

**How to Cite:**

Tiwari, R. V. C., Sahu, D., Sharma, A., Managutti, A., Mathew, P., Mathai, P., & Kumar, A. (2022). Comparison of topical agents versus invasive agents in facial acne: An original research. *International Journal of Health Sciences*, 6(S3), 6509–6514.  
<https://doi.org/10.53730/ijhs.v6nS3.7453>

## **Comparison of topical agents versus invasive agents in facial acne: An original research**

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**Abstract**---The purpose of this present research was to compare the application of topical agent and invasive agent for treatment of facial acne. A total of 124 patients with mild to moderate acne entered this prospective, single-blind study comparing topical (benzoyl peroxide

5%) with invasive treatment (microneedling). There were 60 female and 64 male subjects in the present research. Reductions in the mean number of inflamed and non-inflamed lesions were compared using Student's t-test, as were the mean grades for skin tolerability. The incidence of self reported adverse effects were compared using the  $\chi^2$  test. A significant difference was noted in baseline assessment of facial erythema between the two groups ( $P < 0.05$ ), being greater in the microneedling group. Comparisons between the two groups showed that microneedling was significantly better than at one month ( $P < 0.05$ ), however benzoyl peroxide 5% was better at two months ( $P < 0.001$ ), and three months ( $P < 0.001$ ). Microneedling was effective in removing the comedones with immediate effectiveness but the effects were not long lasting with possibility of scar formation when compared to benzoyl peroxide, who didn't have relapses in the treatment and were cost effective as well.

**Keywords**---microneedling, acne vulgaris, chemical peels, scarring.

## Introduction

Acne vulgaris is a common chronic inflammatory disease of the skin. It is found in about 80% of young adults and adolescents. It is a disease that affects the pilosebaceous units of the skin and may result in inflammatory or non-inflammatory lesions.<sup>1-3</sup> Strauss et al.<sup>4</sup> defined acne as a chronic inflammatory dermatosis which consists of open comedones (blackheads), closed comedones (whiteheads) and inflammatory lesions such as nodules, pustules and papules. Thiboutot et al. suggested that acne should be recognized as a chronic disease which may also affect the patient psychologically.<sup>5</sup> In recent years, acne has been observed in younger patients due to the earlier onset of puberty.<sup>6</sup> Adebamowo et al.<sup>7</sup> stated that acne is more common in girls in the age range of 12 years and younger, but it presents more in boys in the age range of 15 years or older. In most cases, acne disappears within the patient's early twenties; however, acne may persist into adulthood which usually occurs more often in females.<sup>1</sup> Acne has many negative effects on young adolescents. It causes discomfort, emotional stress, disfigurement and even permanent scarring to the skin. It may also cause anxiety and embarrassment in patients and may diminish the patient's physiological and social wellbeing.<sup>8,9</sup>

Several factors may induce acne production or increase its severity. Some of these factors include genetics, the male sex, youth, stress and smoking as well as comedogenic medications such as androgens, halogens, corticosteroids and pore clogging cosmetics. Past research suggests that genetic influence combined with comedogenic hormones (especially androgens) produce abnormal volumes of sebum which contribute to acne lesions.<sup>1,3,10</sup> The main goal of acne treatment is to control and treat existing acne lesions, prevent permanent scarring as far as possible, limit the duration of the disorder and to minimize morbidity. The patient should be informed on the aims involved in preventing new acne lesions while allowing the existing ones to heal. Patients should also be made aware that it may take 3-6 weeks until an improvement can be observed.<sup>11</sup> Individual patient

factors must be taken into account when determining a regimen for the treatment of acne. Some of these factors are the current medical condition, disease state, severity of the lesions, endocrine history and the preferred treatment of the patient (oral or topical).

Other treatment options include the use of natural products or the use of non-drug treatments, such as for example optical therapy. However, a combination treatment that targets more than one of the mechanisms of acne pathogenesis is often successful. The response of the patient is recorded and the regimen can be adjusted as the clinical condition improves.<sup>10</sup> Topical therapy is based on the type and severity of acne. Mild acne is often treated with topical retinoids, or a variety of diverse treatments such as azelaic acid, salicylic acid and benzoyl peroxide. Mild to moderate inflammatory acne can be treated with topical anti-inflammatory agents as well as topical antibiotics.<sup>9</sup> Chemical peels involve facial resurfacing whereby removal of the epidermis stimulates re-epithelization and skin rejuvenation.<sup>12</sup> Chemical peeling also appears to reduce hyperpigmentation and superficial scarring of the skin.<sup>13</sup> This therapy can be divided into different groups according to its penetration depth and destruction. Alpha-hydroxy acids (i.e., glycolic acid and lactic acid) and beta-hydroxy acids (i.e., salicylic acid) are the most common chemicals used in chemical peels.<sup>14</sup> There are several physical invasive treatments available which can be used as adjunctive acne treatment with Comedone Extraction, Cryoslush Therapy, Cryotherapy, Electrocauterization, Intralesional Corticosteroids, laser therapy, light sources and photodynamic therapy.

### **Aim of the present study**

The purpose of this present research was to compare the application of topical agent and invasive agent for treatment of facial acne.

### **Methodology**

A total of 124 patients with mild to moderate acne entered this prospective, single-blind study comparing topical with invasive treatment. There were 60 female and 64 male subjects (mean age of 19.7 years, range 12-35 years) who were included according to certain criteria, that is, older than 12 years, free from intercurrent disease, and not taking systemic antibiotics, corticosteroids, retinoids, anticonvulsants or androgens in the 30 days before the trial. The patients were randomly assigned to either of two treatment groups: microneedling (n=61) and benzoyl peroxide 5% (n=63). (Table 1) The parameters used to assess the relative efficacy of each treatment were changes in the total number of inflamed lesions (superficial and deep) as well as non-inflamed lesions (open and closed comedones) over the period of treatment. An assessment of skin tolerance was also conducted at each review with respect to oiliness, erythema, scaling, pruritus and dryness, (graded from 0-nil, 1-mild, 2-moderate to 3-severe). Reductions in the mean number of inflamed and non-inflamed lesions were compared using Student's t-test, as were the mean grades for skin tolerability. The incidence of self reported adverse effects were compared using the  $\chi^2$  test.

## Results

There was no significant difference between the two study groups with respect to age, sex, duration of acne condition, baseline counts of inflamed and non-inflamed lesions, or baseline assessments of skin oiliness, scaling and dryness. However, it was observed that females were more prone to acne formation. A significant difference was noted in baseline assessment of facial erythema between the two groups ( $P < 0.05$ ), being greater in the microneedling group. Both treatments were effective in reducing the number of inflamed lesions throughout the trial, and this reduction, between baseline and the final review, was statistically significant ( $P < 0.001$ ) in both groups. Comparisons between the two groups showed that microneedling was significantly better than at one month ( $P < 0.05$ ), however benzoyl peroxide 5% was better at two months ( $P < 0.001$ ), and three months ( $P < 0.001$ ). There was no significant difference between the treatment groups for the assessment of skin erythema during treatment. Assessment for skin oiliness showed a significant difference between treatments at one month ( $P < 0.001$ ), two months ( $P < 0.02$ ) and three months ( $P < 0.02$ ), the benzoyl peroxide group showing increasingly less skin oiliness. (Table 2)

## Discussion

Due to the various pathological factors responsible for acne development, the use of multimodal therapy which targets different processes simultaneously has been receiving considerable attention.<sup>15</sup> Combination products have been found to be more effective in treating acne than monotherapy.<sup>16</sup> Additionally, the availability of existing and introduction of new fixed combination treatments can increase patient adherence as the treatment for patients can be more personalized.<sup>15</sup> Physical removal of microcysts, macrocomedones or closed comedones will enhance the therapeutic efficacy of topically applied comedolytic agents. It has also been suggested that benzoyl peroxide and salicylic acid, which have different mechanisms of action, be combined to treat acne due to their complementary effect when used together.<sup>17</sup> Microneedling is a relatively new minimally invasive procedure involving superficial and controlled puncturing of the skin by rolling with miniature fine needles to induce a normal wound healing process with release of several growth factors, including platelet derived growth factor, fibroblast growth factor, and transforming growth factors a and b, which stimulate the migration and proliferation of fibroblasts.<sup>18</sup> Another hypothesis has been also proved by Jaffe et al. who mentioned that cell membranes react to the local change with an electrical potential that creates increased cell activity and the release of potassium ions, proteins and growth factors.<sup>19</sup> Such a practice can offer immediate relief for the patient, but it can result in scarring and incomplete evacuation of lesion contents.

Benzoyl peroxide is an important treatment for mild to moderate acne and, although it can be used as monotherapy for a period of 6–8 weeks, is often combined with topical antibiotics in order to reduce the resistance of the *P. acnes* species and to increase the efficacy of treatment. Gollnick and Krautheim suggested that benzoyl peroxide is best combined with topical retinoids.<sup>20</sup> However, it has been found that all retinoids (except for adapalene) are unstable when combined with benzoyl peroxide and should therefore be applied separately.

The main side effects of benzoyl peroxide include burning, dryness, erythema, peeling or stinging.<sup>21</sup>

Acne is a common inflammatory skin disease which causes much distress to patients constantly suffering from it. It has been researched extensively with regards to the disease itself as well as available and potential treatment options. The target for acne therapy is the four well-known pathogenic factors responsible for this disease state. However, due to the increasing resistance of *P. acnes* towards the available antibiotics and inter-patient differences, further research in this field will always be required. We observed that microneedling was effective in removing the comedones with immediate effectiveness but the effects were not long lasting with possibility of scar formation when compared to benzoyl peroxide, who didn't have relapses in the treatment and were cost effective as well.

### **Conclusion**

Physical removal of microcysts, macrocomedones or closed comedones will enhance the therapeutic efficacy of topically applied comedolytic agents. Further research is needed evaluating the efficacy of non-antimicrobial treatments for acne with a specific focus on optimizing combination products or treatments regimens and on optimizing the use of physical modalities for acne treatment.

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## Tables

Table 1  
Demographic characteristics of the present research

Characteristics	Microneedling	Benzoyl peroxide
Gender	Male-32 Female-29	Male- 32 Female-31
Age	Mean age – 21.3 years	Mean age- 18.2 years
Severity of acne	30- mild 31- moderate	28- mild 35-moderate

Table 2  
Characteristics noted in the research amongst the groups

Variables	Microneedling	Benzoyl peroxide	P value at 1 month	P value at 3 months
Facial erythema	1.38±0.34	0.99± 0.07	< 0.001	< 0.001
Oiliness of skin	2.31±1.56	1.11±0.35	<0.001	<0.02
Scaling of skin	1.6±1.3	1.8±1.67	1.11	0.94
Dryness of skin	2.11±1.5	2.3±1.09	2.09	1.93