Biological and Clinical Sciences Research Journal
eISSN: 2708-2261; pISSN: 2958-4728
www.bcsrj.com
DOI: https://doi.org/10.54112/bcsrj.v2024i1.1049
*Biol. Clin. Sci. Res. J., Volume, **2024**: 1049*
Original research article

COMPARISON OF EFFICACY OF ORAL AZITHROMYCIN PLUS TOPICAL BENZYL PEROXIDE VERSUS ORAL DOXYCYCLINE PLUS TOPICAL BENZYL PEROXIDE IN TREATMENT OF ACNE VULGARIS

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(Received, 19th June 2024, Revised 20th August 2024, Published 24th August 2024)

Abstract: *Acne vulgaris is a common dermatological condition that impacts psychological well-being and social interactions. Despite numerous treatment modalities, the comparative efficacy of combination therapies involving oral antibiotics and topical agents remains inadequately explored.* ***Objective:*** *To compare the efficacy of oral azithromycin plus topical benzyl peroxide versus oral doxycycline plus topical benzyl peroxide in treating Acne vulgaris.* ***Methods:*** *This randomized controlled trial was conducted in the Department of Dermatology at PIMS, Islamabad, from July 2023 to December 2023, following ethical approval. A total of 190 individuals with Acne vulgaris were enrolled and divided into two groups through block randomization. Group A received oral azithromycin 500 mg once daily for three consecutive days each week combined with daily topical benzyl peroxide 5% gel for 12 weeks. Group B was treated with oral doxycycline 100 mg daily and daily topical benzyl peroxide 5% gel for the same duration. Treatment efficacy was assessed after 12 weeks based on lesion clearance, categorized as Excellent, Good, Moderate, Mild, or No Response. Statistical analysis was conducted using SPSS Version 26 to evaluate the differences in treatment outcomes between the groups.* ***Results:*** *Participants had a mean age of 23.88±8.06 years, with gender distribution of 32 males (33.7%) and 63 females (66.3%) in Group A, and 41 males (43.2%) and 54 females (56.8%) in Group B. Treatment responses were significantly better in Group B, with 17.9% achieving an excellent response and 46.3% a good response, compared to 6.3% and 28.4% respectively in Group A (p=0.001).* ***Conclusion****: The study concluded that both combinations of oral antibiotics and topical benzyl peroxide effectively manage Acne vulgaris. However, combining oral doxycycline with topical benzyl peroxide was significantly more effective than oral azithromycin with topical benzyl peroxide, achieving higher rates of excellent and good responses, greater reduction in acne severity, and fewer cases of no response.*

Keywords: Acne vulgaris, Doxycycline, Azithromycin.

Introduction

Acne vulgaris is a common dermatological condition characterized by the inflammation of pilosebaceous units, resulting in various types of lesions such as comedones, papules, pustules, and nodules. (1) It primarily affects adolescents but can persist into adulthood, causing significant cosmetic and psychological impacts. Effective management of acne vulgaris is essential not only to alleviate symptoms but also to prevent long-term sequelae such as scarring and persistent psychological distress. (2) Genetic predisposition is A critical factor in the pathogenesis of acne. Research indicates that if both parents have a history of acne, there is a 75% chance that their children will also develop acne. Conversely, if only one parent has acne, the likelihood decreases to approximately 25%. Like other hereditary conditions, acne can sometimes appear to skip generations, where individuals in one generation may not exhibit symptoms while subsequent generations do. This genetic influence underscores the role of heredity in the development of acne vulgaris. (3, 4) Acne management involves a range of treatments that can be either topical or taken orally. Topical treatments such as benzoyl peroxide, antibiotics, and retinoids are generally the first-line options for mild to moderate acne. These agents target acne through mechanisms like reducing bacterial load, decreasing inflammation, and promoting the turnover of skin cells. In cases of moderate to severe acne, systemic treatments are often required in addition to topical therapies. Oral antibiotics help address bacterial overgrowth and inflammation, and oral retinoids, which significantly reduce oil production and promote skin cell turnover, are commonly used. Hormonal treatments, such as oral contraceptives or anti-androgens, may also be prescribed, particularly for acne linked to hormonal imbalances. (5, 6) Combining systemic treatments with topical agents provides a comprehensive approach to effectively managing more severe cases of acne vulgaris. Azithromycin, a macrolide antibiotic, has recently been utilized to treat acne vulgaris and has demonstrated effectiveness comparable to doxycycline and minocycline. (7) As a nitrogen-containing macrolide, azithromycin is a methyl derivative of erythromycin and shares similar mechanisms of action and therapeutic uses with erythromycin. (8) This class of antibiotics works by inhibiting bacterial protein synthesis, thereby reducing inflammation and bacterial proliferation in acne lesions. Given its efficacy and safety profile, azithromycin has emerged as a viable option for acne treatment, offering an alternative to traditional antibiotics such as doxycycline and minocycline. (9, 10)

Objective: To compare the efficacy of oral azithromycin plus topical benzyl peroxide versus oral doxycycline plus topical benzyl peroxide in treating Acne vulgaris.

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Methodology

After the approval of the hospital ethical committee, this study was conducted in the Department of Dermatology between July 2023 to December 2023. A detailed history was obtained, and a thorough physical examination was performed to exclude any associated diseases. A total of 190 individuals who met the selection criteria were enrolled in the study. The study included patients aged 10 to 40 years of both genders with Acne vulgaris for at least 6 months, having a specified minimum number of inflammatory (e.g., papules, pustules) and non-inflammatory (e.g., comedones) lesions, and with no prior use of antibiotics for acne treatment in the past 3 months. Exclusion criteria were patients with known allergies to azithromycin, doxycycline, and benzyl peroxide; pregnant or breastfeeding women; patients with any systemic illness or severe dermatological condition other than acne vulgaris (e.g., rosacea, eczema); and those with a history of gastrointestinal disorders, including inflammatory bowel disease or malabsorption syndromes that may affect drug absorption. All the patients were randomized into two groups by the block randomization method. Oral Azithromycin was treated in group A patients plus topical benzyl peroxide; group B patients were treated with oral doxycycline plus topical benzyl peroxide. Group A received oral azithromycin at a dosage of 500 mg once daily for 3 days each week, for a total duration of 12 weeks, along with topical benzyl peroxide 5% gel applied once daily to affected areas in the evening for 12 weeks. Group B received oral doxycycline at a dosage of 100 mg daily, for a total duration of 12 weeks, along with topical benzyl peroxide 5% gel applied once daily to affected areas in the evening for 12 weeks. Patients were followed up 12 weeks after treatment to evaluate the response to each drug. The efficacy was determined based on the reduction of characteristic acne vulgaris lesions (whiteheads, blackheads, red spots, and red bumps) and was measured by the percentage of lesion clearance. The outcomes were categorized as follows: Excellent (100% clearance), Good (80-90% clearance), Moderate (50-79% clearance), Mild (30-49% clearance), and No Response (less than 30% clearance). For statistical analysis, SPSS Version 26 was used.

Results

The mean age of all enrolled patients was 23.88±8.06 years. In Group A, the mean age was 24.09±8.11 years, while in Group B, it was 23.68±8.05 years. Regarding gender distribution, Group A consisted of 32 males (33.7%) and 63 females (66.3%), whereas Group B had 41 males (43.2%) and 54 females (56.8%). Age groups were also analyzed, with Group A having 40 patients (42.1%) in the 10-20 years range, 29 patients (30.5%) in the 21-30 years range, and 26 patients (27.4%) in the 31-40 years range. Similarly, Group B had 43 patients (45.3%) in the 10-20 years range, 27 patients (28.4%) in the 21-30 years range, and 25 patients (26.3%) in the 31-40 years range. In Group A, 6 patients (6.3%) exhibited an excellent response, 28 patients (28.4%) showed a good response, 45 patients (47.4%) had a moderate response, 12 patients (12.6%) experienced a mild response, and 5 patients (5.3%) had no response. In contrast, Group B had 17 patients (17.9%) with an excellent response, 44 patients (46.3%) with a good response, 26 patients (27.4%) with a moderate response, 7 patients (7.4%) with a mild response, and only 1 patient (1.1%) with no response. The difference in treatment response between the two groups was statistically significant, with a p-value of 0.001.

Table 1: Mean age of all enrolled patients (n=190)

Variables	Mean±SD
Age (Years)	23.88±8.06

Table 2: Demographic Characteristics of Both Groups

	Groups	
	Groups A	**Groups B**
Age (Years)	24.09±8.11	23.68±8.05
Gender		
Male	32(33.7%)	41(43.2%)
Female	63(66.3%)	54(56.8%)
Age groups		
10-20 years	40(42.1%)	43(45.3%)
21-30 years	29(30.5%)	27(28.4%)
31-40 years	26(27.4)	25(26.3%)

Table 2: Response of treatment of both groups of patients

	Groups		
	Groups A	**Groups B**	
Response	Frequency (%)	Frequency (%)	P-value
Excellent	6(6.3%)	17(17.9%)	0.001
Good	2(28.4%)	44(46.3%)	
Moderate	45(47.4%)	26(27.4%)	
Mild	12(12.6%)	7(7.4%)	
No Response	5(5.3%)	1(1.1%)	

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Discussion

Acne vulgaris is a chronic inflammatory skin disorder that primarily affects the pilosebaceous units, which include hair follicles and their associated sebaceous glands. (1) It is a ubiquitous condition, with nearly every individual experiencing at least a few comedones (blackheads and whiteheads) and papules during adolescence. (11) The prevalence of acne during these formative years underscores the importance of effective treatment strategies. Without appropriate management, acne can lead to significant facial scarring, which not only affects cosmetic appearance but also has profound psychological implications. Scarring can result in long-lasting emotional distress, including lowered self-esteem, social anxiety, and depression. Therefore, timely and effective treatment is crucial to mitigate these (12) potential adverse outcomes and improve the overall quality of life for those affected by acne vulgaris. The present study aimed to compare the efficacy of oral azithromycin plus topical benzyl peroxide versus oral doxycycline plus topical benzyl peroxide in treating acne vulgaris. Our study findings indicate a significant difference in treatment outcomes between the two groups, favoring the combination of oral doxycycline and topical benzyl peroxide. The results revealed that Group B, treated with oral doxycycline and topical benzyl peroxide, showed a higher percentage of patients with excellent and good responses than Group A, treated with oral azithromycin and topical benzyl peroxide. Specifically, 17.9% of patients in Group B experienced an excellent response, compared to only 6.3% in Group A. Additionally, 46.3% of Group B patients had a good response, while only 28.4% of Group A patients achieved a similar outcome. These findings suggest that doxycycline is more effective than azithromycin when combined with benzyl peroxide for acne treatment. Our study was supported by Ghafoor Ullah et al.(13), who observed an excellent response in 6 patients (3.1%) in the azithromycin group. In contrast, a good response was noted in 44 patients (22.8%). In contrast, the doxycycline group saw an excellent response in 22 patients (11.4%) and a good response in 107 patients (55.4%). This difference was statistically significant. Another study (14) reported that azithromycin pulse therapy is more effective and associated with fewer side effects compared to daily doxycycline for treating acne vulgaris. In this study, Group A received azithromycin at a dosage of 500 mg for three consecutive days each week, while Group B was prescribed doxycycline at a daily dose of 100 mg. All patients in both groups were also treated with topical clindamycin. Gruber et al. (12) conducted a study involving Croatian patients and found that both azithromycin and minocycline provided a satisfactory clinical response in treating acne vulgaris. The study reported that there were no significant differences between the two medications in terms of their efficacy or tolerability. This suggests that both treatments are comparably effective and well-tolerated options for managing acne vulgaris. During the follow-up visits, a significant reduction in acne grades was observed in both treatment groups compared to their baseline levels. This substantial improvement underscores the effectiveness of both medications in managing acne vulgaris. The observed decrease in acne severity across both groups indicates that the treatments successfully reduce the number and severity of acne lesions. Still, in the end, the Oral Doxycycline plus Topical Benzyl Peroxide group patients showed more effective results than the Oral Azithromycin plus Topical Benzyl Peroxide group. These findings highlight the potential of both drugs to achieve favorable outcomes in acne management, demonstrating their efficacy in addressing this common skin condition. Prasad D et al.(15) conducted a study comparing the efficacy of azithromycin 500 mg taken for 4 days per month with doxycycline 100 mg administered daily. Their findings revealed that daily administration of doxycycline at 100 mg was as effective as the monthly regimen of azithromycin in treating acne vulgaris. This suggests that with its daily dosing, doxycycline provides comparable therapeutic benefits to azithromycin when given in a pulse regimen. The study highlights the effectiveness of both treatment regimens, indicating that daily doxycycline can be a viable alternative to periodic azithromycin for managing acne.

Conclusion

It was concluded that both treatment regimens are effective in managing Acne vulgaris. However, oral doxycycline combined with topical benzyl peroxide yielded significantly better results than oral azithromycin and topical benzyl peroxide. Patients receiving doxycycline exhibited higher rates of excellent and good responses, with a greater reduction in acne severity and fewer instances of no response. This indicates that doxycycline, when used with benzyl peroxide, provides superior efficacy in treating acne vulgaris compared to azithromycin.

Declarations

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.
Ethics approval and consent to participate.
Approved by the department concerned. (IRB-PIMS-332/23)
Consent for publication
Approved
Funding
Not applicable

Conflict of interest

The authors declared an absence of conflict of interest.

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