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The Effect of Benzoyl Peroxide on Acne

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Abstract. A double-blind study of two commonly used (5%) benzoyl peroxide-containing preparations showed that they were equally effective in the treatment of acne. With these treatments there was a reduction in *P. acnes*, Micrococcaceae and surface-free fatty acids. These data support the continued use of benzoyl peroxide preparations in the treatment of acne.

Key words: Acne; Benzoyl peroxide; Free fatty acids; *P. acnes*

An effective treatment of acne based on anti-bacterial action can be demonstrated by a reduction in the number of acne lesions, a reduction in the cutaneous microflora and a reduction in the amount

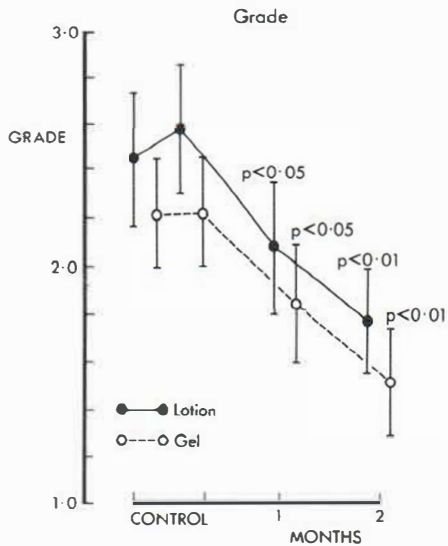


Fig. 1. The effect of therapy on acne grade.

of free fatty acids in the surface lipid as a consequence of diminished bacterial lipase activity.

Benzoyl peroxide has been shown to have anti-bacterial activity against *Propionibacterium acnes* (*P. acnes*) (3). The efficacy of a topically applied drug depends partly on its percutaneous absorption and vehicle. We have compared two commonly available preparations of benzoyl peroxide by monitoring their clinical effect on acne and the effect on the cutaneous bacterial flora and free fatty acids in surface lipids.

MATERIALS AND METHODS

The trial was carried out between January and April. The subjects chosen were 48 student volunteers with acne of a mild to moderate severity. They were aged 18-22 years; 28 were females and 20 were males. They had not been on any topical or oral therapy for acne vulgaris for 6 weeks.

Table I. Percentage of incidence of side effects in patients

	1 month	2 months
Erythema		
Lotion	29	40
Gel	24	24
Scaling		
Lotion	33	21
Gel	25	8

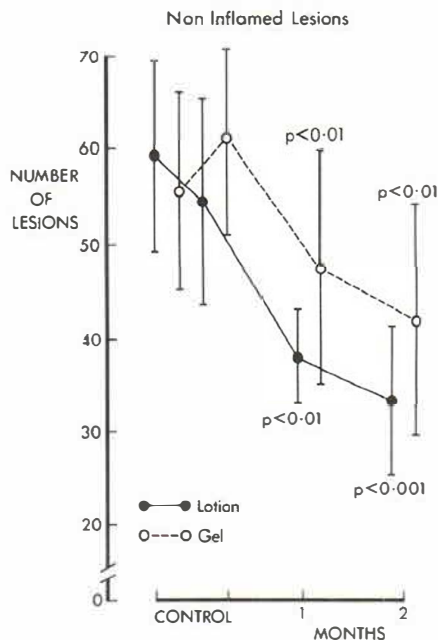


Fig. 2. The effect of therapy on non-inflamed lesions.

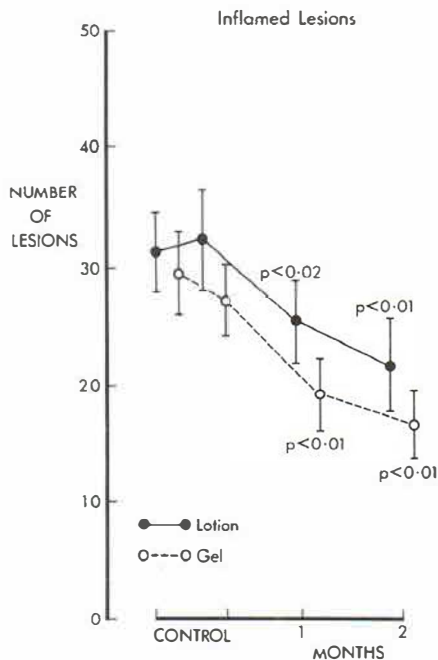


Fig. 3. The effect of therapy on inflamed lesions.

The subjects were seen on two control visits separated by 2 days and thereafter at monthly intervals for 2 months.

At each visit, the following facial assessments were made:

1. **Overall grade.** This is a subjective assessment. The technique was based on the Pillsbury, Shelley & Kligman grading (5) but expanded to the 0–10 scale. It has been shown that the technique is reproducible between the same observer ($r=0.85$) and different observers ($r=0.83$) (1).

2. **Spot counting.** We counted the number of non-inflamed lesions (whiteheads and blackheads) and superficial inflamed lesions (papules and pustules).

3. **Patients' assessment.** A 20 cm visual analogue scale (4) was used by the patient to assess his or her improvement or deterioration.

4. **Side effects.** Erythema and/or scaling were recorded on a 0–5 scale of increasing severity.

5. **Enumeration of the cutaneous bacteria.** Samples of the surface bacteria were obtained using the scrub technique (7). Samples were plated out onto reinforced clostridial media and heated blood agar and were incubated at 37°C anaerobically for 7 days and aerobically for 2 days respectively. *Propionibacterium acnes* and members of the family Micrococcaceae were counted and expressed as logarithm to the base 10 number of organisms per cm² of skin.

6. **Free fatty acid analysis.** The forehead skin was wiped with a polyurethane sponge with analar ether and discarded. One hour later the process was repeated and lipid extracted from the sponge using ether. The ether was evaporated and the lipid weight determined. The free fatty acids extracted from this lipid by the method of Dole and

Meinertz (2) were determined by titration against alkali and expressed as a percentage of the total extracted lipid.

Treatment groups

At the second control visit the patients were divided into pairs on the basis of sex, acne grade and total number of superficial inflamed lesions. Pairing of the patients in this way ensures that the groups are homogeneous prior to starting the treatment and makes analysis of subsequent data easier. Each pair of patients received one of two (5%) benzoyl peroxide preparations. One was in a gel base (Panoxyl Gel) and the other a lotion (Benoxyl lotion).

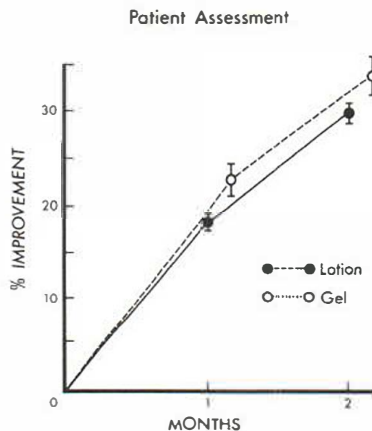


Fig. 4. Patient self-assessment during therapy.

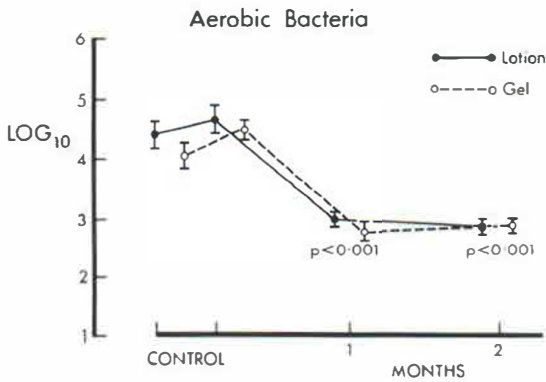


Fig. 5. The effect of therapy on number of skin aerobic bacteria (expressed as mean $\log_{10}$ cm^{-2} of skin).

Statistical analysis

The lesion counts and free fatty acid data within the same treatment group were analysed by a paired *t*-test. For the overall grade and bacterial results a Wilcoxon test (6) was used and to compare data between groups an analysis of co-variance was employed.

RESULTS

The results are shown in Figs. 1–7.

The data shows no difference in the clinical, bacteriological or free fatty acid results between the two groups before treatment. Significant clinical improvement was evident at the first month's follow-up visit and the acne grade and non-inflamed lesions showed even further improvement by the end of the second month. This clinical improvement was paralleled by the patients' own impression of the treatment.

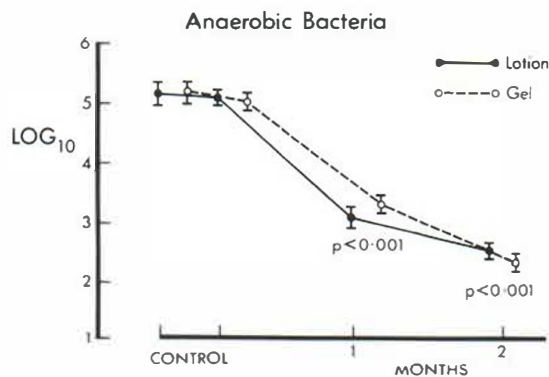


Fig. 6. The effect of therapy on numbers of skin anaerobic bacteria (expressed as mean $\log_{10}$ cm^{-2} of skin).

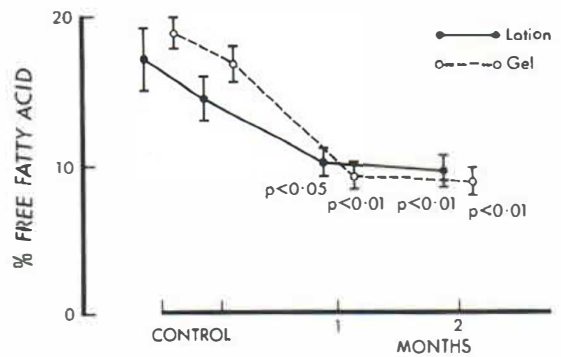


Fig. 7. The effect of therapy on sebum free fatty acids.

The surface *P. acnes* and Micrococcaceae decreased throughout the test period and this was paralleled by a decrease in free fatty acid.

The side effects were minimal and are shown in Table 1. No subject had to discontinue treatment. With increasing use there was an overall decrease in the incidence of side effects, but the lotion continued to produce some erythema throughout therapy.

DISCUSSION

This double-blind study has shown a correlation between clinical improvement, reduction in the number of *P. acnes* and Micrococcaceae, and the free fatty acids of the surface lipids. The data confirm previous observations (3) in which benzoyl peroxide was investigated in a gel base. We could not differentiate between the efficacy of the two products in the present study, which emphasizes the important role of benzoyl peroxide in the topical treatment of acne vulgaris.

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