

Research Article

Comparative Study of Benzoylperoxide and Adapalene for the Treatment of Mild Acne Vulgaris

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ABSTRACT

Background: Acne vulgaris is a common skin inflammatory disease commonly found among adolescents and young adults. Benzoyl peroxide (BPO) and adapalene are most commonly used topical agents for treating mild cases of acne vulgaris, but their effectiveness and tolerability may be different from one another.

Materials and Methods: An observational comparative study in a hospital was carried out for six months at Dr. Pinnamaneni Siddhartha Institute of Medical Sciences & Research Foundation, Andhra Pradesh. Sixty-four patients aged between 13-30 years suffering from mild acne vulgaris participated in the study. The patients were divided into two equal groups for treatment with BPO 2.5% and adapalene 0.1%, and after eight weeks of being treated, all the patients were assessed using the Global Acne Grading System to monitor effectiveness while monitoring adverse effects of the drug and outcome of therapy. The data was analysed using Chi-square test and the t-test.

Results: Majority of participants (43.75%) were in the age range of 16-20 years with a human sex composition of 71.88% female. The overall acne score changed from 15.09 ± 3.40 to 4.06 ± 1.32 in the case of BPO and from 15.27 ± 2.36 to 4.31 ± 1.85 in the case of adapalene with the reductions of 72.83% and 72.05%, respectively. There was no statistically meaningful difference in terms of efficacy of the drugs. BPO was shown to cause more significant reductions in papules ($p=0.035$). Adapalene was responsible for more cases of dryness.

Conclusion: Both BPO 2.5% and adapalene 0.1% were effective for the treatment of mild acne vulgaris suggesting similar overall efficacy. Treatment choice may depend on the patients' tolerance and lesion classification.

Keywords: Acne Vulgaris, Adapalene, Benzoyl Peroxide, GAGS, Topical Therapy, Adverse Drug Reactions.

INTRODUCTION

Acne vulgaris is widely recognized as a chronic inflammatory disease of the sebaceous gland, affecting nearly 80-90% of adolescents and young adults world-wide [1]. Though tended to appear in puberty due to hormonal changes, acne can persist into later periods of life. From a clinical perspective, acne vulgaris is defined by the presence of acne comedones, papules and pustules; in severe cases, nodules, cysts and scarring may also take place. Apart from its physical effects, it can have a profound

psychological impact, lower self-esteem and impairing social communications and quality of life [2][3].

The progression of acne vulgaris involves various factors that can be divided into 4 main groups: (1) over production of sebum, (2) hyperkeratinization of follicles, (3) colonization of the pilosebaceous unit with Cutibacterium acnes and (4) inflammation. All these ways lead to acne lesions, with the severity of the disease ranging from mild comedonal acne to severe inflammatory acne [4][5]. Mild acne vulgaris is

one of the most widespread types of acne defined by the presence of comedones, with limited inflammatory papules and pustules taking place. Early treatment is important to prevent progression of the disease, reduce the risk of scarring, and improve patient outcomes [6].

Topical therapy is endorsed as the primary method for treating mild acne because of its efficacy, safety, and convenience. Among the existing topical treatments are two of the most commonly administered types, benzoyl peroxide, and adapalene [7]. Benzoyl peroxide is a topical agent that acts as an antibiotic against *Cutibacterium acnes*, and possesses the properties of a keratolytic and anti-inflammatory agent. The drug is proficient in fighting bacterial resistance, but can produce side effects like dryness, erythema, and skin irritation [8].

Adapalene is a topical retinoid of the third-generation category. It normalizes the process of keratinization in the pilosebaceous unit, inhibits the formation of microcomedones, and diminishes the inflammation [9]. The third-generation drug is more chemically stable and has higher tolerability compared to the earlier versions of retinoids that preceded it. Although both benzoyl peroxide and adapalene are recommended for use in treating patients with mild acne, the combination of these products can produce the side effect of each specific topical medication [10][11].

Hence, it is essential to compare both of these topical formulations in order to determine the best treatment for mild acne vulgaris. The goal of our study is to analyze and compare the effectiveness of benzoyl peroxide and adapalene. The results of this research may help medical practitioners in choosing the right treatment and providing better care for their patients.

MATERIALS AND METHODS

A hospital-based observational comparative study was carried out for a period of 6 months October 2025 to March 2026 at Dr. Pinnamaneni Siddhartha Institute of Medical Sciences and Research Foundation (Dr. PSIMS & RF), Andhra Pradesh to evaluate the efficacy and safety of 2.5% benzoyl peroxide and 0.1% adapalene in the patients suffering from mild acne vulgaris. A total of 64 patients of age between 13-30 years of either sex suffering from mild acne vulgaris were included from the targeted population by applying the convenience sampling method. Hypersensitive

patients to the study drugs, pregnant women, lactating women, patients without complete documentation, and patients unwilling to sign the informed consent form were excluded. An approval from the ethics committee was acquired, and a written informed consent was obtained from all participants before enrollment.

Baseline demographic and clinical information were gathered using a structured data collection form. The patients underwent treatment with 2.5% benzoyl peroxide or 0.1% adapalene as per the prescription made by the treating dermatologist, with an 8-week follow-up period. The clinical effectiveness of treatment was assessed during the follow-up visit based on the analysis of acne severity using Global Acne Grading System (GAGS), compliance with treatment, and adverse drug reactions. Collected data were analysed by means of Microsoft Excel and IBM SPSS Statistics version 21. Qualitative variables were presented in terms of frequency and percentage. Quantitative variables were shown as mean $\pm$ standard deviation. For statistical analysis, Chi-square test and independent t-test were applied in this study, with $p < 0.05$ being statistically significant for the results.

RESULTS

The current research was carried out on 64 patients with acne vulgaris of mild severity. The highest proportion of patients were aged 16 to 20 years (43.75%) followed by patients of age group 21 to 25 (31.25%) followed by patients of age group 26 to 30 (14.06%) and patients of age group 11 to 15 (10.94%). Females made up 71.88% of the population and males made up 28.13%. The allocation of patients was equal among the two groups so there were 32 patients in each group [Table1].

The comedone scores at baseline were: 4.72 ± 2.33 and 4.02 ± 2.64 ; the papule scores at baseline were 3.31 ± 2.31 and 3.97 ± 2.58 ; and the total acne scores at baseline were: 15.09 ± 3.40 and 15.27 ± 2.36 . There was no statistically significant difference between the two groups which indicates that both groups had similar baseline severity of disease. At the second assignation, both groups revealed a significant clinical advancement. The average comedone indices turned out to be 2.36 ± 1.49 (benzoyl peroxide) and 1.84 ± 1.43 (adapalene), while the papule indices showed values of 1.66 ± 1.29 and 2.16 ± 1.37 accordingly. The mean overall acne results were equal to 7.77 ± 2.47 and 7.72 ± 2.25 , with

no significant difference in terms of the treatment between the groups ($p > 0.05$).

It should be noted that by the time of the third visit, a further decrease of acne severity has been recorded. The mean comedone indices for benzoyl peroxide and adapalene represented 1.19 ± 0.67 and 0.97 ± 0.97 accordingly [Table2]. The average values of papule indices for the two groups appeared to be 0.78 ± 0.49 and 1.16 ± 0.85 respectively. The mean overall acne scores were assessed at 4.06 ± 1.32 for benzoyl peroxide and at 4.31 ± 1.85 for adapalene. Only the papule scores showed a significant difference ($p = 0.035$), while comedone and overall acne indices turned out to be similar for the two sets of patients [Table3].

In general, the average total acne scores decreased by 11.03 points for the benzoyl

peroxide-treated patients and by 10.96 points for the adapalene-treated individuals, which meant a reduction of 72.83% and 72.05% respectively. Both methods showed significant improvement at baseline level ($p < 0.001$). When it comes to safety, it was found that there was a higher rate of irritation and itching in the benzoyl peroxide group while the experience of dryness was reported in both groups with statistical significance ($p < 0.001$) [Table4]. In general, the outcome of treatment was similar for both classes of medications. There was good improvement noted in 34.38% of patients treated with benzoyl peroxide and in 43.75% of patients treated with adapalene, and moderate in 65.63% and 50% of the patients correspondingly. There was only a mild improvement in adapalene group and the percentage was 6.25% [Table5].

Table 1 Demographic Characteristics and Treatment Group Distribution

Characteristic	Category	Number of Patients (n)	Percentage (%)
Age (years)	11-15	7	10.94%
	16-20	28	43.75%
	21-25	20	31.25%
	26-30	9	14.06%
Gender	Female	46	71.88%
	Male	18	28.13%
Treatment Group	Adapalene	32	50.00%
	Benzoyl Peroxide	32	50.00%

Table 2 Comparison of Acne Lesion Scores Across Visits

Visit	Parameter	Benzoyl Peroxide	Adapalene	t-value	p-value
1st	Comedones	4.72 (2.33)	4.02 (2.64)	1.129805	0.262979
	Papules	3.31 (2.31)	3.97 (2.58)	-1.071877	0.287983
	Total Score	15.09 (3.40)	15.27 (2.36)	-0.235095	0.815004
2nd	Comedones	2.36 (1.49)	1.84 (1.43)	1.414000	0.162000
	Papules	1.66 (1.29)	2.16 (1.37)	-1.505000	0.137000
	Total Score	7.77 (2.47)	7.72 (2.25)	0.079000	0.937000
3rd	Comedones	1.19 (0.67)	0.97 (0.97)	1.053000	0.297000
	Papules	0.78 (0.49)	1.16 (0.85)	-2.168000	0.035000
	Total Score	4.06 (1.32)	4.31 (1.85)	-0.622000	0.536000

Table 3 Reduction in Acne Lesion Scores from Baseline to the Third Visit

Treatment	Baseline (1 st visit)	Final Visit (3 rd visit)	Mean Reduction	Percentage Reduction (%)	t-value	p-value
Benzoyl Peroxide	15.09 (3.40)	4.06 ((1.32)	11.03	72.83%	21.632	< 0.05
Adapalene	15.27)	4.31 (1.85)	10.96	72.05%	29.893	< 0.05

Table 4 Adverse Effects Observed During Treatment

Adverse Effects	Benzoyl Peroxide	Adapalene	Chi-Square (χ^2)	p-value
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Irritation	0.4688	0	17.0667	0.00004
Itching	0.5	0	18.75	0.00001
Dryness	0.0313	0.4063	11.0629	0.00088

Table 5 Overall Therapeutic Outcome of Treatment

Improvement Category	Benzoyl Peroxide	Adapalene	Chi-Square (χ^2)	p-value
Good	0.3438	0.4375	0.2626	0.6084
Moderate	0.6563	0.5	1.025	0.3113
Mild	0	0.0625	0.5161	0.4725

DISCUSSION

The purpose of this research was to compare the efficacy and safety of 2.5% benzoyl peroxide with that of 0.1% adapalene in the treatment of mild acne vulgaris. Sixty-four participants were involved in this study, with each treatment group composed of 32 study participants. Most subjects fell into the 16-20 age range (43.75%), followed by 21-25 age group (31.25%) and female subjects made up 71.88% of study sample. The predominance of younger age group in the studied population is attributable to the fact that acne is a common ailment in adolescence and early adulthood.

The current study found that both groups had a notable reduction in acne severity. The average total acne score dropped from 15.09 ± 3.40 to 4.06 ± 1.32 in the group treated with benzoyl peroxide and from 15.27 ± 2.36 to 4.31 ± 1.85 in the group treated with adapalene. That means there was a decrement of 72.83% in the benzoyl peroxide group compared to a decrement of 72.05% in the adapalene group. The benefit in treatment of both groups was statistically equal which correlated with the results of Rani et al. (2022) [12] who found the same effectiveness of 2.5% benzoyl peroxide and 0.1% adapalene in decreasing acne severity.

In addition, the current study reported high difference in papule scores at the third visit ($p = 0.035$) which was in favour of benzoyl peroxide. The results of present study are in agreement with those reported by Ullah et al. (2024) [13] who stated that benzoyl peroxide was better in decreasing inflammatory lesions effectively comparing the results of adapalene treatment which was more resulted in more efficacious in treating non-inflammatory lesions. On the other hand, Dubey and Amame (2019) [14] point out that adapalene provided greater efficacy overall. The possible reason for discrepancy in results may be due to difference in treatment period, characters of participants and evaluation methods used.

In terms of safety, irritation and itching were reported with benzoyl peroxide more than with tetracycline, whereas both treatments were responsible for causing skin dryness. This agrees with findings of Mokhtari et al (2019) [15], who found local adverse effects like dryness, burning and irritation with the use of topical agents for acne. The greater irritation experienced with the use of benzoyl peroxide could be attributed to its keratolytic and antibactericidal properties.

In summary, the present study's findings reveal that both 2.5% benzoyl peroxide and 0.1% adapalene are effective therapies for mild acne vulgaris, resulting in almost 72% reduction in acne scores with no significant difference in the efficacy. The use of benzoyl peroxide produced a greater decrease in papules but was associated with higher incidence of side effects. These findings are generally consistent with data of studies already conducted and indicate that therapeutic decisions may be different based on the type of lesions and tolerated by the patient.

CONCLUSION

The results of this study show that 2.5% benzoyl peroxide and 0.1% adapalene are effective treatments for mild acne vulgaris. Both studied agents resulted in significant reduction in the severity of acne, although the reduction of 72.83% was achieved by benzoyl peroxide and 72.05% by adapalene. It was found that benzoyl peroxide is more effective in decreasing the number of papules, while adapalene has demonstrated good overall effectiveness. Nevertheless, benzoyl peroxide appears to be associated with skin irritation and itching more often than adapalene does, although both formulations can cause dryness. To sum up, it can be concluded that both topical agents could be regarded as effective treatments for mild acne vulgaris, although the choice of the specific medication will be determined by the patient's individual response.

to treatments and their tolerance to specific agents.

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Conflict of Interest

Nil

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