

Challenges in Adult Acne and the Role of Skin Care in Managing the Condition

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ABSTRACT

Background: Acne vulgaris is a complex, multifactorial, inflammatory skin condition. Although frequently presented at dermatology clinics, the literature on adult acne is scarce, particularly concerning skin barrier function and management.

We aimed to provide insights into the role of skin barrier integrity in adult acne patients and the role of cleansers and moisturizers as adjunctive to treating and maintaining adult acne.

Methods: A panel of eight dermatologists who treat adult patients with acne developed a consensus paper on the role of skin barrier function and skin care in adult acne management. The modified Delphi method comprised a face-to-face meeting and online follow-up to discuss the results of a scoping literature review. Drawing from their experience and opinions, they agreed on seven consensus statements.

Results: Epidermal barrier dysfunction plays a vital role in acne pathogenesis and asymmetrically impacts adult female acne. Erythema, pruritus, peeling, and xerosis are common adverse effects of first-line acne treatment options and, if not appropriately counseled and managed, can exacerbate, leading to regimen nonadherence and poor patient experience and outcomes.

Conclusion: Improving patient knowledge of comprehensive acne treatments, including quality adjunctive cleansers and moisturizers, may maximize regimen efficacy and provide patients with personalized and successful acne treatment and maintenance tools.

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INTRODUCTION

Acne vulgaris (acne) is a multifactorial skin condition affecting the pilosebaceous unit¹ and the most prevalent inflammatory dermatosis in the United States, affecting up to 50 million Americans.² The four central factors in acne development affect the pilosebaceous unit: hyper-seborrhea and dysseborrhea, hyperkeratinization, *Cutibacterium acnes* colonization, and inflammation.^{3,4} Studies implicate skin barrier dysfunction as a material contributor to the pathophysiology of acne.⁴

Acne can occur at any stage of life but primarily affects adolescents and young adults, with over 85% of 12- to 24-year-old individuals experiencing some manifestation or sequelae of

acne.⁵⁻⁸ Adult acne is more prevalent among females and may have a unique presentation characterized by a predominance of inflammatory lesions on the jawline with few comedones.⁹

Acne can have significant social, psychological, and physical consequences, which can create feelings of embarrassment, humiliation, and self-consciousness.¹⁰⁻¹² Longitudinal and population studies showed it can lead to psychiatric disturbances, including increased risk of depression and suicide.¹³⁻¹⁶ After the resolution of active lesions, individuals can be left with sequelae, including dyschromia and atrophic or hypertrophic scars, which can be compounded by potentially lifelong psychosocial scarring, further affecting the quality of

life.^{2,15,17} Adult acne can be very isolating due to social stigma and misconceptions that acne only affects teenagers, and negative perceptions by others can have a profound socioeconomic impact, such as observed higher unemployment rates in those with severe acne.^{7,8}

Despite frequent occurrences in the dermatology clinic, the literature on adult acne is scarce, particularly concerning skin barrier function and management. This manuscript aims to provide insights into the role of skin barrier integrity in adult acne management and the clinical significance of skincare with cleansers and moisturizers as adjuncts to acne treatment.

MATERIALS AND METHODS

A panel of eight dermatologists who treat adult patients with acne convened to develop consensus statements about the role of skin barrier function and adjunctive skin care in managing adult acne.

Literature Review

Before the meeting, a scoping literature review was performed on Pubmed and Google Scholar from August 20 to August 22, 2023, independently evaluated by two reviewers (JM and AA). The searches encompassed English-language, human-based data from guidelines, algorithms, consensus, systematic reviews, meta-analyses, and clinical studies published between January 1, 2010, and August 20, 2023. Search terms used, Group 1: Adult acne* AND quality of life OR pathogenesis OR hormonal OR female. Group 2: Adult acne* AND prescription treatment OR adjunctive OR skincare OR cleanser OR moisturizer OR emollient OR ceramide-containing skincare). Duplications and publications not addressing acne or skincare were excluded (Figure 1).

Statement Development

The modified Delphi process comprised a face-to-face panel

meeting on September 23, 2023, and an online follow-up to discuss the literature search results and draw from clinical experience and opinion of the panel to adopt and agree on seven statements.

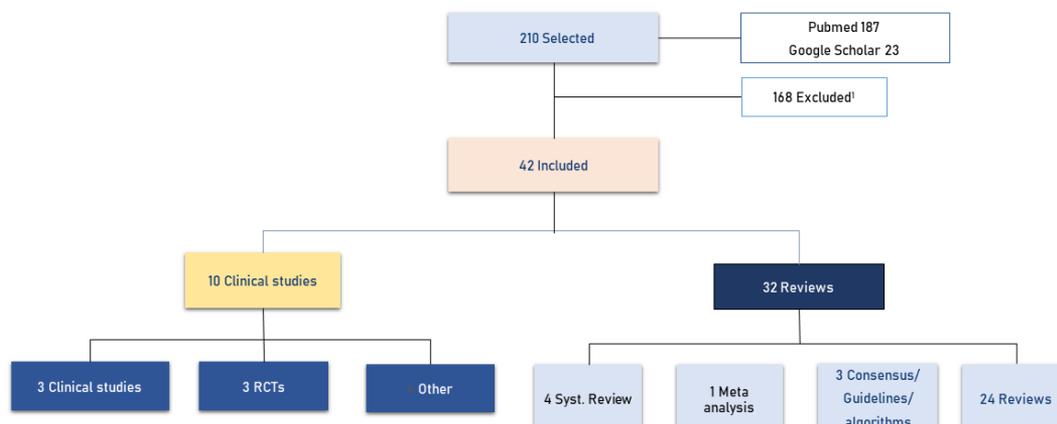
During the face-to-face meeting, the panel members split into three groups. Drawing from thirteen draft statements, each group selected the seven top statements that were modified as needed. Following the workshop, the panel reconvened, finalized and agreed on seven statements combining the feedback from each group. Follow-up and review of the manuscript took place online.

RESULTS

Statement 1: *While most common during adolescence, acne also affects a substantial number of adults, particularly women.*

Globally, in 2013, skin conditions accounted for the 18th leading cause of disability-adjusted life-years (DALYs) and, when adjusting for mortality, the fourth largest cause of morbidity-associated disability.¹⁸ Acne vulgaris (acne) was the second largest subgrouping, accounting for over 16% of the global burden of cutaneous diseases.¹⁸ While stereotypically considered a disease of adolescence, acne affects a material portion of the adult population, with increased prevalence among women.^{2,5} A 2012 cross-sectional study found that among North American women ages 10 to 70 (n=2895), 55% had at least mild acne.¹⁹ Subdivided by age group, 45% of women ages 21-30, 26% ages 31 to 40, and 12% ages 41 to 50 had clinical findings consistent with acne vulgaris.¹⁹ Additional survey and population/community-based studies showed similar trends among females ages 26 to 44.²⁰⁻²² While likely multifactorial in cause, the increase in the prevalence of adult female acne may be tied to factors including changes in skin barrier function that may disproportionately affect females, altered response to classic treatment paradigms, additional psychosocial pressures

FIGURE 1. Literature search results.



¹Excluded: Duplications; Not addressing adult acne; No reference to skincare Systematic (Syst), Randomized controlled trials (RCTs)

affecting treatment adherence, and rising perception of acne less as a tolerant condition rather than a cutaneous dermatosis necessitating treatment.⁹

Statement 2: *Compared to adolescent acne, adult acne may present with more lesions on the lower half of the face, while comedones are less common. Adult acne patients do not typically present with endocrinopathy.*

Acne typically presents with comedones and inflammatory lesions such as papules, pustules, and nodules in areas with a high density of sebaceous glands, most commonly affecting the face, chest, and back.³ Adult female acne may favor the lower third of the face and lateral regions of the superior neck, presenting with scattered papules, pustules, and nodulocystic lesions along the jawline and angle of the jaw.⁷ Comedones are not typically dominant in adult acne, except for patients over 40 and active smokers who are more likely to develop primarily comedonal acne on the front lateral face.²⁵

Androgens play a crucial role in the pathophysiology of acne lesions in all patients. Most patients, including adult women and individuals with a longitudinal history of acne starting in adolescence, do not have a concurrent or underlying endocrine disorder.^{23,24} The exception is patients with polycystic ovarian syndrome (PCOS), who often present with acne as well as associated hyperandrogenism/insulin-resistance cutaneous findings, including hirsutism, acanthosis nigricans, and male-pattern alopecia.²⁴ The authors note that, despite normal circulating androgens in most patients, the local androgens' role in sebaceous glands drives hyper-seborrhea and dysseborrhea. These factors are part of a larger interconnected framework of epidermal barrier dysfunction and acne disease pathogenesis.²⁶

Statement 3: *Acne patients may experience cosmetically disfiguring sequelae such as erythema, dyschromia, and scarring. Especially when severe, acne may lead to negative emotions such as embarrassment and self-consciousness.*

Acne vulgaris is strongly associated with psychological burden and can lower quality of life (QoL) by reducing self-confidence and self-perceived negative body image.^{27,28} Even after the prototypical lesions associated with acne resolve, the physical sequelae of postinflammatory dyspigmentation, erythema, and scarring can lead to further psychosocial duress.^{1,6,9,15,25} Population-based studies have found a high frequency of these sequelae.^{9,25,29} Studies of the real-world experiences of adult female patients with acne have highlighted persistent themes of ongoing mental health disturbances affecting patients' professional and social lives.³⁰ These frustrations may be magnified in adulthood as affected individuals have fewer peers similarly affected by acne and often receive unsolicited and erroneous advice despite already taking steps to address their

acne.³⁰ Psychosocial detriments of adult female acne can have real-world consequences, including postponing or canceling social engagements during flares and experiencing discomfort and self-consciousness that negatively impact occupational and romantic relationships.³⁰

Statement 4: *Acne is associated with inherent abnormalities in skin barrier function. Acne medications can induce additional changes that further disrupt the skin barrier.*

Traditional tenants of acne pathophysiology implicate hyperkeratinization, androgen-mediated sebogenesis, colonization of the pilosebaceous unit with *C. acnes*, and inflammation.³¹ Studies suggest subclinical inflammation and hormone-induced sebaceous secretory dysfunction may precede the formation of microcomedones and other prototypical acne lesions.^{26,32-34} CD4+ lymphocytes and macrophages have been observed with the concurrent increase in intercellular adhesion molecules such as vascular adhesion molecules, E-selectin, and integrins.

It may also alter filaggrin, keratin (16 and 17), and interleukin (IL) 1 α expression with concurrent decreases in keratin 79 and 75 expressions, leading to hyperkeratinization and the creation of microcomedones.³¹ This inflammatory state may be partly driven by dysseborrhea, alterations in the normal composition of sebaceous gland excretion. In addition to the correlation between acne severity and increased sebum excretion rates, studies have found decreased levels of linoleic acid, total ceramides, free sphingosine, and higher levels of inflammatory free fatty acids (FFA). The latter are metabolic products of virulent strains of *C. acnes* (ie, clade 1A2) capable of activating nod-like receptor 3 (NLRP3) inflammasome and IL-1 β .^{4,26,31,32,35-37} These sebum composition and inflammation changes have been correlated with epidermal barrier dysfunction.^{4,38} In a population study of young adult male Japanese patients with mild (n=25) and moderate (n=11) acne, Yamamoto et al found evidence of increased transepidermal water loss (TEWL) and stratum corneum barrier dysfunction in acne, which correlated with acne severity (TEWL g/m²/h \pm SD: Control 10.3 \pm 2.4; Mild acne, 14.4 \pm 2.5; Moderate acne, 16.8 \pm 3.8, P <0.01).³⁹ Furthermore, they examined the relationship between water barrier function and the lipid content of the stratum corneum, demonstrating a decrease in ceramides and free sphingosine that correlated with an increase in TEWL and a decrease in water-holding capacity of the stratum corneum. Barrier dysfunction is accompanied by hyperkeratosis of the follicular epithelium, and water barrier dysfunction may be partly responsible for comedone formation.³⁹

With chronological aging, TEWL and facial skin pH increase, and stratum corneum hydration, overall barrier function, and the recovery speed of barrier function decrease.⁴⁰ Data suggest these changes may be more exaggerated in females.⁴¹ This is partly

explained by age-related (>30%) reduction in total epidermal lipids⁴¹ and by an age-associated decrease in ceramide NG only observed in women.⁴² These findings highlight the potential significance of adrenarche and female hormones in epidermal barrier function. Ceramide-deficiency disorders such as acne directly impact epidermal barrier function and may benefit from quality skin care containing ceramides. Barrier dysfunction may translate into commonly reported symptoms of burning, pruritus, stinging, tingling, and skin tightness.⁴ These symptoms are often magnified by topical acne products, most notably benzoyl peroxide (BPO) and retinoids, that may transiently increase TEWL while improving acne severity over the long term.^{4,43}

Statement 5: *Once-or-twice-daily application of fragrance-free, non-irritating, and non-comedogenic cleansers, moisturizers, and sunscreen may reduce adverse events resulting from prescription oral and topical medications, such as dryness, erythema, photosensitivity, and PIH.*

Acne management includes topical retinoids and BPO, which, in addition to having documented efficacy for acne, can also increase cell turnover, induce stratum corneum thinning, and increase TEWL, often leading to xerosis, irritation, and inflammation.^{4,26,44-48} Clinical evidence and expert consensus have found that when combined with acne treatment regimens, the application of gentle moisturizers, cleansers, and sunscreen can improve patient comfort and patient-centered goals, including minimizing adverse effects of xerosis, irritation, and photosensitivity and may improve postinflammatory dyspigmentation.^{3,26,49-51} A single-center, double-blinded randomized study compared the outcome of an acne treatment regimen consisting of a twice-daily skincare routine in addition to a nightly combination topical agent (adapalene 0.3%/ benzoyl peroxide 2.5%).⁵² Ninety-one participants with moderate acne were randomized to use a ceramide-containing foaming cleanser and a ceramide-containing facial moisturizing lotion versus a foaming face wash gel during the 12-week study.⁵² Based on both participants' subjective measures (on a 5-point Likert scale), investigator global assessment (IGA), and TEWL (right preauricular cheek 30 minutes after facial cleansing), the study found statistically significant improvement in both primary endpoints: markers of skin barrier function and acne severity.⁵² Measurements of TEWL showed a material increase followed by a sustained decrease in both arms with lower TEWL in the ceramide-containing products treated arm than control.⁵² IGA assessing xerosis, erythema, and scaling showed a reduction in xerosis for the ceramide-containing product-treated arm, starting at week 1 (persisting at weeks 4, 8, and 12), erythema beginning at week 4 (and continued at week 8 and 12) and a trend to decreasing scaling that was significant at weeks 1 and 8.⁵² Subjectively, participants using the ceramide-containing products reported a positive experience with skin barrier function

(ie, skin does not feel dry, regimen does not leave skin feeling tight, skin feels comfortable) at greater frequencies and earlier time points than their control counterparts.⁵² This study demonstrated that ceramide-containing products can mitigate AE's of prescription topical agents and the importance of counseling patients on incorporating gentle cleansing and moisturizing into their treatment regimens.⁵²

Statement 6: *Irrespective of the effect of a prescription acne product on skin barrier integrity, repair and support of the skin barrier should be a foundational goal of a skincare regimen in acne patients.*

Skin cleansers utilize surfactants to solubilize and remove oils and debris from the stratum corneum. Harsh cleansers, especially those with non-physiologic pH's, may solubilize barrier lipids and disrupt skin barrier function, inducing erythema and dryness.⁴ Appropriately formulated skincare as adjunctive to prescription therapy may play a role in acne management regimens. Small studies have demonstrated that daily use of a facial cleanser and moisturizer can reduce acne lesions without aggravating epidermal barrier dysfunction, thereby reducing TEWL, mitigating aberrations of cutaneous pH, and fostering the growth of a diverse microbiome.^{4,45-47,49,51,53,54}

Adjunctive to prescription therapy, some studies have shown the complementary benefit of gentle cleansers and moisturizers. In a 4-week randomized controlled trial of 100 Japanese patients [mean age 25.6 years old (Standard deviation 4.7 years)] with mild (n=46) and moderate (n=46) acne were randomized to either once-daily adapalene gel monotherapy or combination therapy of adapalene gel and a once to twice daily (pretreatment) heparinoid-based lotion or ointment.⁵⁵ Although both arms had similar efficacy in reducing comedonal and inflammatory lesions, the combination therapy group had significantly greater adherence (100% versus 70%) than the adapalene-monotherapy group. The monotherapy group had a significantly higher rate of patient-reported symptoms, with the only trial adverse event of eyelid dermatitis reported in the monotherapy group.⁵⁵

A 16-week randomized-controlled trial of 119 patients with acne on either tazarotene 0.1% cream monotherapy or tazarotene 0.1% cream plus a ceramide-containing moisturizer found similar efficacy in the reduction of all acne lesions at the end of the study with patients enrolled into the combination arm reporting significantly less facial dryness during the initial 2-week retinization period (ie, maximum skin irritation).⁵⁶

In the 12-week randomized-controlled trial of 91 patients with moderate acne treated with once-daily adapalene 0.3% and benzoyl peroxide 2.5% topical agent daily, patients randomized to a twice-daily ceramide-containing cleanser and moisturizer had more significant improvements in inflammatory lesions,

FIGURE 2. Skincare routine restores acne treatment-induced skin barrier disruption.

TEWL, and dryness than the control (twice-daily basic foaming wash) group, by the end of the study (Figure 2).⁵² Importantly, this finding highlights that a quality skin care regimen need not detract from the efficacy of prescription topical agents. Although the study did not stratify findings by patients by Fitzpatrick score, patients of all skin tones were included; this may suggest findings have a degree of generalizability to the broader population of patients with acne.

Statement 7: *Improving skin barrier function, which reduces skin irritation, may increase adherence to acne medications and, thus, improve clinical outcomes.*

Acne is a chronic inflammatory dermatosis,³ and long-term adherence to a prescription regimen is essential to successful treatment. In a (n=3139) survey study of patients with acne, potentially mitigating factors in a multivariate analysis contributing to nonadherence included side effects, lack of knowledge about acne treatments, and lack of patient satisfaction with treatment. Improved adherence to treatment regimens was associated with using skincare comprising moisturizers and cleansers, topical therapy alone, satisfaction with therapy, and knowledge of acne treatments.⁵⁷ It is vital to dedicate time during initial and follow-up encounters to patient education regarding acne chronicity, the efficacy of treatment options, and the importance of a quality skincare regimen. In an internet survey study of patients with acne on a combination BPO-clindamycin product, between ~40-50% of patients reported experiencing dryness, flaking/peeling, irritated, or itchy skin, which resulted in poor adherence, such as deviation from recommended treatment protocol or complete abandonment of prescribed regimen.⁵⁸

When combined with prescription therapy, gentle cleansers, and moisturizers may mitigate irritation, erythema, dryness, pruritus, and other symptoms common during the initiation phase of topical regimens^{52,55,56} and may have additive or synergistic effects in achieving treatment outcomes aside from maximizing adherence.

Multiple expert panels have put forth consensus statements highlighting the importance of quality cleansers and moisturizers to minimize treatment disruption, improve the patient experience with prolonged treatment courses required to manage chronic conditions, and maximize treatment regimen outcomes.^{26,46,59-61}

Limitations

There is a lack of robust, long-term randomized clinical trial data with diverse populations, including pediatric patients and patients with skin of color.

CONCLUSION

Adult acne is a common but inconclusively elucidated acne variant that presents more commonly in women. Given the role of epidermal barrier dysfunction and its asymmetrical impact on adult female acne, further studies, including the role of skin care in promoting skin barrier integrity in adult acne patients and as an adjunct to acne treatment and maintenance, are needed. While challenging to execute within the confines of a high-volume practice, improving patient knowledge of comprehensive acne treatments, including quality adjunctive cleansers and moisturizers, may be an effective way to maximize regimen efficacy and provide patients with the necessary tools for personalized and successful acne treatments.

DISCLOSURES

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