics [21].

**Isothermal amplification techniques.** Although PCR-based identifying methods are employed, thermocyclers remain necessary for DNA amplification. To tackle this problem, isothermal amplification techniques have been devised. The approaches encompass rolling circle amplification (RCA), multiple displacement amplification (MDA), and loop-mediated isothermal amplification (LAMP). These approaches enable the identification of a diverse range of microorganisms [20].

In the assessment and management of scabies in primary care, it is vital to consider the available noninvasive diagnostic techniques, the affordability and accessibility of treatments, and the potential for active case finding and referral. Additionally, targeted measures for identifying suspected cases of crusted scabies and managing both the individual and their environment are essential components in the comprehensive approach to scabies management [6].

### **Management of Scabies: An Evidence-Based Approach:**

The primary approach to treating scabies involves promptly isolating and treating the initial case, identifying those who have been in contact with the infected person, and disinfecting the environment. It is crucial to treat the close contacts of individuals diagnosed with scabies at the same time since they may have been infected without showing symptoms yet, and hence serve as sources of infection. Implementing isolation measures and securing doors for individuals with dementia and wandering tendencies is crucial, despite the potential distress it may cause both the residents and staff [22].

The majority of scabies infestations can be effectively treated using scabicides. Simultaneous implementation of environmental disinfection measures is crucial alongside medical treatment. Topical therapies usually necessitate the application of the product on the entire body, from the neck to the soles of the feet, including the nails, and must be left on for several hours. There is a lack of global agreement regarding the optimal treatment schedule, and advice in one country may not be relevant in different jurisdictions [23].

Permethrin was determined to be superior to other scabicides in a study of therapies for scabies. A recent research revealed no discernible disparity in the effectiveness of permethrin when compared to ivermectin. While malathion has demonstrated efficacy in numerous locations, there is a lack of comparative trials assessing its performance in relation to other scabicides [24].

Antihistamines and emollients are effective for managing the symptoms of itch, particularly itch caused by medicine after scabies treatment. Crusted scabies can be treated using topical keratolytics, such as salicylic acid. It is used on days when scabicide is not used [25].

Recently, there has been a growing number of reports regarding the resistance to scabicides. Four distinct players that may potentially contribute to resistance against scabicide have been identified as follows: The four components are: (a) voltage-gated sodium channels, (b) glutathione S-transferase (GST), (c) ATP-binding cassette transporters, and (d) ligand-gated chloride channels. Moxidectin, which is already used to treat scabies

in dogs and sheep, is currently being studied as an oral treatment for scabies. This substance is closely connected to ivermectin and operates in the same manner, but it possesses a higher affinity for lipids, allowing it to remain in tissues for a longer period of time. The potential of moxidectin as a forthcoming treatment for scabies has shown great promise [26,27].

Vaccination has demonstrated potential in managing scabies epidemics. Ongoing research is currently being carried out to create a vaccine for scabies [28].

### ***Environmental disinfection***

Isolation rooms should undergo thorough cleansing. Personnel working in residential and care facilities should refrain from engaging in direct skin-to-skin contact by utilizing protective attire such as gowns and gloves. Proper disposal of protective clothes must be followed.

Bedding, clothing, towels, and personal bed jackets belonging to individuals infested with pests should be washed separately in a washing machine using water at a temperature over 75 °C, and then dried using hot cycles in a dryer. There is no need for any specific procedures such as autoclaving or bleaching. Non-launderable items, such as shoes, should be enclosed in a plastic bag and stored for a duration of 72 hours. It is advised to refrain from sharing amenities and equipment, such as geriatric chairs, commodes, and toilets, until at least 24 hours after treatment. The disinfection of rooms containing afflicted individuals has been carried out using a 5% solution of chloramine [9].

### ***Management of complications or failure of therapy***

The satisfactory resolution of active lesions and the reduction of pruritus suggest that the therapy has been effective. However, it is important to note that pruritus, or itching, may continue for a period of two to four weeks following effective treatment. This itching can either be a normal component of the healing process or a result of post-scabies dermatitis. In this scenario, scabies lesions can be examined again after using topical scabicides to ensure complete elimination of the infestation.

The primary cause of confirmed treatment failure is mostly due to the inadequate administration of topical scabicides and insufficient environmental management. When early therapies fail, it is advisable to investigate alternative therapy [4].

### ***Outbreak and Prevention Program Management***

Early detection of scabies is crucial in residential homes and care institutions to avoid the spread of the disease. The diagnosis of scabies in older individuals may be delayed due to the atypical presentation of the condition. Upon the occurrence of an outbreak, it is crucial to promptly control the index patient and swiftly trace the contacts in order to discover any secondary cases. When a case of scabies leads to several secondary cases due to prolonged exposure, the most effective approach to end the epidemic is to conduct simultaneous mass prophylaxis. This can be done without closing the ward; however the logistical challenges should be taken into account. Alternatively, it has been suggested to adopt a proactive strategy to minimize the spread of transmission. This can be achieved by implementing measures such as decreasing staff turnover, cancelling community activities, and, if feasible, closing wards to new admissions [29].

The lack of well-designed, randomized controlled trials (RCTs) makes it uncertain whether prophylaxis is better than a "wait and see" approach. In the "wait and see" approach, contacts are educated about the possibility of infection and advised to seek medical consultation if they develop symptoms of infection. Managing extensive epidemics is inherently challenging and necessitates substantial investment in terms of time, financial resources, organizational capacity, coordination, and collaboration among healthcare personnel [30].

### **Role of Primary Care Professionals in Scabies Management:**

As the prevalence of scabies continues to rise, particularly in regions such as Saudi Arabia, it is crucial to enhance the understanding of local knowledge and awareness of this parasitic infestation. Just as in the case of leishmaniasis in various regions, it is essential to assess the local knowledge related to scabies to bridge the gap between the need for healthcare facilities and their provision within communities. This could be particularly important in areas where the quality of biomedical healthcare is lacking. Similar to the challenges faced in the management of leishmaniasis, there is a need for intensive awareness programs for clinicians and healthcare workers to ensure effective patient management, as well as for the general public to improve

treatment-seeking behavior. These programs should be supported by qualitative studies to enhance early case detection, similar to the strategies recommended for leishmaniasis. Additionally, the use of modern technological tools, such as satellite remote sensing, could aid in the epidemiological surveillance of scabies and the identification of potential outbreak hotspots [31].

The management of scabies also presents challenges in terms of treatment options and accessibility. As with leishmaniasis, the availability of cost-effective healthcare and use of more accessible treatment options could improve patient compliance and reduce the overall prevalence of the disease within communities. Furthermore, understanding the local knowledge and cultural practices related to scabies is essential in developing targeted measures for case identification and management to effectively address the impact of the disease on individuals and communities [32].

In conclusion, to effectively manage the rising prevalence of scabies in primary care settings, it is imperative to not only focus on evidence-based approaches to treatment but also to consider the local knowledge and awareness of the communities, implement awareness programs, and utilize modern technological tools for surveillance and outbreak prediction, similar to the strategies used for leishmaniasis.

### Conclusion:

In conclusion, the assessment and management of scabies in primary care settings is crucial for the timely diagnosis and treatment of this highly contagious skin condition caused by mites. Healthcare providers should be well-versed in recognizing the characteristic symptoms of scabies and conducting a thorough physical examination to confirm the diagnosis. Treatment options, including topical medications and oral medications, should be carefully considered based on the severity of the infestation and the individual patient's medical history. Additionally, patient education on the importance of proper hygiene and environmental measures to prevent reinfestation is essential. By effectively assessing and managing scabies in primary care settings, healthcare providers can help alleviate the discomfort and prevent the spread of this parasitic skin condition.

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