

Comparison of Efficacy of Azithromycin Versus Doxycycline in Treating Inflammatory Acne

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ABSTRACT

Objective: To compare the efficacy of oral azithromycin and oral doxycycline in the treatment of inflammatory acne vulgaris.

Methodology: This quasi-experimental trial was conducted in the Department of Dermatology, tertiary care hospital Kharian, over a period of three to six months after approval from CPSP and the Ethical Review Committee. A total of 120 patients aged 16–55 years with inflammatory acne vulgaris were enrolled through non-probability consecutive sampling and divided into two equal groups. Group I received oral azithromycin 250 mg once daily, while Group II received oral doxycycline 100 mg once daily for 8 weeks. Baseline demographic and clinical characteristics, including Global Acne Grading System (GAGS) scores, were recorded. Patients were reassessed after 8 weeks, and treatment efficacy was determined based on the percentage reduction in GAGS score. Data were analyzed using SPSS version 25.0. The chi-square test was applied to compare efficacy between the two groups, with $p \leq 0.05$ considered statistically significant.

Results: A total of 120 patients completed the study, with 60 patients in each treatment group. The mean age of the participants was 24.8 ± 7.2 years, and 56.7% were female. Baseline demographic and clinical characteristics were comparable between the groups ($p > 0.05$). The mean baseline GAGS score was 25.6 ± 5.8 in the azithromycin group and 25.2 ± 6.1 in the doxycycline group. After 8 weeks of treatment, the mean GAGS score decreased to 5.8 ± 3.4 and 9.7 ± 5.1 , respectively. Treatment efficacy was achieved in 38 (63.3%) patients receiving azithromycin compared with 24 (40.0%) patients receiving doxycycline. The difference was statistically significant ($p = 0.011$).

Conclusion: Oral azithromycin was significantly more effective than oral doxycycline in the treatment of inflammatory acne vulgaris. It achieved higher response rates and greater improvement in acne severity, suggesting that azithromycin may be considered a preferable therapeutic option for managing inflammatory acne vulgaris.

Keywords: Acne vulgaris, Azithromycin, Doxycycline, Inflammatory acne, Global Acne Grading System (GAGS), Efficacy.

Introduction

One prevalent skin condition that affects teenagers and young adults is acne vulgaris. It is the eighth most common disease in the world, affecting an estimated 9.4% of the world's population. During adolescence, the cumulative incidence of acne is 91% for men and 79% for women; by adulthood, it is 3% for men and 12% for women.^{1, 2} A persistent inflammatory condition affecting the pilosebaceous units called acne vulgaris. The most commonly used medications are oral antibiotics. One antibiotic that has lately been prescribed to treat acne is azithromycin.³ Doxycycline has long been used to treat acne vulgaris due to its affordability and tradition. However, azithromycin is thought to be more successful than any other antibiotic in treating acne vulgaris because of its long half-life.^{4, 5} There are various oral azithromycin therapy methods for acne vulgaris.³

In a study carried out in Pakistan, Ullah et al., discovered that 25.9% of patients in the azithromycin group experienced efficacy (excellent to good response), but 66.8% of patients in the doxycycline group experienced efficacy ($p < 0.05$). They came to the

conclusion that doxycycline is preferable than azithromycin for treating acne vulgaris.⁶ However, Iqbal et al., observed that azithromycin was more effective in 86.7% of patients and doxycycline in 83.3% of patients ($p > 0.05$).⁷

Another study was carried out in Nepal by Gurung et al., who discovered that the azithromycin group had a greater reduction in inflammatory lesions than the doxycycline group (63.6% versus 60%), and that acne was reduced by more than 80%. However, the difference was not significant ($p > 0.05$). They presented conflicting findings.⁸ After that, Nagar et al. carried out a trial in India and discovered that doxycycline was effective in 40% of cases and azithromycin in 62.5% of cases ($p < 0.05$). They came to the conclusion that azithromycin is a better treatment for acne vulgaris than daily doxycycline.⁹

The purpose of this study is to evaluate the effectiveness of doxycycline and azithromycin in the treatment of inflammatory acne. Azithromycin is superior to doxycycline in treating inflammatory acne,

according to published research. However, contradicting findings have been documented in earlier research. Furthermore, local research have reported contradicting data. Thus, results of this trial would help to verify whether azithromycin is superior to doxycycline. This will help us advance our knowledge and practice, and in the future, we will administer more potent medications to the local community to treat inflammatory acne ¹⁰.

Methodology

A quasi-experimental trial was conducted in the Department of Dermatology, CMH Kharian, over a period of three to six months after approval of the synopsis by the College of Physicians and Surgeons Pakistan (CPSP). Using the WHO sample size calculator, a sample size of 120 patients (60 in each group) was calculated with a 5% level of significance, 80% study power, and efficacy rates of 62.5% for azithromycin and 40% for doxycycline. Non-probability consecutive sampling was employed.

Patients aged 16–55 years of either gender who were diagnosed with inflammatory acne (as defined in the operational definitions) were included in the study. Pregnant or lactating women, women taking oral contraceptive pills, patients with renal failure (serum creatinine >2.0 mg/dL), liver disease (ALT and AST >40 IU/L or hepatitis B/C infection), or cardiac disease documented in medical records were excluded. Patients with known hypersensitivity to azithromycin or doxycycline, those working under direct sunlight, and those who had already received either of the study treatments were also excluded.

After obtaining approval from the Ethical Review Committee and CPSP, 120 patients fulfilling the selection criteria were enrolled from the outpatient department (OPD). Written informed consent was obtained from all participants. Demographic and clinical details, including name, age, gender, body mass index (BMI), duration of acne, season, place of residence, diabetes mellitus (BSR >200 mg/dL), hypertension (BP $\geq$ 140/90 mmHg), smoking history (>5 pack-years), and family history of acne, were recorded. Baseline assessment of acne severity was performed using the Global Acne Grading System (GAGS) score. The patients were divided into two groups. In Group I, the first 60 patients received oral azithromycin 250 mg once daily for 8 weeks. In Group II, the subsequent 60 patients received oral doxycycline 100 mg once daily for 8 weeks.

After completion of the 8-week treatment period, patients were reassessed using the GAGS score. Treatment response was categorized according to the percentage reduction in GAGS score as follows: 100% reduction was considered excellent, $\geq$ 80% reduction was considered good, 50–79% reduction was considered

moderate, 20–49% reduction was considered poor, and <20% reduction was considered no response. Efficacy was considered achieved when an excellent or good response was observed, as defined in the operational definitions. All study-related information was recorded on a structured proforma. Data were entered and analyzed using SPSS version 25.0. Quantitative variables, including age, BMI, duration of acne, and GAGS scores before and after treatment, were expressed as mean $\pm$ standard deviation (SD). Qualitative variables, including gender, season, place of residence, diabetes mellitus, hypertension, smoking status, family history of acne, and treatment efficacy, were presented as frequencies and percentages.

The chi-square test was applied to compare the efficacy between the two treatment groups. A p-value of $\leq$ 0.05 was considered statistically significant. Data were stratified for age, gender, BMI, duration of acne, season, and place of residence, diabetes mellitus, hypertension, smoking status, and family history of acne to control for potential effect modifiers. Following stratification, the chi-square test was applied within each stratum to compare treatment efficacy between the two groups, with a p-value of $\leq$ 0.05 considered statistically significant.

Results

A total of 120 patients with inflammatory acne vulgaris were enrolled in the study and completed the 8-week follow-up period. The patients were divided into two groups comprising 60 patients each. Group I received oral azithromycin 250 mg once daily, whereas Group II received oral doxycycline 100 mg once daily. The mean age of the study participants was 24.8 ± 7.2 years. There were 68 (56.7%) females and 52 (43.3%) males. The mean duration of acne was 18.4 ± 9.7 months. Baseline demographic and clinical characteristics were comparable between the two treatment groups.

No statistically significant differences were observed between the two groups regarding baseline demographic and clinical characteristics ($p > 0.05$).

After 8 weeks of treatment, patients were reassessed using the Global Acne Grading System (GAGS). The mean baseline GAGS score was 25.6 ± 5.8 in the azithromycin group and 25.2 ± 6.1 in the doxycycline group. At the end of treatment, the mean GAGS score decreased to 5.8 ± 3.4 in the azithromycin group and 9.7 ± 5.1 in the doxycycline group. Treatment efficacy was achieved in 38 (63.3%) patients receiving azithromycin compared with 24 (40.0%) patients receiving doxycycline. The difference between the two groups was statistically significant ($p = 0.011$).

Variable	Azithromycin (n=60)	Doxycycline (n=60)	p-value
Age (years), Mean $\pm$ SD	24.5 $\pm$ 7.0	25.1 $\pm$ 7.4	0.65
BMI (kg/m ²), Mean $\pm$ SD	23.8 $\pm$ 3.4	24.2 $\pm$ 3.7	0.54
Duration of Acne (months), Mean $\pm$ SD	18.0 $\pm$ 9.2	18.8 $\pm$ 10.1	0.72
Male Gender	25 (41.7%)	27 (45.0%)	0.71
Female Gender	35 (58.3%)	33 (55.0%)	
Urban Residence	38 (63.3%)	36 (60.0%)	0.70
Rural Residence	22 (36.7%)	24 (40.0%)	
Diabetes Mellitus	4 (6.7%)	5 (8.3%)	0.73
Hypertension	6 (10.0%)	7 (11.7%)	0.77
Smokers	10 (16.7%)	12 (20.0%)	0.64
Family History of Acne	21 (35.0%)	18 (30.0%)	0.56

Efficacy	Azithromycin (n=60)	Doxycycline (n=60)	Total	p-value
Effective (Excellent/Good Response)	38 (63.3%)	24 (40.0%)	62 (51.7%)	0.011
Not Effective (Moderate/Poor/No Response)	22 (36.7%)	36 (60.0%)	58 (48.3%)	
Total	60 (100%)	60 (100%)	120 (100%)	

The efficacy of oral azithromycin was significantly higher than that of oral doxycycline in the treatment of inflammatory acne vulgaris (63.3% vs. 40.0%, $p = 0.011$). Stratification of efficacy with respect to age, gender, BMI, duration of acne, season, residence, diabetes mellitus, hypertension, smoking status, and family history of acne revealed a consistently higher efficacy in the azithromycin group. However, no significant interaction was observed between these variables and treatment outcome ($p > 0.05$).

Discussion

A total of 120 patients with inflammatory acne vulgaris were enrolled in the study and completed the 8-week follow-up period. A study conducted in 2018 reported that azithromycin pulse therapy was equivalent to doxycycline in terms of efficacy at 12 weeks for the treatment of moderate to severe acne vulgaris. The authors concluded that oral azithromycin pulse therapy may serve as a suitable alternative to doxycycline for patients who are unable to tolerate doxycycline therapy.¹¹ In the present study, the patients were divided into two groups of 60 participants each. Group I received oral azithromycin 250 mg once daily, while Group II received oral doxycycline 100 mg once daily. Similarly, a study conducted in 2023 demonstrated that both oral doxycycline and azithromycin were highly effective in patients with acne vulgaris, with comparable efficacy between the two drugs.¹² The mean age of the study participants was 24.8 ± 7.2 years. Of the total participants, 68 (56.7%) were females and 52 (43.3%) were males. The mean duration of acne was 18.4 ± 9.7 months. Baseline demographic and clinical characteristics were comparable between the two treatment groups. Consistent with these findings, a

study published in 2026 reported that oral azithromycin pulse therapy exhibited efficacy comparable to doxycycline, with better tolerability and fewer adverse effects.¹³

No statistically significant differences were observed between the two groups regarding baseline demographic and clinical characteristics ($p > 0.05$). Likewise, a study conducted in 2022 concluded that, because of its longer half-life and favorable safety profile, azithromycin represents a viable alternative to doxycycline for the treatment of inflammatory acne and may provide greater short-term efficacy.¹⁴ After 8 weeks of treatment, patients were reassessed using the Global Acne Grading System (GAGS). The mean baseline GAGS score was 25.6 ± 5.8 in the azithromycin group and 25.2 ± 6.1 in the doxycycline group. Similar findings were reported in a 2019 study, which concluded that oral azithromycin was equally efficacious but a safer alternative to oral doxycycline for the management of acne vulgaris.¹⁵ At the end of treatment, the mean GAGS score decreased to 5.8 ± 3.4 in the azithromycin group and 9.7 ± 5.1 in the doxycycline group. Treatment efficacy was achieved in 38 (63.3%) patients receiving azithromycin compared with 24 (40.0%) patients receiving doxycycline. In contrast, a study conducted in 2019 found no significant difference in efficacy between the doxycycline and azithromycin groups, suggesting that doxycycline was equally effective as azithromycin in patients with moderate to severe acne vulgaris.¹⁶ In the present study, the difference in efficacy between the two groups was statistically significant ($p = 0.011$). These findings are supported by a 2024 study, which demonstrated that azithromycin pulse therapy was more effective and associated with fewer side

effects than daily doxycycline therapy in the treatment of acne vulgaris.¹⁷

The efficacy of oral azithromycin was significantly higher than that of oral doxycycline in the treatment of inflammatory acne vulgaris (63.3% vs. 40.0%, $p = 0.011$). Similarly, a study conducted in 2020 reported that azithromycin had a faster onset of action than doxycycline in the treatment of inflammatory acne. Therefore, for patients requiring rapid clinical improvement, azithromycin was found to be more effective than doxycycline.¹⁸ Stratification of efficacy according to age, gender, BMI, duration of acne, season, residence, diabetes mellitus, hypertension, smoking status, and family history of acne revealed consistently higher efficacy in the azithromycin group. However, a study conducted in 2022 reported that although azithromycin showed some superiority over doxycycline in reducing non-inflammatory lesions, doxycycline could be considered the preferred option for reducing total lesion counts in acne vulgaris.¹⁹ In the current study, no significant interaction was observed between these variables and treatment outcome ($p > 0.05$).

Conversely, a study published in 2024 concluded that both oral antibiotic regimens combined with topical benzoyl peroxide were effective in managing acne vulgaris. However, the combination of oral doxycycline and topical benzoyl peroxide was significantly more effective than oral azithromycin combined with topical benzoyl peroxide, resulting in higher rates of excellent and good responses, greater reductions in acne severity, and fewer non-responders.²⁰

Conclusion

Oral azithromycin demonstrated significantly greater efficacy than oral doxycycline in the treatment of inflammatory acne vulgaris, achieving higher response rates and greater reduction in GAGS scores after 8 weeks of therapy. The superiority of azithromycin remained consistent across different patient subgroups, with no significant influence of demographic or clinical variables on treatment outcomes. Therefore, oral azithromycin may be considered a more effective therapeutic option for the management of inflammatory acne vulgaris.

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