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# Acne vulgaris in black pediatric patients: clinical presentation, treatment patterns, and unique needs

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## Abstract

Acne vulgaris is a common dermatological diagnosis observed in pediatric patients with skin of color, often resulting in scarring, keloid formation, and post-inflammatory hyperpigmentation, significantly impacting their quality of life. This exploratory retrospective chart review included 77 black pediatric patients seen at a tertiary care center for acne vulgaris between 2018 and 2023. We analyzed demographics, acne descriptors, and treatment modalities. The most common acne morphology was comedonal acne (83.6%), with 71% of the patients being female. Significant age differences were observed particularly for acne at the chin and overall face. Treatment regimens commonly prescribed included combinations of adapalene and benzoyl peroxide (22%), topical antibiotics, tretinoin, and benzoyl peroxide (34%). Given the higher risk of sequelae for patients with darker skin, it is crucial to address their unique treatment needs. This study highlights the distinctive characteristics of acne in black pediatric patients and calls for further research to enhance our understanding and treatment of this population. Limitations include the lack of direct patient interactions and reliance on chart data. Further studies are needed to compare acne presentation in skin of color of other populations, refining our knowledge of acne clinical presentation, complications, and treatment modalities for diverse patient populations.

*Keywords: (single-word alphabetized list): acne, pediatrics, pigmentation, skin of color*

## Introduction

Acne vulgaris is among the most common dermatologic diagnoses in patients with skin of color [1]. Previous research has suggested that there are racial and ethnic differences in the clinical presentation and sequela of acne vulgaris but this research is limited [2]. Although peak prevalence is in ages 15-20 years, acne is now presenting earlier and lasting longer [1]. The clinical presentation of acne vulgaris often includes open and closed comedones, inflammatory papules, pustules, nodules, and cysts. The presence of erythema is often harder to recognize in darker skin types [2]. Various treatment regimens exist, though topical therapies such as tretinoin, adapalene, benzoyl peroxide, and azelaic acid remain first line [3]. Common sequelae from acne vulgaris in the pediatric skin of color population includes scarring, keloid formation, and post-inflammatory hyperpigmentation. The risk of post-inflammatory hyperpigmentation increases with recurrent inflammation [4]. There is growing recognition that these sequelae may present challenges that impact the quality of life for the pediatric skin of color population. Therefore, it is important to better understand acne vulgaris in our skin of color pediatric population to guide clinicians in recognizing and treating acne and associated complications. Our study specifically aims to elucidate patterns in clinical presentation and treatment plans for black pediatric patients—a historically underrepresented group in dermatologic research. We aim to add insight to an evolving

understanding of acne vulgaris in this population to guide clinicians in recognizing and treating acne and associated complications.

## Methods

This study was approved by the University of California (UC) Davis Institutional Review Board. This is a retrospective chart review study examining sex, age at first appointment, acne descriptors, and treatment modalities in black pediatric patients seen at the UC Davis dermatology clinic for acne vulgaris (International Classification of Diseases, Tenth Revision codes: L70.0, L70.8, L70.9) between 2018 and 2023. Patients over the age of 18 as well as those diagnosed and treated for acne outside of the UC Davis dermatology department were excluded from this study. An age cutoff of 11 years was made to separate pre-pubertal from post-pubertal patients to investigate trends in age. We reviewed clinical notes for descriptions of acne severity, indicated by notes including descriptors such as "mild," "moderate," and "severe."

Results were analyzed using R version 4.2.2. Two-sample t-test or ANOVA were used for normally distributed continuous variables; Fisher's exact test was used for categorical variables. Hypothesis tests were two-sided and evaluated at a significance level of 0.05.

## Results

### Demographics

A total of 77 patients met inclusion criteria, aged 10-18 years old (average 14.3 years). Strikingly, 71.4% (55) of black pediatric patients seeking care at a dermatology office for acne were female, whereas only 28.6 (22) were male. All patients self-identified as Black or African American (**Table 1**).

### Acne type

The most common acne morphology diagnosed in our black pediatric population was comedonal acne. In fact, 83.6% of patients in our study were diagnosed with comedonal acne. Male (86.4%) and female (83.6%) patients were equally likely to be diagnosed with comedonal acne ( $P>0.99$ ). There was no significant difference in average age between

those with comedonal acne and those without ( $P=0.271$ ). A total of 46 patients (59.7%) were diagnosed with inflammatory acne and there was no difference between male (68.2%) and female (56.4%) patients ( $P=0.443$ ). There were no differences in the diagnosis of inflammatory acne based on age in our population ( $P=0.185$ ).

The least common acne morphology diagnosed in this population was cystic acne. A total of 5 patients were diagnosed with cystic type acne and there was no difference between male (4.5%) and female (7.3%) patients ( $P>0.99$ ). Additionally, there were no differences in diagnosis of cystic acne based on age in our pediatric population ( $P=0.511$ ).

### Acne location and severity

In our study of black pediatric patients seeking treatment for acne in our dermatology office, there was no association between patient age and acne location on the forehead, cheek, nose, ears, neck, chest, shoulders, arms, and back. Interestingly, however, patients with acne location at the chin ( $P=0.015$ ) and the general face ( $P=0.028$ ) had a significantly higher age compared to patients without acne at those locations. The average age for patients without acne on the chin in our study was  $13.8\pm 2.4$  years, whereas the average age for patients with acne on the chin was  $15.2\pm 2.0$  years. Average age for patients without acne on the general face was  $14.6\pm 2.3$  years, whereas the average age for patients with acne on the general face was  $13.2\pm 2.2$ . There was no significant difference between acne location and self-identified sex in our study.

Acne severity descriptors were documented in clinical notes in 27 patients and we found no significant trends between severity and age ( $P=0.396$ ) in our population. Thirteen patients were diagnosed with mild acne, with an average age of

**Table 1.** Demographics of Black pediatric patients seeking care for acne in a dermatology office.

Demographic	Value (%) N=77
Sex	
Female	55 (71.4%)
Male	22 (28.6%)
Age (years)	
Median (Q1, Q3)	14.0 (13.0, 16.0)
Mean (SD)	14.3 (2.3)
Range	10.0-18.0

13.7 years and a standard deviation of 2.6 years. Thirteen patients were diagnosed with moderate acne, with an average age of 13.8 years and standard deviation of 2.1 years. One patient in our study was diagnosed with severe acne (age 12).

### Scarring and post-inflammatory hyperpigmentation

In total, 29 patients were diagnosed with post-inflammatory and 13 patients had documented scarring. We examined the association of acne scarring and post-inflammatory hyperpigmentation by sex and age. In our population, no significant difference was seen between female (82.8%) and male (17.2%) patients for post-inflammatory pigmentary changes ( $P=0.120$ ). Likewise, no significant difference was seen between female (61.5%) and male (38.4%) patients and scarring in our study ( $P=0.502$ ), though sample size likely contributed to this result of statistical insignificance.

### Treatment

In this study, topical benzoyl peroxide was the most common treatment modality prescribed, followed by tretinoin, topical antibiotics, adapalene, oral antibiotics, azelaic acid, salicylic acid, topical dapson, isotretinoin, oral contraceptives, sulfur wash, and spironolactone (**Table 2**). Six female patients were prescribed an oral contraceptive. There were no statistical differences in age or sex for any treatment modality other than topical dapson, though this was prescribed to a small sample group (females  $N=2$  [3.6%]), (males  $N=5$  [22.7%]), ( $P=0.018$ ).

### Combination treatment

Combination therapies were used frequently in our cohort. The most commonly prescribed combination therapy was adapalene and benzoyl peroxide (34%) whereas topical antibiotics plus benzoyl peroxide was prescribed in 22%.

## Discussion

This single-center retrospective cohort study describes the clinical presentation and treatment modalities for acne vulgaris in black pediatric patients from 2018 to 2023. We identified trends in acne location and age, as well as commonly

**Table 2.** Acne treatments by frequency.

Treatment	Frequency
Topical benzoyl peroxide	78%
Tretinoin	75%
Topical antibiotics	62%
Adapalene	44%
Oral antibiotics	30%
Azelaic acid	23%
Salicylic acid	14%
Topical dapson	9%
Isotretinoin	9%
Oral contraceptives	8%
Sulfur wash	4%
Spironolactone	3%

Total percentages presented in the study exceed 100% due to the inclusion of patients who underwent multiple acne treatments simultaneously.

prescribed treatment regimens and sex. It is important to note that this manuscript presents an exploratory analysis, aiming to generate hypotheses rather than confirm them. We conducted multiple comparisons, necessitating attention to the false positive rate.

One of the most striking findings of this study is that, among the black pediatric population, 71.4% of our patients were female compared to only 28.6% male. It is not clear that this represents more severe acne burden in female patients in this cohort or if female patients were more motivated to seek treatment based on societal pressures. Although we did not discover significant results in scarring and post-inflammatory hyperpigmentation between sexes, sample size may have affected these results. Further study into gender roles in acne treatment and outcomes in the black pediatric population is warranted. We also found that patients with acne at the chin and overall face were higher in age in comparison to patients without acne at those locations. In fact, the median age for patients with acne documented on the chin was 15.2 years compared to 13.8 years for patients who did not have chin involvement. We hypothesize that this may relate to hormonal influence. During puberty, sebaceous glands enlarge, and sebum output increases significantly. Several studies have demonstrated that certain hormones regulate sebaceous gland secretions—namely androgens,

estrogens, growth hormone, and insulin [5,6]. Sebaceous glands are notably larger and more numerous on the cheeks, forehead, scalp, and chin. Thus, it comes to no surprise that patients experiencing puberty often present with hormonal acne specifically at those locations. Although we did not discover significant results in other hormonally impacted locations (i.e., cheeks, forehead), it is important to recognize that our smaller dataset may have had an impact on our findings.

Prior studies have shown that a combination of topical antibiotics and/or retinoids with benzoyl peroxide can also be effective at treating acne vulgaris and unique challenges with skin of color, including hyperkeratinization, inflammation, and dyspigmentation [2]. Similarly, Alexis et al. evaluated the efficacy and safety of adapalene 0.1%/benzoyl peroxide 2.5% gel in 238 African American individuals and found that this combination was well tolerated; no cases of treatment-related post-inflammatory hyperpigmentation were observed [7]. In our cohort, combination therapies were used frequently; 22% of black pediatric patients received adapalene and benzoyl peroxide whereas 34% received topical antibiotics, tretinoin, and benzoyl peroxide. These combination regimens are known to be well-tolerated in skin of color and successfully treat post-inflammatory hyperpigmentation [4]. For this population, it is important to consider a regimen that is efficacious enough to eradicate the acne while avoiding irritation, as post-inflammatory hyperpigmentation may be a complication from topical treatments that are not well-tolerated. This study highlights some of the unique features of acne

in black pediatric patients and highlights the need for further study to better meet the needs of this population.

This study is limited by the lack of direct patient interactions by the majority of investigators and reliance on chart data. Further studies comparing acne presentation in skin of color to other populations will be necessary to refine knowledge of acne clinical presentation, complications, and treatment modalities in a diverse patient population.

## Conclusion

Acne vulgaris is one of the most common skin disorders observed in pediatric patients with skin of color. Black patients are at risk of acne complications including post-inflammatory hyperpigmentation, hypertrophic and keloidal scarring, and prolonged subclinical inflammation. Given the higher risk of sequelae for patients with more pigmented skin, it is important to recognize that this population has unique treatment needs.

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## Potential conflicts of interest

The authors declare no conflicts of interest.

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