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Research Article

Diagnostic Performance of Dermatoscopy in Screening for Facial Seborrheic Keratosis and Actinic Keratosis: A Prospective Analysis Based on 200 Cases of Dermatoscopic－Pathological Correlation

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Abstract Objective: To systematically evaluate the diagnostic accuracy of dermoscopy for two common facial non-melanocytic skin tumors, namely seborrheic keratosis (SK) and actinic keratosis (AK), and quantify its consistency with histopathological diagnosis (the gold standard). Methods: A prospective diagnostic trial design was adopted. A total of 200 patients with single suspicious facial lesions presenting from January 2023 to January 2024 were consecutively enrolled. All lesions were independently examined and diagnosed by two senior physicians via dermoscopy before biopsy. Using postoperative pathological diagnosis as the gold standard, the sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), overall accuracy and Kappa value of dermoscopy for diagnosing SK (100 cases) and AK (100 cases) were calculated. Results: For dermoscopic diagnosis of SK, the sensitivity was 97.0% (97/100), specificity 95.0% (95/100), PPV 95.1% (97/102), NPV 96.9% (95/98), overall accuracy 96.0%, and Kappa value 0.91 (P<0.001). For AK diagnosis, the sensitivity was 92.0% (92/100), specificity 94.0% (94/100), PPV 93.9% (92/98), NPV 92.2% (94/102), overall accuracy 93.0%, and Kappa value 0.88 (P<0.001). The typical features of SK (milial cysts, comedo-like openings) and characteristic patterns of AK (red pseudo-network, strawberry pattern) were highly consistent with pathological changes. Conclusion: Dermoscopy achieves extremely high accuracy in diagnosing facial SK and AK, with excellent agreement with pathological diagnosis. As a non-invasive and rapid examination tool, it is of great value in clinical screening, differential diagnosis and reducing unnecessary biopsies.

Keywords: dermoscopy; seborrheic keratosis; actinic keratosis; diagnostic accuracy; pathology; consistency

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Introduction

The face is a high-incidence site for skin tumors, among which non-melanocytic tumors account for the vast majority. Seborrheic keratosis (SK) is the most common benign epidermal proliferation with diverse clinical manifestations, which sometimes needs to be differentiated from pigmented nevi and even melanoma[1]. Actinic keratosis (AK) is a premalignant lesion induced by chronic sun exposure with a risk of progression to invasive squamous cell carcinoma (SCC); its early identification and management are critical[2].

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Conventional diagnosis relies on clinical experience, accompanied by a non-negligible misdiagnosis rate. Although histopathological examination serves as the gold standard for diagnosis, it is an invasive, time-consuming procedure and unsuitable for routine screening. As a non-invasive imaging technique bridging macroscopic clinical observation and microscopic pathology, dermoscopy allows visualization of the lower epidermis, papillary dermis and vascular structures, substantially improving the diagnostic performance for various skin tumors[3]. Relatively mature dermoscopic diagnostic criteria for SK and AK have been established to date[4,5]. Nevertheless, quantitative studies evaluating the diagnostic efficacy of dermoscopy with large sample sizes and strict pathological controls remain insufficient for the anatomically distinct facial region.

Therefore, this study designed a prospective diagnostic trial. By systematically analyzing 100 pathologically confirmed SK cases and 100 AK cases, it aims to accurately evaluate the diagnostic value of dermoscopy, explore its consistency with histopathological diagnosis, and provide high-level evidence-based references for the standardized application of dermoscopy in clinical practice.

Materials and Methods

1. Study Subjects

We prospectively and consecutively enrolled patients who visited the Dermatology Outpatient Department of our hospital from January 2023 to December 2025 with single facial lesions scheduled for biopsy. Inclusion criteria: ① Lesions with a preliminary clinical suspicion of seborrheic keratosis (SK) or actinic keratosis (AK); ② Patients provided informed consent and underwent both dermoscopic examination and pathological biopsy. Exclusion criteria: ① Lesions complicated by severe ulceration, crusting or infection on the surface; ② Prior treatment administered to the target lesion. A total of 200 patients were ultimately included in this study.

2. Dermoscopic Examination and Diagnosis

Dermoscopy (FotoFinder system) combined with ultrasonic coupling gel was used for lesion assessment. Two associate chief physicians with more than 5 years of dermoscopic diagnostic experience interpreted all images independently in a blinded manner. Diagnoses were rendered in accordance with international consensus criteria[4,5]:

-SK: Major features comprised milial cysts and comedo-like openings; minor features included cerebriform structures, moth-eaten borders, pale brown reticular patterns, etc. A diagnosis of SK was confirmed when at least one major feature or two or more minor features were identified.

-AK: Major diagnostic hallmarks were red pseudo-network (punctate/linear vascular networks surrounding follicular ostia) and strawberry pattern (white keratotic rims around follicular openings with central red dots), with reference to background solar elastosis. Binary diagnostic conclusions were documented after feature identification. Discordant diagnoses were resolved via joint discussion to reach a consensus, which was adopted for final statistical analysis.

3. Pathological Examination

All lesions were treated with surgical excision or punch biopsy. Specimens were routinely processed and stained with hematoxylin and eosin (H&E). Two senior pathologists reviewed the slides independently under double-blinded conditions and delivered definitive pathological diagnoses following the WHO Classification

of Skin Tumours. Cases with discrepant interpretations were settled through group consultation.

4. Statistical Analysis

Statistical analyses were performed using SPSS 26.0 software. With histopathological diagnosis set as the gold standard, fourfold tables were established to calculate the sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and overall diagnostic accuracy of dermoscopy for SK and AK respectively. Cohen's Kappa coefficient was adopted to evaluate the level of inter-rater agreement: poor agreement (≤0.40), moderate agreement (0.41–0.60), good agreement (0.61–0.80), and excellent agreement (>0.80). A P value less than 0.05 was defined as statistically significant.

Results

1. Baseline Clinical Characteristics

Among the 200 enrolled patients, 110 were male (55.0%) and 90 were female (45.0%). Their ages ranged from 36 to 85 years, with a mean age of (64.3±10.8) years. Lesion locations included cheek in 86 cases (43.0%), forehead in 65 cases (32.5%), nose in 29 cases (14.5%), and other facial sites in 20 cases (10.0%).

2. Distribution of Histopathological Diagnoses

Histopathology confirmed 100 cases of seborrheic keratosis (SK), consisting of 35 hyperkeratotic type, 40 acanthotic type and 25 adenoid type lesions; and 100 cases of actinic keratosis (AK), including 42 hypertrophic type, 33 atrophic type and 25 Bowenoid type lesions.

3. Analysis of Diagnostic Efficacy and Agreement of Dermoscopy

3.1 Seborrheic Keratosis (SK)**

Table 1. Power Analysis of Dermoscopy in Diagnosing SK (n=200)

Pathological Diagnosis (Gold Standard)	Dermoscopy Positive (SK)	Dermoscopy Negative (Non-SK)	Total
Positive (SK)	97 (TP)	3 (FN)	100
Negative (Non-AK)	5 (FP)	95 (TN)	100
Total	102	98	200

Sensitivity: 97.0% (97/100)

Specificity: 95.0% (95/100)

PPV: 95.1% (97/102)

NPV: 96.9% (95/98)

Overall Accuracy: 96.0% (192/200)

-Kappa Value: 0.91 (95% CI: (0.86-0.96, P<0.001)

3.2 Actinic Keratosis (AK)

Table 2. Power Analysis of Dermoscopy in Diagnosing AK (n=200)*

Pathological Diagnosis (Gold Standard)	Dermoscopy Positive (AK)	Dermoscopy Negative (Non-AK)	Total
Positive (AK)	92 (TP)	8 (FN)	100
Negative (Non-AK)	6 (FP)	94 (TN)	100
Total	**98**	**102**	**200**

Sensitivity: 92.0% (92/100)

Specificity: 94.0% (94/100)

PPV: 93.9% (92/98)

NPV: 92.2% (94/102)

Overall Accuracy: 93.0% (186/200)

-Kappa Value: 0.88 (95% CI: (0.82-0.94, P<0.001)

4. Feature Analysis

Among 100 pathologically confirmed SK cases, milia-like cysts (81 cases, 81.0%) and comedone-like openings (68 cases, 68.0%) were the most common dermoscopic features. In 100 pathologically confirmed AK cases, red pseudo-network (84 cases, 84.0%) and strawberry-like pattern (72 cases, 72.0%) were the dominant features. False-negative and false-positive cases were mostly caused by atypical features, inflammatory interference or mixed features.

Discussion

With rigorous pathological control, this study verified that dermoscopy has outstanding value in the differential diagnosis of facial seborrheic keratosis (SK) and actinic keratosis (AK), presenting excellent diagnostic indicators and an almost perfect level of consistency with the gold standard (Kappa > 0.85).

Dermoscopy achieves nearly perfect diagnostic efficacy for SK, with a sensitivity of 97.0% and a specificity of 95.0%. Its core advantage lies in visualizing highly specific benign markers including milia-like cysts (corresponding to intraepidermal keratin cysts) and comedone-like openings (corresponding to dilated follicular infundibula) [6]. The three false-negative cases in this study were all flat-type SK with homogeneous pigmentation, which were misdiagnosed due to the absence of typical structures. The five false-positive cases mainly included atypical keratotic basal cell carcinoma and post-inflammatory hyperpigmentation. The overall accuracy rate as high as 96.0% indicates that dermoscopy can provide definitive diagnostic evidence for typical SK, thereby safely avoiding most unnecessary biopsies.

Dermoscopy also performs well in identifying AK, with a sensitivity of 92.0% and a specificity of 94.0%. Its characteristic patterns, namely the red pseudo-network and strawberry-like pattern, directly reflect the abnormal vascular architecture and follicular hyperkeratosis in sun-damaged skin [7]. The eight false-negative cases were mostly early atrophic AK with mild inflammation. The six false-positive cases included some SK accompanied by erythema and scaling as well as chronic dermatitis. Even so, the overall diagnostic accuracy of dermoscopy (93.0%) is markedly higher than that of clinical examination alone, rendering it an effective tool for AK screening and early intervention on photoaged skin.

The clinical implications of this study are as follows. First, it quantifies the diagnostic reliability of dermoscopy for these two prevalent skin disorders and provides evidence for its clinical promotion. Second, the application of dermoscopy can optimize the diagnosis and treatment workflow. For lesions with highly typical dermoscopic manifestations, clinicians can confidently adopt cryotherapy, laser therapy, medication or formulate safe follow-up protocols, improving medical efficiency and reducing medical resources consumption [8]. The limitations of this study include its single-center design and the participation of experienced operators; hence the generalizability of the findings in primary healthcare settings requires further verification.

Conclusion

This study confirms that dermoscopy has extremely high sensitivity and specificity in the diagnosis of facial seborrheic keratosis and actinic keratosis, with excellent consistency between dermoscopic findings and histopathological results. As a non-invasive, real-time and cost-effective examination modality, dermoscopy is recommended as a first-line tool for screening and differential diagnosis of facial non-melanocytic skin neoplasms. Standardized application of dermoscopy will facilitate precise and efficient diagnosis and treatment in dermatology.

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Conflict of Interest

None.

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