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Original Article

Frequency of Burrows Under Dermatoscope in Children Suspected of Scabies Presenting at Tertiary Care Hospital Karachi

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ABSTRACT

Scabies is a highly contagious parasitic skin condition that is more common among children in resource-poor environments. The diagnosis is difficult to make due to atypical presentations in the paediatric age group. Dermoscopy is a non-invasive tool that can be used in real time to visualise-scabies-specific structures such as burrows. **Objectives:** To assess the diagnostic yield of dermoscopy in detecting scabies burrows in children with clinically suspected scabies. **Methods:** An analytical cross-sectional study was conducted at the Department of Dermatology, Civil Hospital, Karachi, from March to June 2025 (Approval No.: IRB-3811/DUHS/Approval/2025/105). Seventy-one children aged 1–16 years with clinical suspicion of scabies were enrolled by non-probability consecutive sampling. A polarised handheld dermoscope (10× magnification) with ultrasound gel as the interface medium was used. A binary logistic regression was used, and $p<0.05$ was regarded as statistically significant. **Results:** The mean age was 7.1 ± 4.3 years; 46 (64.8%) were female. The use of dermoscopy revealed that 36 (50.7%) children had burrows. Statistically significant associations were observed with longer symptom duration (OR = 0.80; 95% CI: 0.648–0.986; p=0.026) and prior scabies treatment (OR = 3.61; 95% CI: 1.324–9.849; p=0.011). **Conclusions:** The diagnostic yield of dermoscopy in children with clinical suspicion of scabies was around 50%, which was lower than previously reported. The presence of burrows was more likely when symptoms had been present longer and if treatment had been given.

INTRODUCTION

Scabies is a dermatological disease that is highly contagious and is caused by the parasite Sarcoptes scabiei var. hominis, which creates a polymorphous eruption of the skin that is accompanied by pruritus due to a delayed hypersensitivity reaction to the mites' antigen. It continues to be a significant public health issue, especially among children in crowded and resource-limited settings, where delayed diagnosis can result in perpetuation of transmission and secondary infection, such as bacterial superinfection and post-streptococcal sequelae [1-3]. Clinical symptoms of scabies may be different in children compared to adults due to a reduced stratum corneum and unusual distribution of lesions. Children under one year may develop lesions on their scalp, face, palms and soles that resemble other inflammatory dermatoses like eczema, papular urticaria and infantile acropustulosis [4-6]. The combination of these unusual characteristics and lack of cooperation in examination makes accurate clinical diagnosis difficult, especially in children. The stratum corneum is the site of burrows formed by fertilised female mites through tunnelling activity, which are pathognomonic for scabies but are often hard to distinguish with the naked eye because of excoriation, secondary eczematisation, crusting or superimposed

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infection [7-9]. The diagnostic gold standard is the microscopic identification of mites, eggs and faecal pellets, but this is an invasive, operator-dependent test which can give false-negative results from inadequate sampling [10, 11]. Dermoscopy is a non-invasive diagnostic method that allows for in vivo visualisation of scabies-specific structures. The delta-wing jet sign (also termed the sarcoptic triangle) refers to a darkened triangular structure at the burrow terminus representing the pigmented exoskeleton of the mite body; its appearance resembles the silhouette of a delta-wing aircraft and is considered a highly specific dermoscopic feature of scabies [12]. Dermoscopy has been shown to improve diagnostic accuracy, reduce reliance on invasive procedures, and facilitate earlier diagnosis, particularly in paediatric patients [13-15].

Although there is increasing evidence worldwide to support the use of dermoscopy in the diagnosis of scabies, there are few objective local studies that specifically focus on the use of dermoscopy in the diagnosis of scabies in children with clinically suspected scabies. There is a lack of local evidence that helps answer the question of the effectiveness of dermoscopy in the real practice of dermatology in tertiary care. Therefore, this study aimed to evaluate the diagnostic utility of dermoscopy in children who had clinically suspected scabies in a tertiary care dermatology centre in Karachi.

METHODS

This analytical cross-sectional study was conducted at the Department of Dermatology, Civil Hospital, Karachi, from 6th March to 6th June 2025, following approval from the Institutional Review Board (IRB) (Approval No.: IRB-3811/DUHS/Approval/2025/105, dated 5th March 2025). Written informed consent was obtained from parents or legal guardians before enrolment. Scabies was diagnosed on clinical criteria without microscopic (skin scraping) confirmation; this reflects routine clinical practice but may introduce misclassification bias, which is acknowledged as a study limitation. Children aged 1–16 years of either sex presenting to the outpatient department with clinical suspicion of scabies were enrolled by non-probability consecutive sampling. Children with confirmed diagnoses of papular urticaria, atopic dermatitis, lichen planus, dermatitis herpetiformis, or infantile acropustulosis were excluded. Clinically suspected scabies was defined as typical lesions in characteristic distribution with ≥1 relevant history feature (pruritus, contact history, or household clustering), or atypical lesions or distribution with ≥2 relevant history features. A dermoscopically positive burrow was defined as a visible burrow channel with a discernible entry point, scaling, and a characteristic mite-related terminal structure (delta-wing jet sign) on dermoscopic examination. The sample size of 71 was calculated using the WHO formula for a single proportion, based on an assumed dermoscopic burrow detection rate of 90.2% with a precision of ±7% and a 95% confidence interval However, the observed detection rate was 50.7%, yielding an actual precision of approximately ±11.6%; the study is therefore underpowered for the observed proportion [14]. Dermoscopic examination was performed by a single consultant dermatologist with more than ten years of post-qualification experience. The observer was not blinded to clinical history, and no second observer was used; therefore, interobserver reliability was not assessed. A handheld polarised dermoscope with 10× magnification was used. Ultrasound gel was applied as the interface medium, and representative dermoscopic images were captured and digitally recorded for documentation. All findings were recorded on a proforma that was structured and pre-designed and recorded during a single clinical encounter, with no scheduled follow-up visits.

The data were analysed using SPSS version 26.0. Frequencies and percentages were computed for categorical variables; mean ± standard deviation (SD) was calculated for continuous variables. Comparisons between groups were made with the chi-square test. For the associations between clinical variables and dermoscopic burrow detection, binary logistic regression was used to calculate odds ratios (OR) with 95% confidence intervals (CI). A p-value < 0.05 was deemed statistically significant.

RESULTS

The study included a total of 71 children who were clinically suspected of having scabies were included in the study. The age of study participants was 7.1 ± 4.3 years, and the duration of symptoms was 3.0 ± 2.7 months. The cohort comprised 46 (64.8%) females and 25 (35.2%) males. Pruritus was the predominant presenting complaint, reported in 69 (97.2%) children. The most examined anatomical sites were the trunk 42 (59.2%), arms 10 (14.1%), scalp 7 (9.9%), legs 7 (9.9%), face 2 (2.8%), neck 2 (2.8%), and genital area 1 (1.4%). A history of contact with an infected individual was reported in 59 (83.1%) and a family history of pruritus in 55 (77.5%) participants. Prior treatment for scabies was reported in 29 (40.8%) children (Table 1).

Table 1: Baseline Demographic and Clinical Characteristics of Children with Clinically Suspected Scabies (n=71)

Characteristics	Mean ± SD / n (%)	95% CI
Continuous Variables		
Age (Years)	7.1 ± 4.3	6.1–8.1
Duration of Scabies (Months)	3.0 ± 2.7	2.4–3.6
Categorical Variables		
Male	25 (35.2%)	25 (35.2%)

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Female	46 (64.8%)	46 (64.8%)
Primary Complaint		
Itching (Pruritus)	69 (97.2%)	69 (97.2%)
Rash	2 (2.8%)	2 (2.8%)
Dermoscopy Examination Sites		
Scalp	7 (9.9%)	7 (9.9%)
Face	2 (2.8%)	2 (2.8%)
Neck	2 (2.8%)	2 (2.8%)
Trunk	42 (59.2%)	42 (59.2%)
Arms	10 (14.1%)	10 (14.1%)
Legs	7 (9.9%)	7 (9.9%)
Genital Area	1 (1.4%)	1 (1.4%)
History and Exposure		
Contact with an Infected Individual	59 (83.1%)	59 (83.1%)
Family History of Itching	55 (77.5%)	55 (77.5%)
Previous Treatment for Scabies	29 (40.8%)	29 (40.8%)

Categorical data presented as Frequency (%). CI = confidence interval; SD = standard deviation

Dermoscopy identified burrows in 36 (50.7%) of the 71 children, while no dermoscopically identifiable burrows were detected in the remaining 35 (49.3%) (Figure 1).

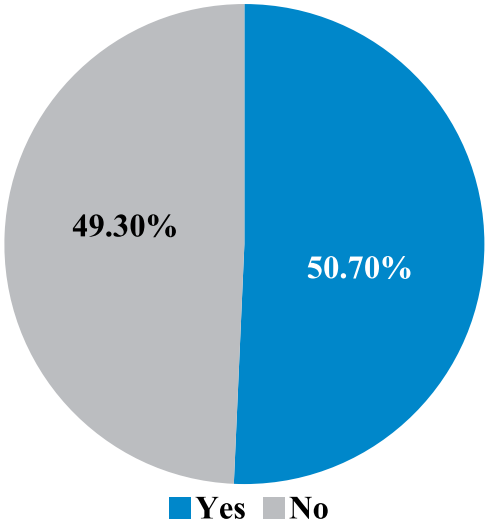


Figure 1: Proportion of Children with and Without Dermoscopically Detectable Scabies Burrows (n=71)

A purely descriptive comparison of demographic and clinical characteristics between children with and without dermoscopically detected burrows is presented. The two groups were similar in mean age (7.2 ± 4.2 vs 7.1 ± 4.5 years). Children in whom burrows were dermoscopically detected had a longer mean symptom duration (3.7 ± 2.9 vs 2.3 ± 2.4 months) than those in whom burrows were not detected. Males comprised 16 (44.4%) of the burrow-positive group versus 9 (25.7%) of the burrow-negative group, while a prior history of scabies treatment was reported in 20 (55.6%) of burrow-positive children compared with 9 (25.7%) of burrow-negative children (Table 2).

Table 2: Descriptive Comparison of Clinical Characteristics Between Children with and without Dermoscopically Detected Burrows (n=71)

Characteristics	Burrows Present (n=36), Mean ± SD / n (%)	No Burrows (n=35), Mean ± SD / n (%)
Continuous Variables		
Age (years)	7.2 ± 4.2	7.1 ± 4.5
Duration of Scabies (Months)	3.7 ± 2.9	2.3 ± 2.4
Categorical Variables		
Gender: Male	16 (44.4%)	9 (25.7%)
Gender: Female	20 (55.6%)	26 (74.3%)
Prior Scabies Treatment	20 (55.6%)	9 (25.7%)

Continuous data presented as Mean ± SD; categorical data presented as Frequency (%)

On univariable binary logistic regression, no statistically significant association was observed between age and dermoscopic burrow detection (OR = 0.995; 95% CI: 0.892–1.110; p = 0.926). Symptom duration was associated with dermoscopic burrow detection (OR = 0.799; 95% CI: 0.648–0.986; p = 0.026). However, the OR <1 suggests that each additional month of symptom duration was associated with approximately 20% lower odds of burrow detection. This direction contradicts the descriptive data in Table 2, where burrow-positive children had a longer mean symptom duration (3.7 ± 2.9 vs 2.3 ± 2.4 months).

Table 3: Binary Logistic Regression Analysis of Factors Associated with Dermoscopic Burrow Detection (n=71)

Predictors	Odds Ratio	95% CI	p-value
Age (Years)	0.995	0.892–1.110	0.926
Duration of Scabies (Months)	0.799	0.648–0.986	0.026*
Male Gender (Ref: Female)	2.311	0.847–6.303	0.099
Prior Scabies Treatment	3.611	1.324–9.849	0.011*

*Statistically significant at p ≤ 0.005. OR = odds ratio; CI = confidence interval. Each predictor was analysed by univariate binary logistic regression

DISCUSSION

Scabies presents significant diagnostic challenges in paediatric populations due to variable and often atypical clinical manifestations. Excoriated, eczematised, or secondarily infected lesions obscure typical features and reduce the utility of naked-eye examination [1-3]. These challenges have driven interest in non-invasive adjunctive tools such as dermoscopy, which enables real-time visualisation of scabies-specific structures, including burrows and the delta-wing jet sign [12]. The present study assessed the diagnostic yield of dermoscopy in children with clinically suspected scabies, identifying burrows in 50.7% of enrolled participants. This yield is considerably lower than the rates of 85–90% or more reported in earlier paediatric studies [13, 14]. A recent meta-analysis of

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scabies diagnostic methods reported a pooled dermoscopic sensitivity of approximately 43% and specificity of 84%, underscoring the wide variability of dermoscopic yield across study settings [16]. Comparative accuracy studies have nonetheless confirmed the value of dermoscopy as a non-invasive diagnostic adjunct, including in resource-limited settings and in patients with darker skin phototypes [17]. The relatively low yield is perhaps due to late presentation and previous treatment exposure; however, there are also some secondary inflammatory changes that can mask the dermoscopic appearance of intact burrows. These are associations, not causal. The diagnostic yield observed (50.7%) was much lower than the assumed detection rate of 90.2% (previously published study [14]. This difference may be due to different patient populations, chronicity of the disease, and the different treatment settings and prior treatment. Importantly, this is the lower-than-expected yield and has implications for statistical power; the present sample could have been underpowered to detect smaller associations, and the precision of effect estimates may be limited. All findings should be interpreted in the light of these considerations. The mean age of children enrolled (7.1 ± 4.3 years) is in line with previous reports that children attending school are most often the age of peak scabies infestation [4, 13]. Females outnumbered males in the cohort, but gender was not statistically significantly associated with the detection of dermoscopic burrows (OR = 2.311; 95% CI: 0.847–6.303; p=0.099), consistent with previous studies which did not find sex to be independently associated with dermoscopic characteristics of scabies [11, 18]. Longer symptom duration was associated with the presence of dermoscopic burrows (p=0.026), but no statistically significant association was found between the presence of dermoscopic burrows and other factors. This association may be due to progressive burrow formation, where, over the course of chronic infestation, keratinising material along burrow tracks may improve dermoscopic visibility. This is only an association in a cross-sectional study, and no temporal causality can be inferred [17, 18]. Prior treatment for scabies was found to be significantly associated with an increased risk of finding scabies dermoscopically (OR = 3.611; 95% CI: 1.324–9.849; p=0.011). This association can be interpreted as a suppression of symptoms as a result of incomplete or inadequate treatment, while the mites remain. Partial or inadequate treatment in the past has been observed to result in atypical, persistent, or initially misdiagnosed scabies from multicentre data [19]. In previously treated patients, where clinical features may not be enough to confirm or exclude infestation, dermoscopy may have a special role in these patients; however, this is an association-based interpretation [20].

This study has several important limitations. First, the sample size (n=71) is relatively small, and the study was conducted in a single centre, which restricts the generalisability and statistical power of the results. Secondly, non-probability consecutive sampling performed in a tertiary care hospital also creates a selection bias, since the study population might not be representative of the paediatric population with scabies. Third, the diagnosis of scabies was based on clinical diagnosis rather than microscopy, which could cause misclassification bias. Fourth, no interobserver reliability was carried out on all the dermoscopic evaluations, which could cause observer bias and may not increase reproducibility. Fifthly, a full multivariable model that would adjust for all potential confounders was not used, and this may lead to residual confounding. Sixth, the assumption of the statistical tests used (such as minimum expected cell count for chi-square analysis) and normality of continuous variables were not formally tested. Seventh, there were limited numbers for some subgroups (e.g., genital area, n=1), which reduces the reliability of comparisons within these subgroups. Seventh, dermoscopy was performed by a single unblinded observer without interobserver reliability testing; this may introduce observer expectation bias and limits reproducibility of the findings. The univariable logistic regression showed a contradictory direction for symptom duration (OR <1 despite longer mean duration in burrow-positive children). This may be due to unadjusted confounding, non-linear effects, or the influence of outliers, and highlights the need for multivariable modelling and larger samples to clarify the true relationship. Further studies are needed with larger multicentre studies combined with microbiological confirmation of scabies, assessment of interobserver reliability, prospective studies to assess the temporal relationships.

CONCLUSIONS

This study aimed to find out the prevalence of burrows in children attending a tertiary care hospital in Karachi with the suspicion of scabies under a dermatoscope. Dermoscopically, the rate of identification of burrows in enrolled children was around half of the previously reported rate (50.7%), possibly due to time of disease presentation, previous treatment, and secondary skin changes. Statistically significant associations were noted for symptom duration and dermoscopic burrows and previous scabies treatment; however, these are associations with a cross-sectional design and should not be viewed as causal associations. The findings support the utility of dermoscopy as a non-invasive adjunct in diagnostically complex paediatric scabies cases.

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Confirmatory testing, interobserver validation and multivariable analysis are recommended in larger multicentre prospective studies to better characterise the value of dermoscopy in the diagnosis of paediatric scabies.

Authors' Contribution

Conceptualization: FN
Methodology: FN, RM, AR, E, HT
Formal analysis: FN, RM, AR, E, HT
Writing and Drafting: FN, RM
Review and Editing: FN, RM, AR, E, HT

All authors approved the final manuscript and take responsibility for the integrity of the work

Conflict of Interest

All the authors declare no conflict of interest.

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