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A STUDY OF CLINICOBACTERIOLOGICAL PROFILE OF ACNE VULGARIS IN NORTH-INDIA

Microbiology

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ABSTRACT

Background: Acne is a chronic inflammatory disease of pilosebaceous units. **Aim:** To assess the various types of lesions in various grades of acne and to study the microbial flora in various grades of acne. **Materials and methods:** 200 patients of Acne vulgaris in the age group 15-30 years attending Dermatology OPD at tertiary care centre of North India were enrolled and Specimen collected were sent to Department of Microbiology of the same tertiary centre for gram staining and aerobic and anaerobic culture. **Results:** Grade II acne was found to be the most common type, Coagulase Negative Staphylococcus (CONS) was most commonly and Micrococcus was least common isolated bacterium. CONS was most susceptible to cotrimoxazole, Propionibacterium acnes (P. acnes) was most susceptible to fusidic acid and both were least susceptible to azithromycin.

Conclusion: Acne is frequently encountered in day to day clinical practice. CONS and P. acnes are important microbial agents in pathogenesis of acne. In clinical practice, the possibility of widespread antibiotic resistance should be borne in mind and careful use of anti-acne treatment regimen should be done to prevent emergence of resistance.

KEYWORDS

Acne vulgaris, Microbial flora, Antibiotic resistance

INTRODUCTION:

Acne is a chronic inflammatory disease of the pilosebaceous units, characterized by formation of comedones, erythematous papules and pustules, less frequently by nodules or pseudocysts.(Cunliffe,1998) The condition usually begins in adolescence and frequently resolves by the mid-twenties. Acne develops earlier in females than in males.(Burton,1971) The major factors involved in the pathogenesis are increased sebum production, abnormality of microbial flora, cornification of the pilosebaceous duct, inflammation and increased androgen levels.(Webster,2005) On the basis of clinical severity, acne grading is done from 1-4.(Tutakne,2001) Microorganisms play an important role in pathogenesis of acne vulgaris and antibiotic resistance to doxycycline, azithromycin, clindamycin, tetracycline is an established problem which the dermatologists come across while treating acne patients.(Marples,1974),(González,2010)

The present study was undertaken to review the role of P.acnes in the initiation of various acne lesions and the antibiotic sensitivity pattern of P.acnes to frequently used antibiotics.

MATERIAL AND METHODS:

In this cross-sectional observational study conducted in the Department of Microbiology in association with Department of Dermatology at a tertiary care centre of North India, a total of 200 cases of Acne vulgaris were enrolled. Patients in the age group 15-30 years of both the sexes were included in the study. Non-compliant and immunocompromised patients were excluded from the study. After cleansing the area with 70% ethyl alcohol, pus from the lesions was collected by surface swab for gram staining and aerobic and anerobic culture. The isolates were identified on basis of their colony morphology and biochemical reactions like catalase, oxidase, indole and nitrate test. Antibiotic susceptibility was done after standardizing the innoculum to 0.5 McFarlands standards on Muller Hinton agar as per CLSI guidelines.

Acne was graded as per following table (Tutakne,2001): [Table 1]

Table 1: Grading of the cases according to types of lesion

Grade I	Comedones, occasional papules
Grade II	Papules, comedones, few pustules
Grade III	Predominantly pustules, nodules and abscesses
Grade IV	Mainly cysts or abscesses, widespread scarring

Results:

Among the two hundred consecutive OPD patients with acne vulgaris selected and studied for their clinicobacteriological profile, 132 (66%) belonged to the age group of 16-20 years, followed by 21-25 year age group with 49 (24.5%) and 14 patients (7%) between 26-30 years. 114 (57%) were females and 86 (43%) were males in the ratio 1.3(F):1 (M). The peak age of onset was <15 years in 54 (27%) cases, 16-20 years in 114 cases (57%), whereas only 27 (13.5%) cases were in 21-25 year age group. The majority of cases were students 136 (68%), followed by agriculturists 29 (12.5 %), housewives 22 (11%) and 17 (8.5%) were unemployed.

40 patients (20%) had duration of lesions <1 year, 102 (51%) had duration between 1-2 years, another 40 (20%) had duration of 3-4 years and 18 (9%) had a duration of >5 years.

Cosmetics were the aggravating factor in 125 (62.5%) cases, stress in 104 (52.4%), seasonal change in 86 (43%) cases, premenstrual flare in 74 (37%) and high glycemic diet in 96 (48%) cases. Out of 200, 182 patients (91%) had lesions on face alone, 16 (8%) had lesions on face and back and 2 patients (1%) had lesions on face, back and chest.

Maximum number of patients, 130 (65%), belonged to grade II acne, 50 (25%) to grade III acne and 20 (10%) to grade IV acne [Table 2]. The predominant lesions were comedones followed by papules.

Table 2: Distribution of the cases according to types of lesion

		Comedones	Papules	Pustules
Grades	No	Mean ±SD	mean ±SD	mean ±SD
I	0	-	-	-
II	130	38.32 ±19.86	13.05 ±9.95	2.27 ±3.10
III	50	39.32 ±18.46	16.32 ±9.93	2.42 ±2.001
IV	20	41.65 ±18.15	17.99 ±9.34	3.05 ±2.32

CONS was isolated in 105 patients (52.5) and Propionibacterium acnes in 87 patients (43.5%).

Of the 130 patients with grade II acne, propionibacterium was isolated in 53 (40.7%) and CONS in 72 (55.3%), and miscellaneous organisms including Klebsiella, Staphylococcus aureus, Micrococcus and Pseudomonas were isolated in 4% cases. Whereas for grade III Propionibacterium acnes was isolated in 29 patients (56%) and CONS in 22 patients (43.1%). Among patients with grade IV acne, CONS was isolated in 11 (57.89%) patients, Propionibacterium acnes in 7 patients (36.8%) [Table 3].

Table 3: Distribution of cases according to clinicobateriological analysis

	Pus Culture							
	CONS		Klebsiella (Kl)		Micrococcus (Mi)		P.acnes (Pr)	
	No.	%	No.	%	No.	%	No.	%
II	72	55.38	1	0.77	4	3.08	53	40.7
III	22	43.14	0	0	0	0	29	56
IV	11	57.89	0	0	1	5.26	7	36.8

In the present study, maximum resistance [Table 4] was to Azithromycin in 89 (44.5%), Clindamycin in 75 (37.5%), Erythromycin in 64 (32%) and least resistance was observed to Ciprofloxacin in 42 (21%) and fusidic acid in 45 (22.5%) patients.

Table 4: Distribution of cases according to Antibiotic susceptibility

	Resistant		Susceptible	
	No	%	No	%
Doxycycline	57	28.5	143	71.5
Tetracycline	58	29	142	71
Cotrimoxazole	45	22.5	155	77.5
Clindamycin	75	37.5	125	62.5
Erythromycin	64	32	136	68
Azithromycin	89	44.5	111	55.5
Ciprofloxacin	42	21	158	79
Fusidic Acid	45	22.5	155	77.5
Mupirocin	47	23.5	153	76.5
Cephalexin	55	27.5	145	72.5
Amoxicillin	72	36	128	64

Out of the 105 patients from whom CONS was isolated, maximum susceptibility [Table 5] was to cotrimoxazole in 85 (80.95%) and least susceptibility was to Azithromycin in 54 (51.43%).

For the 89 patients, from whom P.acnes was isolated, maximum susceptibility was to fusidic acid 69 (77.53%), next ciprofloxacin in 68 patients (76.4%), and least susceptibility was to clindamycin (64.04%) and azithromycin (59.55%). Yet, the susceptibility of P.acnes was much higher than that of CONS.

Table 5: Distribution of cases according to Antibiotic susceptibility of organisms

	CONS (N=105)		Kl (N=1)		Mi (N=5)		Pr (N=89)	
	No	%	No	%	No	%	No	%
Doxycycline	76	72.30	0	0	1	29	66	74.16
Tetracycline	74	70.48	0	0	1	20	67	75.28
Cotrimoxazole	85	80.95	1	100	3	60	66	74.16
Clindamycin	65	61.90	0	0	3	60	57	64.04
Erythromycin	66	62.86	1	100	3	60	66	74.16
Azithromycin	54	51.43	1	100	3	60	53	59.55
Ciprofloxacin	84	80.00	1	100	5	100	68	76.40
Fusidic Acid	81	77.14	1	100	4	80	69	77.53
Mupirocin	82	78.10	1	100	3	60	67	75.28
Cephalexin	79	75.24	0	0	3	60	63	70.79
Amoxicillin	67	69	1	100	3	60	58	65.17

In our study, out of 89 patients with history of previous therapy, highest resistance was to azithromycin in 69.66% of patients followed by clindamycin 57.3%, erythromycin 50.66%. Least resistance was found to ciprofloxacin 24.72% and fusidic acid 23.6%.

DISCUSSION:

Acne is a common problem encountered in clinical dermatology. Comedones are the primary lesions of acne. The inflammatory lesions vary from small papules, to pustules, to large tender fluctuant nodules. True cysts are rarely found in acne.

Types of Clinical lesions in various grades of Acne:

In our study out of 200, maximum number of patients, 130 (65%), belonged to grade II acne, 50 (25%) to grade III acne and 20 (10%) to grade IV acne. Similar findings were reported by Supreethi Biswas et al (2010). None of our patients presented with Grade I acne whereas in study done by Adityan et al (2009) 60.2% of patients had grade 1 acne [Table 6].

Table 6: Comparison of patients having various grades of acne in different studies

		Grades of Acne			
Study series	Year	I	II	III	IV
Adityan et al	2009	60.2%	27.5%	2.6%	9.7%
Supreethi Biswas et al	2010	32%	45%	16%	7%
Present study	2018	0%	65%	25%	10%

While some studies suggest grade I acne to be the commonest, others suggest acne vulgaris to be a dynamic disorder characterized by the presence of comedones, papules, pustules, nodules and scars with papules being the commonest lesions.

Types of organisms & bacteriological analysis:

In the present study, in all the grades of acne the organisms most commonly isolated were Coagulase negative staphylococci 105 (52.5%) and Propionibacterium acnes 87 (43.5%). The miscellaneous group comprising of Staphylococcus aureus, Klebsiella, Pseudomonas and Micrococcus species was isolated in 9 patients (4%). Table [7].

Similar findings were noted by Nishijima et al (2000) and Brook et al (1995) with Staphylococcus being the most commonly isolated organism from the lesions of acne, 83% and 47% respectively. On the other hand, in the research done previously by Marples and Izumi (1970) P.acnes was isolated in the highest numbers (73%) from the acne patients.

Table 7: Comparison of types of organism and bacteriological analysis

Study series	Year	CONS	P. acnes
Marples and Izumi	1970	60%	73%
Brook et al	1995	47%	34%
Nishijima et al	2000	83%	79%
Present study	2018	52.5%	43.5%

Drug susceptibility and resistance:

In our study, overall drug resistance in previously treated patients (89 in number) was maximum to azithromycin (69.66% patients), in accordance with the study done by Roger et al (2010). This is in great contrast with the study done by Zandi et al (2000) in P.acnes which showed no resistance to the drug. Higher rates of resistance to azithromycin in previously treated subjects could be due to the common practice of prescribing it for upper respiratory infections and over the counter access to these drugs. [Table 8]

Table 8: Comparison of overall drug resistance in previously treated acne patients:

Study series	Year	Azithromycin	Clindamycin	Cotrimoxazole	Erythromycin	Tetracycline
Cove et al	1990	-	-	-	60%	88%
Zandi S et al	2000	0%	56.9%	69%	84.5%	93.1%
Roger Gonzalez et al	2010	92.5%	36%	77.7%	59.2%	14.8%
Present study	2018	69.66%	57.3%	22.5%	50.5%	71%

Drug susceptibility:

In the present study, maximum susceptibility was to ciprofloxacin (79%) followed by cotrimoxazole (77.5%) and fusidic acid (77.5%), mupirocin (76.5%), cephalexin (72.5%) and tetracycline (71%). Least susceptibility was found to azithromycin (55.5%), clindamycin (62.5%), amoxicillin (64%) and erythromycin (68%) [Table 9].

Table 9: Comparison of drug susceptibility

Study series	Year	Azithromycin	Clindamycin	Cotrimoxazole	Erythromycin	Tetracycline
Zandi S et al	2000	0%	56.9%	69%	84.5%	93.1%
Roger Gonzalez et al	2010	82%	36%	68%	46%	14%
Present study	2018	55.5%	62.5%	77.5%	68%	71%

In study done by Zandi S et al (2000) susceptibility was maximum to tetracycline (93.1%) correlating well with our study (71%). Whilst, Roger Gonzalez et al (2010) reported 82% susceptibility to azithromycin which was only 55.5% in the present study.

CONCLUSION:

Acne vulgaris, though a very common malady of adolescents, is better regarded as a disease due to its inflammatory component and the disfigurement it produces on the face, which is socially and psychologically the most important body region. It is frequently encountered in day to day clinical practice. CONS and P. Acnes are important microbial agents in pathogenesis of acne. The possibility of widespread antibiotic resistance should be borne in mind and careful use of anti-acne treatment regimen should be done to prevent emergence of resistance.

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