

Rapid Treatment of Mild Acne With a Novel Skin Care System Containing 1% Salicylic Acid, 10% Buffered Glycolic Acid and Botanical Ingredients

Ashish C. Bhatia MD^{a,b} and Felipe Jimenez PhD^c

^aDepartment of Dermatology, Northwestern University, Feinberg School of Medicine, Chicago, IL

^bThe Dermatology Institute, Naperville, DuPage Medical Group, Naperville, IL

^cEnvy Medical, Inc., Westlake Village, CA

ABSTRACT

The biggest hurdle in the treatment of acne vulgaris is patient non-compliance that is due in large part to poor tolerability to common acne medications. As such, new acne treatments must be developed that balance good anti-acne efficacy with excellent tolerability in order to ensure patient adherence and by extension ensure good clinical outcomes. The goal of the present study was to determine the tolerability and efficacy of a novel skin care system, composed of a cleanser, containing 1% salicylic acid and botanical ingredients, and a treatment gel, containing 1% salicylic acid, 10% buffered glycolic acid and botanical ingredients for the treatment of mild acne. In this single-center, open-label clinical study, 25 male and female volunteers used the test cleanser and test gel twice daily over six weeks. Tolerability assessments showed that the skin care regimen was very well tolerated by all study volunteers. Acne severity was significantly reduced by two acne grades at six weeks. Inflammatory lesion counts were significantly reduced, on average, by 59.06% ($P \leq 0.0001$), 91.62% ($P \leq 0.0001$), 90.85% ($P \leq 0.0001$) and by 98.55% ($P \leq 0.0001$) at weeks 1, 2, 4, and 6, respectively. Non-inflammatory lesion counts were reduced, on average, by 13.54% (ns), 38.95% ($P \leq 0.0001$), 44.48% ($P \leq 0.0001$) and by 56.10% ($P \leq 0.0001$) at weeks 1, 2, 4, and 6, respectively. Standardized photography also demonstrated a progressive reduction in acne lesions over time. In conclusion, results of the present study suggest that the tested skin care regimen offers rapid acne clearance and excellent tolerability that together may help to improve patient adherence as well as treatment outcome.

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INTRODUCTION

Acne vulgaris is a multifactorial skin disorder affecting the pilosebaceous unit. The main factors involved in its pathogenesis include follicular hyperkeratinization, sebum overproduction, *Propionibacterium acnes* (*P. acnes*) over proliferation, inflammation and fluctuation in androgen levels.¹ In addition, recent developments suggest that *P. acnes* bacteria interaction with Toll-like receptors (TLRs) may also play a role.² It is estimated that acne vulgaris affects about 40 to 50 million individuals annually in the US alone, with an estimated annual cost of \$2.5 billion.³ Of these affected individuals, roughly 85% are young people between the ages of 12 and 24 and 12% are women and 3% are men between the ages of 25 and 44.³ While acne vulgaris affects people of all races, Perkins and co-workers reported that it was more prevalent in African Americans and Hispanics in their evaluation of 2,895 women between the ages of 10 and 72 in four U.S. cities.⁴

Common topical treatments for acne vulgaris include benzoyl peroxide (and benzoyl peroxide/antibiotic combinations), antibiotics (clindamycin, erythromycin and sodium sulfacetamide/sulfur) retinoids, salicylic acid and azelaic acid.⁵ Common oral medications may include minocycline, erythromycin, tetracy-

cline, doxycycline, oral contraceptives, oral spironolactone and isotretinoin.⁵ Although all of the aforementioned treatments can be used to effectively treat acne, they are not without either systemic or cutaneous side effects. For example, it is well known that chronic use of antibiotics to treat acne may lead to the development of antibiotic-resistant *P. acnes* bacteria.⁶ Using oral isotretinoin can cause systemic side effects including elevated liver enzymes, muscle pain, headaches and dry skin.⁷ Cutaneous side effects of topical medications may include irritation, dryness, erythema, pruritus and scaling in skin that can lead to the patient becoming non-compliant with the prescribed acne treatment regimen.⁸ In fact, poor medication adherence is one of the major reasons for treatment failure among patients with acne vulgaris.⁹ As such, new acne treatments must be explored that can afford a better tolerability profile while providing excellent efficacy in order to improve treatment adherence for the optimal treatment of acne vulgaris. The aim of this study was to determine the tolerability and efficacy of a novel skin care system, containing 1% salicylic acid, 10% buffered glycolic acid and botanical ingredients, for the treatment of mild acne vulgaris over 6 weeks in 25 males and females between the ages of 12 and 34.

MATERIALS AND METHODS

Study Design

An open-label, prospective study was conducted to assess the ability of the ClarityMD Acne Solution (Envy Medical, Inc., Westlake Village, CA) to treat mild acne vulgaris over six weeks in 25 female and male volunteers. The tested regimen consisted of a cleanser (ClarityMD Deep Pore Cleanser) and a gel (ClarityMD Clarifying Gel). The cleanser contained 1% Salicylic Acid and botanical ingredients, such as hydrolyzed *Psoralea Corylifolia* Extract, bisabolol and *Aloe Barbadensis* Leaf Juice. The gel contained 1% Salicylic Acid, 10% Glycolic Acid and botanical ingredients such as hydrolyzed *Psoralea Corylifolia* Extract, bisabolol and *Olea Europaea* (Olive) Fruit Extract and was buffered to pH 4.0. The secondary objective of this study was to determine the tolerability of the test regimen when used as described in the present study. Consent was obtained from all study volunteers prior to their participation in this study. The study protocol was approved by the local institutional review board and was conducted following the guidelines of the Declaration of Helsinki.

Inclusion/Exclusion Criteria

Volunteers that were eligible for inclusion in this study were females and males of all races and Fitzpatrick Phototypes between the ages of 12 and 35 years of age that were generally in good health and had an acne score of "2" or "3" according to a modification of Cook's Acne Grading Scale (Table 1). Grounds for exclusion from this study included pregnancy, sensitivity or allergy to the ingredients in the test products, use of OTC or prescription acne medications during the 4 weeks immediately before the start of the study and the existence of systemic or dermatologic disorders that might interfere with the conduct of the study or the interpretation of the study results or that may increase the risk of an adverse reaction.

Treatment Regimen

Study volunteers applied warm water to the face and hands. They then applied the ClarityMD Deep Pore Cleanser in an amount sufficient to fully cover the face, nose, and neck areas. Volunteers then gently massaged the ClarityMD Deep Pore Cleanser into their skin for one (1) minute and then rinsed thoroughly with warm water and towel dried. Once the skin was completely dry, volunteers applied the ClarityMD Clarifying Gel in an amount sufficient to cover the affected areas on their face, nose and neck areas. Application of the cleanser and gel was done twice daily in the morning and at night.

Measures of Clinical Safety and Efficacy

The tolerability of the tested products was determined after one week, two weeks, four weeks and six weeks of using the test regimen. The potential for the test regimen to cause erythema, dryness and edema was assessed by a trained technician at each visit using a 5-point scale where 0 = None, 1 = Barely Perceptible, 2 = Mild, 3 = Moderate and 4 = Severe. The potential for the test

TABLE 1.

Modified Cook's Acne Grading Scale

| | |
|---|--|
| 0 | Facial skin need not be perfectly clear. A few scattered comedones or papules may be present, but these should be visible only on close examination. |
| 1 | Comedones and small papules are present and noticeable from a distance of 1 – 3 feet away. |
| 2 | About one fourth (25%) of facial area is involved, with small papules (about 6 – 12) and comedones (a few pustules or large prominent papules) |
| 3 | Approximately 30% (26 – 49%) of facial area is involved with small papules (13 – 20) and small comedones (a few pustules or large prominent papules). |
| 4 | Approximately half (50%) of facial area is involved, with small papules and large or small comedones. A few pustules or large prominent papules are usually present. (If lesions are generally large, subject may a grade "4" severity, although less than half of facial area is involved). |
| 5 | More than half (51 – 74%) of facial area is involved with large and small papules and comedones (less facial area of involvement is permissible if inflammatory lesions are large). A moderate number of pustules are usually present, some of which may be large. |
| 6 | Approximately three fourths (75%) of facial area is involved, with papules and/or large open comedones. (Less facial area of involvement is permissible if inflammatory lesions are large). Numerous pustules are usually present; some of which may be large. |
| 7 | Greater than 75% but less than 85% of facial area is involved with lesions with the majority being papules and large open comedones. Pustules may be large and prominent. |

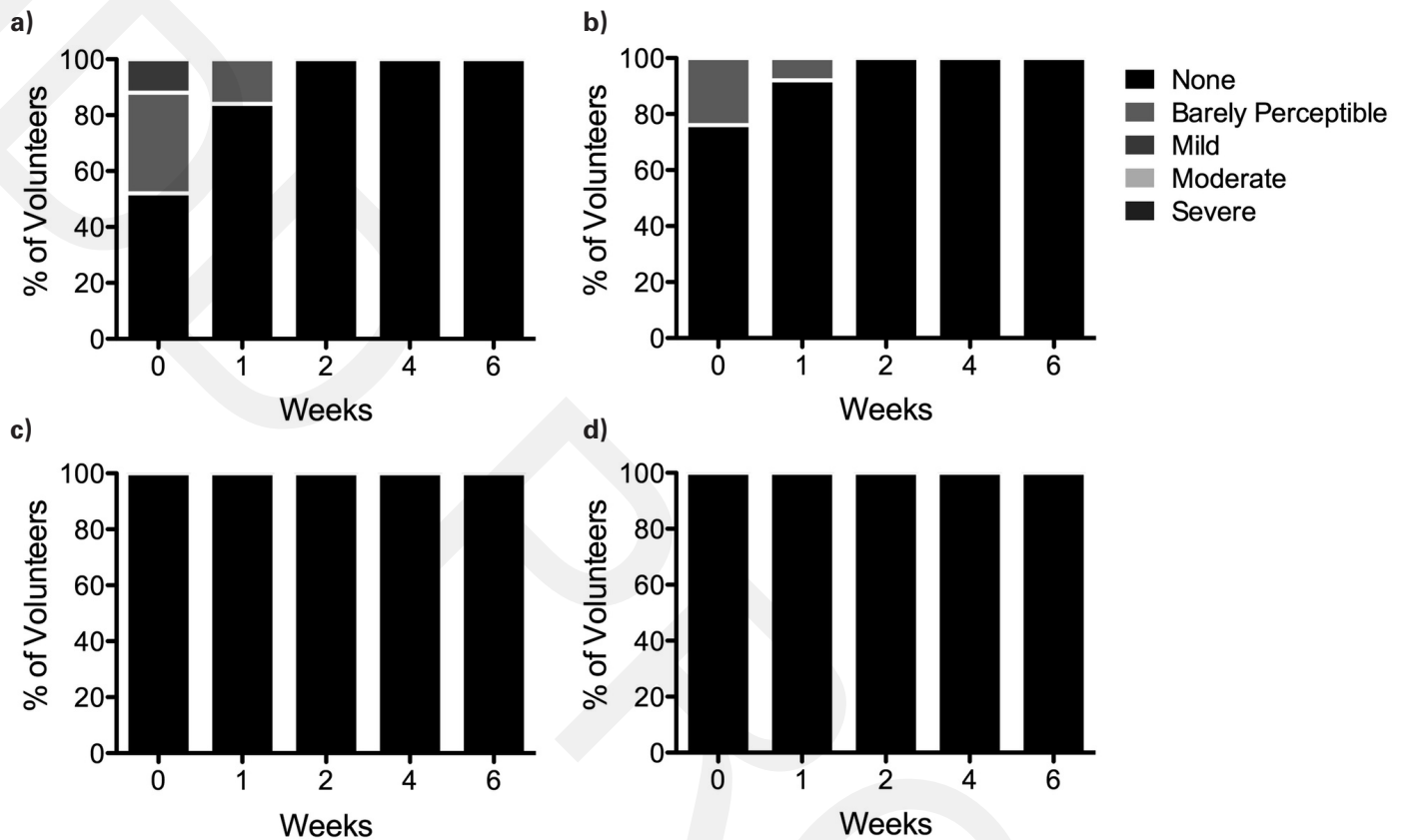
regimen to cause stinging, burning and itching was self-assessed at each visit by the study volunteers using a 4-point scale where 0 = None, 1 = Mild, 2 = Moderate and 3 = Severe.

The ability of the tested products to diminish inflammatory and non-inflammatory acne lesions was determined after one week, two weeks, four weeks and six weeks of using the test regimen. Acne severity was graded at all time points using a modification of Cook's photo numeric acne grading scale (Table 1).¹⁰ In addition, non-inflammatory (open comedones, closed comedones) and inflammatory (papules, pustules and nodules) acne lesions on the facial skin of study volunteers were counted at all time points. Moreover, improvement in acne was also corroborated photographically using a Visia-CR® Imaging System (Canfield Scientific, Inc. – Fairfield, NJ). Standardized photos were taken at baseline, one, two, four and six weeks. Photos were not retouched other than being cropped and assembled into before and after photo composites.

Statistical Methods

Statistical analyses were performed using the Graphpad Prism 5.0 statistical software suite (Graphpad Software, Inc. – La Jolla, CA.).

FIGURE 1. Percent of study volunteers presenting **a)** erythema; **b)** dryness; **c)** edema; or **d)** stinging, burning or itching at baseline and weeks 1, 2, 4, and 6.



All statistics are presented as mean (\pm standard deviation). Statistical difference ($P \leq 0.05$, two-tailed) between mean acne severity grades measured at 1, 2, 4, and 6 weeks and acne severity grades measured at baseline was determined using one-way analysis of variance (ANOVA) with a Dunnett's post-test. Statistical difference ($P \leq 0.05$, two-tailed) between mean lesion counts (inflammatory and non-inflammatory) measured at 1, 2, 4, and 6 weeks and lesion counts measured at baseline was determined using one-way ANOVA with a Dunnett's post-test. Statistical significance ($P \leq 0.05$, two-tailed) for percentage change in acne lesion counts from baseline was determined using a Wilcoxon Signed Rank Test.

RESULTS

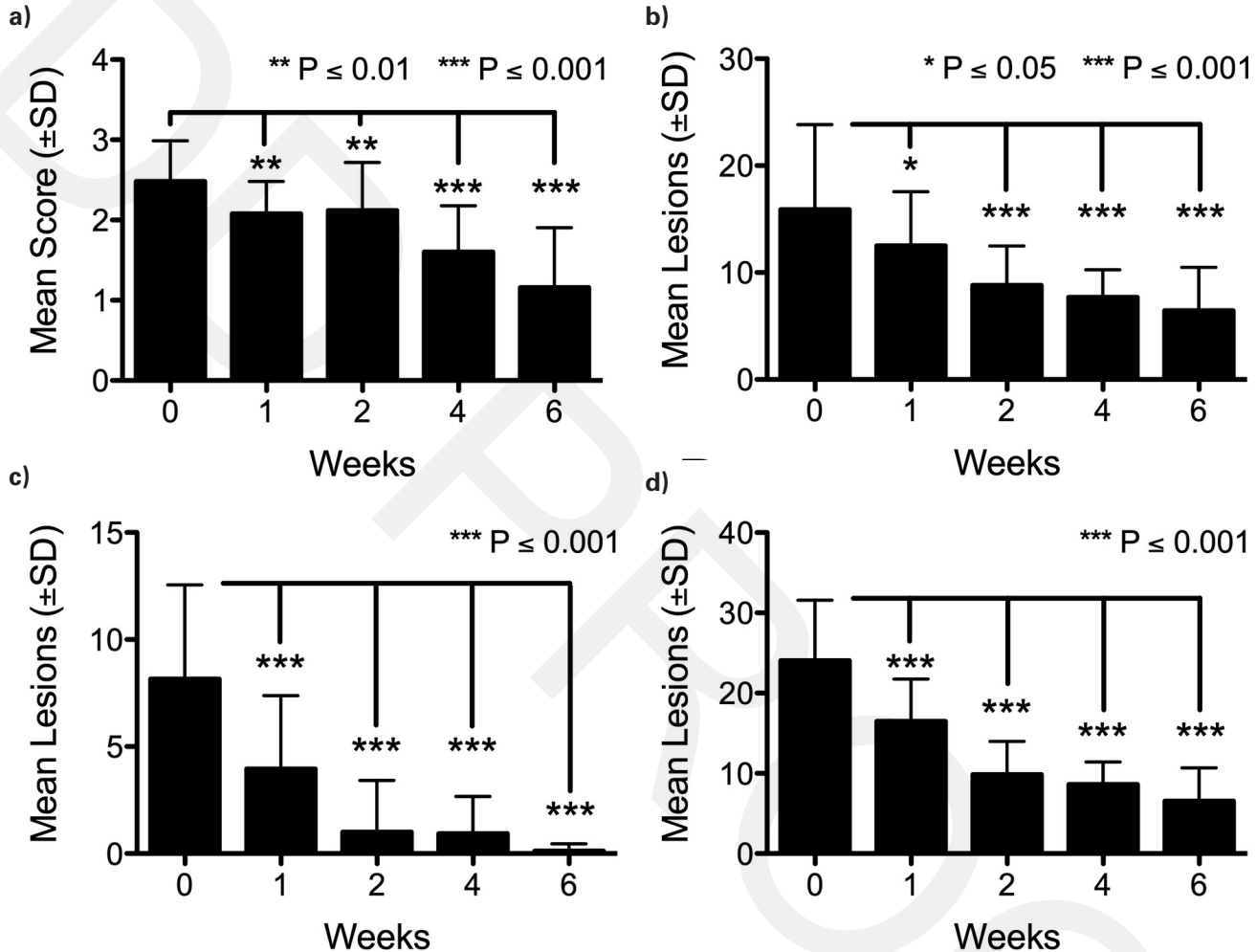
Twenty-five healthy volunteers (10 males and 15 females), between the ages of 12 and 34, were enrolled in the study. Eighty (80) percent of the study volunteers were below the age of 20 and five (5) percent of volunteers were above the age of 20. Volunteers were of Asian (4%), African (4%), Caucasian (76%) or Hispanic (16%) descent having Fitzpatrick phototypes of 1 thru 5. All twenty-five (25) volunteers successfully completed the study.

The treatment regimen was generally well tolerated with no adverse events reported. At baseline, 12% of study volunteers presented with mild erythema, 36% presented with barely per-

ceptible erythema and 52% presented with no erythema (Figure 1A). At one week, 16% of volunteers presented barely perceptible erythema and 84% had no erythema (Figure 1A). One hundred percent of volunteers presented with no erythema from weeks two thru six. At baseline and one week, 24% (76% experienced no dryness) and 8% (92% experienced no dryness) of study volunteers experienced barely perceptible dryness, respectively (Figure 1B). No volunteers experienced skin dryness from week two thru week six. None of the study volunteers experienced edema (Figure 1C) or stinging, burning or itching (Figure 1D) throughout the study.

Global assessment of acne severity was significantly reduced at all time points, reaching a two-grade reduction from baseline at week six (Figure 2A). Non-inflammatory (Figure 2B), inflammatory (Figure 2C) and total (Figure 2D) lesion counts were also significantly reduced at all time points. In fact, mean percent reduction in inflammatory acne reached 59% in seven days and over 91% in two weeks (Table 2). Non-inflammatory acne was reduced by over 13% at week one and by 56% at week six. Total lesion counts were reduced by over 29% and over 73% at week one and six, respectively. Moreover, standardized photography demonstrated a progressive reduction in inflammatory (Figure 3A) and non-inflammatory (Figure 3B) lesions over time.

FIGURE 2. a) Mean (\pm SD) acne severity scores, according to a modification of Cook's Acne Grading Scale, at baseline and weeks 1, 2, 4, and 6; b) Mean (\pm SD) non-inflammatory acne lesion counts at baseline and weeks 1, 2, 4, and 6; c) Mean (\pm SD) inflammatory acne lesion counts at baseline and weeks 1, 2, 4, and 6; d) Mean (\pm SD) total acne lesion counts at baseline and weeks 1, 2, 4, and 6.



DISCUSSION

The results demonstrated that the tested skin care products were well tolerated by the study volunteers. This may be due to the fact that the tested products did not contain alcohol, which is typically used to solubilize salicylic acid, which can cause dryness and pruritus in skin. In addition, both the ClarityMD cleanser and ClarityMD gel formulas contain only 1% salicylic acid, or half the normal concentration normally used in topical acne treatments, which may also contribute to their tolerability. Moreover, none of the study volunteers displayed sensitivity to the 10% glycolic acid in the ClarityMD Clarifying Gel, which may be due to the fact that this formula was buffered to pH 4.0. In addition, the anti-inflammatory properties of the hydrolyzed *Psoralea Corylifolia* Extract¹¹ and bisabolol¹² ingredients in the ClarityMD Clarifying Gel may have also contributed to its tolerability.

Results of the study also indicate that the tested skin care regimen rapidly reduced both inflammatory and non-inflam-

matory acne lesions. This observed efficacy could be ascribed to the keratolytic and anti-inflammatory nature of salicylic acid found in both of the tested formulas and to the glycolic acid found in the ClarityMD Clarifying Gel that has been previously shown to reduce mild acne when applied topically at a 10% concentration.^{13,14} In addition, emerging research suggests that bakuchiol, a phenolic compound and the major component of the hydrolyzed *Psoralea Corylifolia* Extract found in both of the tested formulas, has good antimicrobial efficacy against *P. acnes* bacteria and inhibits the 5- α -reductase enzyme that can trigger excessive oil production in skin.¹⁵

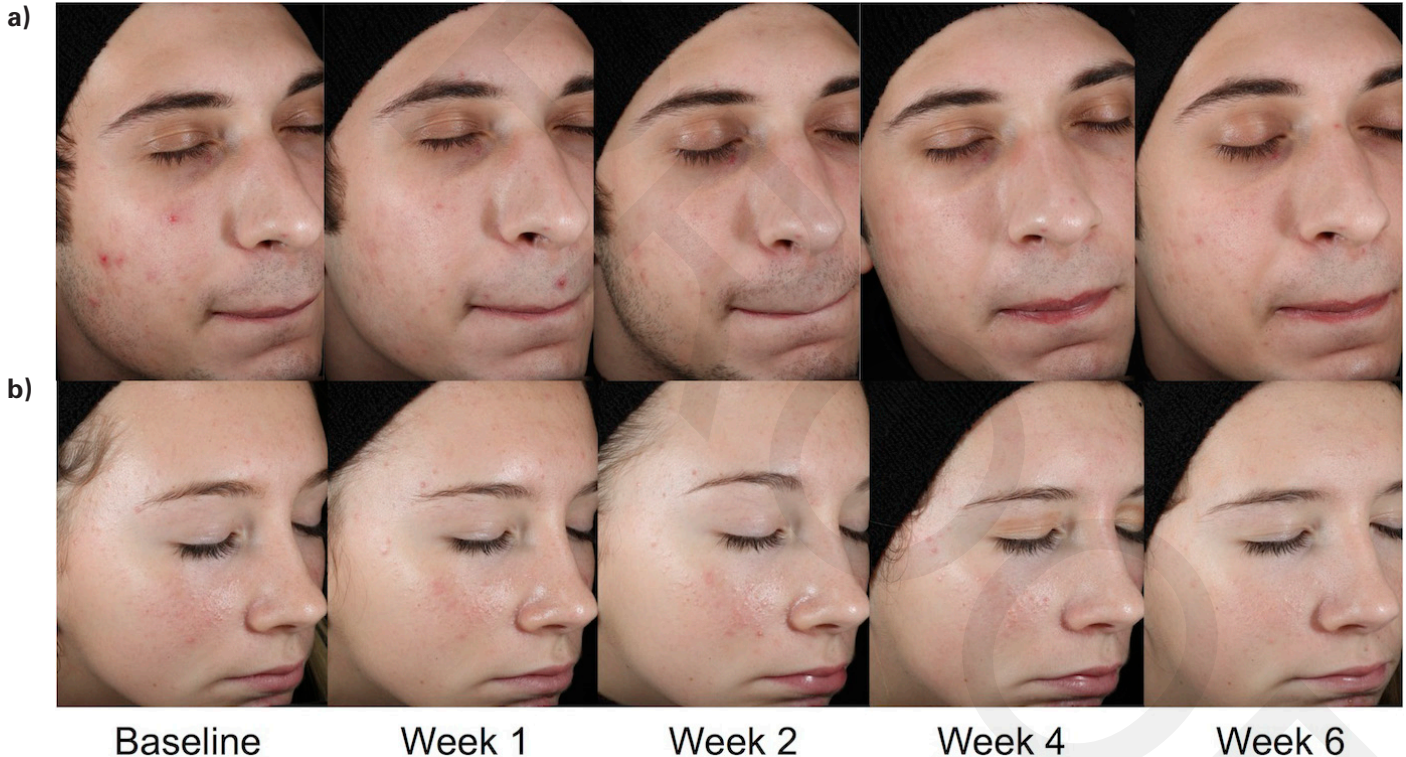
A limitation of the present study is that it only contemplated the effect of the test regimen on mild acne in a small study population. Additionally, the study was not controlled in order to determine the relative contributions of each ingredient to the overall efficacy and tolerability of the tested products.

TABLE 2.

Mean (\pm SD) Percent Change in Acne Lesion Counts from Baseline

| Weeks | Non-Inflammatory | | Inflammatory | | Total Lesions | |
|-------|------------------------|---------------|------------------------|---------------|------------------------|---------------|
| | Mean (\pm SD) | P-value | Mean (\pm SD) | P-value | Mean (\pm SD) | P-value |
| | n = 25 | | n = 25 | | n = 25 | |
| 1 | -13.54% (\pm 35.74) | ns | -59.06% (\pm 31.38) | \leq 0.0001 | -29.71% (\pm 14.91) | \leq 0.0001 |
| 2 | -38.95% (\pm 28.53) | \leq 0.0001 | -91.62% (\pm 20.68) | \leq 0.0001 | -58.85% (\pm 14.30) | \leq 0.0001 |
| 4 | -44.48% (\pm 25.29) | \leq 0.0001 | -90.85% (\pm 16.23) | \leq 0.0001 | -62.99% (\pm 11.02) | \leq 0.0001 |
| 6 | -56.10% (\pm 28.77) | \leq 0.0001 | -98.55% (\pm 4.09) | \leq 0.0001 | -73.50% (\pm 14.40) | \leq 0.0001 |

FIGURE 3. a) Standardized photographs at baseline and weeks 1, 2, 4, and 6 of a 21 year-old Caucasian male presenting mild inflammatory acne at baseline; **b)** Standardized photographs at baseline and weeks 1, 2, 4, and 6 of a 13 year-old Caucasian female presenting mostly mild comedonal acne at baseline.

**CONCLUSION**

The clinical data presented herein suggests that the tested ClarityMD Acne Solution is both efficacious and tolerable when used to treat mild acne over 6 weeks. Further comparative studies must be conducted to determine whether the observed efficacy and tolerability of the ClarityMD Acne Solution will afford high patient adherence as compared to that of other comparable acne treatments. Larger clinical studies should also be conducted to not only confirm the results presented herein but to also determine the effect of the test regimen on moderate to severe acne, preferably over 12 weeks.

DISCLOSURES

Dr. Jimenez is the Chief Scientific Officer at Envy Medical, Inc., the developer of the products tested in the present study. This study was entirely funded by Envy Medical, Inc.

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AUTHOR CORRESPONDENCE**Felipe Jimenez PhD**

E-mail:..... felipe@envymedical.com