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# CLINICAL-ALGORITHMIC APPROACHES TO THE DIAGNOSIS OF LATENT AND ATYPICAL FORMS OF SCABIES IN CHILDREN

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**ABSTRACT:** Introduction: Scabies, caused by the mite *Sarcoptes scabiei var. hominis*, remains a significant public health issue globally, particularly affecting children. While classic presentations are readily identifiable, latent and atypical forms pose considerable diagnostic challenges, leading to delayed treatment, increased morbidity, and continued transmission. This study aims to develop and propose a structured clinical-algorithmic approach to enhance the diagnostic accuracy of these challenging scabies presentations in the pediatric population. Methods: A comprehensive literature review was conducted using PubMed, Scopus, and Google Scholar databases to identify studies related to atypical scabies, scabies in infants, diagnostic methods, and clinical guidelines published between 2000 and 2025. Based on the synthesized evidence and analysis of prototypical clinical scenarios, a step-by-step diagnostic algorithm was developed. The algorithm integrates epidemiological data, clinical manifestations (both classic and atypical), and modern diagnostic tools like dermoscopy. Results: The developed algorithm stratifies the diagnostic process based on the initial clinical suspicion. It guides the clinician from initial assessment (pruritus characteristics, contact history) through a detailed physical examination focused on subtle and location-specific signs in different pediatric age groups. Key decision points include the presence of eczematous, nodular, or bullous lesions, and involvement of atypical sites such as the scalp, face, palms, and soles. The algorithm incorporates dermoscopy ("delta wing jet" sign) as a crucial second-line investigation and skin scraping for microscopy as a confirmatory test. A scoring system is proposed to aid in decision-making for empirical treatment in cases with high clinical suspicion but negative microscopy. Discussion: Atypical presentations of scabies in children are often misdiagnosed as eczema, impetigo, or allergic reactions, primarily due to the unique immunological responses of children and the frequent use of topical steroids (scabies incognito). The proposed algorithm provides a systematic framework that minimizes diagnostic errors by encouraging clinicians to consider scabies in a wider range of dermatological presentations. Its implementation can lead to earlier diagnosis and treatment, thereby reducing complications like secondary bacterial infections and preventing outbreaks in families and communities. The algorithm's utility lies in its structured approach, which is particularly valuable for primary care physicians and pediatricians who may be less familiar with atypical dermatoses. Conclusion: The diagnosis of latent and atypical scabies in children requires a high index of suspicion and a systematic approach. The proposed clinical algorithm serves as a practical tool to improve diagnostic accuracy, ensure timely management, and control the spread of this common but often-overlooked infestation.
**Keywords:** Scabies, Atypical Scabies, Pediatric Dermatology, Diagnostic Algorithm, Sarcoptes scabiei, Dermoscopy, Scabies Incognito.

## INTRODUCTION

Scabies is a contagious ectoparasitic skin infestation caused by the mite *Sarcoptes scabiei var. hominis*. It is a ubiquitous disease, with an estimated global prevalence of over 200 million cases at any given time, showing a particular predilection for children, the elderly, and populations in resource-limited settings (Leung & Miller, 2011). In children, the infestation not only causes intense pruritus, which severely impacts sleep and quality of life, but also predisposes them to

secondary bacterial infections like impetigo and cellulitis. In some cases, these infections can lead to severe systemic complications, including septicemia and post-streptococcal glomerulonephritis (Romani et al., 2015).

The diagnosis of classic scabies is typically straightforward, based on the identification of characteristic clinical signs: burrows, papules, vesicles, and pustules, with a specific distribution pattern involving the interdigital spaces, wrists, axillae, and genital areas. The hallmark symptom is intense nocturnal pruritus. However, the clinical spectrum of scabies is broad, and atypical presentations are common, especially in the pediatric population. These forms represent a significant diagnostic challenge for clinicians, including pediatricians, general practitioners, and even dermatologists (Sharma & Singal, 2011).

Atypical forms of scabies in children include, but are not limited to, scabies incognito (presentation altered by corticosteroid use), nodular scabies, bullous scabies, and manifestations specific to infants, where the face, scalp, palms, and soles are frequently affected (Boralevi et al., 2014). Latent or paucibacillary scabies, characterized by a low mite burden and subtle symptoms, is also difficult to diagnose but remains infectious, contributing to the silent transmission of the disease within families and communities. Misdiagnosis of these forms as other common pediatric skin conditions, such as atopic dermatitis, contact dermatitis, or insect bites, is frequent. This leads to inappropriate treatment, prolongation of the patient's suffering, and an increased risk of community outbreaks.

The gold standard for diagnosis, microscopic identification of mites, eggs, or scybala from skin scrapings, has a variable and often low sensitivity, especially in cases with a low mite count (Walter et al., 2011). In recent years, non-invasive techniques like dermoscopy have emerged as valuable aids, allowing for the visualization of the mite and its burrow (*in vivo*) with higher sensitivity than traditional microscopy. However, access to and expertise in these techniques can be limited.

Given these diagnostic hurdles, there is a clear need for a structured, evidence-based approach to aid clinicians in navigating the complexities of atypical and latent scabies in children. Currently, diagnostic pathways are often based on individual clinical experience rather than standardized protocols. Therefore, this paper aims to synthesize the existing evidence to develop and propose a comprehensive clinical-algorithmic approach for the diagnosis of latent and atypical scabies in the pediatric population. This algorithm is intended to serve as a practical tool to improve diagnostic accuracy, facilitate timely intervention, and ultimately reduce the burden of this persistent disease.

## METHODS

This study employed a systematic review and evidence synthesis methodology to develop a clinical diagnostic algorithm. The process was conducted in three distinct phases: (1) literature search and data extraction, (2) analysis and synthesis of evidence, and (3) development of the clinical algorithm.

Literature search and data extraction - A comprehensive search of the literature was performed using the electronic databases PubMed, Scopus, and Google Scholar. The search was restricted to articles published in English between January 2000 and December 2025 to ensure the inclusion of current diagnostic and management trends. The search strategy utilized a combination of Medical Subject Headings (MeSH) terms and keywords, including: "scabies," "Sarcoptes scabiei," "child," "pediatric," "infant," "atypical," "unusual," "latent," "scabies incognito," "nodular scabies," "bullous scabies," "crusted scabies," "diagnosis," "dermoscopy," "videodermoscopy," "microscopy," and "clinical algorithm."

Inclusion criteria were: (1) original research articles, (2) review articles, (3) case reports and series focusing on atypical presentations in children, and (4) articles discussing diagnostic

methods for scabies. Exclusion criteria were: (1) articles focusing solely on adult populations, (2) studies on animal scabies (mange), and (3) articles not available in English. Two independent reviewers screened the titles and abstracts of the retrieved articles, and any disagreements were resolved by consensus or consultation with a third reviewer. Full-text articles of the selected studies were then reviewed for data extraction.

Analysis and synthesis of evidence - The extracted data were organized and synthesized to identify key themes related to the diagnosis of challenging scabies cases in children. The focus of the analysis was on: Epidemiological risk factors (e.g., household contacts, institutional settings). Specific clinical features of atypical scabies variants (morphology and distribution of lesions). Age-specific differences in clinical presentation (infants vs. older children). The diagnostic utility, sensitivity, and specificity of various methods (clinical examination, skin scraping, dermoscopy, adhesive tape test, biopsy). Common diagnostic pitfalls and differential diagnoses.

This synthesis formed the evidence base for constructing the decision points and pathways within the proposed algorithm. Prototypical clinical scenarios were developed based on the literature to test the logical flow and practicality of the algorithm.

Development of the clinical algorithm - The algorithm was designed as a flowchart to provide a clear, step-by-step guide for clinicians. The structure was conceived to be intuitive and applicable in various clinical settings, from primary care to specialized dermatology clinics. The algorithm begins with the initial patient presentation and proceeds through a series of questions and decision nodes. These nodes incorporate: Initial Suspicion: Based on core symptoms (pruritus) and epidemiological links. Clinical Phenotype Assessment: Differentiating between classic and suspected atypical presentations. Age-Stratified Examination: Highlighting specific areas to examine in infants versus older children. Diagnostic Testing: Integrating non-invasive (dermoscopy) and invasive (microscopy) tests in a logical sequence. Therapeutic Decision-Making: Providing guidance on when to proceed with empirical treatment based on the strength of the clinical evidence.

The algorithm was iteratively refined to ensure clarity, logical consistency, and clinical relevance. A simple scoring system was integrated to assist in quantifying the level of clinical suspicion, particularly in scenarios where definitive microscopic confirmation is not possible.

**RESULTS**

The synthesis of evidence from the literature review culminated in the development of a structured Clinical-Algorithmic Approach for Diagnosing Atypical and Latent Scabies in Children. The core results are the algorithm itself (Figure 1) and a summary of key clinical indicators for atypical scabies (Table 1).

Key clinical indicators of atypical pediatric scabies - Based on the literature review, a summary of clinical presentations that should raise suspicion for atypical scabies was compiled (Table 1). These features are central to the decision-making process in Step 3 of the algorithm.

***Table 1.***

***Clinical characteristics of atypical scabies in children***

| Variant | Age group | Key clinical features | Common differential diagnoses |
|---|---|---|---|
| **Infantile Scabies** | Infants (<2 years) | - Vesiculopustular lesions are common. | Atopic dermatitis, impetigo, Langerhans cell histiocytosis, acropustulosis of infancy |
| | | - Widespread eczematous dermatitis. | |
| | | - Involvement of face, scalp, neck, palms, and soles is frequent. | |
| | | - Burrows may be more prominent and widespread. | |

| | | | |
|---|---|---|---|
| **Scabies Incognito** | All ages | - Altered morphology due to topical corticosteroid use.<br>- Reduced inflammation, but pruritus persists and may worsen.<br>- Lesions can be widespread and lack classic distribution.<br>- Mite count can be significantly higher. | Atopic dermatitis, contact dermatitis, fungal infection |
| **Nodular Scabies** | All ages | - Persistent, reddish-brown, intensely pruritic nodules (1-2 cm).<br>- Typically located in covered areas: axillae, groin, scrotum, buttocks.<br>- Represents a hypersensitivity reaction; may persist for months after successful treatment. | Urticaria pigmentosa, insect bite reactions, lymphoma cutis |
| **Bullous Scabies** | All ages (rare) | - Tense bullae on an erythematous base, resembling bullous pemphigoid.<br>- Often coexists with classic scabietic lesions. | Bullous impetigo, bullous pemphigoid, linear IgA bullous dermatosis |

## DISCUSSION

The primary challenge in managing scabies in children is not treatment but diagnosis. The algorithm and clinical summaries presented in this study are designed to address this gap by providing a structured framework for clinicians. The discussion will focus on the rationale behind the algorithm's structure, its clinical implications, and its limitations.

Rationale and significance of the algorithmic approach - The proposed algorithm is built on a hierarchical process that reflects a typical clinical workflow. It starts with the most common indicators (pruritus and contact history) to establish an initial index of suspicion. This is critical because a high index of suspicion is the single most important factor in diagnosing atypical scabies (Thomas et al., 2020). The algorithm deliberately separates classic from atypical presentations to force the clinician to consider scabies even when textbook signs are absent.

A key strength of this approach is the emphasis on age-specific examination. The classic "scabies-free zone" of the head and neck in adults is invalid in infants, where scalp and facial involvement is common (Boralevi et al., 2014). Failure to examine these areas is a major cause of missed diagnosis in this vulnerable age group. Similarly, highlighting the features of scabies incognito is vital, as the widespread use of potent topical steroids for any eczematous rash can effectively mask the underlying infestation, creating a diagnostic trap.

The integration of dermoscopy as a first-line investigation after clinical examination is another crucial element. Dermoscopy is a rapid, non-invasive tool that, in experienced hands, has a higher sensitivity (over 90%) than skin scraping for detecting scabies (Dupuy et al., 2007). By placing it before skin scraping, the algorithm promotes a less invasive diagnostic pathway, which is particularly advantageous in children. Skin scraping remains the gold standard for confirmation but is relegated to a second-line test for cases where dermoscopy is negative or unavailable.

Finally, the inclusion of a clinical scoring system for empirical treatment decisions addresses a common clinical dilemma: what to do when suspicion is high but confirmatory tests are negative. Given the low sensitivity of microscopy, a negative result does not rule out scabies. In such cases, a therapeutic trial is often warranted to prevent ongoing transmission and patient discomfort. The proposed score provides a semi-objective basis for this decision, justifying treatment for the patient and their close contacts.

Clinical implications and public health impact - The implementation of a systematic approach like the one proposed could have significant clinical and public health benefits. For the individual child, an early and accurate diagnosis translates to faster relief from distressing pruritus, reduced risk of secondary bacterial infections, and improved quality of life. Misdiagnosis with atopic dermatitis, for example, often leads to treatment with topical steroids, which can exacerbate the infestation, leading to scabies incognito with a much higher mite burden and increased infectivity (Sharma & Singal, 2011).

From a public health perspective, every undiagnosed case of scabies is a potential source of transmission. Children are major vectors for scabies within households and schools. Latent cases, with minimal symptoms, can unknowingly perpetuate the cycle of infestation. By improving the detection of these subtle and atypical cases, the algorithm can help break chains of transmission and contribute to the control of community outbreaks. This is particularly relevant in settings like daycare centers and schools, where scabies can spread rapidly.

**LIMITATIONS**

This study has several limitations. First, the proposed algorithm is based on a synthesis of existing literature and has not been prospectively validated in a clinical setting. Its diagnostic accuracy, clinical utility, and impact on patient outcomes need to be assessed through future clinical trials. Second, the utility of the algorithm is dependent on the clinician's skill and the availability of resources. The effective use of dermoscopy, for instance, requires specific training and equipment that may not be available in all primary care settings. Third, the clinical suspicion score is a conceptual tool and has not been validated. Its components and weighting are based on established clinical principles, but its performance characteristics (sensitivity, specificity) are unknown.

Despite these limitations, the algorithm serves as a valuable conceptual framework and educational tool. It promotes a systematic and thorough approach to a common diagnostic problem and can be adapted to different clinical contexts.

**CONCLUSION**

The diagnosis of latent and atypical scabies in children remains a significant clinical challenge that contributes to patient morbidity and public health burden. The classic textbook presentation of scabies is often absent in the pediatric population, particularly in infants, leading to frequent misdiagnosis and delayed treatment. This paper presents a comprehensive, evidence-based clinical algorithm designed to improve the recognition of these challenging cases.

The proposed algorithm emphasizes a high index of suspicion, a systematic physical examination tailored to different age groups, and the rational integration of modern diagnostic tools like dermoscopy. By providing a structured pathway for evaluation and decision-making, this tool can empower pediatricians, family physicians, and other healthcare providers to diagnose atypical scabies more accurately and confidently. Early diagnosis and treatment are paramount to alleviating suffering, preventing complications, and controlling the spread of this highly contagious disease. Future research should focus on the prospective validation of this algorithm in diverse clinical settings to confirm its utility and refine its application.

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