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Editorial

Welcome to Volume 3, Issue 1 (2026) of the *International Journal of Pediatric Dermatology*. Practitioners in pediatric dermatology routinely confront rapid shifts in their daily clinical practice, driven by atypical disease presentations, heightened parental concern, and evolving epidemiological trends that continuously require the adaptation of diagnostic and therapeutic strategies. The six articles in this issue reflect this multifaceted reality, spanning from rare, diagnostically complex cases to widespread public health challenges.

A common theme across several contributions is the value of diagnostic persistence when a clinical picture diverges from classical expectations. Kanaan et al. exemplify this principle with a challenging case of severe pediatric linear IgA bullous dermatosis (LABD). Because initial direct immunofluorescence was inconclusive, establishing a definitive diagnosis required three years and a repeat biopsy. Throughout this interval, the clinical team had to manage secondary infections, dapsone toxicity, and adherence difficulties, underscoring the critical importance of rigorous pharmacovigilance and caregiver education in chronic autoimmune blistering disorders.

In early infancy, diagnostic accuracy often relies on considering conditions rarely encountered in this age group. Arcangeli and Licordari report a case of *pityriasis versicolor* in a three-month-old infant presenting with lesions on the face, trunk, and scalp. Because *Malassezia* infections are predominantly associated with adolescents, infantile presentations are easily underrecognized, particularly when they involve the scalp. Similarly, Chiriac et al. present three novel cases of acquired facial hyperpigmented macules (AFHM) in Caucasian infants from Romania, paired with a review of 261 published cases. While AFHM follows a benign course, it generates substantial parental distress, and their review highlights a relevant clinical distinction: whereas lesions typically undergo spontaneous resolution in Chinese patients, they tend to persist longer in European and mixed populations.

Beyond diagnostic complexities, the management of refractory conditions remains a primary clinical challenge. Extensive generalized vitiligo in children carries a profound psychosocial burden and frequently exhibits resistance to standard therapies. Batchu et al. describe a 12-year-old boy with vitiligo affecting 75% of his body surface area (BSA) who had failed nearly two years of phototherapy as well as topical and oral corticosteroids. Within three months of initiating oral upadacitinib (30 mg daily) as monotherapy, he achieved complete facial repigmentation and marked improvement elsewhere, permitting the discontinuation of all concomitant treatments. Cases such as this support the emerging therapeutic potential of oral JAK inhibitors in severe pediatric vitiligo.

At the same time, individual clinical advancements cannot be separated from broader public health realities. In a systematic review, Sron et al. examine the epidemiological burden of *tinea capitis* among pediatric refugees. Overcrowding, shared fomites, and limited access to healthcare during displacement create favorable conditions for pathogens such as *Trichophyton violaceum*, with prevalence rates reaching up to 15% in some cohorts. Their findings provide a compelling rationale for integrating routine dermatological screening into standard refugee health assessments.

Finally, this issue addresses an endemic ectoparasitosis that is resurging across Europe: scabies. Arcangeli et al. report the results of a nationwide survey of 932 Italian pediatricians and emergency physicians, elucidating why scabies is becoming increasingly difficult to control. Over 90% of respondents reported diagnostic delays, largely because early lesions are frequently misdiagnosed as

atopic dermatitis. Meanwhile, treatment failures are rising, driven by poor adherence, incomplete treatment of close contacts, medication costs, and improper topical permethrin regimens. Notably, nearly 99% of surveyed clinicians agreed on the urgent need for a shared consensus between pediatricians and dermatologists.

Taken together, these papers highlight the dual imperative of pediatric dermatology: combining meticulous bedside clinical observation with novel therapeutic modalities and a broader awareness of the environmental contexts in which patients live. We thank the authors and reviewers for their scholarly contributions, and we trust that this issue will prove valuable in daily clinical practice.

Editor-in-Chief

Professor Fabio Arcangeli

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Case Report

A Severe Case of Pediatric Linear IgA Bullous Dermatosis

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KEYWORDS

Linear IgA bullous dermatosis, chronic bullous disease of childhood, pediatric dermatology

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ABSTRACT

Linear IgA bullous dermatosis (LABD) is a rare immune-mediated subepidermal blistering disease, most commonly affecting children between 4 and 5 years of age. Although generally self-limiting, some cases present diagnostic and therapeutic challenges.

We report an 8-year-old boy who presented at age 5 with disseminated pruritic bullous lesions. Initial direct immunofluorescence was inconclusive, and diagnosis was confirmed only three years later upon repeat biopsy demonstrating linear IgA deposition at the basement membrane zone. The clinical course was complicated by recurrent secondary infections, drug-induced hepatitis from dapsone overdose, cyclosporine-induced disease aggravation, and treatment non-adherence. Disease control was ultimately achieved with dapsone and corticosteroids.

This case highlights the importance of repeat biopsy when clinical suspicion persists despite inconclusive findings, careful drug monitoring, and comprehensive caregiver education. A multidisciplinary approach is essential for managing severe pediatric LABD.

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1. Introduction

Linear IgA bullous dermatosis (LABD), classically referred to as chronic bullous disease of childhood (1–3), is an immune-mediated vesicobullous disease that may affect both children and adults. Pediatric prevalence is unknown; however, it is considered a rare disease with a peak occurrence between 4 and 5 years of age and an estimated global incidence of 0.2 to 2.3 cases per million population annually (3–5). LABD is a subepidermal blistering disease characterized by a hallmark immunohistochemical finding: linear deposition of IgA autoantibodies along the basement membrane zone (BMZ) of the dermoepidermal junction, where IgG and C3 may also be detected, in conjunction with a neutrophilic dermal infiltrate (3, 6–8).

In children, LABD is mostly benign; however, in rare cases, it can cause severe mucosal involvement and be associated with a worse prognosis. The disease is considered idiopathic and multifactorial and has been associated with environmental triggers, such as drug exposure, as well as autoimmune diseases (e.g., rheumatoid arthritis and psoriasis). Antibiotics—especially vancomycin—are the most commonly implicated agents in drug-induced forms; however, many other drugs, including anti-inflammatory/analgesic agents (e.g., ketoprofen, diclofenac, and piroxicam) and antihypertensive medications (e.g., captopril and other ACE inhibitors), can also trigger the disease (5, 9–11). More recently, associations with specific human leukocyte antigen (HLA) haplotypes have suggested a genetic predisposition (12).

The diagnosis of LABD can be challenging, as there are no rapid tests or expedited diagnostic pathways to reliably distinguish it from bullous pemphigoid (BP) or dermatitis herpetiformis (DH). Bullous pemphigoid typically presents with tense bullae on erythematous or urticarial bases, whereas dermatitis herpetiformis is characterized by grouped vesicles and papules accompanied by intense pruritus. In contrast, LABD classically exhibits annular or polycyclic lesions forming the characteristic "cluster of jewels" configuration. Nevertheless, significant clinical overlap frequently delays diagnostic confirmation. Moreover, drug-induced LABD can manifest from 24 hours to 4 weeks after exposure to the causal agent, warranting consideration of LABD in the differential diagnosis when evaluating patients with bullous disease.

Herein, we report a challenging case of pediatric LABD complicated by recurrent secondary infections and treatment non-adherence, highlighting the diagnostic and therapeutic complexities of this condition.

2. Clinical Case

An eight-year-old boy first presented to the Pediatric Dermatology Division of Hospital Jesus in 2020, at the age of five, with disseminated papules. Over a 10-month period, these lesions progressed to severe pruritic bullous lesions with annular configurations, predominantly affecting the back, arms, and periaxillary regions (Figure 1A and 1B).

Initial laboratory evaluations, including complete blood count, bilirubin levels, and renal and liver function tests, were within normal ranges. Based on the clinical history and lesion characteristics, LABD was suspected. A skin biopsy with direct immunofluorescence (DIF) was performed; however, the results were inconclusive, supposedly due to intense secondary infection and/or technical difficulties. The first treatment regimen consisted of dapsone, the first-line therapy for pediatric LABD, combined with prednisolone for additional disease control, chlorpheniramine to alleviate pruritus, and vitamin D supplementation for documented deficiency. This regimen was administered for four months.

In February 2022, the patient was hospitalized for 14 days due to secondary skin infections and drug-induced hepatitis caused by maternal doubling of the prescribed dapsone dosage. During hospitalization, the dapsone dose was adjusted, oxacillin was initiated, and prednisolone was continued. Although temporary improvement was observed, blistering lesions persisted. One month after discharge, another secondary infection required treatment with sulfamethoxazole for 14 days, in combination with prednisolone and dapsone.

Attempts to taper corticosteroids in May 2022 resulted in exacerbation of the lesions. Subsequent maternal nonadherence further exacerbated disease activity by August 2022, with the emergence of scalp lesions. Cyclosporine was initiated but led to significant disease aggravation. Therapy was reverted to dapsone and prednisolone, with terbinafine added to treat concurrent tinea capitis.

By May 2023, further efforts to taper corticosteroids led to recurrence of bullous lesions, prompting

initiation of mycophenolate mofetil. Later that year, the patient developed febrile lymphadenopathy, abdominal pain, and infected skin lesions, leading to another hospitalization. Management included intravenous immunoglobulin and broad-spectrum antibiotics (clindamycin, vancomycin, and fluconazole) for the treatment of sepsis.

By November 2023, at eight years of age, the patient demonstrated stable clinical improvement on a regimen of dapsone, corticosteroids, sulfamethoxazole, and omeprazole. Bullous lesions were limited to the perioral and genital regions and were effectively managed with topical corticosteroids. A new skin biopsy with DIF exhibited linear IgA deposition along the basement membrane zone (BMZ), confirming LABD diagnosis (Figure 2). Long-term dapsone therapy proved successful (Figure 1 C and D).



Figure 1. A, B: *Disseminated pruritic bullous lesions with annular configuration involving the back, arm, and periaxillary regions at initial presentation, showing the characteristic "cluster of jewels" pattern of pediatric linear IgA bullous dermatosis.* **C, D:** *Marked clinical improvement after long-term treatment with dapsone and corticosteroids, with resolution of widespread bullous lesions and residual limited involvement.*

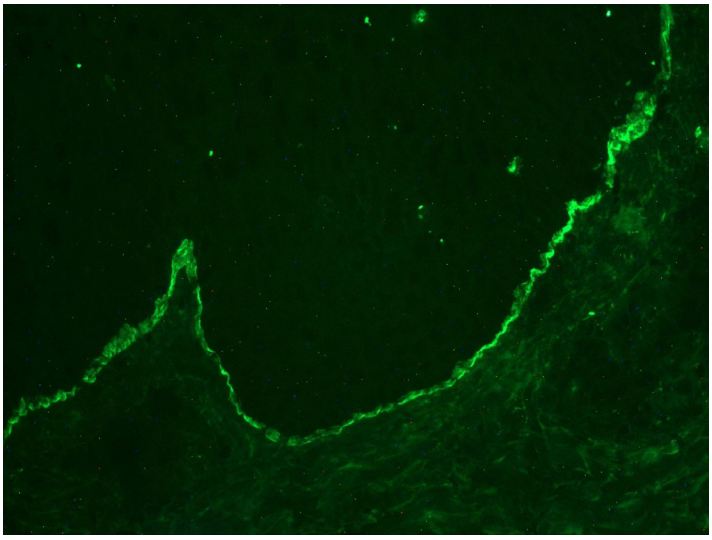


Figure 2. *Direct immunofluorescence: finely linear fluorescence for IgA at the basement membrane.*

3. Discussion

LABD clinical and histopathological features overlap with dermatitis herpetiformis, bullous lupus erythematosus, drug eruption, and rare forms of bullous pemphigoid, and the precise diagnosis requires a skin biopsy with DIF, which demonstrates linear IgA deposition at the BMZ. Occasionally, IgG and C3 deposits may also be observed. In cases where initial DIF findings are inconclusive despite strong clinical suspicion, repeat biopsy is warranted, as demonstrated in our patient, whose diagnosis was only confirmed upon a second DIF performed three years after initial presentation.

Prompt recognition of LABD is critical for ensuring accurate diagnosis and timely treatment. Pruritic bullous lesions with annular configurations and the characteristic "cluster of jewels" pattern should alert pediatricians to consider LABD, particularly when drug-induced causes are suspected or exacerbations occur following medication use.

Dapsone remains the first-line treatment for pediatric LABD, with favorable outcomes at doses of 50–100 mg/day or 0.5 to 3 mg/kg/day (12, 13). However, regular monitoring of hepatic function is essential, as illustrated by our case, in which maternal overdose of dapsone resulted in drug-induced hepatitis requiring hospitalization.

Cyclosporine has been proposed for refractory cases; however, it has also been reported to induce LABD (6, 12, 14). In our patient, cyclosporine initiation led to significant disease aggravation, prompting its discontinuation. The precise mechanisms underlying this paradoxical response remain unclear but are likely related to complex interactions between the host immune or genetic background and drug-induced immune modulation, which underscores the importance of close clinical monitoring when introducing immunosuppressive agents in LABD.

Although pediatric LABD is generally considered a self-limiting condition, with spontaneous resolution typically occurring within four years (4), our case demonstrates that a subset of patients may experience a protracted and complicated course. Factors contributing to disease severity in this case included recurrent secondary infections, treatment non-adherence, and challenges in corticosteroid tapering.

This case illustrates many of these diagnostic and therapeutic challenges, including inconclusive early biopsy, overlapping clinical features, and refractory disease course, emphasizing the need for vigilance in prolonged or refractory bullous eruptions.

4. Conclusions

This case underscores the complexity of managing severe LABD, particularly in pediatric patients. Key challenges include recurrent secondary infections, treatment non-adherence, and the delicate balance between tapering corticosteroids and minimizing adverse effects while maintaining adequate disease control.

Effective management requires a multidisciplinary approach, strict adherence to prescribed therapy, and comprehensive caregiver education to reduce complications and optimize clinical outcomes. This case also reinforces the importance of timely biopsy, careful drug monitoring, and long-term follow-up to ensure sustained remission.

Authorship information

All authors contributed to every stage of the manuscript, actively participated in guiding the research, provided intellectual input into the diagnostic and therapeutic management of the case, critically reviewed the literature, and approved the final version of the manuscript.

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Case Report

Successful Repigmentation of Extensive Pediatric Vitiligo with Oral Upadacitinib: A Case Report

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KEYWORDS

Vitiligo, pediatric vitiligo, upadacitinib, Janus kinase inhibitor, repigmentation

ABSTRACT

Generalized vitiligo in children is challenging to treat and often demonstrates an incomplete response to conventional therapies. In this case report, a 12-year-old boy with generalized vitiligo involving 75% of the body surface area had failed nearly two years of treatment with home narrowband UVB phototherapy, topical tacrolimus, topical corticosteroids, and pulsed oral dexamethasone. Oral upadacitinib at a dose of 30 mg daily was initiated in August 2025. Significant repigmentation was observed within three months, with complete clearance of facial lesions and marked improvement across the trunk and extremities. Treatment with oral upadacitinib as monotherapy allowed for the complete discontinuation of all topical agents and phototherapy. This case highlights the potential role of oral Janus kinase inhibitors as an effective therapeutic option in selected pediatric patients with refractory generalized vitiligo.

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1. Intoduction

Vitiligo is an acquired autoimmune depigmentation disorder caused by destruction of melanocytes. It affects approximately 0.5–2% of the global population, with at least 25% of cases beginning before age 10 (1). In children with extensive disease (>50% body surface area [BSA]), vitiligo confers a substantial psychosocial burden, including stigma, bullying, anxiety, and impaired quality of life (2).

The pathogenesis is driven by interferon-gamma signaling through the Janus kinase (JAK)-signal transducer and activator of transcription (JAK-STAT) pathway, making JAK inhibitors (JAKi) a rational therapeutic target (3). First-line treatments including topical corticosteroids, tacrolimus, pulsed oral corticosteroids, and narrowband ultraviolet B (nbUVB) phototherapy, often yield only partial or transient repigmentation in refractory generalized disease and impose a significant treatment burden (4).

Topical ruxolitinib cream (Opzelura) received U.S. FDA approval in July 2022 for nonsegmental vitiligo in patients 12 years of age and older, based on two phase 3 randomized trials demonstrating significant repigmentation (5). Despite this advance in topical JAK inhibition, oral JAKi remains an emerging therapeutic option, with only sparse data available in pediatric populations.

Oral JAKi have shown promising efficacy mainly in adults. Phase 2 and phase 3 trials have demonstrated significant repigmentation with once-daily upadacitinib in adults (6). In contrast, pediatric data remain scarce. A case series of 13 children (ages 6–16 years) treated with oral tofacitinib, which exhibits JAK1, JAK3 and some JAK2 inhibition, showed significant repigmentation in 8 patients (7). Experience with upadacitinib in pediatric vitiligo is limited to a small case series of four children (ages 6–7 years) achieving mean 60.2% Vitiligo Area Scoring Index improvement at 24 weeks (8).

Herein, we report a 12-year-old boy with longstanding generalized vitiligo refractory to nearly two years of conventional therapies who was treated with oral upadacitinib.

2. Case Report

A 10-year-old boy presented to our pediatric dermatology clinic on September 26, 2023, for a second opinion regarding widespread vitiligo that had been present for slightly over one year. The lesions were first noticed on the hands and chest as small white patches that quickly spread to the arms, back, legs, feet, hands, and face. The lesions were not itchy, painful, or cosmetically bothersome to the patient. His past medical history included mild intermittent asthma and reading difficulty. Family history was negative for hypothyroidism, rheumatoid arthritis, or other autoimmune disorders. Laboratory evaluation by his primary care provider, including thyroid studies, vitamin D level, and hemoglobin A1c, was within normal limits. Physical examination (Figure 1) revealed well-circumscribed chalk-white depigmented macules and patches with moth-eaten borders involving the face, neck, chest, back, groin, buttocks, arms, hands, legs, and feet, affecting approximately 75% BSA. No leukotrichia was noted on examination.



Figure 1. *Baseline appearance of generalized vitiligo in September 2023, prior to start of conventional therapy. Extensive well-circumscribed chalk-white depigmented macules and patches with moth-eaten borders involved the face, neck, trunk, extremities, groin, and acral sites, affecting approximately 75% body surface area (BSA).*

The patient had previously been evaluated by an outside dermatology practice and treated with topical corticosteroids and topical tacrolimus without improvement. At our initial visit in September 2023, a shared decision-making approach led to initiation of topical tacrolimus 0.03% ointment twice daily to the face, neck, axillae, and groin; triamcinolone 0.1% ointment twice daily, three days per week, to the arms, legs, and trunk; pulsed oral dexamethasone 4 mg each Saturday and Sunday for 12 weeks; and home nbUVB phototherapy three times weekly. At the three-month follow-up in January 2024, the family reported significant improvement in pigmentation and BSA involvement had decreased to 50%. The regimen was continued, with tacrolimus increased to 0.1% when possible.

By July 2025, when the patient was 12 years old, the disease had progressed again despite ongoing treatment. The family reported that his condition was worse than previous visits, with suspected new areas of depigmentation and recurrent sunburns (Figure 2). Adherence to topical therapies had become inconsistent because they were no longer perceived as providing meaningful improvement. Topical ruxolitinib was not selected, as FDA approval is limited to a maximum treatment area of 10% BSA. Instead, the option of an oral JAKi was discussed in detail with the patient and family, including common and serious risks. The patient had no family history of clotting disorders.



Figure 2. *Appearance of vitiligo in July 2025, after nearly 2 years of conservative therapy with home narrowband UVB phototherapy, topical tacrolimus, topical corticosteroids, and pulsed oral dexamethasone. The disease remained largely refractory with persistent involvement of approximately 50% BSA prior to initiation of oral upadacitinib.*

Treatment was initiated with oral upadacitinib 30 mg daily in August 2025 after screening laboratories returned normal and prior authorization was approved. All topical medications and phototherapy were discontinued. Baseline laboratory evaluation prior to initiating upadacitinib included complete blood count, comprehensive metabolic panel, lipid panel, hepatitis serologies, and tuberculosis testing, all of which were within normal limits except for mildly elevated triglycerides. Repeat laboratory monitoring in October 2025 showed no significant changes. Given the absence of major risk factors and stable laboratory findings, repeat laboratory monitoring was planned for every 6-12 months unless clinically indicated. The patient and family were counseled on medication administration, periodic laboratory monitoring, and precautions regarding live vaccines.

At the three-month follow-up in November 2025 the patient and his father reported significant improvement. Facial involvement had completely resolved and repigmentation was noted on the chest and back (Figure 3). He remained on upadacitinib 30 mg daily. Mild morning fatigue was noted but did not interfere with daily activities. At the six-month follow-up, steady improvement was observed across the face, chest, back, arms, and legs, with many previously depigmented areas now showing light tan macules coalescing into tan patches. Clinical assessment demonstrated substantial repigmentation, with complete clearance of facial involvement and marked improvement on the trunk and extremities, corresponding to a reduction in affected body surface area from approximately 75% at baseline prior to upadacitinib to <50%. The patient had experienced four mild self-limited upper respiratory infections over the winter. Due to mild fatigue and the increased frequency of upper respiratory infections, the dose was reduced to upadacitinib 15 mg daily.



Figure 3. *Significant repigmentation in February 2026, six months after initiation of oral upadacitinib. Multiple previously depigmented areas on the face, chest, back, arms, and legs demonstrate light tan macules coalescing into tan patches.*

3. Discussion

This case demonstrates a marked response to oral upadacitinib in a pediatric patient with refractory generalized vitiligo. After nearly two years of conventional therapies including home nbUVB phototherapy, topical tacrolimus, topical triamcinolone, and pulsed oral dexamethasone, the patient achieved complete facial repigmentation and substantial improvement across the trunk and extremities within six months of initiating upadacitinib 30 mg daily. This response allowed complete discontinuation of all topical agents and phototherapy and represents successful use of oral JAKi in a child with extensive disease that had failed standard first-line options.

In adult patients with extensive non-segmental vitiligo, oral upadacitinib has shown strong efficacy. The phase 2 randomized trial by Passeron et al. reported significant facial and total body repigmentation with once-daily dosing (6). However, pediatric data remain

scarce. While small case series using a different JAKi, oral tofacitinib, have reported repigmentation rates of 70–80% (7), responses appear to be slower and less complete than those seen in adult trials. Experience with upadacitinib in children is even more limited.

This pediatric case describes the successful treatment of extensive generalized vitiligo, initially involving 75% of the BSA, which had remained refractory despite nearly two years of conventional therapies (Figures 1–3). This report also provides practical, real-world insight into the management of common adverse effects. Mild morning fatigue and an increased frequency of upper respiratory infections prompted a dose reduction from upadacitinib 30 mg to 15 mg daily at the six-month follow-up visit. These effects are recognized, dose-dependent adverse events associated with JAK1 inhibition. At the time of dose reduction, the patient had already achieved significant and sustained repigmentation, and the dose adjustment was undertaken to optimize tolerability while maintaining clinical response.

Importantly, oral upadacitinib used as monotherapy proved sufficient for significant and sustained repigmentation, allowing complete discontinuation of all topical agents and phototherapy. This simplified treatment regimen may improve adherence and reduce treatment burden and suggests that oral JAKi may emerge as a promising monotherapy for pediatric patients with refractory generalized vitiligo.

The safety profile observed in this pediatric patient aligns with the known profile of upadacitinib. No serious infections, laboratory abnormalities, cardiovascular events, or thromboembolic complications were observed. Mild morning fatigue and recurrent upper respiratory infections were managed with dose reduction, consistent with longer-term data from atopic dermatitis trials in adolescents, in which similar mild adverse events were managed without discontinuation (9).

Limitations of this report include its single-patient nature and relatively short follow-up of six months. Larger, longer-term studies are needed to confirm durability of response, optimal dosing strategies, and long-term safety in the pediatric population. Despite these constraints, the degree of repigmentation achieved with oral monotherapy following failure of conventional therapies is noteworthy.

4. Conclusions

This case demonstrates that oral upadacitinib can induce significant and sustained repigmentation in a pediatric patient with extensive generalized vitiligo refractory to nearly two years of conventional therapies. The successful use of oral JAK inhibition as monotherapy highlights its potential as a valuable treatment option for pediatric vitiligo when standard therapies fail.

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Case Report

Pityriasis (Tinea) Versicolor in a Three-Month-Old Infant: A Case Report

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KEYWORDS

Pityriasis versicolor, tinea versicolor, children, neonates, scalp, Malassezia

ABSTRACT

Pityriasis versicolor (PV) is a superficial fungal disease caused by Malassezia species, typically affecting adolescents and young adults and rarely reported in children and neonates. We describe a three-month-old infant presenting with hypopigmented macules on the face, trunk and scalp. Wood's light examination showed dull white areas and yellow green fluorescence consistent with active PV. This case, together with available literature, highlights that infantile and neonatal PV - though uncommon - may be frequently underestimated and the apparently unusual location on the scalp should always be considered.

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1. Introduction

Pityriasis versicolor (PV), or tinea versicolor (TV), is a superficial fungal skin disease caused by Malassezia species (globosa, furfur or sympodialis), a common lipophilic yeast that is a saprophyte of human skin (1-4). Factors that lead to the conversion of saprophytic yeast into a parasitic form include genetic predisposition, warm and humid environments, use of oils and greasy topicals and seborrheic skin. Sometimes, immunosuppressive diseases or immunosuppressive drugs may play a causal role (5).

Due to the lipophilic nature of Malassezia, PV generally prefers the most seborrheic skin areas such as the upper trunk, the neck and sometimes the proximal part of the upper limbs, while more rarely it can affect the scalp and lower limbs (3, 4).

Although PV can occur at any age, it is more common among adolescents and young adults (1, 4, 5, 6). However, it has been reported several times in pediatric age (1, 7).

Clinically it presents with hypopigmented or less frequently hyperpigmented lenticular macules, sometimes confluent, with well-defined edges and often covered with fine desquamation. Examination with a Wood's light of the hypopigmented macules reveals a dull white color (melanopenic hypomelanosis) because the Wood's light is partially reflected and partially absorbed, and shows a characteristic yellow-green fluorescence in active forms (3, 4).

Despite the availability of effective local and systemic antifungal therapies, repeated recurrences are almost inevitable due to the saprophytic nature of the fungus involved and the frequent persistence or recurrence of the contributing factors.

We report here the case of a three-month-old child with a one-month history of hypopigmented macules distributed on the face, trunk, and scalp.

2. Case Report

A three-month-old boy was presented to our medical office with multiple hypopigmented macules on his face. Born through normal vaginal delivery at 38 weeks of gestation, he was in good health and had not taken any medications or applied any skin medications.

Physical examination revealed numerous lenticular hypopigmented macules distributed across the face, especially the forehead (Figure 1).

Wood's light examination revealed a typical yellow-green fluorescence of the macules, making them visible also on other parts of the body, such as the scalp and trunk (Figures 2, 3, 4).

After the diagnosis of PV the child was treated with miconazole 2% solution twice daily for two weeks with a favorable outcome (Figures 5, 6).

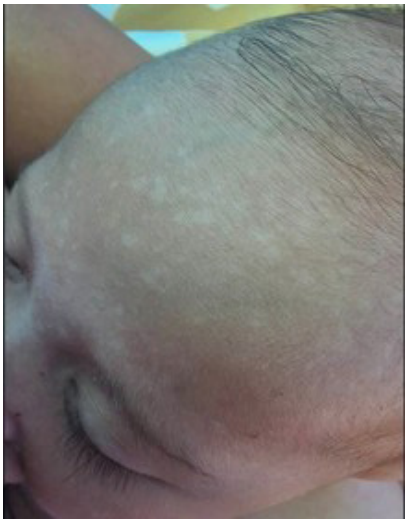


Figure 1. *Lenticular-shaped hypopigmented macules, partly confluent, on the forehead.*



Figure 2. *Wood's light examination. Yellow fluorescent spots on the forehead.*

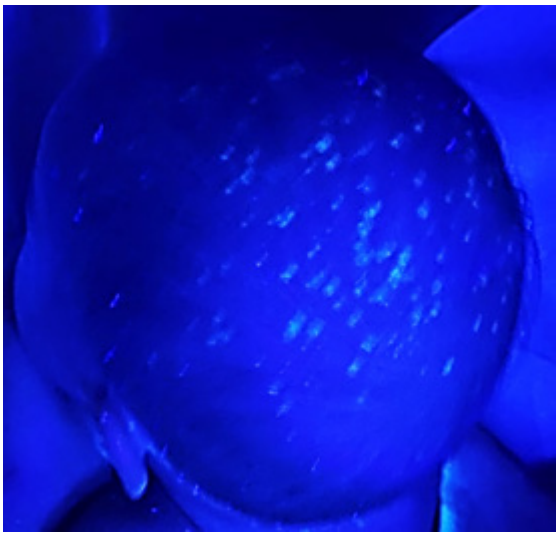


Figure 3. *Wood's light examination. Yellow fluorescent spots on the scalp.*

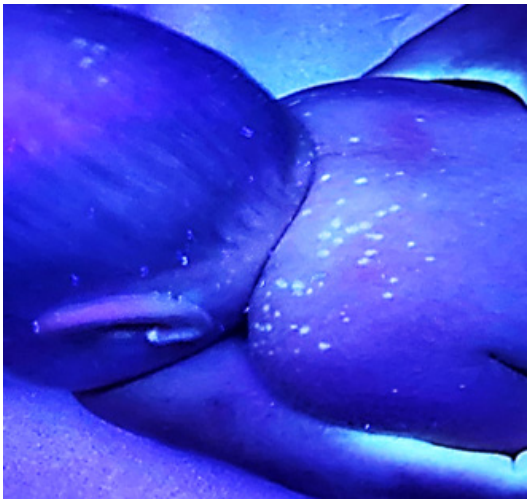


Figure 4. *Wood's light examination. Yellow fluorescent spots on the trunk.*



Figure 5. *Two weeks after antifungal therapy. The hypopigmented macules were no longer visible.*

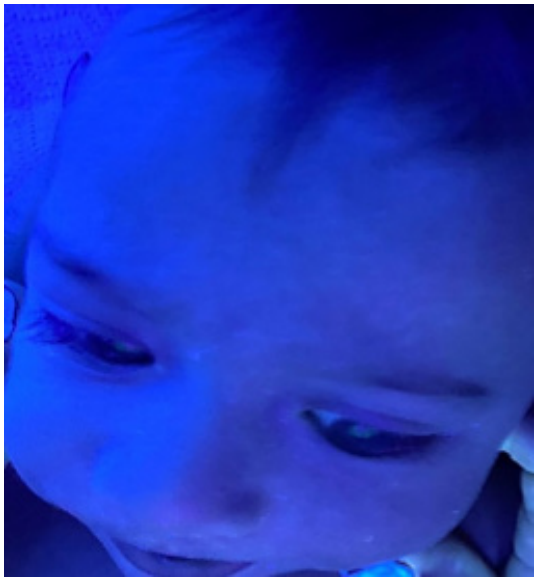


Figure 6. *wo weeks after antifungal therapy. Wood's light examination was negative.*

3. Discussion

PV is common in adolescents and young adults (3, 4) and less common in children. However, in a recent study, Luo Z et al. (1) reported 415 children with PV observed in just two years at their dermatological center. The age groups in which PV was common were younger than 6 months (35.42%) and 7 to 14 years (34.94%).

This may be due to the fact that the sebaceous glands are well developed at birth and, under the influence of maternal androgen hormones, they are extremely active from the first hours of life (8). Furthermore, human skin is colonized by Malassezia already at birth (9). Sebum production then gradually decreases, reaching low levels at about 6 months of age. At subsequent ages, the sebaceous glands have very low secretory activity until 6–7 years of age, when they start producing sebum again in increasing quantities (1, 9).

PV shows a slightly higher prevalence in males, likely attributed to increased sebaceous activity among them (1).

To our knowledge, before the study of Luo et al. (1), there were only 16 cases of PV reported in children under one year of age (5, 7, 10–16). Twelve were male and four female. Most diagnosed cases were in the 1–3 month age group, and no diagnosis was reported after the eighth month of life. The most commonly affected area was the face (the forehead), followed by the trunk and neck. The scalp was involved in only four cases.

In the pediatric age group, contrary to what happens in adulthood, the face is frequently affected. Luo Z et al. (1) found it in 65.29% of their cases. In our case, in addition to the face, the macules were diffusely present not only on the trunk, a commonly affected site in every age group, but also on the scalp.

The location of pityriasis versicolor lesions varies based on the individual's age, with the face and neck being more common sites in children. Scalp involvement is rare in both children and adults (17). In children of all ages, only a few cases of PV localized to the scalp, as in our case, are reported, and in children under one year of age, only three cases in addition to ours have been described (11, 16).

Wang et al. reported the case of a 7-year-old boy with PV on the scalp (18). In the study of Luo Z et al. (1), the scalp was affected in six children, and Zhou et al. (16) reported a series of four cases with hypopigmented lesions on the scalp, suggesting that we should not ignore scalp involvement in children with PV.

4. Conclusions

Contrary to previous assumptions, PV is not uncommon in the pediatric age group. In children under one year of age, it is likely underdiagnosed. Recognizing its clinical features and using Wood's light fluorescence are essential for a correct diagnosis. The most recent publications contribute to better defining the clinical spectrum of the disease in the pediatric age group, and in particular in the first months of life, highlighting a clear prevalence in the male sex, frequent localization on the face (particularly the forehead), and the not infrequent involvement of the scalp.

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Systematic Review

The Burden of Tinea Capitis in Paediatric Refugee Populations: A Systematic Review

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KEYWORDS

Tinea capitis, paediatrics, refugees

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ABSTRACT

Tinea capitis (TC) is a dermatophytic fungal infection that infects the scalp predominantly in children resulting in both physical and psychosocial impacts. Refugee children have increased risk factors for infection due to factors related to overcrowding, sharing of grooming items or reduced sanitation access during transit and decreased access to healthcare services. This systematic review examined the burden of tinea capitis in paediatric refugee populations until September 2025. Of 449 studies screened, 6 were included for review. Four studies were from the Middle East region and two studies were from Australia. Overall, our study highlights the limited refugee-specific evidence on Tinea capitis in paediatric populations but published studies span over two decades and reveal a lack of recent, systematic epidemiological data. Higher infection rates were found in younger children and males, particularly among those of African descent. Rates of infection ranged from 0.43–1.06% in the Middle East to 9–15% in Australia. *Trichophyton violaceum* was the predominant pathogen with an increasing burden among displaced children. Strengthened surveillance and integration of fungal screening through skin checks into refugee health assessments are needed to improve early detection, treatment, and reduce health inequity.

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1. Intoduction

Tinea capitis is a fungal scalp infection caused by dermatophytes. It is most common in children, due to close contact with peers and household members increasing contagion, and underdeveloped sebaceous activity reducing the protective effect of sebum (1). Clinically, it presents with patchy alopecia, scalp scaling, and sometimes inflammatory lesions such as kerion (2). The most common causative organisms are *Trichophyton* and *Microsporum* species, though distribution varies with geography and migration patterns (3). Globally, it is one of the most common communicable childhood skin infections, with prevalence in some regions exceeding 20–30% (4). Beyond physical symptoms, tinea capitis can cause embarrassment, stigma and school absenteeism, reducing self-esteem and affecting academic performance and peer relationships (5). It may also predispose to secondary bacterial infection, which can lead to complications including invasive infection, acute rheumatic fever, post-streptococcal glomerulonephritis and chronic kidney disease (6).

Prevalence varies widely and is influenced by region, climate, crowding and socioeconomic factors. Fungal skin infections remain among the most common conditions in children globally, with prevalence above 20% in some low- and middle-income regions (1). In high-income countries, outbreaks occur in schools and immigrant communities, typically caused by *Microsporum canis* and *Trichophyton* species (1).

Children and adolescents make up over half of the global refugee population (7). Those in refugee and displaced settings face overlapping risk factors that heighten susceptibility, including shared beds and clothing, proximity to animals, limited access to clean water and sanitation, and poor housing (4). Sharing grooming products and close physical contact further promotes transmission, reported in some immigrant and displaced communities (3). Frequent relocation, limited primary care access, language barriers and low health literacy also hinder treatment and increase spread (8).

This paper aims to assess the burden of tinea capitis in paediatric refugee populations.

2. Methods

The systematic review was registered on PROSPERO (international prospective register of systematic reviews) at the National Institute for Health Research and Centre for Reviews and Dissemination (CRD) at the University of York.

This systematic review has been conducted using standard methodology and reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) 2020 statement checklist (Appendix A).

Eligibility criteria

Primary observational studies with epidemiological data on tinea capitis in refugee cohorts were eligible for inclusion. This included all population based, cross sectional and/or cohort studies (both prospective and retrospective), with both population and institutional based studies considered. Studies with clinically or mycologically proven tinea capitis were included. In studies that reported tinea capitis in conjunction with other tinea infections (i.e. tinea corporis), efforts were made to obtain original data sets to see if separated data were available. If not possible, and where a clear distinction could not be established, the study was excluded. Children/young people were defined as those below the age of 24 years (9) and refugees defined as a person who has been forced to flee their country to escape conflict, violence, or persecution and have sought safety in another country (10).

There was no restriction on geographical or countries income levels.

Information sources

Literature searches were conducted using various national electronic databases including MEDLINE (Ovid), Embase (Ovid), Emcare (Ovid), Web of Science and PubMed. The reference list of all included articles was hand-searched for additional manuscripts. Google Scholar, BASE and MedNar were used to identify grey literature.

Search strategy

The search was limited to studies published in the English language. A predefined search strategy adapted for MEDLINE is provided, with the search last conducted in September 2025 (See Appendix B).

Selection process

Duplicate records were removed before two independent investigators (DS and HC) working separately reviewed titles and abstracts for their relevance. Any discrepancies between investigators were resolved by a senior investigator (BR).

Data collection process

Independent data extraction was completed (DS and HC) on all papers meeting the inclusion criteria.

Data items

Data were extracted for the primary outcome of tinea capitis disease frequency (proportion, prevalence and incidence). Where available the secondary outcomes of clinical features, risk factors, close contacts, comorbidities, complications and culture were extracted. Data were sought for the variables of study period, diagnostic criteria, age range, sex, ethnicity, population location, country of origin of the refugee population and method of data collection.

Risk of bias assessment

Where relevant, two authors (DS and HC) independently appraised the studies, reporting prevalence data using the Joanna Briggs Institute (JBI) appraisal checklist (Appendix C).

3. Results

Study selection

In total, 438 studies were identified with 11 duplicates removed. Of the 438 screened articles, 409 were removed. Full text of two papers could not be retrieved and following full text review of the remaining 27 papers, 21 were excluded. Grey literature and citation searching did not reveal any further articles for inclusion. Overall, six manuscripts were included for review and from three countries over a 27-year period (Fig. 1, Table I).

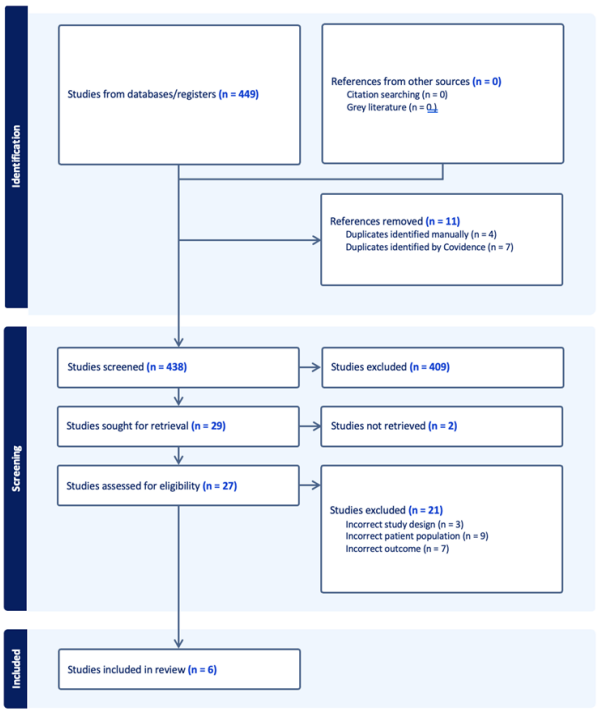


Fig. 1. *Flowchart of systematic review according to the PRISMA 2020 statement.*

Table I. *Number of articles on tinea capitis based on country, year and refugee population characteristics.*

Author	Country	Year	Region	Refugee Population – Ethnic characteristics
Ali-Shtayeh et al. (11)	Palestine (West bank)	1996	Middle East	No further demographic information given about ethnic origin of refugee population
Ali-Shtayeh et al.(12)	Palestine (West bank)	1998	Middle East	No further demographic information given about ethnic origin of refugee population
McPherson et al. (13)	Australia	2005	Oceania	Arabic 41.6%, Sudanese 21.5%, Dari 13.7%, Asian 11.1%, Other African 6.5%, Other 4%, 1.6% (not stated)
Mutch et al. (14)	Australia	2012	Oceania	Sudanese 32.7%, Burmese 15%, Other African 49.6%, Afghani 0.6%, Iraqi 0.6%, Iranian 0.2%, Sri Lankan 0.1%, Serbian 0.1%
Mashiah et al. (15)	Israel	2011-2014	Middle East	African Refugee population – Eritrean 86.9%, Other African 13.1%
Kassem et al. (16)	Israel	2023	Middle East	African Refugee population – Eritrea and Republic of Sudan (no percentage breakdown given)

Tinea capitis

Six studies were included: four from the Middle East and two from Australia (Table II). The Middle Eastern studies comprised two cross-sectional surveys from refugee schools in the West Bank (11, 12) and two retrospective reviews from the Tel Aviv Medical Centre, Israel (15, 16). The Australian studies were prospective longitudinal studies – one in a refugee school in Melbourne (13) and one in a refugee clinic in Perth (14).

Four studies reported ethnicity, showing predominance of African refugee children (43.5–100%), with smaller representations of Afghani, Iraqi, Iranian, Sri Lankan, and Serbian backgrounds (13-16). Diagnosis of TC was based on clinical suspicion with microbiological confirmation in five studies (11-13, 15-16), and on clinical findings alone in one (14).

Four of the six studies reported age-related data, consistently showing higher TC risk among younger children. One study found the highest incidence among children aged 6–10 years (1.2–1.6%) compared with 10–14 years (0.2–0.7%) (11). Another reported 81.8% of TC cases occurred in children aged 10–12 years (12). A third study identified a peak prevalence at 9 years (26.1%), followed by 6 and 11 years (17.4%) and 8 and 10 years (13.0%) (13). More recently, the average age of infected refugee children was 2.5 years younger than non-refugee Israeli children—3.97 vs 6.1 years in girls and 3.7 vs 6.58 years in boys (15). Collectively, data from 1998 to 2023 support that younger refugee children are at increasingly higher risk of TC than their older counterparts.

Table II. *Tinea capitis in refugee children populations, study characteristics and findings.*

Author, Site, Country	Age range	Study period	Study design	Participants	M/F (%)	Diagnostic criteria	Proportional	Incidence data	Prevalence data (over study period)	Causative Dermatophyte
Ali-Shtayeh et al. West Bank Palestine (11)	6 – 14 years	January - June 1994	School-children cros-sectional nal study. Clinic children prospective study	2252 school children, 117 clinic children (mix of refugee, rural, and urban)	69.3/ 30.7** (estimate based on overall population)	Clinical inspection. Direct microscopy and culture	School children - 32% (24/75), Clinic children - 22.5% (20/89)	-	*24/2252 (1.06%) in school children*	In school children: T. violaceum (54.2%) M. canis (41.7%) T. schoenleinii (4.1%) In clinic children: T. violaceum (65%) M. canis (25%), T. mentagrophytes (10%), T. schoenleinii (1.13%)
Ali-Shtayeh et al. West Bank Palestine (12)	6-14 years	October 1998 - May 1999 (examined at 3 monthly interval)	Cross-sectional study	2572	72.7/ 23.5	Clinical inspection. Direct microscopy and culture. Hair brushings cultured for asymptomatic carriage rates	Tinea capitis - 47% (11/23) Carrier – 37.5% (12/32)	-	*11/2572 (0.43%) – 8 boys (0.59%), 3 girls (0.25%) Asymptomatic carriage rates - 12/788 (1.52%)*	T. violaceum (90.9%) M. canis (9.1%)

Author, Site, Country	Age range	Study period	Study design	Participants	M/F (%)	Diagnostic criteria	Proportional	Incidence data	Prevalence data (over study period)	Causative Dermatophyte
Mashiah et al. Tel Aviv Medical Centre Israel (15)	7 months – 10 years	Jan 2011 – Dec 2014	Retrospective study	130	70/30	Skin scraping and hair sample for direct microscopy and culture	Overall 130/145 (89.7%)* 2011 – 4/6 (66.7%) 2012 – 18/22 (81.8%) 2013 - 15/20 (75%) 2014 – 93/97 (95.8%) *100% TC in population group (89.7%)* 2011 – 4/6 (66.7%) 2012 – 18/22 (81.8%) 2013 - 15/20 (75%) 2014 – 93/97 (95.8%) *100% TC in population group	Overall new cases per year: 2011 – 4 2012 – 18 2013 – 15 2014 – 93	-	T. violaceum (48.5%) M. audouinii (44.6%) M. canis (3%)
McPherson et al. Melbourne Australia (13)	5-12 years	November 2005 – 2 studies a fortnight apart	Prospective study	153	52/48	Clinical examination, microbiological specimen taken from scalp/hair of suspicious areas	23/153 (15.0%) *22/23 have ethnicities listed	-	-	T. soudanese (47.8%) M. audouinii (26.1%) T. violaceum (17.4%) Both T. soundanese and T. violaceum (8.7%)
Mutch et al. Western Australia Australia (14)	2 months – 17.3 years	March 2006 – December 2008	Prospective study	1026	-	Symptom history and clinical exam	93/1026 (9.1%)	-	-	-
Kassem et al. Israel (16)	2 months – 13 years	Jan 2004 – Jan 2020	Retrospective, population-based cohort study	1861	61.4/ 38.6%	Clinical and mycological diagnosis	1861/3358 (55.4%)	-	-	Trichophyton (95%) -T. violaceum (85%)

Two studies from the Nablus Area in the Middle East compared the prevalence in rural, refugee, and urban groups. One study showed TC was the second most common (1.1%) with rural children having the most (1.9%) and urban children the least (0.4%) (11). A second study in a similar population group identified that refugee children had the highest prevalence (0.43%) (12). Similarly, an Israeli study observed a rising proportion of new cases of TC attributed to paediatric refugees between 2011–2014 (66.7% to 95.8%) (15).

Five studies reported male predominance, (52–73%) (11-13, 15-16) and one did not specify gender (14). Two studies also reported asymptomatic dermatophyte carriage in refugee children, ranging from 1.5% to 5.8% (12, 13).

Five studies identified the causative organisms (11-13, 15, 16). *Trichophyton violaceum* was predominant (48–95%) (11, 12, 15, 16), followed by *Microsporum audouinii* (26–45%) (13, 15) and *M. canis* (3–42%) (11, 12, 15), *T. soudanense* was the most common in one study, (13) and *T. schoenleinii* was occasionally isolated (11).

One Israeli study had incidence data on new cases of TC per year in the paediatric population increasing from four in 2011 to 93 in 2014 (15). Importantly, the overall population was not stated so percentage increases could not be obtained, however it supports the rise in morbidity in this region.

Overall data was limited and heterogeneous, precluding meta-analysis. Middle Eastern cross-sectional studies reported TC prevalence between 0.43–1.06% (11, 12), while Australian data from the proportion of those with TC positive cases from paediatric refugees referred for assessment showed much higher rates of 9–15% (13, 14). Proportional data from Israel showed the percentage of TC attributed to paediatric refugees ranging from 55.4% - 89.75% (15, 16).

The risk of bias assessment was completed using the JBI critical appraisal tool where both reviewers DS and HC independently assessed and collated a score for each article with the consensus scoring reported (Appendix C). All articles were deemed appropriate for inclusion.

4. Discussion

This review highlights the limited refugee specific evidence on TC in paediatric populations. Despite the scarcity of the data, the studies appraised revealed these key findings:

1. Primary school aged children had the highest TC burden;
2. Refugee populations had higher TC burden than non-refugees;
3. There was a slight male predominance.

Global context and relevance to refugee populations

Placing the results of this review in the broader global context shows that TC is consistently over-represented in refugee and immigrant populations. A recent systematic review of infectious dermatological conditions in adult and paediatric refugee groups identified fungal infections as the most common type, highlighting the disproportionate burden of superficial mycoses in refugee children (17). Epidemiological reports reinforce this pattern: an Israeli study found 84% of African refugee children with scalp scale were culture-positive for dermatophytes, mainly *T. violaceum* (18). Another Israeli analysis reported 40–50 paediatric TC cases annually with a median age of 6 years, showing a sustained burden (19). In Greece, after the 2015 refugee influx, refugee and immigrant children accounted for 30–35% of paediatric TC (3). In Australia, a Western Australian refugee clinic audit found 9.1% of newly arrived children had TC at first assessment (14). Broader reviews of dermatological disease in refugee camps report that 5–25% of presentations were skin-related, with fungal infection prevalence ranging from 7.9–37.8% in high-density camp environments (20). Collectively, these findings demonstrate the heightened vulnerability of refugee children to TC and emphasise the importance of examining its burden more closely.

Burden of disease

From the two included Middle Eastern cross-sectional studies, TC prevalence among refugee children ranged from 0.43-1.06% (11). Initially, rates were intermediate between rural and urban groups (rural 1.9%, refugee 1.1%, urban 0.4%), but later data showed the highest prevalence in refugee populations (0.43% vs 0.2% in rural and urban groups) (12), suggesting an increasing burden over time.

Higher burden in refugee populations aligns with data from countries of origin, where endemicity is greater. A study from Gondar, Ethiopia reported 29.4% TC prevalence among schoolchildren, with younger age, animal contact and crowding as major risk factors (21). A meta-analysis of over 9,400 Ethiopian schoolchildren showed a pooled prevalence of 29%, confirming a large disease reservoir (4). Outside Africa, prevalence is lower but clinically significant: paediatric dermatology clinics in Athens reported 2–4% annual TC prevalence between 2012–2019, with higher rates during increased immigration (3).

Across studies, TC was more common in younger children, with much lower rates above age 12 (11–13, 15). A meta-analysis showed children under 10 had 1.65 times higher odds of TC (4). Risk drivers include

immature sebaceous activity, close contact, shared grooming, animal exposure and limited healthcare access.

Asymptomatic dermatophyte carriage was higher in refugee children (1.5%) compared with rural (0.7%) and urban (0.5%) groups (12), and reached 5.8% in one Australian study (13). Carrier prevalence correlated with community TC rates and contributed to household clustering, especially among siblings (13). Larger families and classrooms also showed higher prevalence, supporting the value of early household and school-based screening (11, 12).

Israeli studies reported increased TC cases among refugee children from 66.7% to 95.8% over three years, with higher incidence than non-refugee groups (22). Males were more frequently affected, consistent with global patterns (3).

Two Australian studies reported higher TC proportions (9.1–21%) (13–14) than Middle Eastern data, mirroring African prevalence estimates (23–29%) (4, 23). These findings likely reflect national screening guidelines (24) and migration patterns prioritising resettlement of African refugees (25, 26). Clustering within newly arrived groups likely reflects spread in communal housing and schools, consistent with broader infection trends during resettlement (27). Within the Australian context, refugee families are resettled in temporary housing initially for the first 1-2 months, then relocated to more stable housing (6-12 month leases). Families are not colocated with other families or groups, reducing the risk of over-crowding and inter-family transmission; however intra-family spread may still occur.

Causative dermatophytes

T. violaceum was the predominant pathogen in Middle Eastern refugee cohorts (17, 18, 20), consistent with regional data showing it as the leading cause among 76 paediatric refugees in Israel in 2016–17 (18) and across African/Middle Eastern migrant groups (16). In contrast, one Australian study identified *T. soudanense* as most common, with *T. violaceum* third (13). The predominance of *T. violaceum* reflects the high proportion of African refugee children in Israel, Ethiopian children (<2% of the population) accounted for 16% of TC cases (19). Similar shifts have been reported across Europe and the US, where refugee arrivals have altered pathogen patterns towards *T. violaceum* and *T. tonsurans* (4, 28–30). These findings demonstrate migration's influence on dermatophyte epidemiology and the need for routine skin checks in refugee children. Diagnostic challenges related to skin of colour further reinforce this need (31).

Limitations

Our study has several limitations. Firstly, there was significant heterogeneity in the data available not allowing for any meta-analysis. Only two papers had prevalence data and the overall number of papers included in the study was small. The included papers only represented two different world regions in the Middle East and Australia which may not be reflective of the broader global context and impact the generalisability of the results found. Whilst TC appears to disproportionately impact refugee children of African ethnicity, the lack of prevalence data from African countries (including transit countries) did not enable direct comparative analyses. Time intervals between the included studies varied significantly as did study settings and refugee screening protocols in addition to laboratory investigations and microscopy.

5. Conclusion

Tinea capitis remains an under-recognised yet important burden among paediatric refugee populations, with evidence limited to a few studies from the Middle East and Australia. Although overall prevalence rates appear modest, younger children and boys are disproportionately affected. The predominance of *T. violaceum* has been observed, consistent with the organism's endemicity in African regions, highlighting the role of migration in shaping dermatophyte epidemiology.

Our findings highlight the need for strengthened epidemiological surveillance and integration of fungal infection screening and skin checks into refugee health assessments, which are recommended in some countries (32). This will improve early detection, treatment,

and prevention of TC. Addressing tinea capitis within refugee health frameworks offers an opportunity to reduce health inequities and prevent avoidable morbidity among paediatric refugee populations.

Key Points:

• There remains limited current epidemiological data on tinea capitis in paediatric refugee populations; however we show that from the available data tinea capitis remains an important burden amongst this population group that should be addressed;

• Younger children and boys remain disproportionately affected, and causative organisms are likely reflective of the endemicity of the country of origin of refugee;

• There remains a need for further epidemiological surveillance and screening to ensure that refugee health assessments can reduce the burden of tinea capitis in refugee populations;

• Delayed access to healthcare or misunderstanding of different treatments available in arrival country may undermine efforts to treat and prevent onwards transmission.

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Case Series

Acquired Facial Hyperpigmented Macules in Infants – Three New Cases and a Short Review

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KEYWORDS

Acquired facial hyperpigmented macules of infancy, childhood, differential diagnoses

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ABSTRACT

Facial pigmentations in infants are worrisome for parents and families. A definite diagnosis will allow appropriate consultation and – if necessary – treatment. Acquired facial hyperpigmented macules in infants (AFHM) is an entity first described in 2014, mainly in infants and young children of Chinese or Mediterranean origin. We evaluated infants from Romania with AFHM. We present three new cases of AFHM in Caucasian infants from Romania and performed a narrative literature search on PubMed database. The infants were 6, 14, and 24 months old (medium 14.7 months), a boy and two girls. They presented with irregular macules mainly on the forehead, although some macules were observed on the bridge of the nose, while extrafacial hyperpigmentation was absent. The lesions were brownish and asymptomatic. A short time course with mild topical corticosteroids or emollients had no effect. Follow-up was six months. In the literature research, we identified 261 cases worldwide with a male to female ratio of 1.4. Most case reports came from China followed by the Mediterranean region. There were no reports from Central, Eastern or Northern Europe. More than 90% of Chinese cases show a complete clearance after several years. According to published data the disease seems to be limited to preschoolers. In contrast, AFHM remained persistent in mixed American and European populations for up to 4.5 years. Stringent data on pathogenesis of AFHM are not available. Treatment options may include sun protection, but this has not been validated. Further studies are needed. AFHM seems to be more common in patients with Chinese and Mediterranean background. Among Chinese patients the course of the disease is benign and self-limited, while data from mixed non-Chinese patients suggest a longer persistence.

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1. Introduction

Cutaneous hyperpigmentation is a common condition that can be triggered by various factors. The three leading causes are genetics, sun exposure, and particular medications. Cutaneous pigmentary anomalies in infants and young children – hypo- or hyperpigmentation – are a matter of concern for their families. The perceived color of skin depends on several factors, including the type and amount of melanin (eumelanin and pheomelanin), the size and the depth of pigment deposits (1).

In case of dermal melanin deposits, the skin shows a blue-gray hue that looks bluer as the pigment is deposited deeper. A pronounced yellowing of the skin is common in infants on high carotenoid diet. Red and blue hues are caused by oxyhemoglobin and reduced hemoglobin in capillaries, arteries, and veins in the dermis. Inflammatory disorders may eventually result in hypo- or hyperpigmentation as in post-inflammatory hyperpigmentation. Exogenous pigments may also lead to hyperpigmentation of various colors (2).

Acquired hyperpigmented facial macules were described by Hernández-Martín et al. (2014) as a new entity in 25 infants and young children from Spain, Canada and the US (3). This condition is characterized by the appearance of multiple, asymptomatic, hyperpigmented macular lesions on the forehead and in the temporal region without segmental distribution and without the previous presence of erythema, edema, or desquamation. The mean age at presentation was 12.2 months (range: 2-24 months). The condition affected patients of different races, and there was no history of similar lesions among family members or close contacts.

We present three new cases in infants and young children of Fitzpatrick skin type I and II from Romania.

2. Case Reports

We have seen in consultations during the last months three infants and young children - a boy and two girls - aged 6, 14 and 24 months (medium 14.7 months) addressed to us for skin hyperpigmentation on the face (Figures 1-3). Informed written consent was obtained from the parents for publishing the images and cases.



Figure 1. *Acquired facial hyperpigmented macules in a 6-month-old boy.*



Figure 2. *Acquired facial hyperpigmented macules in a 14-month-old girl.*



Figure 3. *Acquired facial hyperpigmented macules in a 24-month-old girl.*

All patients were in good health. There were no chronic illnesses and no medications. No other skin changes were noted previously or at the time of the examination. Short-time topical steroids and emollients were initially recommended but without improvement.

The acute onset of the hyperpigmentation was within the last few weeks with neither amelioration nor new lesions described later. Hyperpigmented macules were brownish, uniformly colored, and without inflammatory changes, non-scaling, and completely asymptomatic. Forehead and temples were affected in all cases; isolated macules were found on the bridge of the nose. Extrafacial hyperpigmentation was not observed. The macules were of irregular shape with a diameter up to 5 mm.

A meticulous anamnesis was performed in each case, but no trigger factor could be identified. Investigations for routine clinical laboratory were within normal limits. Skin scrapings to exclude dermatomycosis/ pityriasis versicolor were negative in all cases. Patch tests and skin biopsies were not performed due to the age of the patients.

Close follow-up was performed and skin hyperpigmentation was present in all cases at 6 month-control without aggravation or involvement of non-facial skin. There was no sign of confluence of lesions.

The diagnosis of AFHM is based upon the following criteria:

a) Onset in infancy;
b) Lesions located on the forehead and temporal regions
c) Lesions are generally multiple, with a diameter mostly less than 1 cm;
d) Dermoscopy usually shows pseudoreticular pigmentation, with or without linear vessels (4).

In our cases dermoscopy was not available. The diagnosis of acquired facial hyperpigmented macules in infants and young children (AFHM) was confirmed. We recommended a wait-and-see strategy based on the suggestions in recent literature on this topic.

3. Literature Review

A narrative review on PubMed was performed from January 2014 to June 2026. We considered reviews, original studies, case series and case reports. We employed search terms combined by Boolean operators (AND, OR) and truncated search terms according to the PubMed User Guide. PubMed's Automatic Term Mapping was applied. We used the following MeSH terms: (hyperpigmentation*) AND (facial) OR (acquired*) OR (infant) OR (children).

We identified a total of 261 cases including our own

(Table I) (3-9). Most studies are from China (n=5) (5-9), one study investigated a mixed population (3), and one study included patients from South America and the Mediterranean Region (4). While the original study reported persistent hyperpigmented lesions for up to 4.5 years (3), Chinese patients had a shorter disease duration with more spontaneous remissions (6-9). This discrepancy is not fully understood but different ethnicities and lifestyle factors (sun protection, nutrition etc.) may be of some importance. Our Caucasian cases did not show any regression for 6 months follow-up but were lost for further monitoring.

4. Discussion

AFHM is a relatively new disease. The first report from 2014 included 25 infants and young children without a sex preference and of "many races". Their age ranged from 2 to 24 months (mean 12.2 months). The hyperpigmentation presented abruptly during the year and was distributed on the forehead and/or temples. Histopathologic analysis was consistent with post-inflammatory hyperpigmentation despite no previous clinical signs of inflammation. After a follow-up period up to 4.5 years, the lesions persisted (3).

Dermoscopy is helpful in diagnosis. An investigation used dermoscopy as an adjuvant tool in 16 patients with AFHM. Light brown pseudoreticular pigmentation the most common finding in 93.7% of cases. All patients had erythema and linear/branching vessels (5). Unfortunately, dermoscopy was unavailable in our cases.

A retrospective study was conducted on the clinical and dermoscopic features of 32 infants and young children with AFHM. Light brown pseudoreticular pigment and linear/branching vessels were the two major dermoscopic features. During the follow-up period of 31 months to 67 months the lesions of all patients improved. A complete disappearance of the macules was observed in 96.4% of cases. These authors concluded that AFHM is a self-limited disease characterized by sudden appearance of irregularly shaped pigmented macules on the foreheads and temples in infants and young children. They proposed that ultraviolet radiation may play an important role in the etiology and pathogenesis of AFHM (7).

Another smaller study demonstrated pink fibrillary structures on direct optical microscopy examination of the adhesive tape test possibly originating from textiles with a questionable relationship to pathogenesis (5).

Wang et al. (2026) reported on 15 cases with AFHM. Histopathology demonstrated a sparse perivascular lymphocytic infiltration, scattered dermal melanophages, and dilated, proliferating capillaries that stained positively for CD31, CD34, and vascular endothelial growth factor. Therefore, these authors recommended the term acquired facial telangiectatic hyperpigmented macular dermatosis instead of AFHM. AFHM, however, has been the established and widely accepted term based on clinical features. Histopathology is not a necessity in diagnostics. After a follow-up of one year the lesions cleared spontaneously in 11 patients, faded in one child and remained stable in another one (8).

The largest series included 160 infants and young children. Dermoscopic investigations demonstrated two major dermoscopic patterns: (a) non-infiltrating pattern, i.e. pseudoreticular -like brown pigmentation with linear or punctate telangiectasia, and (b) infiltrating pattern, i.e. pseudoreticular -like brown pigmentation without vascular changes. A complete regression of the facial hyperpigmentation was noted in 93.6% of cases at a mean age of (2.8 ± 0.7) years (9).

A review on published case series is provided in Table I (3-9). Our literature research identified 261 cases worldwide, mainly from China and the Mediterranean region, none from Central, Northern or Eastern Europe.

Table I. *Published cases of AFHM.*

Author(s)	n	Male to female ratio	Age range	Ethnicity	Follow-up
Hernández-Martín et al. (2014)	25	13:12	2–24 months (*mean 6 months*)	"Many" ethnicities, but mostly Mediterranean	3–54 months
Giacaman et al. (2016)	3	0:3	1–3 years (*mean 2 years*)	South American, Mediterranean	up to 12 months
Lai et al. (2024)	16	12:4	1–18 months (*mean 6.1 months*)	Chinese	Data unavailable
Zhang et al. (2024)	7	2:5	9-24 months (*mean 2.6 months*)	Chinese	24 months
Chen et al. (2026)	32	17:15	5–24 months (*mean 12.5 months*)	Chinese	31–67 months
Wang et al. (2026)	15	10:5	7–40 months (*mean 16 months*)	Chinese	12 months
Sun & Zhang (2026)	160	95:65	<0.6–16 months (*mean 7.9 months*)	Chinese	up to 72 months
Current study	3	1:2	6-24 months	Caucasian	6 months
Total	**261**	**1.4:1**	**<0.6 month –72 months**	**–**	**3 months - 72 months**

Treatment recommendations are rare and seem to be unnecessary based on Chinese experience. Chen et al. recommended sun protection (7). In our experience, both short-term topical corticosteroids and emollients did not result in a marked improvement. Wait-and-see is the most recommended method among Chinese patients (9).

In contrast, AFHM in non-Chinese infants and children seems to persist for years, which may lead to stigmatization when children attend primary school (3). Therefore, treatment would be justified. However, none of the more specific modalities for hyperpigmentation have yet been studied in AFHM, like topical retinoids, hydroquinone, azelaic acid, niacinamide, thiamidol, tranexamic acid and oral *Polypodium leucotomos* extract, which might be able to shorten disease duration and avoid stigmatization for those patients without spontaneous remission (10-13).

There are several differential diagnoses to be considered (Table II). A careful clinical examination and medical history including family history are sufficient in most cases. Histopathology is rarely needed. Genetic investigations may be considered in syndromic cases of macular facial hyperpigmentation.

Table II. *Differential diagnoses.*

Diagnosis	Remarks	Reference
Pityriasis versicolor	Hypo- or hyperpigmented macules with scaly desquamation, commonly affects the face in children and adolescents; mycology positive for *Malassezia* spp.	(14)
Benign cephalic histiocytosis	A rare, self-limiting non-Langerhans cell histiocytosis that primarily presents in infancy, typical within the first year of life; erythematous to yellow-brownish macules and papules; histology: infiltrate of non-Langerhans cell histiocytes in the papillary dermis.	(15)
Urticaria pigmentosa	Most common form of cutaneous mastocytosis in children; brownish, itchy lesions present a positive Darier sign; histology: increased number of mast cells in the dermis.	(16)
Idiopathic eruptive macular pigmentation	A rare disease characterized by asymptomatic, pigmented brown macules involving the neck, trunk, and proximal extremities; spontaneous resolution; histology: pigmentation of the basal layer, pigmentary incontinence, melanophages, and mild perivascular lymphohistiocytic infiltrate in the papillary dermis.	(17)
Ashy dermatosis *(Erythema dyschromicum perstans)*	A disorder of pigmentation characterized by gray or blue-brown macules or patches in individuals with Fitzpatrick skin types III-V; lesions are usually distributed symmetrically on both sun- and non-sun-exposed areas including the trunk, limbs, neck, and face; the course is chronic progressive.	(18)
Naegeli–Franceschetti–Jadassohn syndrome *(NFJS)*	Caused by heterozygous nonsense or frameshift mutations in the *KRT14* gene; most consistent characteristic clinical features are the absence of dermatoglyphics and hypohidrosis, but also hyper- and hypopigmentation of skin – not restricted to the face.	(19)
Dermatopathia pigmentosa reticularis	Allelic to NFJS caused by distinct mutations in *KRT14*; a triad of reticulate hyperpigmentation, nonscarring alopecia, and nail dystrophy.	(20)
Reticulate acropigmentosa of Kitamura	A rare autosomal dominant genodermatosis; typically begins in the first or second decade of life; a mixture of pigmented and depigmented macules on the extremities; pigmented palmar pits; facial lesions are uncommon, and atrophy of the early lesions is a defining feature.	(21)
Fibrous dysplasia/ McCune-Albright syndrome	Early embryonic postzygotic somatic activating pathogenic variant in *GNAS* (encoding the cAMP pathway-associated G protein Gαs [Gs alpha subunit]); hyperpigmented cutaneous macules are common and are usually the first manifestation of the disease, apparent at or shortly after birth; further characterized by involvement of the skeleton and certain endocrine organs.	(22)
Dyschromatosis universalis hereditaria	Skin lesions usually appear in infancy or early childhood and cease to progress beyond adolescence; multiple irregular hyperpigmented macules interspersed with hypopigmented macules in a mottled pattern over the trunk and extremities; facial involvement in 50% of individuals.	(23)
Laurence-Moon-Bardet-Biedl syndrome	A rare autosomal recessive defect, mostly occurs in children born from consanguineous marriages; major features are cone-rod dystrophy, polydactyly, obesity, learning disabilities, hypogonadism in males, renal anomalies, nystagmus, speech disorders, developmental delay, polyuria, polydipsia, ataxia, and poor coordination/clumsiness; multiple non-itchy hyperpigmented macules on face and back.	(24)
Noonan syndrome with multiple lentigines	A rare disorder with mutations of *PTPN11*, *BRAF* and *RAF1* genes; brownish lentigines; ocular hypertelorism, hypertrophic cardiomyopathy, pulmonic stenosis, genital abnormalities, growth delay, deafness, facial anomalies.	(25)

5. Conclusions

AFHM is a benign acquired macular hyperpigmented disorder of early childhood (commonly within the first year of life). We report herein three European cases from Romania on Fitzpatrick skin types I and II, while most cases worldwide have been reported from China. A minority of patients came from South America, Canada, US, and Spain.

The lesions are irregular, with a diameter usually ≤ 1 cm, in our series with up to 0.5 cm. In most cases the macules are brown. Brownish-red lesions are seen in less than 20% (9). The lesions do not itch and there is no scaling. The forehead and the temporal region are mainly involved, while extrafacial hyperpigmentation is absent. Boys are slightly more often affected than girls (male to female ratio 1.4) (Table I). The disease shows a benign course with complete regression within 4 years in over 90% of children of Chinese descent but has been reported to be persistent for at least 4.5 years from a mixed non-Chinese population. This discrepancy might be due to ethnic and lifestyle factors but needs additional investigations. Further research is warranted related to the pathogenesis of AFHM and possible treatments to shorten the course of the disease.

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Original Article

Management of Pediatric Scabies in Italy: Results of a National Survey and Proposals for an Inter-Specialistic Consensus

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KEYWORDS

Scabies, Sarcoptes scabiei, pediatrics, permethrin, national survey, Inter-Specialistic Consensus, Clinical Practice

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ABSTRACT

Recent years have witnessed a global and European resurgence of human scabies, posing a substantial epidemiological burden on the pediatric population. Clinical management in infants and children presents critical challenges, including diagnostic delays and increasing reports of treatment failure, primarily attributable to obsolete or improper single-application regimens of topical permethrin. This study aimed to evaluate epidemiological perceptions, diagnostic and therapeutic practices, management hurdles, and educational needs among Italian pediatric healthcare professionals concerning pediatric scabies. A nationwide cross-sectional survey was conducted using a 25-item structured online questionnaire (SurveyMonkey platform) distributed to a representative cohort of primary care pediatricians, hospital pediatricians, and pediatric emergency physicians across Italy. A total of 932 healthcare professionals completed the survey (70.06% Primary Care Pediatricians [PCPs]; 20.82% Hospital Pediatricians [HPs]). Overall, 75.21% of respondents observed a marked increase in scabies cases over the last 3–5 years, with the highest concentration in children aged 2-5 years (52.58%) and primary transmission occurring within household/family clusters (84.55%). The diagnostic approach remains predominantly clinical and anamnestic (76.29%); 83.26% refer patients to dermatologists for confirmation, and 60.94% rely on specialists for treatment decisions. Diagnostic delays were reported by 93.02% of respondents, primarily driven by clinical misdiagnosis with infantile eczema/atopic dermatitis (73.39%). Topical permethrin 5% remains the overall first-line therapy (70.82%). Increased treatment failures were noted by 36.80% of participants, with 71.31% associating failures with permethrin. Primary determinants of failure were identified as poor treatment adherence (74.36%), improper management of close contacts (58.34%), high drug costs (32.02%), and suspected pharmacological resistance (24.56%). Finally, 98.82% of respondents considered a joint pediatric-dermatological consensus document useful or indispensable. The survey highlights an urgent requirement for updated diagnostic-therapeutic algorithms, optimized integrated healthcare pathways, and coordinated educational interventions to curb recurrences and combat treatment failures in pediatric scabies.

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1. Introduction

Human scabies is a contagious parasitic dermatosis caused by the microscopic mite Sarcoptes scabiei var. hominis. Classified by the World Health Organization (WHO) as a neglected tropical disease (NTD) (1), scabies represents an escalating public health concern, experiencing a significant resurgence across high-income countries and Western European territories (2–4). In pediatric patients, the clinical presentation differs substantially from classic adult scabies. In infants and young children under 2 years of age, polymorphic lesions (including pustules, vesicles, and inflammatory nodules) frequently involve atypical anatomical sites such as the scalp, face, neck, palms, and soles (3, 5). These atypical manifestations markedly increase diagnostic confusion—most notably with infantile eczema/atopic dermatitis or papular urticaria—thereby prompting the inappropriate use of topical corticosteroids and causing protracted delays in initiating effective scabicidal therapy (5, 6). In addition to diagnostic difficulties, clinicians are now faced with a worrying increase in therapeutic failures following the use of topical permethrin 5%, historically regarded as the gold-standard, first-line treatment. The legacy prescriptive practice of a single overnight application (a "one-night scheme") is now considered obsolete based on robust international clinical evidence (7–10). The reduced clinical efficacy of permethrin has sparked intense scientific debate, counterposing genuine pharmacological resistance or molecular target mutation against pseudo-resistance mechanisms (e.g., poor compliance, incorrect application technique, or failure to treat asymptomatic cohabitants simultaneously) (11–14). In this context, the present nationwide survey provides a snapshot of the real-world clinical practice of Italian pediatricians, providing a comprehensive epidemiological overview and establishing the foundational rationale for a multi-society inter-specialistic consensus document among pediatricians, dermatologists, and public health authorities.

2. Materials and Methods

Study Design and Population

A nationwide, cross-sectional study was conducted targeting pediatric healthcare providers across Italy. Data collection was performed using a web-based structured electronic questionnaire hosted on the SurveyMonkey platform. A total of 932 healthcare professionals completed the survey with a 100% item completion rate.

Questionnaire Structure

The questionnaire comprised 25 single and multiple-choice items structured into four main operational domains:

- **Demographics and practice setting (Items Q1 - Q3)**: professional role, geographic region, and clinical setting;
- **Epidemiology and clinical presentation (Items Q4 - Q9)**: case trends over 3-5 years, annual caseload, age distribution, outbreak settings, and socio-environmental risk factors;
- **Diagnostic practice and pitfalls (Items Q10 - Q13)**: diagnostic modalities, specialist referral rates, perceived diagnostic delay, and underlying causes of misdiagnosis;
- **Therapeutic strategies and contact management (Items Q14 - Q25)**: pharmacological prescriptions, dosing schedules, re-treatment intervals, treatment failure analysis, management of asymptomatic contacts, school return protocols, and educational/operational needs.

3. Results

Sample Demographics and Practice Settings

The study cohort (N = 932) predominantly comprised PCP (70.06%, n = 653), followed by HP (20.82%, n = 194), Pediatric Residents (4.94%, n = 46), Pediatric Emergency Physicians (3.22%, n = 30), and General Practitioners with pediatric practice (0.97%, n = 9). Geographic distribution covered all Italian regions, with the highest participation in Lombardia (18.56%), Lazio (11.27%), Emilia-Romagna (9.01%), Sicilia (8.91%),

Campania (8.48%), and Puglia (8.50%). Overall, 68.24% operated in primary care outpatient clinics and 20.92% in hospital or research institutes.

Epidemiology and Clinical Patterns

An overwhelming 75.21% of respondents (n = 701) reported a clear increase in pediatric scabies cases over the past 3–5 years. Over the preceding 12 months, 88.84% had managed 1 to 15 suspected or confirmed cases, while 3.11% had managed more than 15 cases. The most affected age group was children aged 2–5 years (52.58%), followed by those aged 6–10 years (29.40%), infants under 2 years (10.62%), and adolescents aged 11 years or older (7.40%). Household/family clusters constituted the primary transmission setting (84.55%), followed by nurseries/preschools (16.74%), primary schools (12.02%), reception centers (11.91%), and community care homes (10.41%). The main risk factors identified included precarious socio-economic conditions (34.33%), household overcrowding (13.20%), and recent travel/migration (11.48%), although 23.39% observed no specific risk factors.

Diagnostic Approaches and Delays

Initial consultations were chiefly prompted by generalized pruritic dermatitis (62.23%) and nocturnal itching (57.94%), whereas classical burrows or pearl-like vesicles were identified in 30.26% of cases. Clinical history and physical examination served as the primary diagnostic approach for 76.29% of clinicians. Dermoscopy was regularly utilized by only 21.35%, and direct microscopic examination by 2.36%. Overall, 83.26% referred patients to dermatologists for diagnostic confirmation. Diagnostic delays were acknowledged by 93.02% of participants (frequent: 53.43%; occasional: 39.59%). Primary drivers of diagnostic delay are summarized in Table I.

Table I. *Main causes of diagnostic delay in pediatric scabies (multiple options allowed, N = 932).*

Perceived cause of diagnostic delay	Percentage (%)	Count (n)
Clinical misdiagnosis/overlap with infantile eczema/atopic dermatitis	73.39%	684
Early use of topical corticosteroids masking clinical features (“scabies incognito”)	24.68%	230
Atypical clinical presentation in infants (< 2 years)	29.18%	272
Lack of dermoscopic examination	27.04%	252
Inadequate family information and awareness	27.90%	260
Difficulty in performing thorough physical examination (uncooperative child)	4.08%	38

Therapeutic Practices, Failures, and Contact Management

While 38.41% of pediatricians manage scabies treatment independently, 60.94% delegate prescription decisions to dermatologists. Therapeutic choices across primary and specialist settings are detailed in Table II.

Regarding treatment repetition schedules, 51.18% routinely perform a second application after 7 days; 27.58% perform a third application after 14 days; 16.85% repeat therapy only if symptoms persist, and 4.40% rely on a single treatment cycle. Treatment failures were reported as increasing compared to the past by 36.80% of respondents (32.51% responded “don’t know”). To the question “With which treatment do you most often notice failure?” 71.31% indicated topical permethrin, 13.60% benzyl benzoate, 11.94% sulfur, and 3.15% oral ivermectin. However, only 24.56% of respondents attributed this to the hypothesis of actual drug resistance. 74.36% indicated non-adherence to treatment recommendations as the main cause of treatment failure, in addition to the lack of or incorrect treatment of close contacts (58.34%). Notably, 32.02% of respondents identified the high cost of topical and systemic antiparasitic medications as a primary cause

of non-compliance and treatment failure, especially in cases necessitating repeated cycles for the index patient and all household contacts.

In contact management, 53.76% systematically treat all asymptomatic cohabitants with a day 1 and day 8 regimen; 16.09% repeat treatment on days 1, 8, and 15; 15.34% treat only symptomatic contacts, and 14.81% do not treat contacts.

Table II. *First-line therapeutic choices in pediatric scabies management (N = 932 responses).*

Therapeutic Category	Prescription Option	Usage Percentage (%) [n]
Topical First-Line	Permethrin 5% cream	70.82% (n = 660)
	Benzyl benzoate (10-25%)	14.38% (n = 134)
	Topical Precipitated Sulfur	1.07% (n = 10)
Systemic First-Line	Oral Ivermectin	2.36% (n = 22)
Combined Approach	Combination therapy (Topical + Oral Ivermectin)	11.37% (n = 106)

School Readmission and Operational Needs

For school readmission, 46.89% follow local public health directives, which vary by region; 33.26% require completion of the second application (day 8); and 14.38% allow readmission 24 hours after the first application, as stipulated by national regulations (26). Finally, 98.82% of respondents strongly supported the creation of a joint pediatric-dermatological guidance document (Indispensable: 39.27%; Very useful: 42.49%; Useful: 17.06%).

4. Discussion

Data from this national survey, conducted on a large sample of 932 Italian pediatricians, including 653 PCP, representing over 600,000 patients, confirm that scabies is a growing public health problem in Italy, especially among preschool-age children. Delayed diagnosis (93.02%) and the high rate of specialist consultation (83.26%) underscore the need to strengthen basic pediatric diagnostic skills.

Diagnostic refinement: the 2020 International Alliance for Scabies Control (IACS) Criteria (Box 1)

Box 1. *2020 International Alliance for Scabies Control (IACS) Criteria (adapted).*

- **Level A (Confirmed Scabies):** Direct visualization of mites, eggs, or fecal pellets (scybala) via microscopy or dermoscopy.
- **Level B (Clinical Scabies):** Presence of burrows or characteristic lesions in typical distribution (including face/scalp/palms in infants) PLUS epidemiological link.
- **Level C (Suspected Scabies):** Atypical lesions with severe nocturnal pruritus and compatible history.

Integrating dermoscopy ("entomodermoscopy") into pediatric primary care along with the 2020 International Alliance for Scabies Control (IACS) consensus criteria (15) is crucial for early diagnosis and to prevent steroid-induced diagnostic masking ("scabies incognito") (5, 15).

Overcoming single-application permethrin failure

While permethrin 5% remains the initial therapy for 70.82% of clinicians, over a third report increasing treatment failures. European studies in Germany, Austria, and France confirm a drop in cure rates for single-application permethrin from historic values > 90% down to 50 - 65% (7, 11, 12). Failure mechanisms include:

1. Incomplete ovicidal activity: permethrin does not kill all eggs. Eggs hatch in 3 - 4 days. If residual drug levels decay before hatching completes, surviving larvae perpetuate infestation (7, 8).

2. Molecular resistance/tolerance: voltage-gated sodium channel mutations and esterase detoxifying upregulation reduce mite susceptibility (13, 14, 16).

3. Keratin binding: permethrin binding to stratum corneum keratin reduces free active drug availability (17).

4. Application errors: short application times (< 12h), omitting scalp/face in infants, and failure to treat asymptomatic contacts simultaneously drive pseudo-resistance (7, 10, 13).

Major international guidelines explicitly mandate abandoning single-application protocols in favor of a compulsory two-application scheme on Day 1 and Day 8 (2, 8, 10, 18).

Refractory scabies and special populations

For refractory cases after two fully compliant topical cycles, oral Ivermectin (200 µg/kg on day 1 and day 8) it is recommended for children weighing more than 15 kg (2, 9, 20, 23) but is also considered safe for children weighing less than 15 kg (24). Combination therapy (oral ivermectin plus topical permethrin) is indicated for severe, crusted, or recurrent household outbreaks (19, 21, 22). For infants and children < 15 kg, extemporaneous galenic formulations of benzyl benzoate (10 - 12.5%) or precipitated sulfur (5 - 10%) represent safe and effective alternatives to oral ivermectin (3, 5, 25).

School Readmission

In Italy, readmission criteria for individuals with scabies are governed in accordance with the provisions of national health authorities (26, 27) which stipulate return to the community 24 hours after the initiation of acaricidal treatment. This aligns with major international guidelines (2, 28). Regional and local public health authorities may adopt specific guidelines which generally stipulate a return to the community 24 hours after the start of effective acaricidal treatment (16 out of 20 Italian regions), in accordance with national provisions (26, 27). Conversely, some regions may mandate the completion of a second course of treatment or the presentation of a medical certificate confirming that the prescribed treatments have been carried out.

5. Conclusions

The national survey underscores an urgent imperative to establish a unified national consensus guidance across pediatric, dermatological, and public health societies in Italy. Standardizing two-dose treatment algorithms, reinforcing simultaneous contact treatment, and implementing structured post-scabietic care are essential to control the current epidemic surge and mitigate drug resistance (Box 2). In our survey, a significant proportion of respondents (32.02%) identified the high financial burden of topical and systemic antiparasitic agents as a critical driver of treatment failure, particularly when multiple therapeutic cycles are required for the index case and all close contacts. Given that scabies represents a public health concern with substantial social impact, the lack of full reimbursement for first-line scabicides by the National Health System in Italy constitutes a major structural barrier to effective disease control and eradication. It is also desirable that readmission criteria to school, in the absence of high-risk situations for transmission that would warrant autonomous decisions by local public health authorities, be standardized nationwide.

Box 2. *Key Recommendations for an Inter-Specialistic National Consensus.*

1. **Abandon single-dose protocols**: obligatory 2 - dose regimen (Day 1 and Day 8) for both index cases and all household contacts.
2. **Optimized topical application**: minimum 12 - hour application time, fully covering scalp, face, and ears in children < 2 years.
3. **Universal contact tracing**: simultaneous treatment of all cohabitants regardless of symptom status.
4. **Escalation for refractory cases**: oral Ivermectin (200 µg/kg on Days 1 and 8); galenic benzyl benzoate or sulfur.
5. **Post-scabietic pruritus protocol**: clear guidance on emollient and mild topical steroid use for reactive itch (lasting 2 - 4 weeks) to avoid inappropriate antiparasitic overtreatment.

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