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Efficacy of Azithromycin and Doxycycline in the Treatment of Acne Vulgaris- A Single Center Study in Bangladesh

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Abstract **Original Research Article**

Background: Acne vulgaris is a very common skin disease which is seen primarily in adolescents and young adults. For cost-effectiveness and tradition, doxycycline has been used in treating acne vulgaris for a long period of time. On the other hand, it is assumed that as azithromycin poses a long half-life so it is more effective than any other antibiotic in treating acne vulgaris. But we have very little comparative data regarding this issue. ***Aim of the Study:*** The aim of this study was to compare the efficacy of azithromycin with doxycycline in treating acne vulgaris. ***Methods:*** This prospective, comparative study was conducted in Department of Skin & Venereology, Joypurhat District Hospital, Bangladesh, during the period from July 2020 to June 2021. A total of 110 patients with moderate-to-moderately severe (Grade II and III), acne vulgaris were finalized as the study population and divided into two groups. Patients of Group A were given azithromycin 500 mg three times a week as pulse therapy along with 0.05% topical tretinoin for one month and the patients of Group B were given doxycycline 100mg once daily along with 0.05% topical tretinoin for one month. ***Results:*** In this study, after 1 month of treatment, in Group A among 33(60.0%) and 22(40.0%) participants we found mild and moderate non-inflammatory lesions respectively which were found in 35(63.6%) and 20(36.4%) cases respectively in Group B and we found a significant correlation (P=0.004). Besides these, after 1 month of treatment, in Group A among 35(63.6%) and 19(34.6%) participants, we found mild and moderate inflammatory lesions respectively which were found in 33(60.0%) and 21(38.2%) cases respectively in Group B and we found a significant correlation (P=0.004) also. But at the same time, in analyzing the frequencies of 'total lesions' between the groups we found an extremely significant correlation where the P value was found as <0.001. ***Conclusion:*** Although, for eradicating non- inflammatory lesions, azithromycin shows some superiority over doxycycline, regarding the efficacies on total lesions doxycycline may be considered as the better choice than azithromycin in treating acne vulgaris.

Keywords: Efficacy, Azithromycin, Doxycycline, Acne vulgaris, Skin diseases.

INTRODUCTION

Acne vulgaris is a multifactorial disease primarily of teenagers with follicular plugging and inflammation. Acne is one of the most common skin diseases; affecting almost every individual during puberty [1, 2]. For cost-effectiveness and tradition doxycycline has been used in treating acne vulgaris for a long period of time. On the other hand, it is assumed that azithromycin poses a long half-life so it is more effective than any other antibiotic in treating acne vulgaris. But we have very little comparative data regarding this issue. Acne vulgaris is characterized by noninflammatory, open, or closed comedones and inflammatory papules, nodules, and pustules. It results from androgen-induced increased sebum production, inflammation, altered keratinization as well as bacterial colonization of hair follicles by Propionibacterium acnes [3]. Basically, acne is a complex disease with multifactorial pathogenesis and considerable variation in severity [4]. It develops in the pilosebaceous unit, composed of epidermal cells lining the hair follicle and the sebaceous gland [5]. Acne represents obstruction and inflammation of the sebaceous follicles, a subtype

of pilosebaceous units [6]. Worldwide, in the treatment procedure of acne, antibiotic therapy plays an important role and physicians have been using antibiotics for this purpose for the past 40 years although 'acne is not an infection in the classic sense [7]. The effect of Azithromycin (Macrolide antimicrobials), has been attributed to reversible binding to the 50S ribosomal subunit within the bacterial cell, with the consequent inhibition of protein synthesis [8]. Doxycycline inhibits bacterial protein synthesis by reversibly binding to the 30S ribosomal subunit and preventing the association of aminoacyl- tRNA with the bacterial ribosome [9]. There are many topical and systemic modalities for acne treatment besides antibiotics [9]. In a study, it was reported that, worldwide in acne management, systemic treatments like azithromycin and doxycycline are used routinely in clinical practice [10]. This study had been conducted to collect comparative information regarding the efficacy of azithromycin and doxycycline in treating acne vulgaris.

METHODOLOGY

This prospective, comparative study was conducted in Department of Skin & Venereology, Joypurhat District Hospital, Joypurhat, Bangladesh, during the period from July 2020 to June 2021. A total of 110 patients with moderate-to-moderately severe (Grade II and III), acne vulgaris were finalized as the study population and divided into two groups. Patients of Group A were given azithromycin 500 mg three times a week as pulse therapy along with 0.05% topical tretinoin for one month and the patients of Group B were given doxycycline 100mg once daily along with 0.05% topical tretinoin for one month. All the participants were included from both gender and the age range of the participants was 20 to 40 years. According to the exclusion criteria of this study, pregnant and/or lactating mothers, patients taking topical treatment in the last 2 weeks before this intervention or using systemic antibiotics in the last 3 weeks before the study, or taking hormonal treatment or contraceptives, patients refused to consent, cases with known hypersensitivity to the study drugs were excluded. A pre-designed questionnaire was used to collect all the necessary data. Patients who fulfilled the selection criteria were informed in detail about the study being done and about their contribution to the study. After taking properly written consent, the parameters including age, sex, site of lesion, duration of the lesion, grade, relation to the menstrual cycle, etc. were obtained as per the questionnaire. Acne vulgaris was graded by using a simple grading system taking into account the predominant lesion to grade acne, which classifies the acne vulgaris into four grades as described by Amol Doshi *et al.*, 1997 [11]. All comparative data were collected, processed, analyzed, and disseminated by SPSS version 22.0 and MS Office program as per need.

RESULTS

In this study, among the total of 110 participants, 37(34.0%) were male whereas the rest 73(66.0%) were female. So female participants were dominated in number and the male-female ratio was 1:2. The mean (±SD) age of Group A participants was 20.96±5.81 years which was found 21.56±6.91 in Group B. In this study, in analyzing the clinical characteristics of acne in both groups at baseline, we found comparatively higher frequencies of moderate lesions in both groups which were non-inflammatory as well as inflammatory. But there was not any significant correlation between the groups. So, in the 'total lesions' analysis at baseline, we did not find any significant correlation between the groups also. On the other hand, after 1 month of treatment, in Group A among 33(60.0%) and 22(40.0%) participants, we found mild and moderate non-inflammatory lesions respectively which were found in 35(63.6%) and 20(36.4%) cases respectively in Group B and we found a significant correlation between the groups where the P value was 0.004. Besides these, after 1 month of treatment, in Group A among 35(63.6%) and 19(34.6%) participants, we found mild and moderate inflammatory lesions respectively which were found in 33(60.0%) and 21(38.2%) cases respectively in Group B and we found a significant correlation between the groups where the P value was 0.004 also. But at the same time, in analyzing frequencies of 'total lesions' between the groups we found an extremely significant correlation where the P value was found as <.001.

Table 1: Age distribution of total participants (N=110)

Age (Years)	n	%
< 20 yrs.	47	42.7
20-29 yrs.	56	50.9
30-39 yrs.	6	5.5
>40 yrs.	1	0.9

Table 2: Group wise age distribution of participants (N=110)

Study group	Age (In Year)	Range
	Mean ±SD	Year
Group A (n=55)	20.96±5.81	13-37
Group B (n=55)	21.56±6.91	14-56
Total sample (n=110)	21.26±6.36	13-56

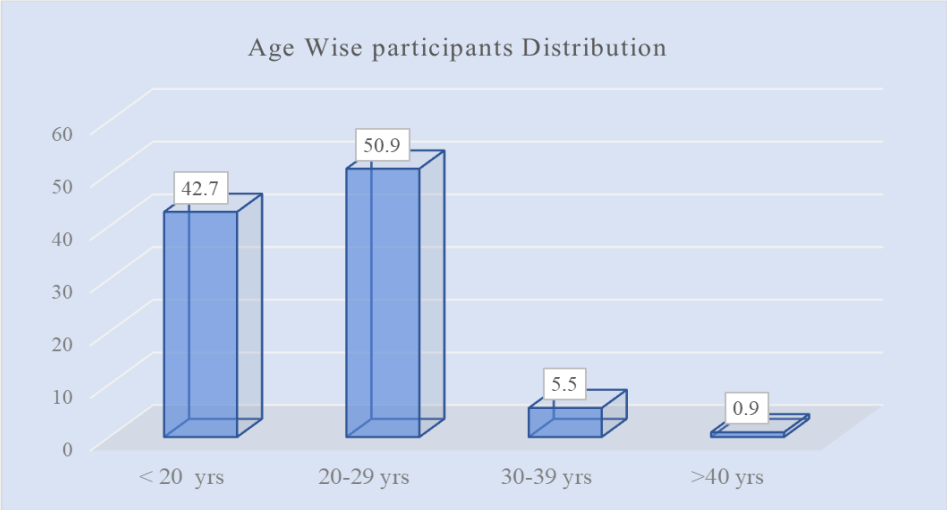

Figure I: Bar chart showed age distribution of total participants (N=110)

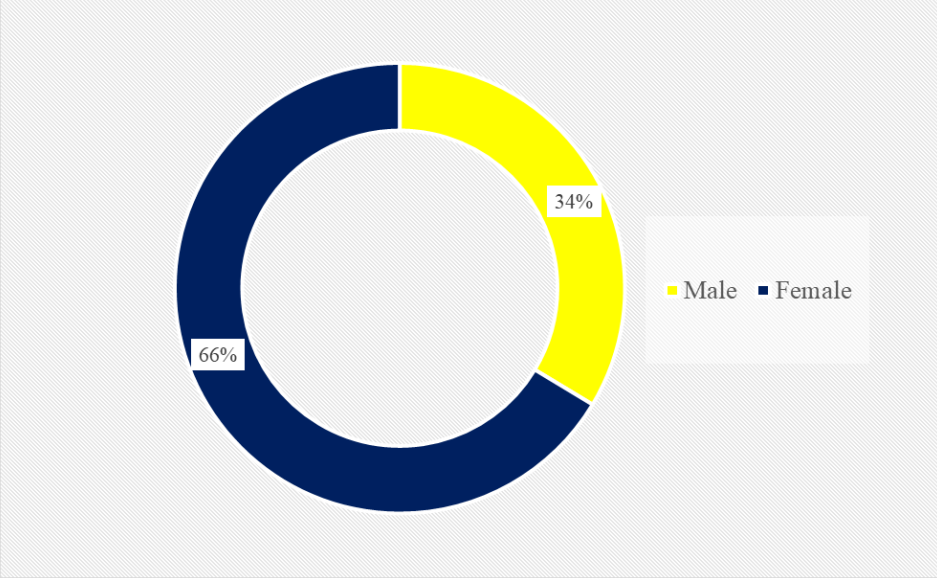

Figure II: Pie chart showed Gender distribution of the participants (N=110)

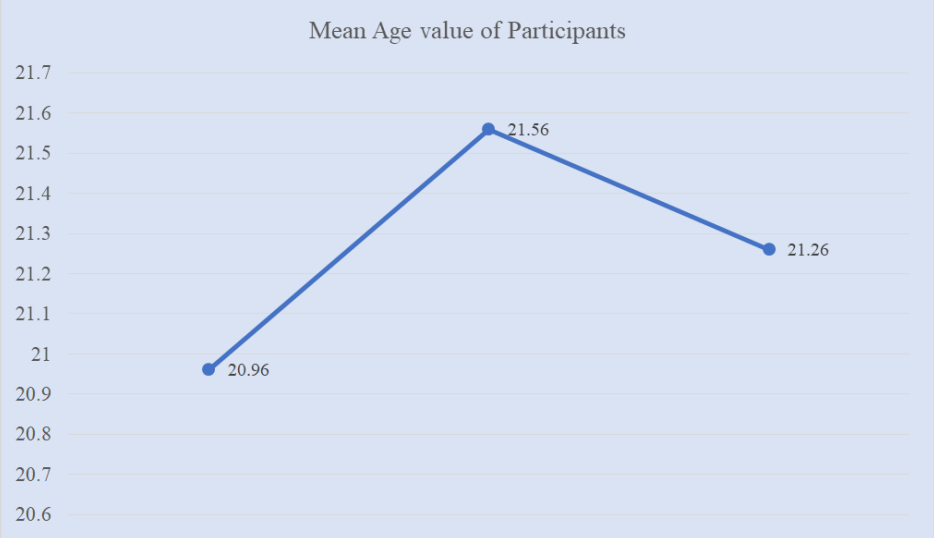

Figure III: Line chart showed mean age value of the participants (N=110)

Table 3: Comparison of clinical characteristics of acne in both groups at baseline and after 1 month of treatment (N=110)

Lesion types		Baseline status			Status after 1-month treatment		
		Group A	Group B	P value	Group A	Group B	P value
		n (%)	n (%)		n (%)	n (%)	
Non-inflammatory lesions	0 (none)	0(0.0)	0(0.0)	0.428	0(0.0)	0(0.0)	0.004
	1-19 (mild)	22(40.0)	18 (32.7)		33(60.0)	35(63.6)	
	20-100 (moderate)	33(60.0)	37(67.3)		22(40.0)	20(36.4)	
	>100 (severe)	0(0.0)	0(0.0)		0(0.0)	0(0.0)	
Inflammatory lesions	0 (none)	0(0.0)	1(1.8)	0.418	1(1.8)	1(1.8)	0.004
	1-14 (mild)	23(41.8)	27(49.1)		35(63.6)	33(60.0)	
	15-50 (moderate)	32(58.2)	27(49.1)		19(34.6)	21(38.2)	
	>50 (severe)	0(0.0)	0(0.0)		0(0.0)	0(0.0)	
Total lesions	0 (none)	0(0.0)	0(0.0)	0.863	0(0.0)	0(0.0)	<0.001
	1-29 (mild)	9(16.4)	7(12.7)		41(74.5)	43(78.2)	
	30-125 (moderate)	44(80.0)	46(83.7)		13(23.7)	12(21.8)	
	>125 (severe)	2(3.6)	2(3.6)		1(1.8)	0(0.0)	

DISCUSSION

In this study, patients of Group A were given azithromycin 500 mg three times a week as pulse therapy along with 0.05% topical tretinoin for one month and the patients of Group B were given doxycycline 100mg once daily along with 0.05% topical tretinoin for one month. As per the findings of many other studies, azithromycin is one of the antibiotics that has been recently prescribe in treating acne which is at least as effective as doxycycline and minocycline [12-15].Azithromycin, a macrolide antibacterial agent and a methyl derivative of erythromycin with actions and uses similar to those of erythromycin [16, 17]. The extensive distribution of azithromycin in the tissues allows pulse-dose regimen recommendations for increased compliance [18]. In this study, after 1 month of treatment, in Group A among 33(60.0%) and 22(40.0%) participants, we found mild and moderate non-inflammatory lesions respectively which were found in 35 (63.6) and 20(36.4%) cases respectively in Group B and we found a significant correlation (P=0.004). Besides these, after 1 month of treatment, in Group A among 35(63.6%) and 19(34.6%) participants, we found mild and moderate inflammatory lesions respectively which were found in 33(60.0%) and 21(38.2%) cases respectively in Group B and we found a significant correlation (P=0.004) also. But at the same time, in analyzing the frequencies of 'total lesions' between the groups we found an extremely significant correlation where the P value was found as <.001. In another study, it was reported that both azithromycin and doxycycline were effective in reducing the severity of acne vulgaris when compared before and after using therapies with azithromycin being a little bit superior in the reduction of the percentage of a number of inflammatory lesions than that of doxycycline [19]. In a study, it was reported that P. acnes, is highly sensitive to a number of antimicrobial agents of different classes, including tetracyclines, macrolides, penicillins, clindamycin, cephalosporins, aminoglycosides, trimethoprim, and sulfonamides [20]. Studies have shown that the incidence of side effects is lower with azithromycin [21], and compliance is higher in azithromycin due to ease of administration [22].

Limitation of the Study

This was a single-centered study with a small-sized sample. So, the findings of this study may not reflect the exact scenario of the whole country.

CONCLUSION & RECOMMENDATION

Although, for eradicating non-inflammatory lesions, azithromycin shows some superiority over doxycycline, regarding the efficacies on total lesions doxycycline may be considered as the better choice than azithromycin in treating acne vulgaris. For getting more specific findings we would like to recommend for conducting similar more studies with larger-sized samples in several places. Till now doxycycline is considered as the drug of choice for the treatment of acne vulgaris in several communities.

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