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Comparative Study on the Effectiveness and Tolerability of Topical Clindamycin versus Benzoyl Peroxide Gel in Mild to Moderate Acne Management

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ABSTRACT

Background: Acne vulgaris is a prevalent skin condition requiring effective treatment strategies. This study compares the efficacy and tolerability of topical Clindamycin alone versus a combination with Benzoyl Peroxide in treating mild to moderate acne.
Methods: A randomized study involving 200 participants compared Clindamycin alone (n=100) and Clindamycin combined with Benzoyl Peroxide (n=100). The primary outcome measures were total lesion count and Investigator Global Assessment (IGA) scores over 8 weeks. Adverse events and patient compliance were also evaluated.
Results: The combination therapy group showed a greater reduction in total lesion count (64.7% reduction) compared to the Clindamycin group (48.6% reduction) with a significant difference ($p<0.001$). IGA score improvement was also more substantial in the combination group (52.9% improvement) compared to the Clindamycin group (44.4% improvement, $p=0.046$). Adverse events were more frequent in the combination group but did not significantly affect compliance.
Conclusion: The combination of Clindamycin and Benzoyl Peroxide demonstrated superior effectiveness in treating mild to moderate acne compared to Clindamycin alone, with a higher but manageable rate of adverse events. These findings suggest that combination therapy can be a more effective option for acne management, balancing efficacy and tolerability.

Key Words: *Acne vulgaris*, *Clindamycin*, *Benzoyl Peroxide*, *combination therapy*, *skin lesion*, *topical treatment.*

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INTRODUCTION

Acne vulgaris, commonly referred to as acne, is a chronic inflammatory dermatosis notable for its impact on a significant portion of the population, especially adolescents and young adults. Its pathogenesis involves four main factors: increased sebum production, follicular epidermal hyperproliferation, colonization of the skin by Cutibacterium acnes, and the release of inflammatory mediators into the surrounding skin [1]. The management of acne is multifaceted, with a plethora of topical and systemic therapies available. Among these, topical clindamycin and benzoyl peroxide have emerged as prominent options in the treatment of mild to moderate acne. However, the comparative effectiveness and tolerability of these agents have been subjects of continuous research and debate.

Clindamycin, a lincosamide antibiotic, works primarily by inhibiting bacterial protein synthesis, thereby reducing the population of C. acnes on the skin [2]. Its anti-inflammatory properties further contribute to its efficacy in acne treatment. Benzoyl peroxide, on the other hand, possesses keratolytic, comedolytic, and antibacterial activities, which make it effective against both the inflammatory and non-inflammatory lesions of acne [3]. The oxygen released by benzoyl peroxide is lethal to the anaerobic C. acnes, making bacterial resistance less likely.

The effectiveness of these agents has been a subject of numerous studies. A randomized controlled trial by Smith et al. [4] found that clindamycin alone was effective in reducing both inflammatory and non-inflammatory acne lesions. Similarly, a study by Martin et al. [5] demonstrated the efficacy of benzoyl peroxide in the treatment of acne, highlighting its role in reducing the prevalence of antibiotic-resistant strains of C. acnes.

Combination therapies involving clindamycin and benzoyl peroxide have also been explored, offering the potential benefits of reduced antibiotic resistance and enhanced therapeutic efficacy [6]. However, the individual effectiveness of these agents, their tolerability, and patient compliance are factors that significantly influence treatment outcomes.

Tolerability, particularly, is a crucial aspect of acne management, given the chronic nature of the condition and the potential for adverse effects with long-term therapy. Clindamycin, although generally well-tolerated, may cause side effects such as skin dryness, itching, and, rarely, antibiotic-associated colitis [7]. Benzoyl peroxide is known for its skin irritation potential, which can manifest as dryness, redness, and peeling, potentially impacting patient adherence to treatment [8].

Furthermore, the choice between these agents can be influenced by various patient-specific factors such as skin type, severity and type of acne, previous treatment responses, and patient preference. The emergence of antibiotic resistance in the treatment of acne also necessitates a careful consideration of the benefits and risks associated with the long-term use of antibiotics like clindamycin [9].

Given the prevalence of acne and its impact on quality of life, a deeper understanding of the comparative effectiveness and tolerability of clindamycin and benzoyl peroxide is vital. This study aims to provide a comprehensive review of the available literature, comparing these two agents in the context of mild to moderate acne management. The findings of this study are expected to guide clinicians in making informed decisions about the most appropriate treatment modalities for their patients.

By evaluating the current evidence, this study seeks to illuminate the relative benefits and limitations of these treatment options, contributing to the optimization of acne management strategies.

AIMS AND OBJECTIVES

Primary Aim:

- To assess the effectiveness of topical Clindamycin and Benzoyl Peroxide gel in treating patients with mild to moderate acne vulgaris.

Secondary Objective:

- To evaluate the adverse effects associated with the use of topical Clindamycin and Benzoyl Peroxide gel in these patients.

MATERIALS AND METHODS

Study Setting

The study was conducted in the Dermatology outpatient department of MGM Medical College, Kishanganj. All baseline assessments and patient recruitment were executed here, while preparatory work, data analysis, and archiving were handled by the Department of Pharmacology.

Study Design

This investigation was structured as a randomized, patient-blinded study to ensure unbiased results and avoid placebo effects.

Study Duration

Each participant was involved in the study for a duration of two months, or eight weeks. This period included a baseline visit and two follow-up visits, scheduled at the end of the fourth and eighth weeks, respectively. A 7-day wash-out period was initially provided for participants who were previously undergoing any anti-acne therapy.

Ethical Considerations

Prior to commencement, the study protocol, including Case Record Forms (CRF), Patient Information Sheets, and Informed Consent Forms in Bengali, Hindi, and English, were approved by the Institutional Ethics Committee of MGM Medical College, Kishanganj. During the baseline visit, potential participants were comprehensively briefed about the study. Informed Consent Forms were provided only after participants had been fully informed about the study details and had their queries satisfactorily addressed.

Patient Selection Criteria

Participants were recruited from the Dermatology Out-Patient Department of MGM Medical College, Kishanganj. They were chosen based on specific inclusion and exclusion criteria. The inclusion criteria encompassed healthy males and females aged 18 to 40, with no other facial skin disorders and a willingness to provide written informed consent. The baseline investigator global assessment (IGA) score had to be between 1 and 2. Participants were also required to refrain from using facial cosmetics and oral medications during the study. The exclusion criteria ruled out individuals who could not understand the study protocol or give informed consent, those with nodulo-cystic lesions or other severe forms of

acne, subjects with excessive facial hair or other facial skin disorders, those with a history of skin cancer, use of hormonal oral contraceptives, known allergies or sensitivities to the test article components, and pregnant or lactating women.

Evaluation of Efficacy and Safety Parameters

The primary efficacy parameter was the total lesion count, encompassing both inflammatory and non-inflammatory lesions. Secondary efficacy parameters included the Investigator Global Assessment (IGA).

Study Groups and Randomization

Eligible subjects were randomized into two study groups: Group A received Clindamycin 1% gel, while Group B was treated with a combination of Clindamycin 1% gel and Benzoyl Peroxide 2.5% cream.

Assessment of Compliance

Compliance was evaluated through patient interviews regarding missed doses at each follow-up visit and categorized into excellent, good, fair, or poor based on the percentage of missed scheduled doses.

Safety Monitoring and Adverse Events

Adverse events (AEs) were defined as any untoward medical occurrences during the administration of the study drug, including abnormal laboratory values, but not necessarily causally related to it. Serious Adverse Events (SAEs) were categorized distinctly and included events like fatalities, life-threatening conditions, or events leading to significant disability, prolonged hospitalization, cancer, congenital anomalies, or any event requiring intervention to prevent such outcomes.

Study Procedures

The study involved a baseline visit, during which informed consent was obtained, eligibility assessed, and baseline efficacy parameters noted. This included a total lesion count and an Investigator Global Assessment score. The first follow-up visit, at the end of the fourth week, involved similar procedures with added compliance checks and safety monitoring. The second follow-up or end of trial visit, at the end of the eighth week, repeated these procedures and concluded the study participation for each subject.

In this study, the statistical analysis primarily involved the use of inferential statistics, particularly paired t-tests, to compare changes in total acne lesion counts and Investigator Global Assessment (IGA) scores from baseline to the 8-week follow-up within each treatment group. Additionally, chi-square tests were used to analyze categorical data, such as the incidence of adverse events, ensuring the robustness of the conclusions drawn regarding the efficacy and tolerability of the treatments.

RESULTS

The study aimed to evaluate the comparative effectiveness and tolerability of topical Clindamycin versus a combination of Clindamycin and Benzoyl Peroxide gel in managing mild to moderate acne vulgaris. The results are presented in the following sections based on the data obtained from various assessments and measurements.

Demographics and Baseline Characteristics

The demographic and baseline characteristics of the participants are summarized in Table 1. The study enrolled a total of 200 participants, with 100 in the Clindamycin group and 100 in the Clindamycin + Benzoyl Peroxide group. The average age was 29 years (± 5 years) in the Clindamycin group and 30 years (± 6 years) in the combination group. Gender distribution was fairly balanced in both groups, with a 50/50 male-to-female ratio in the Clindamycin group and a 48/52 male-to-female ratio in the combination group. The baseline Investigator Global Assessment (IGA) scores were comparable between the two groups, with the Clindamycin group having an average score of 1.8 (± 0.4) and the combination group having an average score of 1.7 (± 0.5).

Subject Enrollment and Study Flow

Table 2 details the enrollment and study flow. Out of 150 screened participants, 100 were enrolled in the Clindamycin group, and from 145 screened in the combination group, 100 were enrolled. Of these, 85 participants in the Clindamycin group and 90 in the combination group completed the study. The dropout rate was 15% for the Clindamycin group and 10% for the combination group.

Total Lesion Count

As indicated in Table 3, there was a significant reduction in the total lesion count from baseline to the 8-week follow-up in both treatment groups. The Clindamycin group showed a reduction from 35 (± 8) lesions at baseline to 18 (± 4) lesions at 8 weeks. In the combination group, the lesion count decreased from 34 (± 7) at baseline to 12 (± 3) at 8 weeks. The reduction in total lesion count was more pronounced in the combination group, with statistical significance ($p<0.001$).

Investigator Global Assessment Scores

Improvements in IGA scores were observed in both groups over the 8 weeks, as shown in Table 4. The Clindamycin group's average IGA score decreased from 1.8 (± 0.4) at baseline to 1.0 (± 0.2) at 8 weeks, while the combination group saw a decrease from 1.7 (± 0.5) to 0.8 (± 0.2) in the same period. The improvement in IGA scores was statistically more significant in the combination group (p=0.046).

Adverse Events

Table 5 summarizes the adverse events reported. Skin dryness was the most common adverse event in both groups, reported by 35.3% of the Clindamycin group and 44.4% of the combination group. Redness and peeling were also reported, with a higher incidence in the combination group. No adverse events were reported by 23.5% of the Clindamycin group and 16.7% of the combination group.

Compliance Rates

Compliance with the treatment regimen was assessed and is detailed in Table 6. In the Clindamycin group, 64.7% of participants showed excellent compliance, compared to 72.2% in the combination group. Poor compliance was observed in 0% of the Clindamycin group and 2.2% of the combination group.

Statistical Analysis of Efficacy

The statistical analysis of efficacy parameters is presented in Table 7. The total lesion count reduction was significantly higher in the combination group (64.7%) compared to the Clindamycin group (48.6%) with a p-value of <0.001. Similarly, IGA score improvement was more significant in the combination group (52.9% improvement) than in the Clindamycin group (44.4% improvement), with a p-value of 0.046.

Table 1: Demographic and Baseline Characteristics

Characteristic	Clindamycin Group (n=100)	Clindamycin + Benzoyl Peroxide Group (n=100)
Age (years)	29 ± 5	30 ± 6
Gender (M/F)	50/50	48/52
IGA Score	1.8 ± 0.4	1.7 ± 0.5

Table 2: Subject Enrollment and Study Flow

Stage	Clindamycin Group (n=100)	Clindamycin + Benzoyl Peroxide Group (n=100)
Screened	150	145
Eligible	120	118
Enrolled	100	100
Completed Study	85	90
Dropped Out	15	10

Table 3: Total Lesion Count (Baseline vs. Follow-up)

Time Point	Clindamycin Group (n=85)	Clindamycin + Benzoyl Peroxide Group (n=90)
Baseline	35 ± 8	34 ± 7
4 Weeks	25 ± 6	20 ± 5
8 Weeks	18 ± 4	12 ± 3

Table 4: Investigator Global Assessment (IGA) Scores

Time Point	Clindamycin Group (n=85)	Clindamycin + Benzoyl Peroxide Group (n=90)
Baseline	1.8 ± 0.4	1.7 ± 0.5
4 Weeks	1.4 ± 0.3	1.1 ± 0.2
8 Weeks	1.0 ± 0.2	0.8 ± 0.2

Table 5: Adverse Events

Adverse Event	Clindamycin Group (n=85)	Clindamycin + Benzoyl Peroxide Group (n=90)
Skin Dryness	30 (35.3%)	40 (44.4%)
Redness	20 (23.5%)	25 (27.8%)

Adverse Event	Clindamycin Group (n=85)	Clindamycin + Benzoyl Peroxide Group (n=90)
Peeling	15 (17.6%)	30 (33.3%)
No Adverse Events	20 (23.5%)	15 (16.7%)

Table 6: Compliance Rates

Compliance Level	Clindamycin Group (n=85)	Clindamycin + Benzoyl Peroxide Group (n=90)
Excellent	55 (64.7%)	65 (72.2%)
Good	20 (23.5%)	15 (16.7%)
Fair	10 (11.8%)	8 (8.9%)
Poor	0 (0%)	2 (2.2%)

Table 7: Statistical Analysis of Efficacy

Parameter	Clindamycin Group	Clindamycin + Benzoyl Peroxide Group	p-value
Total Lesion Count Reduction	48.6%	64.7%	<0.001
IGA Score Improvement	44.4%	52.9%	0.046

DISCUSSION

The current study evaluated the effectiveness and tolerability of topical Clindamycin alone versus its combination with Benzoyl Peroxide in the management of mild to moderate acne vulgaris. Our findings demonstrated a statistically significant greater improvement in acne lesions and Investigator Global Assessment (IGA) scores with the combined treatment compared to Clindamycin alone. This aligns with the results of previous studies, which have also indicated enhanced efficacy of combination therapies in acne treatment [10][11].

In our study, the total lesion count reduced by 48.6% in the Clindamycin group and by 64.7% in the combination group, with a significant p-value of <0.001. This is consistent with the findings of Zaenglein et al., who reported a similar trend where combination therapies showed superior efficacy compared to monotherapy in reducing acne lesions [12]. The improvement in IGA scores was more significant in the combination group (52.9%) than in the Clindamycin group (44.4%), with a p-value of 0.046. These results resonate with the study by Leyden et al., which also highlighted a more pronounced improvement in acne severity with combination treatments [13].

Adverse events, primarily skin dryness, redness, and peeling, were more frequently reported in the combination group. This is in line with Sagransky et al.'s findings, where increased incidences of skin irritation were associated with combination treatments, particularly those involving Benzoyl Peroxide [14]. Despite this, the overall high compliance rates in our study (excellent compliance: 64.7% in the Clindamycin group and 72.2% in the combination group) indicate that the adverse effects were not severe enough to affect treatment adherence significantly. This observation is crucial, as patient adherence plays a vital role in the long-term management of acne [15].

The enhanced efficacy of the combination treatment could be attributed to the complementary actions of Clindamycin and Benzoyl Peroxide. Clindamycin, as an antibiotic, reduces the colonization of Cutibacterium acnes, while Benzoyl Peroxide's keratolytic and comedolytic properties address the obstruction of pilosebaceous units, a key factor in acne pathogenesis [16]. Moreover, the use of Benzoyl Peroxide in combination with antibiotics has been shown to reduce the likelihood of antibiotic resistance, a growing concern in acne management [17].

It is important to note the limitations of our study. The follow-up duration was limited to 8 weeks, and longer-term studies might be necessary to fully understand the implications of these treatments, especially regarding safety and sustained efficacy. Additionally, the study's demographic was limited to a specific age group, and results might vary in different populations.

Our study supports the growing body of evidence favoring combination therapies in the treatment of mild to moderate acne vulgaris. The combination of Clindamycin and Benzoyl Peroxide shows superior efficacy over Clindamycin alone, although it is associated with a higher rate of mild adverse events. These findings underscore the importance of individualized treatment planning, considering both the efficacy and tolerability profiles of therapies.

CONCLUSION

The study's findings significantly contribute to the existing literature on the management of mild to moderate acne vulgaris, highlighting the comparative effectiveness of topical Clindamycin alone and in combination with Benzoyl Peroxide. The combination therapy demonstrated superior efficacy in reducing acne lesions, with a total lesion count reduction of 64.7% compared to 48.6% in the Clindamycin only group, a difference that was statistically significant

($p<0.001$). Similarly, improvements in Investigator Global Assessment (IGA) scores were more pronounced in the combination group (52.9% improvement) than in the Clindamycin group (44.4% improvement), with a p-value of 0.046. While the combination therapy was associated with a higher incidence of mild adverse events such as skin dryness, redness, and peeling, these did not significantly impact patient compliance, which remained high in both groups. These results suggest that the combination of Clindamycin and Benzoyl Peroxide could be a more effective option for patients with mild to moderate acne, offering a balance between efficacy and tolerability.

Given the chronic nature of acne and the importance of patient adherence to treatment outcomes, these findings underscore the need for individualized treatment plans that consider both the effectiveness and side effect profiles of available therapies. Future research should focus on long-term efficacy and safety, as well as the impact of combination therapies on antibiotic resistance patterns in acne treatment.

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