2019 Resident Research Competition – 2nd Place

ORIGINAL RESEARCH

Ampicillin Use in Acne

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ABSTRACT

Introduction: In one author's experience, ampicillin is an effective alternative antibiotic for acne; however, current literature for ampicillin use in acne is scant. The objective of this study was to demonstrate the response of oral Ampicillin in acne.

Methods: A retrospective analysis of 243 patients with Acne vulgaris treated with Ampicillin 500mg twice daily was conducted. The severity of acne (on a scale of 0 to 3) at the last visit was compared with baseline severity determined at the initial visit. Results were analyzed using the paired samples t-test.

Results: The average severity of acne was reduced from 1.54 to 0.90 ($p < 0.001$). The average severity was reduced from 1.69 to 1.09 ($p < 0.001$) among men, and from 1.48 to 0.84 ($p < 0.001$) among woman. Lastly, average severity was decreased from 1.67 to 1.12 ($p < 0.001$) in patients with nodulocystic acne, from 1.45 to 0.77 ($p < 0.001$) with inflammatory acne patients, and from 1.00 to 0.38 ($p < 0.001$) in patients with comedonal acne.

Limitations: This study was limited by its retrospective nature and analysis of a small patient population. Additionally, a validated acne scoring system was not used due to provider documentation.

Conclusion: To conclude, Ampicillin had a positive effect on our patient's acne.

INTRODUCTION

Tetracycline antibiotics are considered first-line for acne vulgaris unresponsive to topical comedolytic agents, however, adverse events, allergies, and pregnancy represent contraindications to Tetracyclines in addition to other alternative antiobiotics.[1,2] In one author's experience, Ampicillin is beneficial in patients with inflammatory acne and has a favorable side effect profile. Additionally, Dr. Ronald Shore's correspondence in 1973

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appreciated a similar effectiveness, specifically in mild to moderate inflammatory acne among young woman.[3] While there are studies to support the use of Amoxicillin[2], data supporting the use of Ampicillin in acne is scarce.[4] This retrospective study was designed to assess the effectiveness of ampicillin for the treatment of acne in a private practice population.

MATERIALS AND METHODS

This study retrospectively analyzed 359 adults aged 18 to 70 years diagnosed with acne by a dermatologist, and who were treated with ampicillin 500mg twice daily between January 1, 2000 to July 31, 2018. Patients without a severity description at the initial or final visit were excluded, resulting in 243 patients left for final analysis. This study was granted full IRB approval by the Michigan State University IRB.

Ampicillin response was determined by one outcome variable: severity of acne as determined by the physician as none (0), mild (1), moderate (2), or severe (3) based on the total number of lesions, and whether the lesions are inflammatory or non-inflammatory. Table I describes each of these variables. A single dermatologist recorded each variable at every visit. Two researchers extracted data and determined the acne severity when unspecified with consensus or third researcher resolution of differences.

STATISTICAL ANALYSIS

Analyses were performed using SPSS statistical software (version 25.0, SPSS Inc., Chicago, IL). Values for our outcome at the last visit (n = 243) were compared with baseline scores (n = 243) determined at the initial visit using a paired samples t-test. Statistical significance was assumed with a p-value <0.05.

RESULTS

Characteristics of the study cohort are outlined in Table 1. Prior treatment before initiation of Ampicillin included oral antibiotics (41.9%), topical therapies alone (20.2%), anti-hormonal therapy (4.9%), or a previous course of isotretinoin (13.6%). Additionally, 6.2% of patients tried two or more antibiotics before starting Ampicillin. (Table 2)

For determining the effectiveness of Ampicillin therapy, outcome variables were compared before treatment and at the last documented patient visit. Results are shown in Figure 1. The average severity of acne was reduced from 1.54 to 0.90 ($p < 0.001$). The average severity was reduced from 1.69 to 1.09 ($p < 0.001$) among men, and from 1.48 to 0.84 ($p < 0.001$) among women. Lastly, average severity was decreased from 1.67 to 1.12 ($p < 0.001$) in patients with nodulocystic acne, from 1.45 to 0.77 ($p < 0.001$) with inflammatory acne patients, and from 1.00 to 0.38 ($p < 0.015$) in patients with comedonal acne.

Seventy-nine (32.5%) of patients discontinued Ampicillin therapy due to lack of efficacy or side effects. A majority of these patients went on to isotretinoin therapy or switched to an alternative antibiotic. Ten patients (12.7%) went on to take Spironolactone without antibiotics, and six (7.6%) preferred to only continue on topical therapies. (Table 2)

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Figure 1. The effectiveness of Ampicillin in Acne. Treatment data stratified by acne subtype. All reductions in acne severity were statistically significant.

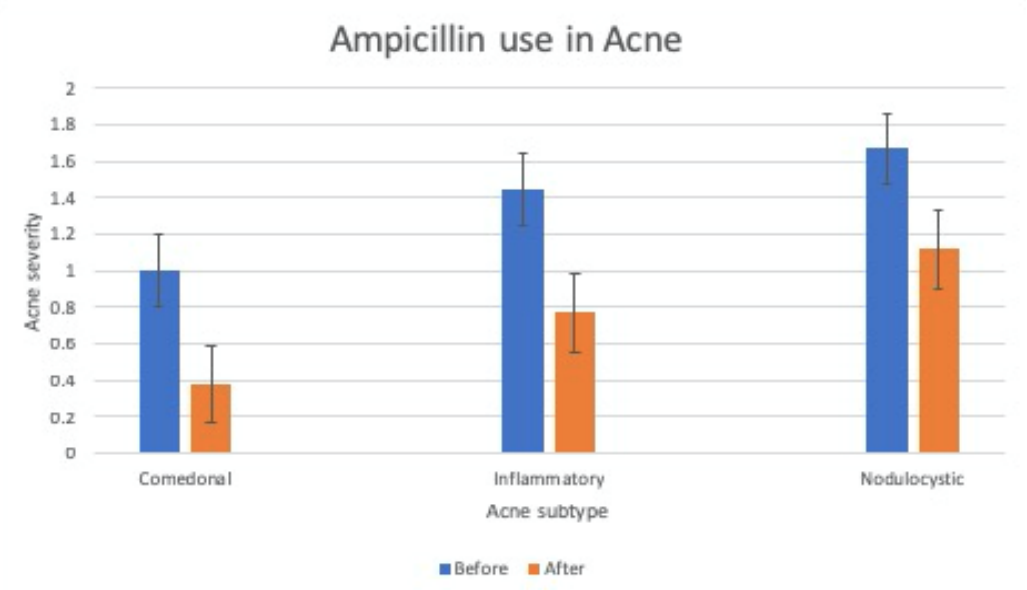

Table 1. The effectiveness of Ampicillin in Acne. Cohort statistics
(UTI = urinary tract infection)

Total No. of Patients	243
Male	61 (25.1%)
Female	182 (74.9%)
Mean Age (years)	31.76 (14-70)
Location of Acne Before Treatment	
Face	158 (65%)
Face and Chest	3 (1.2%)
Face and Back	7 (2.8%)
Face, Chest and Back	75 (30.8%)
Severity of Acne Before Treatment	
Mild	117 (48.1%)
Moderate	122 (50.2%)
Severe	4 (1.6%)
Mean Duration of Treatment	22.4 months
No. of Adverse Side Effects Noted	22
Yeast Infection	10
GI Problems	9
UTI	2
Allergy	1

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Table 2. Treatments tried before, during, and after Ampicillin therapy.

a) Topical therapies included: Retinoids (187 patients), Dapsone (25 patients), Sodium Sulfacetamide (43 patients), Azaleic acid (13 patients), Clindamycin (17 patients), Erythromycin (1 patient), Clindamycin/Benzoyl peroxide (9 patients), Benzoyl peroxide (5 patients).

b) Alternative antibiotics included: Minocycline, Doxycycline, Sulfamethoxazole/Trimethoprim, Cephalexin, and Cefadroxil

Treatments Before Ampicillin	**Total Number of Patients**
Topical therapy[a]	49/243 (20.2%)
Minocycline	64/243 (25.5%)
Doxycycline	3/243 (1.2%)
Cephalexin	16/243 (6.6%)
Ciprofloxacin	1/243 (0.4%)
Cefadroxil	1/243 (0.4%)
Amoxicillin	2/243 (0.8%)
Amoxicillin/Clavulanic Acid	2/243 (0.8%)
Sulfamethoxazole/Trimethoprim	15/243 (6.2%)
Oral contraceptive pills	5/243 (2.0%)
Spironolactone	7/243 (2.9%)
Isotretinoin	33/243 (13.6%)
≥2 antibiotics	15/243 (6.2%)
Treatments During Ampicillin	
Topical therapy[a]	243/243 (100%)
Oral contraceptive pill	5/243 (2.0%)
Treatments After Ampicillin	**79/243 (32.5%)**
Topical therapy[a]	6/79 (7.6%)
Alternative antibiotic[b]	32/79 (40.5%)
Spironolactone	10/79 (12.7%)
Isotretinoin	31/79 (39.2%)

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DISCUSSION

This study demonstrates a positive response of ampicillin in all subtypes of acne vulgaris, with the most significant reduction among patients with inflammatory acne. Additionally, subjects with comedonal and nodulocystic acne also demonstrated a significant improvement in acne severity. Therefore Ampicillin could be considered an effective alternative antibiotic for acne patients with a contraindication to first line therapies or experiencing unwanted adverse events. This includes children where tetracycline antibiotics are contraindicated. This antibiotic could also be considered in pregnant patients given its safety profile and pregnancy category B status, a similar recommendation as presented by Guzman et al.[2]

Limitations in this study are multiple, and included its retrospective nature and small sample size (n=243) . Additionally, the study design was flawed with only a single global average severity measure was used by a single clinician at a single post treatment time. This hindered our ability to use a published and validated comprehensive acne severity scale. This also limits the comparison of this data to other studies using antibiotics for acne. It should also be noted that the mean duration of Ampicillin use is much higher than what is currently practiced, given the increased push towards short term use of antibiotics for acne to reduce antibiotic resistance. Therefore, only short courses of Ampicillin are recommended for use in patients with acne.

Despite these limitations, our data still indicates a positive response of ampicillin in patients with inflammatory and nodulocystic acne. Future studies are necessary to demonstrate the effectiveness of ampicillin compared to more common antimicrobial therapies.

Conflict of Interest Disclosures: None

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IRB/Consent: This study has full IRB approval by the Michigan State University IRB.

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