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ORIGINAL RESEARCH

Dermoscopic Evaluation of Mild-to-Moderate Acne Vulgaris: A Correlation Analysis with Clinical Severity Scales

Lanfang Zhang[1], Lin Li[1], Hongxia She[1], Yang Huang[1], Qi Xiong[1], Jie Hu[1], Changsha Jia[1], Wen Yan[1], Ni Zeng[2]

[1]Department of Dermatology, Affiliated Hospital of Zunyi Medical University, Zunyi, People's Republic of China; [2]Department of Dermatology, Guizhou Province Cosmetic Plastic Surgery Hospital, Affiliated Hospital of Zunyi Medical University, Zunyi, People's Republic of China

Correspondence: Wen Yan, Department of Dermatology, Affiliated Hospital of Zunyi Medical University, Zunyi, 563003, People's Republic of China, Email zyyanwen@163.com; Ni Zeng, Department of Dermatology, Guizhou Province Cosmetic Plastic Surgery Hospital, Affiliated Hospital of Zunyi Medical University, Zunyi, People's Republic of China, Email jennyfantasyzmu@hotmail.com

Background: Acne vulgaris is a chronic inflammatory disorder of the pilosebaceous unit. Accurate and objective assessment of inflammatory activity remains a challenge in clinical practice. Dermoscopy, as a noninvasive imaging technique, enables visualization of vascular and color changes associated with inflammation.

Methods: In this cross-sectional study, 40 patients with mild-to-moderate acne vulgaris were enrolled, and 80 dermoscopic images were obtained. Background color, vascular morphology, vascular distribution, and perifollicular yellow halo were analyzed and compared between severity grades (mild vs. moderate) and among lesion types (comedonal, papular, pustular).

Results: In the mild group, a light-red background predominated (41.7%), whereas red and dark-red backgrounds were more common in the moderate group (both 38.6%), with a significant difference ($\chi^2 = 10.13$, $P = 0.006$). Vascular morphology suggested a trend toward transition from dotted to branched forms with increasing inflammation, although this did not reach statistical significance ($P > 0.05$). By lesion type, comedonal lesions mainly displayed light-red backgrounds with dotted vessels, while papular and pustular lesions exhibited red-to-dark-red backgrounds with branched or atypical vessels ($P < 0.05$).

Conclusion: Progressive deepening of background color and transformation of vascular morphology on dermoscopy are associated with increasing inflammatory activity in acne vulgaris. Quantitative evaluation of these dermoscopic parameters may contribute to preliminary objective severity grading and therapeutic monitoring. Dermoscopy may represent a potentially valuable, noninvasive imaging modality for assessing inflammatory activity in acne.

Keywords: acne vulgaris, dermoscopy, vascular morphology, background color, inflammatory severity, quantitative assessment

Introduction

Acne vulgaris is a chronic inflammatory disorder of the pilosebaceous unit, clinically characterized by comedones, papules, pustules, nodules, and cysts. Recurrent episodes often result in post-inflammatory hyperpigmentation and scarring.[1] The condition predominantly affects adolescents and imposes a substantial cosmetic burden, frequently leading to psychological distress and impaired social interactions.[2]

In clinical practice, the severity of acne vulgaris is typically graded through visual inspection and subjective assessment, which lack objectivity and standardization. Accurate grading is essential for determining appropriate treatment strategies and evaluating therapeutic efficacy. According to the Chinese Expert Consensus on Acne Management (2025), acne vulgaris is classified into four grades and three stages based on lesion morphology.[3] However, existing grading systems, such as the Pillsbury classification and Investigator's Global Assessment (IGA), primarily rely on subjective visual inspection of lesion types and counts, which are prone to inter-observer variability, influenced by lighting conditions, examiner experience, and skin type. These approaches often lack

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sensitivity to subtle inflammatory changes, do not adequately account for post-inflammatory hyperpigmentation or scarring, and may not provide sufficient objectivity for precise therapeutic monitoring or research reproducibility. Early diagnosis, precise grading, rational therapy, and systematic evaluation are therefore critical for improving clinical outcomes.

Dermoscopy is a noninvasive, high-magnification imaging technique that enables visualization of pigment distribution and microstructural changes within the epidermis, dermoepidermal junction, and superficial dermis using polarized light or liquid immersion.[4] Because acne primarily involves the pilosebaceous unit and surrounding vasculature, dermoscopy provides a promising tool for enhancing diagnostic accuracy and for objectively assessing inflammatory activity.[5] Accordingly, this study aims to systematically characterize the dermoscopic features of mild-to-moderate acne vulgaris and to evaluate their potential value in assessing inflammatory severity, thereby addressing the limitations of current subjective grading methods and providing preliminary objective evidence to support clinical grading and treatment planning.

Materials and Methods

Study Subjects and Methods

This cross-sectional observational study included 40 patients with acne vulgaris, aged 16–30 years, who attended the Affiliated Hospital of Zunyi Medical University between July and October 2025. According to the Pillsbury classification system, patients were assigned to a mild group (18 cases) or a moderate group (22 cases). Clinical and demographic data were analyzed at the patient level (n=40), while dermoscopic features were analyzed at the lesion level (n=80). Two representative dermoscopic images were obtained per patient (total 80 images), with lesions selected based on clinical predominance and accessibility. To minimize selection bias, eligible sites were randomized when multiple options existed. To ensure reproducibility, all images were captured by a single experienced technician under standardized conditions: a polarized light mode was used to eliminate surface reflection, the lens was kept in gentle contact with the skin surface without excessive pressure (to avoid blanching of blood vessels), and the magnification was fixed at 40×. Additionally, all procedures were conducted in a temperature-controlled room (24–26°C) to minimize the impact of external factors on skin vascularity. The dermoscopic parameters analyzed included background color, vascular morphology, vascular distribution, and the presence of perifollicular light-yellow halos.

Inclusion Criteria

(1) Diagnosis of acne vulgaris confirmed according to established clinical criteria, with severity graded as mild or moderate using the international Pillsbury classification;
(2) No systemic or topical retinoid therapy, other anti-acne treatments, or chemical peeling within the preceding two months;
(3) Good treatment compliance and ability to complete scheduled follow-up;
(4) Voluntary participation with signed informed consent after full explanation of study aims and procedures.

Exclusion Criteria

(1) History of photosensitivity;
(2) Facial wounds or concurrent dermatologic disorders such as eczema or psoriasis;
(3) Coexistence of severe systemic disease, malignancy, or psychiatric illness;
(4) Pregnancy or lactation;
(5) Tendency toward keloid formation;
(6) Any other condition likely to interfere with the study outcomes. (eg, active infections, recent cosmetic procedures, or immunosuppressive conditions).

The study protocol was performed in accordance with the Declaration of Helsinki and was reviewed and approved by the Ethics Committee of the Affiliated Hospital of Zunyi Medical University (Approval No. KLL-2025-085). Written informed consent was obtained from all participants prior to enrollment.

Statistical Analysis

All analyses were two-tailed. Inter-observer reliability for dermoscopic evaluation was assessed using Cohen's κ coefficient, and agreement was interpreted according to the Landis–Koch criteria, (κ = 0.85, indicating substantial agreement), and agreement was interpreted according to the Landis–Koch criteria. Analyses treated the 80 lesions as independent units for primary comparisons; however, potential clustering (multiple lesions per patient) is acknowledged as a limitation that may affect P-value reliability (see Discussion). All statistical analyses were performed using SPSS version 27.0 (IBM Corp., Armonk, NY, USA). Categorical variables were expressed as frequencies and percentages, while continuous variables were presented as mean ± standard deviation (SD). Comparisons between two groups were conducted using the independent-sample *t*-test for continuous variables and the χ^2-test for categorical variables. For comparisons among more than two groups, one-way analysis of variance (ANOVA) was applied. All analyses were two-tailed, and a P-value < 0.05 was considered statistically significant. All dermoscopic evaluations were independently performed by two qualified dermatologists to ensure consistency of image assessment. In this study, the 80 lesions were analyzed as independent observations. However, we recognize that the inclusion of multiple lesions per patient introduces a clustering effect, which potentially violates the independence assumption. This limitation is addressed in detail in the Discussion section, and all statistical results should be interpreted as exploratory evidence.

Results

General Characteristics

A total of 40 patients were enrolled in the study, and two representative dermoscopic images were obtained for each patient, yielding 80 images in total. Among the participants, 17 were male (42.5%) and 23 were female (57.5%). The patients ranged in age from 16 to 30 years, with a mean age of 22.13 ± 3.86 years. There was no statistically significant difference in age between the mild and moderate groups (21.96 ± 4.01 years vs. 22.27 ± 3.78 years, $t = -0.38$, $P = 0.708$).

According to the four-grade and three-stage classification system, 36 dermoscopic images (45.0%) were obtained from patients with mild acne and 44 images (55.0%) from patients with moderate acne. Regarding lesion type, papular lesions were predominant (36 images, 45.0%), followed by comedonal lesions (27 images, 33.8%) and pustular lesions (17 images, 21.2%).

Representative clinical images are shown in Figure 1. Panels A–C depict Grade I lesions according to the Pillsbury classification, primarily comedones with a few inflammatory papules. Panels D–F represent Grade II lesions, characterized by comedones with a moderate number of inflammatory papules and pustules. Panels G–I correspond to Grade III lesions, showing numerous inflammatory papules and pustules, with fewer than three nodules.

Dermoscopic Features of Lesions in Patients with Mild and Moderate Acne Vulgaris

Significant differences were observed in the distribution of background color among patients with different severity levels ($\chi^2 = 10.13$, $P = 0.006$, Cramér's V = 0.32 indicating moderate effect size) (see Figure 2 and Table 1). In the mild group, a light-red background was predominant (15 images, 41.7%), whereas in the moderate group, red and dark-red backgrounds were equally represented (17 images each, 38.6%). These findings suggest a deepening of the background color with increasing acne severity, potentially reflecting the progression of inflammatory activity.

Regarding vascular morphology, the mild group primarily exhibited branched vessels (14 images, 38.9%) and dotted vessels (13 images, 36.1%), while the moderate group showed a predominance of branched vessels (23 images, 52.3%) and atypical vessels (14 images, 31.8%). However, the difference between the two groups was not statistically significant ($\chi^2 = 4.32$, $P = 0.115$).

In terms of vascular distribution, both groups were mainly characterized by localized vascular patterns (17 images [47.2%] in the mild group and 22 images [50.0%] in the moderate group), followed by diffuse distribution (14 vs. 13 images, respectively), with no significant difference ($\chi^2 = 1.03$, $P = 0.597$).

Perifollicular light-yellow halos were observed in 18 of 36 images (50.0%) in the mild group and 16 of 44 images (36.4%) in the moderate group, and this difference was not statistically significant ($\chi^2 = 1.51$, $P = 0.220$).

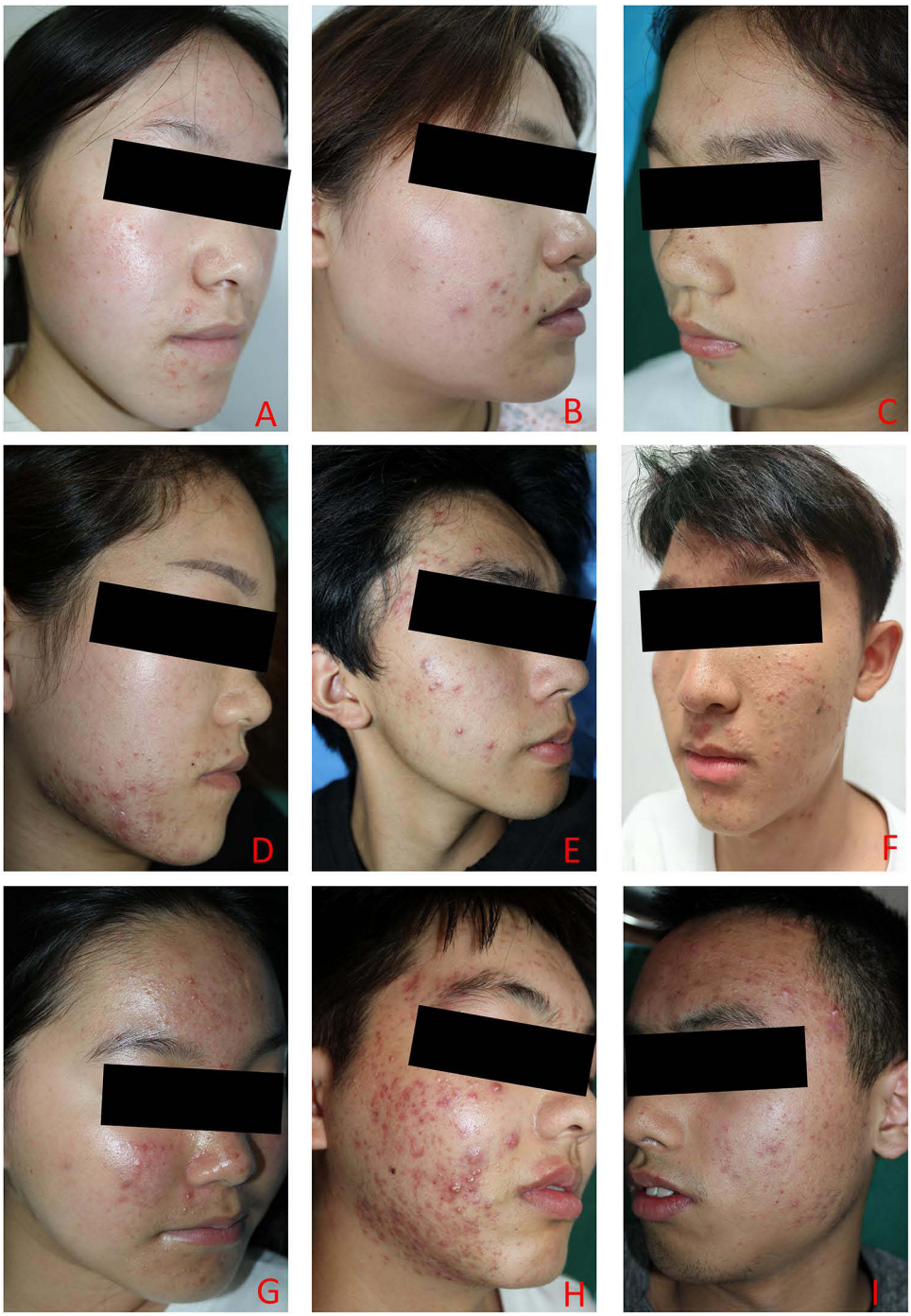

Figure 1 Clinical grading of acne vulgaris severity using the Pillsbury classification. (**A**–**C**) Grade I: Primarily comedones with sparse inflammatory papules. (**D**–**F**) Grade II: Comedones with a moderate number of inflammatory papules and pustules. (**G**–**I**) Grade III: Numerous inflammatory papules and pustules, with fewer than three nodules present. **Note**: Only mild and moderate acne cases were included in the statistical analysis.

Taken together, only background color showed a statistically significant difference between the two severity groups, whereas vascular morphology, vascular distribution, and perifollicular light-yellow halos did not. The progressive change in background color from light red to dark red may indicate increasing inflammatory intensity and is likely associated with disease progression in acne vulgaris.

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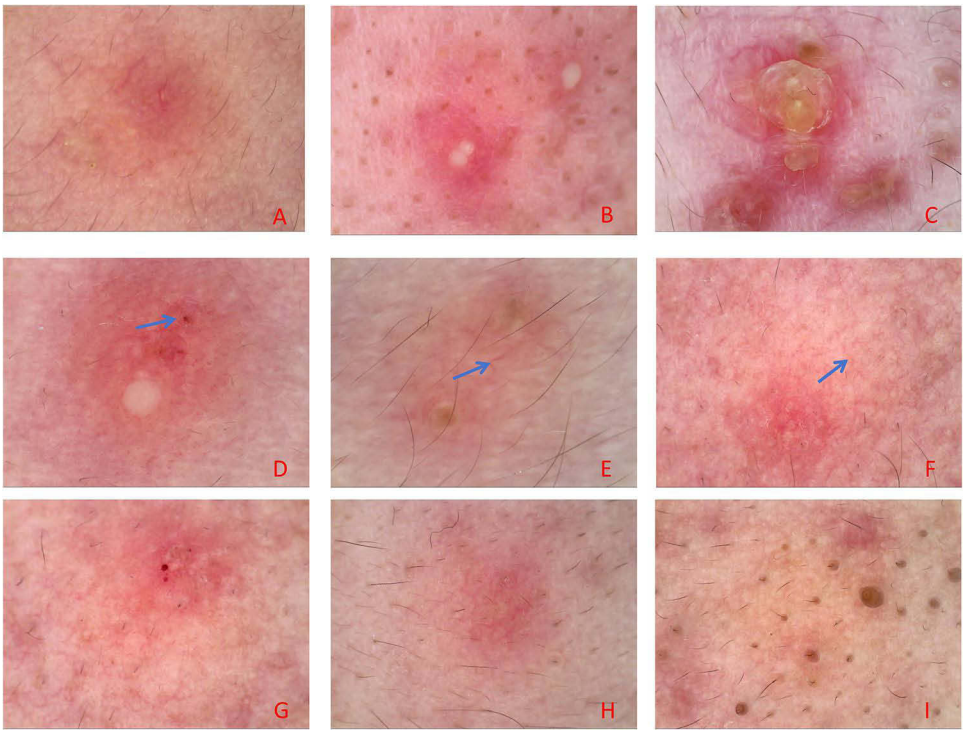

Figure 2 Dermoscopic images of patients with acne vulgaris. (**A**) Light-red background; (**B**) red background; (**C**) dark-red background; (**D**) dotted vessels (indicated by arrows); (**E**) branched vessels (indicated by arrows); (**F**) atypical vessels (indicated by arrows); (**G**) diffuse vascular distribution; (**H**) localized vascular distribution; (**I**) marginal vascular distribution.

Dermoscopic Features of Comedonal, Papular, and Pustular Lesions

No statistically significant differences were found among the three lesion-type groups in terms of age or sex distribution (Age: $F = 0.036$, $P = 0.965$; Sex: $\chi^2 = 0.007$, $P = 0.997$). Significant differences were found in background color among the lesion types ($\chi^2 = 18.33$, $P = 0.001$, Cramér's V = 0.48 indicating moderate-to-strong effect size, Table 2). Comedonal lesions predominantly exhibited a light-red background (15 images, 55.6%), papular lesions showed mainly red

Table 1 Comparison of Patient-Level Characteristics (n=40) and Lesion-Level Dermoscopic Features (n=80) Between Mild and Moderate Groups

Variables	Total (Patients n=40; Lesions n=80)	Mild (Patients n=18; Lesions n=36)	Moderate (Patients n=22; Lesions n=44)	Statistic	*P*
Age, Mean ± SD (years)	22.13 ± 3.86	21.94 ± 4.01	22.27 ± 3.78	t=−0.38	0.708
Background color, n (%)				χ^2=10.13	0.006
Light red	25 (31.25)	15 (41.7)	10 (22.72)		
Red	35 (43.75)	18 (50.0)	17 (38.64)		
Dark red	20 (25.0)	3 (8.3)	17 (38.64)		
Vascular morphology, n (%)				χ^2=4.32	0.115
Dotted	20 (25.0)	13 (36.11)	7 (15.91)		
Branched	37 (46.25)	14 (38.89)	23 (52.27)		
Atypical	23 (28.75)	9 (25.0)	14 (31.82)		
Vascular distribution, n (%)				χ^2=1.03	0.597
Diffuse	27 (33.75)	14 (38.89)	13 (29.55)		
Localized	39 (48.75)	17 (47.22)	22 (50.0)		
Marginal	14 (17.5)	5 (13.89)	9 (20.45)		

(*Continued*)

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Table 1 (Continued).

Variables	Total (Patients n=40; Lesions n=80)	Mild (Patients n=18; Lesions n=36)	Moderate (Patients n=22; Lesions n=44)	Statistic	*P*
Perifollicular light-yellow halo, n (%)					
Absent	46 (57.5)	18 (50.0)	28 (63.64)	χ^2=1.51	0.220
Present	34 (42.5)	18 (50.0)	16 (36.36)		

Notes: t: *t*-test, χ^2: Chi-square test.
Abbreviation: SD, standard deviation.

Table 2 Comparison of Dermoscopic Feature Frequencies Among Different Acne Lesion Types

Variables	Total (n = 80)	Comedonal (n = 27)	Papular (n = 36)	Pustular (n = 17)	Statistic	*P*
Background color, n (%)					χ^2=18.33	0.001
Light red	25 (31.25)	15 (55.56)	9 (25)	1 (5.88)		
Red	35 (43.75)	10 (37.04)	18 (50)	7 (41.18)		
Dark red	20 (25)	2 (7.40)	9 (25)	9 (52.94)		
Vascular morphology, n (%)					χ^2=12.95	0.012
Dotted	20 (25)	13 (48.15)	5 (13.89)	2 (11.77)		
Branched	37 (46.25)	10 (37.04)	17 (47.22)	10 (58.82)		
Atypical	23 (28.75)	4 (14.81)	14 (38.89)	5 (29.41)		
Vascular distribution, n (%)					χ^2=4.59	0.332
Diffuse	27 (33.75)	6 (22.22)	13 (36.11)	8 (47.05)		
Localized	39 (48.75)	17 (62.96)	15 (41.67)	7 (41.18)		
Marginal	14 (17.5)	4 (14.81)	8 (22.22)	2 (11.77)		
Perifollicular light-yellow halo, n (%)					χ^2=0.46	0.795
Present	46 (57.5)	15 (55.56)	20 (55.56)	11 (64.71)		
Absent	34 (42.5)	12 (44.44)	16 (44.44)	6 (35.29)		

Notes: *F*: ANOVA, χ^2: Chi-square test.
Abbreviation: SD, standard deviation.

backgrounds (18 images, 50.0%), whereas pustular lesions had a higher proportion of dark-red backgrounds (9 images, 52.9%). The progressive deepening of background color from light red to dark red with lesion evolution from comedones to papules and pustules suggests an increase in inflammatory activity.

Vascular morphology also differed significantly among the three lesion types (χ^2 = 12.95, P = 0.012). Comedonal lesions mainly displayed dotted vessels (13 images, 48.1%), papular lesions exhibited branched (17 images, 47.2%) and atypical vessels (14 images, 38.9%), while pustular lesions were dominated by branched vessels (10 images, 58.8%). This transformation in vascular morphology suggests a trend toward the progressive expansion of inflammation and the enhancement of vascular reactivity.

Regarding vascular distribution, all three groups were predominantly characterized by localized vascular patterns (17 comedonal, 15 papular, and 7 pustular lesions), followed by diffuse patterns, with no statistically significant difference (χ^2 = 4.59, P = 0.332).

The occurrence of perifollicular light-yellow halos did not differ significantly among groups (χ^2 = 0.46, P = 0.795), with frequencies of 55.6%, 55.6%, and 64.7% in comedonal, papular, and pustular lesions, respectively.

In summary, differences in dermoscopic features among lesion types were primarily reflected in background color and vascular morphology. With increasing inflammatory severity, the background color gradually deepened from light red to dark red, and vascular morphology evolved from dotted to branched or atypical vessels. These findings suggest that dermoscopy provides an objective reflection of the dynamic progression of inflammation in acne lesions.

Discussion

In this study, a total of 40 patients aged 16–30 years with mild-to-moderate acne vulgaris (mean age 22.13 ± 3.86 years) were included, and 80 dermoscopic images were analyzed. Comparisons were performed between the mild (36 images) and moderate (44 images) groups, as well as among lesions of different types, including comedonal (27 images), papular (36 images), and pustular (17 images) acne. The results showed a statistically significant difference in background color between severity groups ($\chi^2 = 10.13$, $P = 0.006$), with a progressive shift from light red to dark red as severity increased. No significant differences were found in vascular morphology, vascular distribution, or perifollicular light-yellow halos between mild and moderate acne.

When dermoscopic characteristics were compared among different lesion types, significant differences were also observed in background color ($\chi^2 = 18.33$, $P = 0.001$) and vascular morphology ($\chi^2 = 12.95$, $P = 0.012$). These findings suggest that the degree of inflammatory activity in acne lesions may be objectively reflected by the dermoscopic appearance of background color and vascular pattern.

In recent years, the application of dermoscopy in acne research has increased, although most reports have been limited to case studies or small-scale investigations. Systematic studies remain relatively scarce. A recent Egyptian study analyzing 24 patients with acne reported that comedonal lesions accounted for 83.3% and inflammatory lesions for 75% of cases.[6] Our findings build upon this by providing a more structured comparison across both severity grades and lesion types. Despite our relatively small cohort (n=40), the highly significant and consistent trends observed in background color ($P = 0.006$) and the characteristic shifts in vascular morphology support the potential of dermoscopy as a sensitive tool for objective assessment. The fact that such robust statistical signals were captured within a limited sample suggests that these dermoscopic parameters are highly responsive to inflammatory variations, though validation in larger, more diverse cohorts remains necessary.

Deepening of Background Color: An Imaging Correlate of Inflammation and Vascular Dilation

Our findings showed a trend toward a deeper background color—ranging from light red to red and dark red—across different acne severity grades and lesion types (from comedonal to papular and pustular lesions). While the cross-sectional nature of this study precludes a direct observation of temporal progression, these variations potentially align with the known pathogenesis of acne, which involves follicular–sebaceous unit obstruction, Cutibacterium acnes colonization, and inflammatory cell infiltration. Theoretically, as inflammatory activity increases, local vasodilation and erythrocyte congestion in the superficial dermis may become more pronounced, resulting in a darker red appearance under dermoscopy.[1,7] This visual darkening is likely associated with increased capillary dilation and elevated hemoglobin concentration during active inflammation,[8] though longitudinal studies are required to confirm this relationship.

Noninvasive imaging modalities such as optical coherence tomography (OCT) and dynamic optical coherence tomography (D-OCT) have also confirmed enhanced vascular signals in inflamed areas, which gradually decrease following anti-inflammatory treatment.[9]

Li et al[10] further validated this trend through a dermoscopy–histopathology correlation study involving 120 patients with acne vulgaris. Mild (Grade I) lesions primarily exhibited a light-red background (50.0%), whereas moderate-to-severe (Grades III–IV) lesions showed yellow-red or dark-red backgrounds (deep red in 26.1%, $P < 0.01$). Histopathological analysis revealed more pronounced perifollicular inflammatory infiltrates and vascular dilation in the severe group. The same study found that comedonal lesions were characterized by dotted vessels with localized distribution ($P < 0.05$), while papular and pustular stages exhibited ring-like or atypical vessels with diffuse distribution—consistent with the present study's observation of a transition from dotted to branched vascular morphology.

These correlative findings indicate that variations in dermoscopic background color and vascular morphology are reproducible and may be positively associated with histologic inflammation. Therefore, they may serve as candidate, noninvasive imaging biomarkers for evaluating inflammatory activity in acne.

Systematic reviews have further emphasized that dermoscopy, reflectance confocal microscopy (RCM), and OCT can all reveal the correspondence between superficial dermal vascular structures and inflammatory severity in acne lesions.[9]

Thus, background color represents a noninvasive, intuitive, and reproducible imaging parameter with potential value in assessing inflammatory activity. Future research should focus on quantifying this parameter—such as through Red-Green -Blue (RGB) colorimetry or spectral analysis—to enhance objectivity and reduce observer bias. Additionally, multimodal imaging combining OCT and RCM could enable in vivo tracking of vascular density and branching, providing precise quantitative endpoints for treatment monitoring.

Vascular Morphology and Distribution: A Clear Trend with Limited Statistical Significance

In this study, vascular morphology showed a clear trend of transition from dotted to branched or atypical patterns across lesion types—dotted vessels predominating in comedonal lesions, while branched or atypical vessels were more frequently observed in papular and pustular lesions. This pattern aligns with the progressive expansion of the inflammatory area and increased vascular reactivity. However, the overall comparison between mild and moderate acne did not reach statistical significance ($\chi^2 = 4.32$, $P = 0.115$), possibly due to the limited sample size, magnification level, and resolution constraints of dermoscopic imaging.

Despite the lack of strict statistical significance in our cohort, the observed transition from predominant dotted vessels to more complex linear-irregular arrangements reflects the progressive neoangiogenesis and vasodilation characteristic of intensifying skin inflammation.[11] Experimental animal models using dermoscopy combined with laser speckle contrast imaging have demonstrated dynamic changes in blood flow and vascular morphology during acne-like lesion development, confirming increased angiogenesis and blood perfusion with disease progression.[12] Similarly, OCT and RCM studies have shown that vascular density and signal intensity increase significantly during active inflammatory phases, suggesting that these parameters may serve as potential indicators of disease activity and therapeutic response.[13]

Reviews on dermoscopic vascular patterns have provided systematic classifications of vessel morphology, emphasizing their diagnostic and prognostic value in inflammatory dermatoses.[14,15] These findings collectively suggest that vascular morphology, though not statistically significant in this study, may remain a potential indicator of microcirculatory changes associated with inflammation.

Future studies are encouraged to employ higher magnification, vascular-enhanced imaging modes, or quantitative vascular metrics—such as total vessel length, branch count, and vessel diameter—to improve detection accuracy. Moreover, integrating OCT and RCM for combined imaging–histopathologic correlation could provide a more comprehensive understanding of microvascular alterations in acne lesions.

Differences Among Lesion Types and Their Clinical Implications

When comparing comedonal, papular, and pustular lesions, significant differences were observed in both background color and vascular morphology. Comedonal lesions typically exhibited a light-red background with dotted vessels, whereas papular and pustular lesions presented red-to-dark-red backgrounds accompanied by branched or atypical vessels. This sequential pattern reflects disease progression from a non-inflammatory stage dominated by closed or open comedones to varying degrees of inflammatory infiltration and pustule formation. With increasing inflammatory severity, local vascular dilation and neovascularization contribute to background color changes, thereby mirroring the inflammatory activity of acne lesions.

Manfredini et al characterized acne-prone skin using D-OCT and RCM, revealing that perifollicular vascular density and signal intensity increased with inflammation—supporting the interpretation that dermoscopic background color and vascular morphology correspond to true hemodynamic and vascular changes.[16] Similarly, Jurairattanaporn et al found in an Asian cohort that post-inflammatory hyperpigmentation (PIH) associated with facial acne was accompanied by enhanced pigment deposition and a more branched vascular pattern.[17]

Therefore, dermoscopy may play a potential role in acne classification and disease assessment, particularly in distinguishing differences in background color and vascular morphology among various lesion types. Quantifying these dermoscopic parameters may allow more accurate evaluation of inflammatory activity, prediction of treatment response, and development of personalized management strategies for patients with acne vulgaris.

Limitations

Several limitations of this study should be acknowledged. First, the cross-sectional design precludes any definitive conclusions regarding the longitudinal progression of individual acne lesions. Second, no formal a priori sample size calculation was performed; our cohort of 40 patients reflects the exploratory nature of this study, which may limit the statistical power to detect subtle differences. Third, although a standardized protocol was followed, potential selection bias may have been introduced by choosing "representative" lesions rather than conducting a randomized whole-body assessment. Furthermore, treating 80 lesions from 40 patients as independent units in the statistical analysis is a significant limitation. This clustering effect could potentially inflate Type I error rates and affect the precision of P-values. Future studies with larger, longitudinal cohorts and more robust statistical models, such as generalized estimating equations (GEE) or mixed-effects models, are required to validate these preliminary findings.

Conclusion

This study analyzed dermoscopic images of patients with mild-to-moderate acne vulgaris and underscored the potential importance of background color and vascular morphology in evaluating inflammatory activity. Background color progressively deepened from light red to dark red with increasing inflammatory severity, whereas vascular morphology evolved from dotted to branched or atypical patterns. These visual and quantifiable dermoscopic parameters constitute valuable imaging indicators for clinical classification and assessment of acne activity.

Changes in background color and vascular morphology were not only significantly different across severity grades but were also closely related to the dynamic inflammatory process. Dermoscopy therefore provides a non-invasive and objective approach for evaluating acne inflammation, enabling accurate assessment of disease activity, prediction of therapeutic response, and guidance for individualized treatment strategies.

Future investigations should focus on quantitative analysis of background color (eg, RGB colorimetry) and vascular morphology (eg, vessel density and branching count) to enhance the objectivity and precision of evaluation. Integration of dermoscopy with other imaging modalities—such as OCT and RCM—together with histopathologic correlation, could enable dynamic and precise monitoring of therapeutic outcomes and inflammatory progression. Establishing a quantitative scoring system based on dermoscopic parameters may help standardize the evaluation of acne inflammation and promote the broader clinical application of dermoscopy.

Although this was a cross-sectional study with a relatively small sample size and without histopathologic or molecular validation, the results suggest that dermoscopic background color and vascular morphology may be sensitive and clinically relevant indicators of acne activity. Longitudinal and multimodal imaging studies are warranted to develop an objective, dermoscopy-based framework for evaluating inflammatory severity in acne vulgaris.

Consent for Publication

All patients (or their legal guardians for minors) provided written informed consent for: participation in the study, and unlimited publication of any accompanying photographic material in print and online, with the understanding that the images might nevertheless allow re-identification.

The signed Chinese-language forms are kept in the patients' hospital charts and are available for inspection by the editorial office at any time.

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Disclosure

The authors declare no conflicts of interest.

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