

# Does enhancing epidermal barrier function with moisturizing topical products improve acne vulgaris in adult patients compared to non-moisturizing products or non-intervention?



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## Abstract

Acne is a common skin disorder with multifactorial causes that can persist beyond adolescence or appear for the first time in adulthood.<sup>1</sup> Current treatment guidelines target sebum production, exfoliation of excess skin cells, and the bacteria *Propionibacterium acnes*.<sup>2</sup> Research as early as 1995 suggests dysfunctions in the skin barrier, such as abnormal ceramide levels and increased water loss, may play a role in the pathophysiology of acne,<sup>3</sup> however, skin barrier function is not addressed by current treatments.

## Introduction

- Acne etiology is multifactorial, including hormones, diet, supplements, medications, and genetics<sup>1</sup>
- While presentation is variable, pathophysiology is similar: increased keratinocytes and sebum plug the hair follicles, enabling the proliferation of *Propionibacterium acnes*, creating an inflammatory response that may eventually rupture the follicle.<sup>4</sup>
- Studies since 1995 have shown acne-prone skin to be deficient in ceramides and to lose water at a faster rate than non-affected skin (trans-epidermal water loss)<sup>2</sup> which can be addressed by moisturizers that replace lipids and occlude the skin barrier to prevent further water evaporation<sup>5</sup> (referred to as "epidermal barrier dysfunction" or "skin barrier dysfunction"<sup>6</sup>)
- Skin barrier dysfunction is strongly associated with other dermatological problems including dermatitis and psoriasis<sup>7</sup>.
- Current treatment guidelines do not address skin hydration or ceramide replenishment.<sup>2</sup>

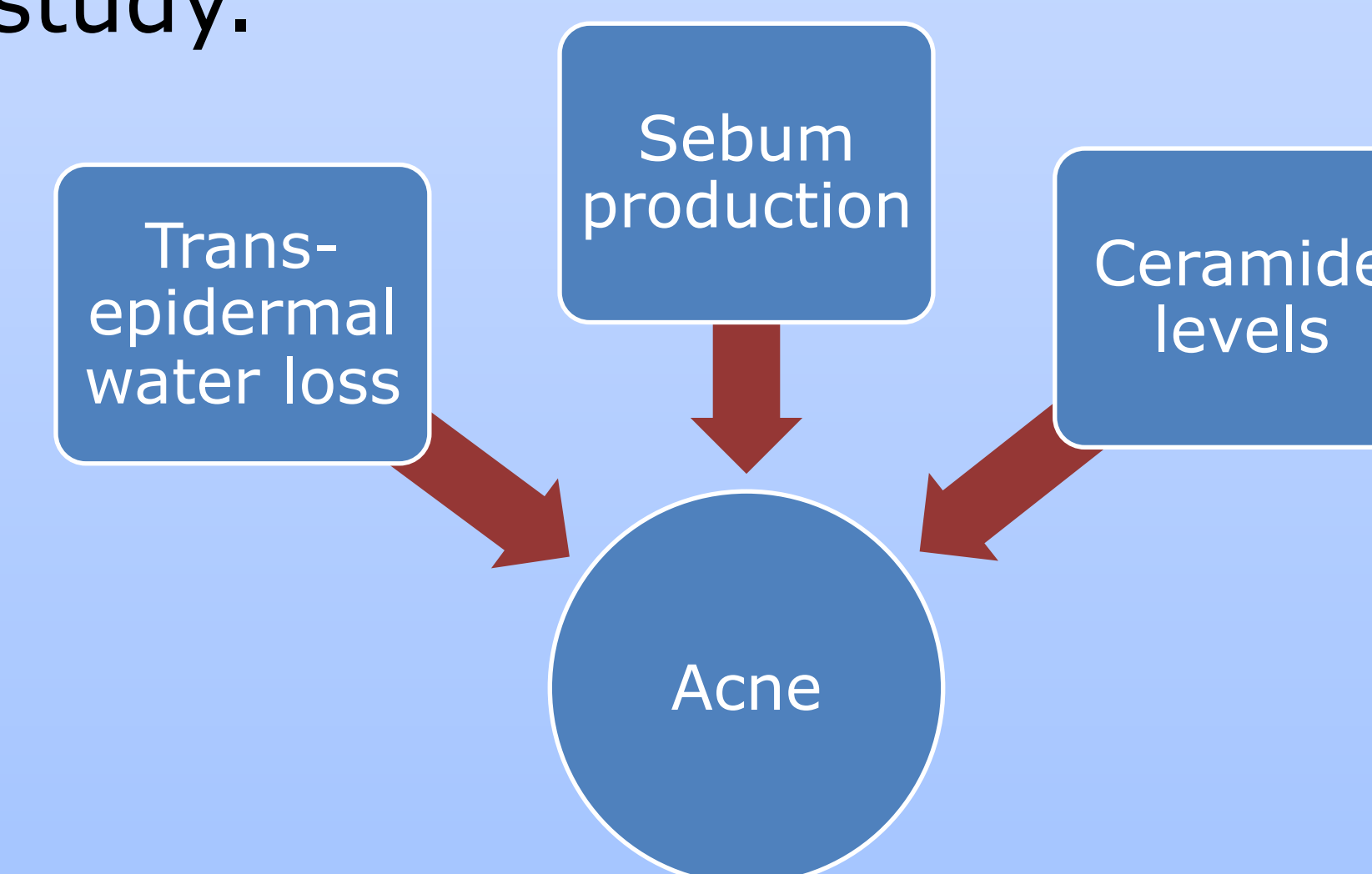
## Methods

- PubMed and Journals@Ovid search using terms "skin barrier", "acne" and "adult", filtered by article types: clinical trial, journal article, and randomized controlled trial, published within the last 5 years
- Use of "similar articles" function in PubMed to locate articles with different search terms
- Dermatology textbooks in Access Medicine as reference for pathophysiology, etiology and current standard of care

## Results

Studies reviewed examined the effect of moisturizers alone on acne, or moisturizers in addition to established acne treatments. The studies also assessed the impact of moisturizers on skin barrier function by measuring trans-epidermal water loss, sebum production, and skin ceramide levels. All moisturizers studied contained lipids, ceramides, or fatty-acids designed to supplement skin barrier components.

All studies attempted to control confounding variables by controlling for use of additional skincare products and excluding participants with systemic conditions that may influence acne. Each study was conducted for a minimum of 4 weeks and was designed as either a RCT, cohort study, or case-control study.



**Table 1.** Summary of results

Study	Visual inspection	TEWL	Sebum production	Subject self-report	Ceramide levels
Cestone E et al. <sup>9</sup>	S	S	S	S	N/A
Chularoj-anamontri L et al. <sup>10</sup>	S	NS**	NS**	S	N/A
de Lucas R et al. <sup>11</sup>	S	N/A	N/A	NS*	N/A
Isoda K et al. <sup>12</sup>	S	S	NS	S	S
Pappas A et al. <sup>13</sup>	N/A	S	N/A	N/A	S
Pavlic T et al. <sup>14</sup>	S†	N/A	N/A	N/A	N/A

\* in de Lucas R et al., subjects reported "quality of life improvement" in lieu of self-rated acne improvement

\*\* though not statistically significant, the group without the moisturizer experienced greater TEWL. All groups experienced less sebum production; which may be clinically significant.

† improvements reported in % reduction of acne; no P-value given

Note: p = .005

## Discussion

In all cases, moisturizers improved the appearance of acne-affected skin, whether used alone or in conjunction with established acne treatments. Moisturizers also improved skin barrier function by reducing transepidermal water loss and increasing skin ceramide content.

Of note, all studies were funded by skincare or pharmaceutical companies, opening the potential for bias.

## Conclusion

While the connection between skin barrier dysfunction and acne needs further research, there is evidence to recommend ceramide and/or lipid containing moisturizers alone or as an adjuvant to established acne treatments, especially for mild-moderate inflammatory acne.

**Table 1. Key**

Visual inspection	TEWL	Sebum production	Subject self-report	Ceramide levels
S = significant reduction in # of comedones (P ≤ 0.05)	S = significant reduction in TEWL (P ≤ 0.05)	S = significant reduction in sebum production (P ≤ 0.05)	S = subjects report significant reduction in acne from baseline (P ≤ 0.05)	S = significantly lower ceramide levels (P ≤ 0.05)
NS = no significant reduction in # of comedones (P ≥ 0.05)	NS = no significant reduction in TEWL (P ≥ 0.05)	NS = no significant reduction in sebum production (P ≥ 0.05)	NS = subjects do not report significant reduction in acne from baseline (P ≥ 0.05)	NS = no significant difference in ceramide levels (P ≥ 0.05)

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