

Scabies under the Dermoscope: Clinical and Diagnostic Perspectives

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Abstract

Background: Scabies is a highly contagious parasitic skin infestation that remains a significant public health concern, particularly in resource-limited settings. Conventional diagnostic methods such as skin scraping are invasive and time-consuming. Dermoscopy has emerged as a rapid, non-invasive diagnostic tool capable of identifying characteristic scabies features, while methylene blue staining may enhance burrow visualization.

Objectives: To evaluate the utility of dermoscopy in the diagnosis of scabies and to assess the efficacy of methylene blue ink staining in improving the visualization of scabies burrows.

Methods: This hospital-based observational descriptive study included 50 clinically diagnosed scabies patients attending the Department of Dermatology between February and March 2025. All patients underwent detailed clinical examination followed by dermoscopic evaluation using the Illuco IDS 1100 dermatoscope. Selected patients also underwent methylene blue ink staining. Clinical, dermoscopic, and staining findings were recorded and analyzed using descriptive statistics.

Results: Among the 50 participants, 36 (72.0%) were males and 14 (28.0%) were females. Dermoscopy demonstrated the characteristic "jet-with-contrail" sign in 27 (54.0%) patients. Methylene blue staining was performed in 15 patients and successfully demonstrated burrows in 4 (26.7%) cases. Dermoscopy proved to be a useful bedside diagnostic modality with greater diagnostic utility than ink staining alone.

Conclusion: Dermoscopy is a simple, non-invasive, and effective diagnostic tool for the early identification of scabies. Methylene blue staining serves as a useful adjunct for burrow visualization in selected cases, supporting improved clinical diagnosis and timely management.

Keywords: Burrow visualization; Dermoscopy; Non-invasive diagnosis; Methylene blue staining; Scabies.

1. Introduction

Scabies is a highly contagious parasitic skin infestation caused by the human itch mite, *Sarcoptes scabiei* var. *hominis*, and continues to represent a significant public health challenge worldwide, particularly in resource-limited settings. The disease affects individuals of all age groups and socioeconomic backgrounds, although it is more prevalent among children, the elderly, immunocompromised individuals,

and people living in overcrowded environments. Transmission occurs predominantly through prolonged skin-to-skin contact, while indirect spread through contaminated clothing or bedding is less common. The hallmark clinical symptom of scabies is intense nocturnal pruritus, which results from a delayed hypersensitivity reaction to the mites, their eggs, and fecal pellets. Persistent itching often leads to sleep disturbances, reduced quality of life, and secondary bacterial infections due to excessive scratching, thereby increasing the burden of disease⁽¹⁾.

Clinically, scabies is characterized by erythematous papules, vesicles, nodules, and the presence of burrows, which are serpiginous tunnels created by female mites within the superficial epidermis. These lesions commonly occur in the interdigital web spaces, flexor aspects of the wrists, axillae, groin, buttocks, periumbilical region, and genitalia, collectively described as the "Circle of Hebra." In infants and young children, lesions may additionally involve the scalp, face, palms, and soles, often making diagnosis more challenging because of atypical presentations⁽²⁾. Although clinical examination remains the cornerstone of diagnosis, burrows are frequently obscured by excoriations, secondary eczema, or bacterial superinfection, leading to missed or delayed diagnosis.⁽³⁾

Conventional diagnostic methods include microscopic examination of skin scrapings for the demonstration of mites, eggs, or fecal pellets, which is considered the reference standard for confirmation. However, this procedure is invasive, time-consuming, operator-dependent, and may require repeated sampling because of its variable sensitivity. Furthermore, patient discomfort during scraping and the need for laboratory expertise reduce its practicality in busy outpatient settings⁽⁴⁾. The burrow ink test, another diagnostic technique, is simple and painless, but its sensitivity remains relatively low and its usefulness decreases in excoriated or inflamed lesions.⁽⁵⁾

Dermoscopy has emerged as a valuable non-invasive diagnostic tool that enables real-time visualization of characteristic scabies structures without causing patient discomfort. Under dermoscopic examination, the mite appears as a dark brown triangular structure at the end of a whitish serpiginous burrow, producing the characteristic "jet with contrail" or "delta-wing" sign. This distinctive appearance allows rapid bedside diagnosis with high specificity and minimizes the need for invasive procedures. Dermoscopy is particularly useful in identifying both typical and atypical lesions, facilitating early diagnosis and prompt treatment while reducing disease transmission.^(6,7)

Adjunctive techniques such as methylene blue ink staining have also been explored to improve visualization of burrows. The dye penetrates the superficial tunnels created by the mites, enhancing their visibility and assisting clinicians in identifying suitable sites for dermoscopic examination or skin scraping. Although ink staining alone has limited diagnostic sensitivity, it may complement dermoscopy by improving burrow detection in selected patients⁽⁸⁾. Recent clinical observations have shown that dermoscopy substantially reduces diagnostic errors, improves clinician confidence, and serves as a practical, patient-friendly alternative to conventional invasive diagnostic techniques in routine dermatology practice^(9,10). The present study was undertaken to evaluate the utility of dermoscopy in the diagnosis of scabies and to assess the efficacy of methylene blue ink staining in enhancing the visualization of scabies burrows for improved clinical diagnosis.

2. Methodology

2.1 Study Design

The present study was conducted as a **hospital-based observational descriptive study**

2.2 Study Setting

The study was conducted in the Department of Dermatology at **Sapthagiri Institute of Medical Sciences and Research Centre**.

2.3 Study Duration

The study was conducted over a period of **one month**, from **1st February 2026 to 1st March 2026**.

2.4 Participants

Inclusion Criteria

- All clinically diagnosed patients with scabies attending the Dermatology Department during the study period.
- Patients who agreed to undergo dermoscopic examination.
- Patients who provided informed consent for participation and clinical photography.

Exclusion Criteria

- Patients who refused to provide consent for clinical examination or dermoscopic imaging.
- Patients unwilling to participate in the study.

2.5 Study Sampling

Patients were enrolled using a **consecutive sampling method**, wherein all clinically diagnosed cases of scabies presenting during the study period and fulfilling the inclusion criteria were included until the required sample size was achieved. This sampling approach ensured the inclusion of all eligible participants encountered during the study period without selective recruitment.

2.6 Study Sample Size

A total of **50 patients** with clinically diagnosed scabies were included in the study. The sample size was predetermined for the study period and consisted of all eligible patients who fulfilled the inclusion criteria and consented to participate. No formal sample size calculation was reported in the presentation.

2.7 Study Parameters

The study evaluated both clinical and dermoscopic parameters. Clinical assessment included the presence of characteristic scabies lesions, distribution of lesions, nocturnal itching, and the presence of burrows. Dermoscopic examination focused on identifying the characteristic **"jet with contrail"** or **"delta-wing"** sign representing the mite, the visualization of serpiginous burrows, and other dermoscopic features suggestive of scabies. In patients who underwent methylene blue staining, the visibility of burrows following ink application was also recorded. Demographic details such as gender and the positivity rates of dermoscopic examination and ink staining were documented.

2.8 Study Procedure

After obtaining informed consent, each participant underwent a detailed clinical examination by a dermatologist. The diagnosis of scabies was initially established based on characteristic clinical features, including nocturnal pruritus, lesion morphology, and lesion distribution. Subsequently, dermoscopic examination was performed using the **Illuco IDS 1100 dermatoscope**. The affected skin areas were carefully examined for characteristic dermoscopic findings, particularly the brown triangular structure corresponding to the anterior portion of the mite and the associated whitish serpiginous burrow, commonly referred to as the "jet with contrail" sign. In selected patients, **methylene blue** was applied over suspected lesions to enhance the visualization of burrows. Excess dye was gently removed from the skin surface, allowing the dye retained within the burrows to improve their identification. Dermoscopic findings and ink staining results were documented using clinical photographs wherever appropriate.

2.9 Study Data Collection

Data were collected using a structured clinical proforma. Information regarding patient demographics, clinical findings, dermoscopic observations, methylene blue staining results, and photographic documentation was recorded systematically. The presence or absence of the characteristic dermoscopic signs, visualization of burrows, and positivity following methylene blue staining were documented for each participant. The collected data were verified for completeness before analysis.

2.10 Data Analysis

The collected data were compiled and summarized using descriptive statistical methods. Continuous variables, where applicable, were expressed as appropriate summary measures, while categorical variables were presented as frequencies and percentages. The proportion of patients demonstrating positive dermoscopic findings and positive methylene blue staining was calculated and presented in tabular form to describe the diagnostic utility of each method. No inferential statistical tests were specified in the source presentation.

2.11 Ethical Considerations

The study was conducted in accordance with ethical principles for biomedical research involving human participants. Written informed consent was obtained from all participants prior to enrollment. Consent was also obtained before capturing clinical and dermoscopic images. Confidentiality and privacy of participant information were maintained throughout the study, and all collected data were used solely for research purposes. Participants were free to withdraw from the study at any stage without affecting their routine medical care. The presentation does **not** specify Institutional Ethics Committee approval details.

3. Results

A total of **50 clinically diagnosed patients with scabies** were enrolled during the study period and underwent detailed clinical examination followed by dermoscopic evaluation. The study primarily assessed the utility of dermoscopy in identifying characteristic scabies findings and evaluated the role of methylene blue ink staining in improving visualization of burrows. Of the total participants, **36 (72.0%) were males and 14 (28.0%) were females**, indicating a predominance of male patients in the study population.

Table 1. Distribution of Study Participants According to Gender (N=50)

Gender	Frequency (n)	Percentage (%)
Male	36	72.0
Female	14	28.0
Total	50	100.0

The study population predominantly consisted of males (72.0%), whereas females accounted for 28.0% of the enrolled patients.

Table 2. Overall Dermoscopic Findings

Dermoscopic Finding	Frequency (n)	Percentage (%)
Positive ("Jet-with-Contrail"/Delta-wing sign)	27	54.0
Negative	23	46.0
Total	50	100.0

Characteristic dermoscopic findings suggestive of scabies were observed in 27 patients (54.0%), while 23 patients (46.0%) did not demonstrate the characteristic dermoscopic pattern.

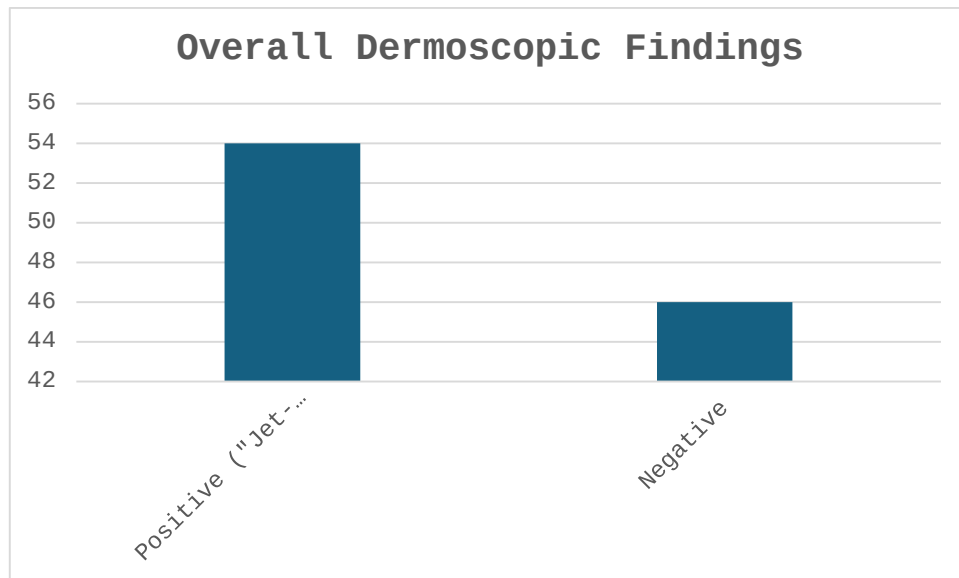


Table 3. Patients Undergoing Methylene Blue Ink Staining

Ink Staining	Frequency (n)	Percentage (%)
Performed	15	30.0
Not Performed	35	70.0
Total	50	100.0

Methylene blue ink staining was performed in 15 patients (30.0%) selected for improved visualization of suspected burrows, whereas 35 patients underwent dermoscopic examination alone.

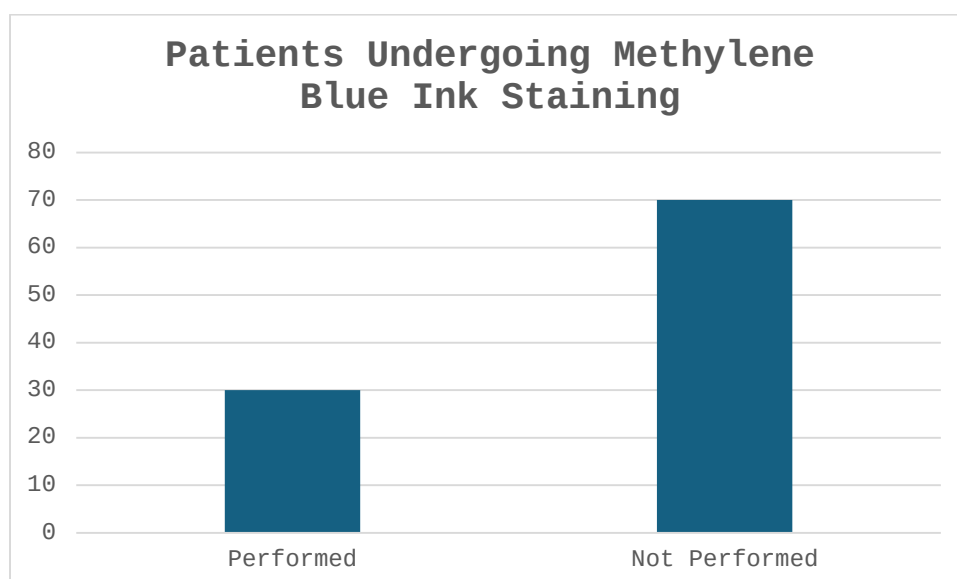


Table 4. Methylene Blue Positivity Among Tested Patients (n=15)

Result	Frequency (n)	Percentage (%)
Positive	4	26.7
Negative	11	73.3
Total	15	100.0

Among the 15 patients who underwent methylene blue staining, positive visualization of burrows was achieved in four patients (26.7%), while eleven patients (73.3%) had negative staining.

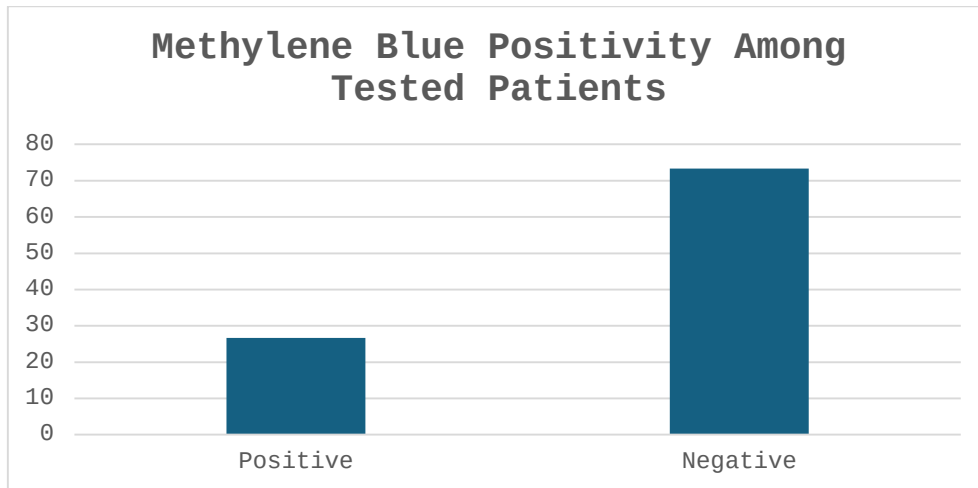


Table 5. Dermoscopic Findings According to Gender

Gender	Total	Dermoscopy Positive	Percentage (%)
Male	36	18	50.0
Female	14	9	64.3
Total	50	27	54.0

Dermoscopic positivity was identified in 18 male patients and 9 female patients. Although males constituted the majority of study participants, the proportion of dermoscopic positivity was relatively higher among female patients.

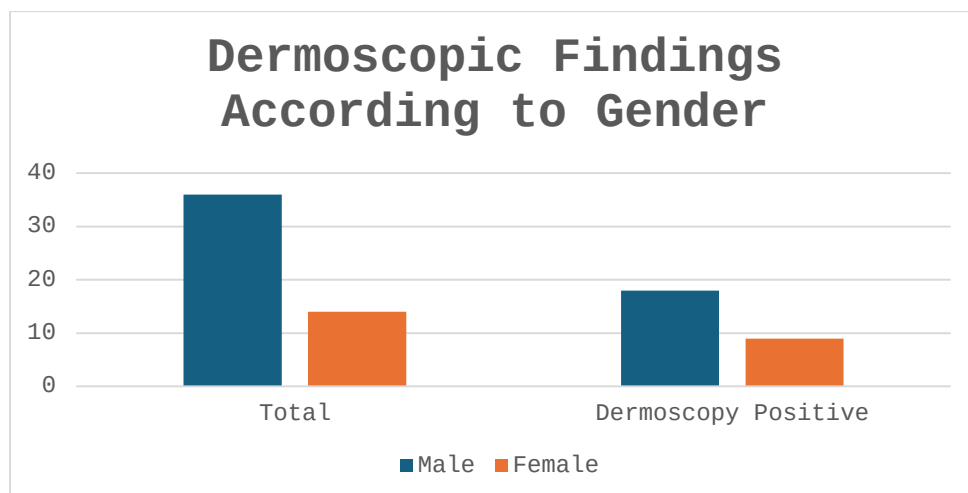


Table 6. Methylene Blue Testing According to Gender

Gender	Total Patients	Tested	Percentage Tested (%)
Male	36	9	25.0
Female	14	6	42.9
Total	50	15	30.0

Nine male patients and six female patients underwent methylene blue staining. A comparatively higher proportion of female participants underwent ink staining.

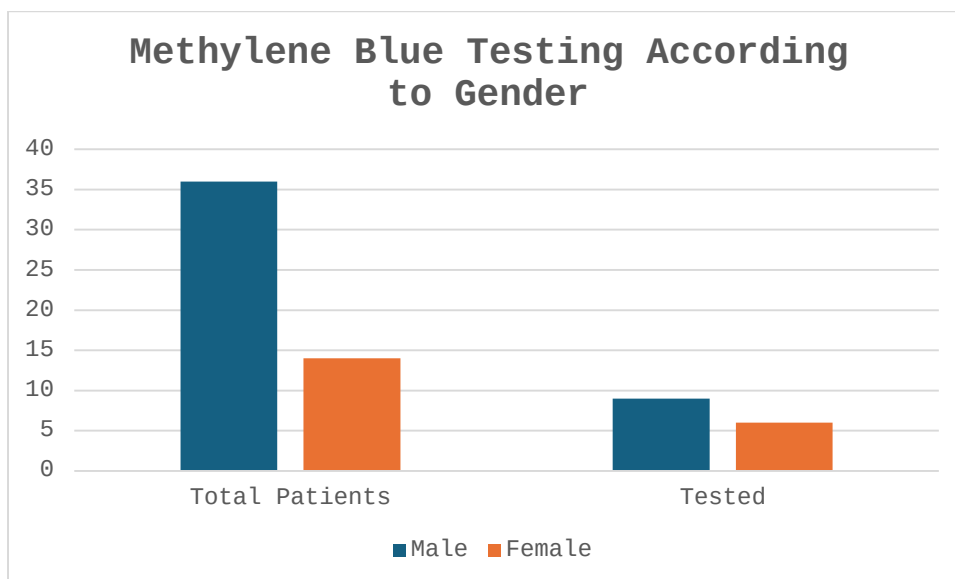


Table 7. Positive Methylene Blue Findings According to Gender

Gender	Tested	Positive	Positivity (%)
Male	9	2	22.2
Female	6	2	33.3
Total	15	4	26.7

Positive methylene blue staining was observed in two males and two females. The positivity rate among stained female patients was slightly higher than among males.

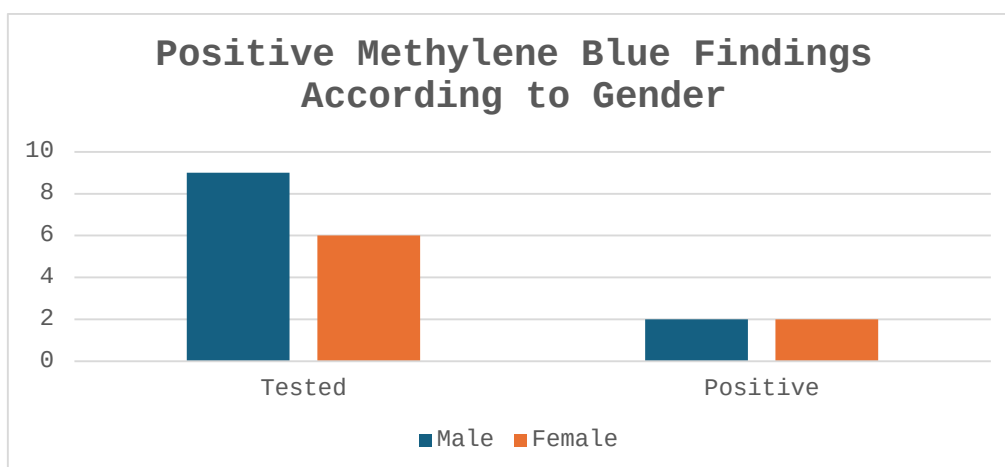
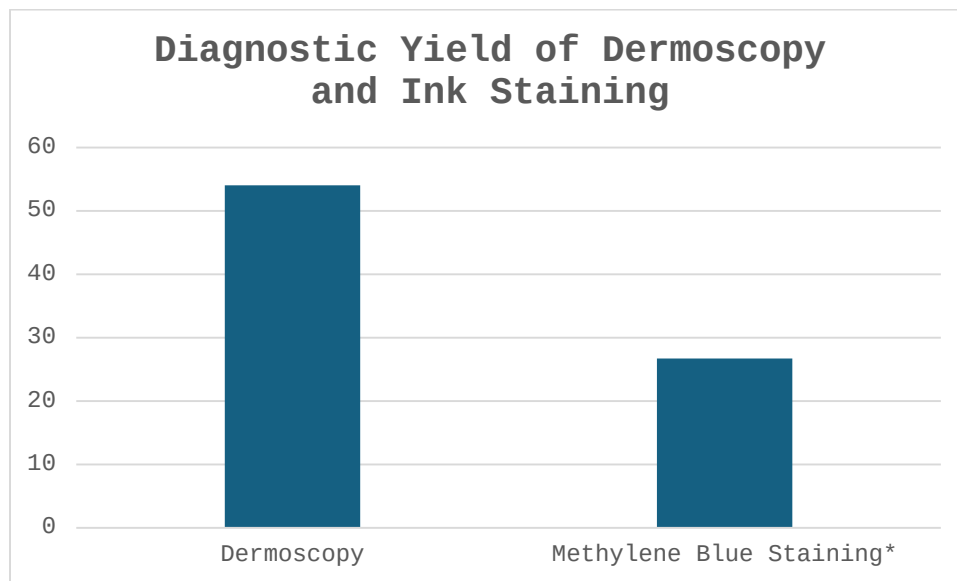


Table 8. Diagnostic Yield of Dermoscopy and Ink Staining

Diagnostic Method	Positive Cases	Percentage (%)
Dermoscopy	27	54.0
Methylene Blue Staining*	4	26.7

*Percentage calculated among the 15 patients who underwent ink staining.

Dermoscopy identified characteristic scabies findings in more than half of the enrolled patients, whereas methylene blue staining demonstrated positive burrow visualization in approximately one-quarter of the selected patients.



4. Discussion

The present hospital-based observational study evaluated the role of dermoscopy in the diagnosis of clinically suspected scabies and assessed the utility of methylene blue ink staining in improving burrow visualization. Among the 50 clinically diagnosed patients included in the study, dermoscopy demonstrated the characteristic "jet-with-contrail" or "delta-wing" sign in 27 (54.0%) patients, while methylene blue staining was performed in 15 selected cases and successfully demonstrated burrows in 4 (26.7%) patients. The findings support the usefulness of dermoscopy as a rapid, non-invasive bedside diagnostic technique for scabies, whereas methylene blue staining served as an adjunctive method for improving visualization of burrows in selected patients. These observations reinforce the growing role of dermoscopy in routine dermatological practice, particularly where conventional microscopic confirmation is either unavailable or impractical.

The demographic distribution of the present study showed a predominance of male patients, with males accounting for 72.0% (36/50) of the study population compared with 28.0% (14/50) females. Although the present study was not designed to investigate gender predisposition, the higher proportion of males may reflect greater occupational exposure, overcrowding, healthcare-seeking behaviour, or referral patterns within the study population. Similar male predominance has been reported by Kandwal et al.⁽¹¹⁾, who observed that approximately two-thirds of the 117 geriatric dermatology patients were males, with a mean age of 68.60 ± 7.01 years. Likewise, Naik et al.⁽¹²⁾ reported that among 305 pediatric dermatology patients, 179 (58.7%) were males and 126 (41.3%) were females, indicating that male predominance is

commonly observed across various dermatological conditions. Although these studies evaluated broader dermatological disorders rather than isolated scabies, they demonstrate comparable demographic trends. A major strength of the present study is the evaluation of dermoscopy as a point-of-care diagnostic modality. Dermoscopy identified the characteristic "jet-with-contrail" sign in 54.0% of clinically suspected patients, facilitating immediate diagnosis without causing patient discomfort. The visualization of the brown triangular anterior portion of the mite along with the serpiginous burrow represents one of the most specific dermoscopic signs of scabies. Early recognition of these features allows prompt initiation of therapy while minimizing disease transmission. Unlike conventional skin scraping, dermoscopy is painless, rapid, repeatable, and does not require laboratory processing, making it particularly suitable for busy outpatient clinics and resource-constrained settings.

The present findings complement those reported by Debash et al.⁽¹³⁾, who evaluated conventional microscopic diagnosis among 422 clinically suspected patients. They microscopically confirmed scabies in 156 patients (37.0%), demonstrating that approximately one-third of clinically suspected cases were parasitologically positive. Furthermore, 35.9% (56/156) of confirmed scabies patients had secondary bacterial infection, predominantly caused by *Staphylococcus aureus*, coagulase-negative staphylococci, and *Streptococcus pyogenes*. Their study also demonstrated multidrug resistance among isolated bacterial strains, emphasizing the importance of early diagnosis before complications occur. While Debash et al. primarily relied on microscopic confirmation, the present study highlights dermoscopy as a practical, non-invasive diagnostic alternative that may facilitate earlier diagnosis and potentially reduce secondary bacterial complications by enabling prompt treatment.

The adjunctive use of methylene blue staining in the present study demonstrated positive burrow visualization in 4 of the 15 (26.7%) patients who underwent staining. Although its diagnostic yield was lower than dermoscopy, methylene blue improved the visibility of burrows in selected lesions and may help clinicians identify appropriate sites for dermoscopic examination or skin scraping. The present findings therefore suggest that methylene blue staining should be considered an adjunct rather than a replacement for dermoscopy. Combining ink staining with dermoscopy may improve diagnostic confidence, particularly in patients with excoriated or atypical lesions where burrows are difficult to appreciate clinically.

The importance of accurate diagnosis is further emphasized by the large multicentre observational study conducted by Ioris et al.⁽¹⁴⁾, who evaluated 1,751 index cases of scabies across 28 Italian dermatology centres. Their study focused primarily on treatment outcomes and reported that benzyl benzoate monotherapy achieved an 84.2% cure rate (250/297), while oral ivermectin achieved an 81.6% cure rate (449/550). In contrast, permethrin showed a substantially lower cure rate of 42.5% (433/1019). They also demonstrated that environmental decontamination counselling significantly reduced treatment failure (OR 0.39; 95% CI 0.26–0.57; $p < 0.0001$), whereas immunosuppression (OR 2.34) and foreign nationality (OR 1.36) increased the likelihood of treatment failure. Although treatment efficacy was beyond the scope of the present study, these findings underscore that accurate and timely diagnosis through dermoscopy is crucial because successful treatment outcomes depend on early case identification and prompt initiation of effective therapy.

Scabies remains an important public health concern because of its highly contagious nature and potential for institutional outbreaks. This was clearly demonstrated by Sponselli et al.⁽¹⁵⁾, investigated a hospital outbreak among healthcare workers in Italy. Following implementation of a multidisciplinary prevention protocol, 183 healthcare workers underwent dermatological screening, and 21 (11.5%) were diagnosed

with scabies. Overall, the outbreak affected only 0.35% (21/6000) of healthcare workers and was successfully contained within 14.7 weeks. The study also identified significant associations between scabies and being a nurse as well as having dust mite allergy. Their findings emphasize that early diagnosis combined with systematic screening can substantially reduce transmission and economic burden. The present study similarly supports the use of dermoscopy as an efficient bedside screening tool capable of facilitating early diagnosis before widespread transmission occurs.

Although the present study was not designed to evaluate disease burden or quality of life, the significance of dermatological disorders on patient wellbeing has been demonstrated by Kandwal et al.⁽¹¹⁾, who reported that 16% of elderly patients experienced a moderate-to-large impact on quality of life because of skin diseases. Considering that scabies produces intense nocturnal pruritus, sleep disturbance, social embarrassment, and psychological distress, rapid diagnosis using dermoscopy may contribute to improved patient wellbeing through earlier treatment and symptom relief. The findings of the present study demonstrate that dermoscopy is a valuable diagnostic modality capable of identifying characteristic scabies findings rapidly and non-invasively. Compared with adjunctive methylene blue staining, dermoscopy provided a higher diagnostic yield and greater practicality in routine outpatient practice. The observations are consistent with previous studies highlighting the importance of early diagnosis, prevention of complications, and interruption of disease transmission. Larger multicentre studies incorporating dermoscopic findings with microscopic confirmation are warranted to further establish standardized diagnostic algorithms for scabies.



Fig 1. 'Jet with contrail' sign

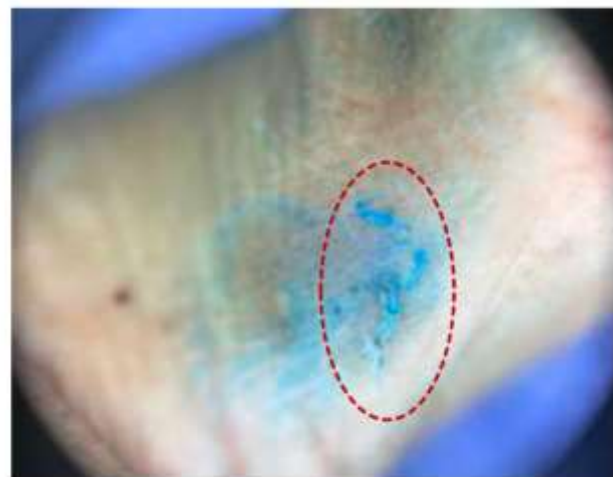


Fig 2. Methylene blue staining

Conclusion

The present study demonstrated that dermoscopy is a valuable, non-invasive, rapid, and patient-friendly diagnostic tool for the evaluation of clinically suspected scabies. Characteristic dermoscopic features, particularly the "jet-with-contrail" or "delta-wing" sign, enabled prompt bedside diagnosis in a substantial proportion of patients, thereby reducing reliance on invasive diagnostic procedures such as skin scraping. Although methylene blue ink staining improved the visualization of burrows in selected cases, its

diagnostic yield was lower and it served primarily as an adjunct to dermoscopy rather than a standalone diagnostic method. The findings emphasize that dermoscopy facilitates early recognition of scabies, allowing timely initiation of treatment and potentially reducing disease transmission and associated complications. Owing to its simplicity, safety, and ease of use in routine outpatient practice, dermoscopy should be considered an important component of the diagnostic approach for scabies. Further multicentric studies with larger sample sizes and comparison with microscopic confirmation are recommended to validate these findings and establish standardized dermoscopic diagnostic criteria for scabies.

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