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Original Research Article

Clinicodermoscopic Evaluation of Genital Dermatoses Mimicking Sexually Transmitted Diseases

Pooja Darji[1], Kunjika V. Damor[2], Parth Darji[3]

[1]MBBS, DDV (Dermatology), Department of Dermatology, Durva Multi-speciality Hospital, Vijapur, Gujarat, India

[2]Assistant Professor, Department of Pathology, Swaminarayan Institute of Medical Science and Research, Kalol, Gujarat, India

[3]Junior Resident, Banas Medical College and Research Institute, Palanpur, Gujarat, India

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Corresponding author: Dr. Parth Darji

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Abstract

Background: Genital dermatoses frequently mimic sexually transmitted diseases (STDs), leading to diagnostic confusion, unnecessary investigations, and significant psychological distress. Dermoscopy has emerged as a valuable non-invasive tool for evaluating genital lesions, potentially improving diagnostic accuracy. This study aimed to evaluate the clinical and dermoscopic features of non-venereal genital dermatoses that clinically simulate STDs and to assess the diagnostic utility of dermoscopy in their differentiation.

Methods: This prospective observational study was conducted on 156 patients presenting with genital lesions initially suspected to be STDs but subsequently diagnosed as non-venereal dermatoses. Clinical examination and dermoscopic evaluation using polarized dermoscopy (10× magnification) were performed. Dermoscopic patterns were documented, and diagnostic accuracy was compared between clinical and clinicodermoscopic assessments using histopathology as the gold standard where applicable.

Results: The mean age was 34.8 ± 12.4 years, with male predominance (67.3%). The most common conditions diagnosed were pearly penile papules (18.6%), Fordyce spots (14.7%), lichen sclerosus (12.8%), and Zoon's balanitis (10.9%). Clinical diagnosis alone achieved 62.8% accuracy, while clinicodermoscopic evaluation improved accuracy to 89.1% ($p<0.001$). Specific dermoscopic patterns were identified: pearly penile papules showed grape-like structures with central vessels, Fordyce spots demonstrated yellowish-white globules, and lichen sclerosus exhibited whitish structureless areas with comedo-like openings. Dermoscopy significantly reduced unnecessary STD investigations (78.2% vs. 34.6%, $p<0.001$).

Conclusion: Dermoscopy substantially enhances diagnostic accuracy in differentiating non-venereal genital dermatoses from STDs. Integration of dermoscopy into routine genital examination can minimize misdiagnosis, reduce patient anxiety, and avoid unnecessary investigations.

Keywords: Dermoscopy; Genital Dermatoses; Sexually Transmitted Diseases; Pearly Penile Papules; Lichen Sclerosus; Fordyce Spots; Non-Venereal Diseases.

Introduction

Genital dermatoses encompass a wide spectrum of inflammatory, infectious, and neoplastic conditions affecting the external genitalia [1]. These conditions frequently present diagnostic challenges due to overlapping clinical features with sexually transmitted diseases (STDs), modified morphology in the genital region, and patient reluctance to undergo thorough examination [2].

The warm, moist, and occluded environment of the genital area often alters the typical presentation of common dermatological conditions, leading to diagnostic uncertainty even among experienced clinicians [3]. Misdiagnosis of benign genital conditions as STDs carries significant consequences, including psychological distress, relationship conflicts, unnecessary antimicrobial treatments, and repeated hospital visits [4]. Studies have documented that up to 30-40% of patients presenting to STD clinics with genital lesions are ultimately diagnosed with non-venereal conditions [5].

Common mimickers include pearly penile papules, Fordyce spots, sebaceous gland hyperplasia, lichen sclerosus, Zoon's balanitis, and fixed drug eruptions, which may resemble condyloma acuminata, molluscum contagiosum, genital herpes,

or syphilitic lesions [6]. Dermoscopy, also known as dermatoscopy or epiluminescence microscopy, has revolutionized the diagnostic approach to numerous dermatological conditions [7]. Originally developed for melanocytic lesion assessment, its application has expanded to inflammatory dermatoses, infections, and hair disorders [8]. In genital dermatology, dermoscopy offers a non-invasive, rapid, and reproducible method for examining lesions that may otherwise require biopsy for definitive diagnosis [9].

Recent investigations have delineated specific dermoscopic patterns for various genital conditions. Pearly penile papules characteristically display grape-like or cobblestone patterns with central comma-shaped vessels [10]. Condyloma acuminata demonstrate mosaic patterns, hairpin vessels, and irregular surface projections [11]. Lichen sclerosus exhibits whitish structureless zones with follicular plugging resembling comedo-like openings [12]. Despite these advances, comprehensive studies systematically comparing clinical versus clinicodermoscopic diagnostic accuracy in genital dermatoses mimicking STDs remain limited.

The psychological impact of suspected STD diagnosis cannot be understated. Patients often experience anxiety, depression, and social stigma even before confirmatory testing [13]. Early and accurate differentiation of non-venereal conditions from STDs through dermoscopy could significantly alleviate this burden and streamline patient management.

The aim of this study was to evaluate the clinical and dermoscopic features of genital dermatoses mimicking sexually transmitted diseases, to identify characteristic dermoscopic patterns for each condition, and to compare the diagnostic accuracy of clinical examination alone versus clinicodermoscopic assessment.

Materials and Methods

Study Design and Setting: This prospective observational study was conducted at the Dermatology and Venereology outpatient department of a tertiary care hospital.

Study Population: A total of 156 patients presenting with genital lesions that were initially suspected to be STDs based on clinical appearance or patient concern were enrolled. Consecutive sampling was employed during the study period.

Inclusion Criteria: Patients aged 18 years and above presenting with genital lesions clinically suspicious for STDs, patients who provided informed consent for clinical examination, dermoscopy, and biopsy if required, and patients with final diagnosis of non-venereal genital dermatoses were included.

Exclusion Criteria: Patients with confirmed STDs based on laboratory investigations (serology, PCR, culture), patients with lesions secondary to trauma or surgical procedures, patients on topical or systemic treatment for genital lesions within the preceding four weeks, patients unwilling to undergo dermoscopic examination or biopsy, and patients with immunocompromised states were excluded.

Clinical Evaluation: Detailed history including demographic data, duration of lesions, associated symptoms (pruritus, pain, and discharge), sexual history, drug history, and history of similar lesions was recorded. Complete mucocutaneous examination was performed with emphasis on genital, perianal, and oral regions. Initial clinical diagnosis was documented before dermoscopic examination.

Dermoscopic Evaluation: Dermoscopy was performed using a polarized handheld dermoscope (DermLite DL4, 10× magnification) with and without contact mode as appropriate. Ultrasound gel was used as the interface medium for contact dermoscopy. Dermoscopic images were captured using a smartphone adapter and stored for analysis. Dermoscopic features were systematically recorded including:

- Background color (white, red, yellow, brown)
- Vascular patterns (dotted, linear, branching, hairpin, comma-shaped)
- Structural patterns (globules, scales, structureless zones, follicular openings)
- Specific morphological features

Histopathological Examination: Skin biopsy was performed in cases where clinical and dermoscopic findings were inconclusive or when histopathological confirmation was required for management. Four-millimeter punch biopsies were obtained under local anesthesia, processed, and examined with hematoxylin and eosin staining. Special stains and immunohistochemistry were employed when indicated.

Final Diagnosis: Final diagnosis was established based on clinicodermoscopic correlation and/or histopathological findings. This served as the reference standard for calculating diagnostic accuracy.

Statistical Analysis: Data were analyzed using SPSS version 25.0. Continuous variables were expressed as mean ± standard deviation (SD), while categorical variables were presented as frequencies and percentages. Comparison of diagnostic accuracy between clinical and clinicodermoscopic assessments was performed using McNemar's test. Chi-square test was used for categorical variable comparisons. Sensitivity, specificity, and positive

predictive values were calculated for dermoscopic patterns. Statistical significance was set at $p<0.05$.

Results

Demographic and Clinical Characteristics: The study included 156 patients with a mean age of 34.8 ± 12.4 years (range: 18-68 years). Males constituted 67.3% (n=105) of the study population. The mean duration of lesions was 8.6 ± 14.2 months. The most common presenting symptoms were asymptomatic lesions (42.3%), followed by pruritus (28.2%), and burning sensation (15.4%). History of prior treatment for suspected STD was present in 38.5% of patients (Table 1).

Distribution of Diagnoses: The most frequently diagnosed conditions were pearly penile papules (18.6%, n=29), Fordyce spots (14.7%, n=23), lichen sclerosus (12.8%, n=20), Zoon's balanitis/vulvitis (10.9%, n=17), and genital psoriasis (9.0%, n=14). Other conditions included angiokeratomas, fixed drug eruption, vestibular papillomatosis, lichen planus, seborrheic dermatitis, and contact dermatitis (Table 1).

Table 1: Demographic Characteristics and Distribution of Diagnoses (N=156)

Parameter	Value
Demographics	
Age (years), mean ± SD	34.8 ± 12.4
Male, n (%)	105 (67.3)
Female, n (%)	51 (32.7)
Duration of lesions (months), mean ± SD	8.6 ± 14.2
Presenting Symptoms	
Asymptomatic	66 (42.3)
Pruritus	44 (28.2)
Burning sensation	24 (15.4)
Pain	12 (7.7)
Discharge	10 (6.4)
Final Diagnosis	
Pearly penile papules	29 (18.6)
Fordyce spots	23 (14.7)
Lichen sclerosus	20 (12.8)
Zoon's balanitis/vulvitis	17 (10.9)
Genital psoriasis	14 (9.0)
Angiokeratoma of Fordyce	12 (7.7)
Fixed drug eruption	11 (7.1)
Vestibular papillomatosis	9 (5.8)
Lichen planus	8 (5.1)
Seborrheic dermatitis	7 (4.5)
Contact dermatitis	6 (3.8)

STD Mimicry Patterns: The most common clinical mimicry was condyloma acuminata (34.0%), followed by genital herpes (21.8%), molluscum contagiosum (16.0%), and syphilis (14.1%).

Pearly penile papules and vestibular papillomatosis most frequently mimicked condyloma acuminata, while fixed drug eruption and Zoon's balanitis commonly mimicked genital herpes and syphilitic chancre respectively.

Dermoscopic Features: Specific dermoscopic patterns were identified for each condition. Pearly penile papules demonstrated grape-like or cobblestone structures (96.6%) with central comma-shaped or dotted vessels (89.7%). Fordyce spots showed yellowish-white globules or clusters (95.7%) without associated vessels.

Lichen sclerosus exhibited whitish structureless areas (100%), comedo-like openings (85.0%), and rosette sign (60.0%). Zoon's balanitis displayed characteristic orange-red structureless zones (94.1%) with curved/serpentine vessels (88.2%) (Table 2).

Table 2: Dermoscopic Features of Common Genital Dermatoses

Diagnosis	Key Dermoscopic Features	Frequency (%)
Pearly penile papules (n=29)		
Grape-like/cobblestone pattern	28 (96.6)	
Central comma-shaped vessels	26 (89.7)	
White-pink background	25 (86.2)	
Fordyce spots (n=23)		
Yellowish-white globules	22 (95.7)	
Clustered arrangement	19 (82.6)	
Absence of vessels	21 (91.3)	
Lichen sclerosus (n=20)		
Whitish structureless areas	20 (100.0)	
Comedo-like openings	17 (85.0)	
Rosette sign	12 (60.0)	
Linear/branching vessels	14 (70.0)	
Zoon's balanitis (n=17)		
Orange-red structureless zones	16 (94.1)	
Curved/serpentine vessels	15 (88.2)	
Focal purpuric spots	11 (64.7)	
Genital psoriasis (n=14)		
Red background	14 (100.0)	
Dotted vessels	13 (92.9)	
White scales	10 (71.4)	
Angiokeratoma (n=12)		
Dark lacunae	12 (100.0)	
Whitish veil	10 (83.3)	
Peripheral erythema	8 (66.7)	

Diagnostic Accuracy Comparison: Clinical diagnosis alone achieved an overall accuracy of 62.8% (98/156 cases). Clinicodermoscopic evaluation significantly improved diagnostic accuracy to 89.1% (139/156 cases) ($p<0.001$). The most substantial improvement was observed for pearly penile papules (clinical: 58.6% vs. clinicodermoscopic: 96.6%), Fordyce spots (clinical: 69.6% vs. clinicodermoscopic: 95.7%), and Zoon's balanitis (clinical: 52.9% vs. clinicodermoscopic: 94.1%).

Dermoscopy reduced unnecessary STD investigations from 78.2% to 34.6% ($p<0.001$) (Table 3).

Table 3: Comparison of Clinical vs. Clinicodermoscopic Diagnostic Accuracy

Diagnosis	Clinical Accuracy n (%)	Clinicodermoscopic Accuracy n (%)	p-value
Pearly penile papules (n=29)	17 (58.6)	28 (96.6)	<0.001
Fordyce spots (n=23)	16 (69.6)	22 (95.7)	0.008
Lichen sclerosus (n=20)	14 (70.0)	18 (90.0)	0.046
Zoon's balanitis (n=17)	9 (52.9)	16 (94.1)	0.003
Genital psoriasis (n=14)	10 (71.4)	13 (92.9)	0.083
Angiokeratoma (n=12)	8 (66.7)	11 (91.7)	0.102
Fixed drug eruption (n=11)	7 (63.6)	9 (81.8)	0.157
Vestibular papillomatosis (n=9)	5 (55.6)	8 (88.9)	0.083
Lichen planus (n=8)	5 (62.5)	7 (87.5)	0.180
Others (n=13)	7 (53.8)	7 (53.8)	1.000
Overall (N=156)	**98 (62.8)**	**139 (89.1)**	**<0.001**
Unnecessary STD workup ordered	122 (78.2)	54 (34.6)	<0.001

Histopathological examination was performed in 68 cases (43.6%) and confirmed the clinicodermoscopic diagnosis in 64 cases (94.1%).

Discussion

This study demonstrates the significant diagnostic value of dermoscopy in evaluating genital

dermatoses that clinically mimic sexually transmitted diseases. Our findings reveal that integrating dermoscopy with clinical examination improves diagnostic accuracy from 62.8% to 89.1%, substantially reducing misdiagnosis and unnecessary investigations. The high prevalence of pearly penile papules (18.6%) among our patients reflects the frequency with which this benign condition is mistaken for condyloma acuminata [14]. The characteristic grape-like or cobblestone dermoscopic pattern with central comma-shaped vessels observed in 96.6% of our cases aligns with previous reports and provides a reliable differentiating feature from genital warts, which typically demonstrate mosaic patterns and hairpin vessels [15]. This distinction is clinically crucial as pearly penile papules require only reassurance, while condyloma necessitates treatment and partner notification.

Fordyce spots, the second most common diagnosis (14.7%), presented a unique dermoscopic appearance of yellowish-white globules without associated vascular structures. This pattern corresponds to the underlying ectopic sebaceous glands and helps differentiate them from molluscum contagiosum, which characteristically shows polylobular white-to-yellow amorphous structures with peripheral crown vessels [16]. The high diagnostic accuracy achieved with dermoscopy (95.7%) underscores its utility in preventing unnecessary treatments for this physiological variation.

Our observations regarding lichen sclerosus dermoscopy, particularly the whitish structureless areas, comedo-like openings, and rosette sign, corroborate findings from previous investigations [17]. The rosette sign, observed in 60% of our cases, represents a relatively specific marker visible only under polarized dermoscopy and reflects the superficial fibrosis and follicular plugging characteristic of this condition [18]. Early dermoscopic recognition is paramount as lichen sclerosus carries potential for malignant transformation if left untreated.

Zoon's balanitis presented distinctive orange-red structureless zones with curved or serpentine vessels in our study, consistent with the plasma cell-rich infiltrate and vascular proliferation histologically observed in this condition [9]. The orange-red color, corresponding to hemosiderin deposits from extravasated erythrocytes, serves as a valuable dermoscopic clue differentiating Zoon's balanitis from erythroplasia of Queyrat or early syphilitic chancre [2].

The significant reduction in unnecessary STD investigations (from 78.2% to 34.6%) following dermoscopic evaluation has important implications for healthcare resource utilization and patient well-being. Previous studies have documented the psychological burden associated with suspected STD diagnosis, including anxiety, depression, and relationship dysfunction [1]. By enabling rapid bedside differentiation, dermoscopy can alleviate these concerns and expedite appropriate management.

Vestibular papillomatosis, observed in 5.8% of female patients, represents another common mimicker of HPV infection. The dermoscopic demonstration of linear, separate papillae with central vessels, as opposed to the fused, irregular projections of condyloma acuminata, provides reliable differentiation [4]. This distinction prevents unnecessary HPV vaccination counseling and reduces stigma associated with STD diagnosis.

The improvement in diagnostic accuracy was most pronounced for conditions with distinctive dermoscopic signatures, including pearly penile papules, Fordyce spots, and Zoon's balanitis. Conversely, conditions like lichen planus and seborrheic dermatitis showed more modest improvement, likely reflecting greater morphological overlap with other dermatoses and the need for histopathological confirmation in select cases [7].

Limitations of this study include its single-center design, which may limit generalizability. Additionally, dermoscopic evaluation was performed by experienced dermatologists, and diagnostic accuracy may vary with operator experience. The study focused on non-venereal conditions, and direct comparison with confirmed STD cases would strengthen the differential diagnostic framework.

Future studies should evaluate the learning curve for genital dermoscopy among trainees and explore the potential role of artificial intelligence in pattern recognition for genital lesions [6].

Conclusion

This study establishes dermoscopy as a valuable adjunct to clinical examination in evaluating genital dermatoses that mimic sexually transmitted diseases. The integration of dermoscopy significantly improved diagnostic accuracy from 62.8% to 89.1% and substantially reduced unnecessary STD investigations. Specific dermoscopic patterns were identified for common genital conditions including pearly penile papules, Fordyce spots, lichen sclerosus, and Zoon's balanitis. The adoption of dermoscopy in genital dermatology practice can minimize diagnostic delays, reduce patient anxiety, avoid unnecessary treatments, and optimize healthcare resource utilization. Clinicians managing patients with genital lesions should consider incorporating

dermoscopy as a routine diagnostic tool to enhance clinical decision-making.

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