Scabies (Sarcoptic Mange), Head Lice (Pediculosis Capitis) in Children —
Symptoms and Treatment

Scabies and head lice infestation are two common parasitic infestations seen in children. Scabies in children can present with diffuse skin lesions and characteristic intraepidermal tunnels known as burrows. The causative mites of scabies live and move inside these tunnels. Intense pruritus is common with scabies. Head louse infestation presents with scalp pruritus, the presence of live lice, and the presence of nits on a physical examination of the hair. Permethrin or ivermectin are indicated for the treatment of both conditions.

Overview

Scabies and pediculosis are two very common infestations that can affect children and have been described in human history for thousands of years.

*Pediculosis is caused by lice* which are ectoparasites of the order phthirapteran that live on the body. Lice feed on human blood after they pierce the skin of the scalp or other regions. They also inject their saliva at the piercing site which is responsible for the typical pruritus seen in pediculosis. They can be found on virtually every warm-blooded animal, but they are more common among human beings. They infest every part of the
human body, although pediculosis is loosely used to mean head infestation (pediculosis capitis).

Scabies, on the other hand, is caused by a mite known as Sarcoptes scabiei hominis. This skin infestation is only seen in humans. The mite causes a severe allergic reaction and intense pruritus.

Epidemiology of Scabies and Pediculosis in Children

Scabies is a very common condition that affects more than 300 million new cases per year worldwide. Scabies infestations become more common during periods of natural disasters, war, and poverty, which are associated with overcrowding conditions.

Scabies in children is usually transmitted from institutional settings such as children who are admitted to psychiatric wards, children living in nursing homes or in day-care facilities. Scabies skin infestation is more common in fall and winter. Approximately, 37.5% of all cases of scabies occur in children younger than 14 years of age.

While scabies is not a common condition among children in the developed world, approximately 30,000 Indian children were diagnosed with the condition per year. Countries with significant poverty issues, such as Bangladesh, have a higher incidence of scabies in children compared to other common childhood illnesses such as infectious diarrhea.

In contrast to scabies, pediculosis is not a reportable disease, therefore, the incidence of the condition is suspected to be underestimated. Despite common belief, self-cleanliness is not associated with the risk of developing pediculosis in children.

Approximately, 12 million new cases of pediculosis are diagnosed in children aged between 3 and 11 years in the United States each year. In contrast to scabies, pediculosis is more common in summer. The peak incidence of head louse infestation is reported to
be in school-aged children. Approximately, 10 to 40% of school-aged children in the United States have the condition. Head louse infestation incidence is reported to be lower among African Americans.

Girls are more likely to develop head louse infestation compared to boys. The most common mode of transmission among school-aged children is prolonged and close head to head contact with a child who has a head louse infestation.

The prognosis of both conditions is excellent with adequate treatment and early diagnosis.

Pathogenesis of Scabies and Pediculosis in Children

The etiology of scabies in humans is the female mite known as *Sarcoptes scabiei hominis*. This is an obligate human parasite that does not affect other primates rather than humans. The responsible mite is transmitted to the patient's skin via three main mechanisms:

**Direct transmission of human to human via direct body contact**: Playing children, bed warmth and intercourse are considered the main exposition risks.

**Environmental transmission of mites from dust and fomites as the parasite survives for 2-5 days** outside the human body at room temperature and pressure.

**Zoophilic transmission is rare.**

This is expected to happen in overcrowding situations such as during periods of natural disasters, at institutional facilities or at times of war.

At first, a small number of mites infest the skin. After two to six weeks, the **number of mites increases, and a delayed type IV hypersensitivity reaction occurs**. The mites, their eggs, and their feces are responsible for the hypersensitivity reaction which is characterized by intense pruritus. The mites live in burrows that they build within the skin; thus, in summary, the scabetic infestation takes a cycle involving:
- Initial infection: Sensitization occurs in several weeks.
- Re-infestation: The patient is already sensitized, and pruritus occurs within 24 hours. In immunocompromised patients, there is an imminent risk of developing hyperkeratotic/ crusted scabies.

The etiology of head louse infestation is the organism known as *Pediculosis humanus capitis*. This parasite is transmitted by prolonged head-to-head contact which can happen in schools and is more common among girls rather than boys. The organism attaches to the scalp, pierce the skin, feed on blood, and release its saliva within the skin piercings. An **immune-mediated allergic reaction to the parasite’s saliva is responsible for the intense pruritus** that is described by children affected by the condition.

**Clinical Features of Scabies and Pediculosis in Children**

The symptoms of scabies are usually worse at night. Children usually describe a similar clinical picture that includes other family members and friends or peers. While the most common sites of the skin lesions related to scabies in adults are the flexor aspects of the wrists, the interdigital web spaces, the dorsal feet, axillae, elbows, and buttocks, the distribution of the skin lesions in infants and children is quite different. **The skin lesions in children are usually more diffuse and can occur on the face, scalp, neck, palms, and soles.**

Physical examination of the skin lesions in children infected with scabies can classify the lesions into **primary and secondary scabies lesions**. Primary scabies lesions are characterized by the presence of small vesicles, papules, and burrows. The presence of burrows is a pathognomonic sign of scabies. These burrows are caused by the moving female mite and are seen as intraepidermal tunnels.

Infants who are too young to scratch their skin lesions can present with **nodular**
**Scabies**. Secondary scabies lesions occur as a consequence to the scratching of the primary lesions or due to the immune response to the mite and its products. They include excoriations, eczema, and crusting.

**Scabies norvegica**

The massive mite infestation at immune suppressed patients (AIDS, long-term glucocorticoid/cytostatic therapy, leukemia, DM) is referred to as scabies norvegica. Due to the decreased immune reaction, there is no or only a slight itching. With **dirty-brown papules, bark formation, and desquamation**, the skin is ichthysiform.

Patients with a head louse infestation present to the clinic because of the **discovering of head lice or nits**. The nits are in fact the eggs of the causative organism of pediculosis. Usually, parents and school teachers are the first to notice the head lice in the child’s head. Children who are old enough to give an adequate history usually complain of intense pruritus, especially at night time. Secondary bacterial infections are also common due to the scratching of the affected areas.

The clinical diagnosis of a head louse infestation is based on the **presence of nits, nymphs or mature lice** on clinical examination. The presence of nits alone without the concurrent confirmation of the presence of live mature lice is not enough for the diagnosis of active pediculosis.

When the hair is dry, the lice can move very quickly which makes it difficult to observe them. A simple trick is to simply wet the hair and use a comb. This approach will reveal a significant number of lice and their eggs which are usually enough to make the diagnosis of active head louse infestation.

**Diagnostic Workup for Scabies and Pediculosis in Children**

The diagnosis of scabies in children is largely a clinical one. The **presence of skin burrows** is a very important sign that is usually enough to make the diagnosis. Other available tests for the confirmation of the diagnosis include:
Microscopy: Skin scrapings of the primary scabies lesions are obtained after adding a drop of oil. They are then observed under a microscope to confirm the presence of the causative mite.

Children with atypical rash distribution can undergo a polymerase chain reaction assay for the amplification and detection of the Sarcoptes DNA from skin scrapings.

A **burrow ink test** is used to demonstrate the typical burrows seen with scabies.

Hematology: Eosinophilia may suggest a diagnosis of crusted scabies.

Dermatopathological identification of the mites.

Likewise, the diagnosis of head louse infestation is also **based on clinical findings** rather than sophisticated laboratory investigations. The presence of a live louse is essential for the diagnosis of an active infestation. Due to the excellent sensitivity and specificity of the clinical findings in the diagnosis of head pediculosis, no laboratory investigations are usually indicated.

**Treatment of Scabies and Pediculosis in Children**

The treatment of confirmed scabies in children includes the **administration of an anti-scabies agent along with antibiotic therapy** if secondary scabies lesions become infected. Permethrin, lindane or ivermectin have been all used in the treatment of scabies in children with comparable efficacy. Neonates with suspected scabies should undergo treatment only after the confirmation of the diagnosis by skin scrapings testing for the live mite.

It is important to understand that pruritus might increase after the introduction of a scabicide agent. Oral antihistamines such as hydroxyzine hydrochloride or diphenhydramine hydrochloride might be indicated to help with the severe pruritus.

Children with a confirmed head louse infestation should undergo **empirical therapy to eliminate head lice**. Hair conditioners and normal shampoos should be avoided during the period of applying the pediculicide. Re-treatment with the same pediculicide one week to ten days is recommended.

The first-line therapy for head louse infestation is permethrin. The drug is safe, even in small children and young infants. Malathion and ivermectin can be also used as topical treatments for head lice.

In addition to the pharmacological treatment of active head louse infestation,
**mechanical elimination** of the parasite is also indicated. This can be achieved by wetting the hair with water and white vinegar. The use of fine-toothed combs is also helpful for getting rid of nits.

References


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