Original Research Article

An appraisal of microbiological spectrum in Acne Vulgaris from a tertiary care teaching institution

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Abstract

Background: Acne vulgaris is one of the most common skin disorders in puberty. The widespread and indiscriminate use of antibiotics in the treatment of acne has resulted in the spread of resistant bacterial strains and treatment failure.

Aim: The study aimed to analyze the microbiological spectrum in acne vulgaris and to evaluate its susceptibility to the antibiotics widely used for acne.

Material and methods: The present cross sectional study was carried out by the Department of Microbiology and Dermatology, MSDS Medical College, Fatehgarh among the patients seeking care for acne vulgaris with pustular and nodulocystic skin lesions in the Dermatology OPD of a rural medical school from western Uttar Pradesh. Patients with pregnancy or endocrinal problems like hirsutism, menstrual dysfunction or adrenal dysfunction and those taking drugs or contraceptives were excluded. The samples were cultured individually on blood agar and Muller-Hinton media. The cultures were then incubated under both aerobic and anaerobic conditions for 2-7 days. Bacteria were

identified and their resistance to common antibiotics was evaluated according to the standard procedures. After compilation of collected data, analysis was done using Statistical Package for Social Sciences, version 21 (IBM, Chicago, USA).

Results: Aerobically, Staphylococcus aureus, Staphylococcus epidermidis, Propionibacterium acne and Micrococcus spp were detected in 44%, 47%, 1% and 46% of samples respectively whereas anaerobically these were 39%, 21%, 34% and 1% respectively. Propionibacterium acne, Staphylococcus epidermidis and Staphylococcus aureus were more sensitive to rifampin (almost 90%) compared to other drugs. Neomycin was found to be least sensitive.

Conclusion: The study highlighted the need to discourage antibiotics' abuse. Rifampin is a suitable antibiotic for acne patients, but to achieve a better result, combination of rifampin with other antibiotics should be tried. It is also suggested that studies with bigger sample size on evaluation acne vulgaris treated by rifampin should be undertaken.

Key words

Microbiological spectrum, Acne Vulgaris, Sensitivity, Culture.

Introduction

Acne vulgaris is a common chronic skin disease involving blockage and/or inflammation of pilosebaceous units (hair follicles and their accompanying sebaceous gland). Acne can present as non-inflammatory lesions, inflammatory lesions, or a mixture of both, affecting mostly the face but also the back and chest [1]. Acne is not an infectious disease, but three major organisms were isolated from the surface of the skin and the pilosebaceous duct of patients with acne including Propionibacterium acne, Staphylococcus epidermidis and Malassezia furfur [2].

Acne vulgaris has a multifactorial pathogenesis, of which the key factor is genetics [3]. Acne develops as a result of interplay of the following four factors: follicular epidermal hyper proliferation with subsequent plugging of the follicle, excess sebum production, the presence and activity of the commensal bacteria Propionibacterium acnes, and inflammation [4]. Acne vulgaris is characterized by non-inflammatory, open or closed comedones and by inflammatory papules, pustules, and nodules. Acne vulgaris typically affects the areas of skin with the densest population of sebaceous follicles. The widespread and indiscriminate use of antibiotics in the treatment of acne has resulted in the spread of resistant bacterial strains and treatment failure. Despite extensive research on acne pathogenesis, the exact sequence of events and their possible mechanisms leading to the development of a microcomedone and its transformation into an inflamed lesion has remained unclear [5]. It seems that several factors influence acne including diet, menstruation, sweating, stress, ultra violet radiation and occupation. Only a few studies have been conducted on this problem. Therefore, the current study was planned to determine microbiological spectrum in acne vulgaris in rural Uttar Pradesh and to ascertain and evaluated its susceptibility to the antibiotics widely used for acne.

Material and methods

The current survey was planned and jointly executed by the department of Microbiology and the Department of Dermatology, MSDS Medical College, Fatehgarh.

Study area: MSDS Medical College, Fatehgarh
Study Population: Patients seeking care for acne vulgaris with pustular and nodulocystic skin lesions in the Dermatology OPD.
Study design: Cross-sectional study
Study period: February-October 2014
Sampling: Purposive sampling
Sample size: 100 patients
Study tool: A self administered questionnaire

Inclusion criteria: Patients with acne vulgaris with pustular and nodulocystic skin lesions

Exclusion criteria: Patients with pregnancy or endocrinal problems like hirsutism, menstrual dysfunction or adrenal dysfunction and those taking drugs or contraceptives were excluded.

Study strategy: After selection of study subjects, they were cautiously examined in the Department of Dermatology. The samples were taken and sent immediately to Microbiology Department. In the Microbiology Department, the collected samples were cultured individually on blood agar and Muller-Hinton media. The cultures were then incubated at 37°C under both aerobic and anaerobic conditions for 2-7 days. The colonies species were determined morphologically by specific culture media such as mannitol, indole and sorbitol media and specific standard microbial tests such as oxidase, catalase and coagulase tests [6].

For identification of P. acnes, all the bacteria anaerobically isolated were subjected to further identification. The sensitivity of bacteria to antibiotics was determined according to the method of Kirbauy [6]. Antimicrobial susceptibility testing was performed per colony morphology type isolated. Gram's stain, catalase, and indole test spot results were used as reference parameter to identify P. acnes among morphologically identical colonies isolated from additional media or from additional specimens from the same patient [7]. According to the manual instruction of Padtan Tab Co., inhibition zone less than 17 mm® was considered as resistance to antibiotic.

Permission of Institutional ethics committee (IEC) was sought before the commencement of the study. Informed consent was obtained from the study participants. All the proformas were manually checked and edited for completeness and consistency and were then coded for computer entry. After compilation of collected data, analysis was done using Statistical Package for Social Sciences (SPSS), version 21 (IBM, Chicago, USA). The results were expressed using appropriate statistical variables.

Results

The micro-organisms in pustular and nodulocystic skin lesions in the samples obtained from study subjects were grown both aerobically and anaerobically in both the genders. Aerobically, Staphylococcus aureus, Staphylococcus epidermidis, Propionibacterium acne and Micrococcus spp were detected in 44%, 47%, 1% and 46% of samples respectively whereas anaerobically these were 39%, 21%, 34% and 1% respectively. (**Table - 1**)

The effects of various different antibiotics on Propionibacterium acne, Micrococcus spp, Staphylococcus epidermidis, and Staphylococcus aureus were tested. Propionibacterium acne, Staphylococcus epidermidis and Staphylococcus aureus were more sensitive to rifampin (almost 90%) compared to other drugs. The sensitivity pattern of various antibiotics on isolated bacteria from pustular and nodulocystic skin lesions of acne vulgaris were examined. The diameter of inhibition zone (mm) by each antibiotic was studied. Neomycin was found to be least sensitive. (**Table - 2**)

Discussion

Acne vulgaris is a common skin disorders in puberty. The widespread and indiscriminate use of antibiotics in the treatment of acne has resulted in the spread of resistant bacterial strains and treatment failure. This has made situation grim. So we evaluated susceptibility of responsible micro-organisms to the antibiotics widely used for acne.

It was observed in this study that, more Staphylococcus aureus and Micrococcus spp were found in aerobic cultures while more Staphylococcus aureus and Propionibacterium acne responsible for acne, were found in anaerobic cultures. Most common bacteria isolated from our acne patients were Staphylococcus aureus, so it is possible that acne

vulgaris is mainly caused by Staphylococcus aureus rather than Propionibacterium acne in the studied geographical area. This comes in contrast to some reports which implicated both Staphylococcus epidermidis and Propionibacterium acnes as bacteria causing acne vulgaris [8].

Table - 1: Culture wise analysis of micro-organisms in pustular and nodulocystic skin lesions in the samples obtained from study subjects.

Samples	Cultures	S. aureus	S. epidermidis	P. acne	Micrococcus species
Pustular and nodulocystic skin lesions	Aerobic	44	47	1	46
	Anaerobic	39	21	34	1

Table - 2: The sensitivity pattern of various antibiotics on isolated bacteria of acne vulgaris among study subjects.

Name of antibiotic	Sensitivity %	Resistance %
Clindamycin	47	53
Doxycycline	71	29
Amoxycillin	58	42
Tetracycline	65	35
Erythromycin	50	50
Cephalothin	45	55
Gentamicin	47	53
Kanamycin	44	56
Rifampin	89	11
Neomycin	18	82
Benzoyl-Peroxide	74	26
Clindamycin + Benzoyl-Peroxide	65	35
Erythromycin + Benzoyl-Peroxide	66	34

It was attempted to take a balanced view of most of the existing evidence, including the microbiological figures, and shown that the central role of P. acnes in the initiation of acne lesions is not yet convincing. It may be said that geographical regions affect the bacteria involved in acne vulgaris. Since bacterial resistance to conventional antibiotics such as erythromycin and tetracycline were reported to have an increasingly trend [9], research on finding the effective antibiotics seems essential.

We observed Staphylococcus aureus as primary casual agent in acne development; Staphylococcus aureus was resistant to tetracycline, erythromycin and clindamycin. These results are cohort with others [10, 11]. On the other hand, it was highly sensitive to Rifampin. Since these antibiotic agents were previously used to treat acne, the observations point out that the widespread use of antibiotics could lead to antimicrobial resistance with serious problems not limited to P. acnes, but also to other bacterial species. The choice of antibacterial agents should take into account the severity of acne, cost-effectiveness, benefit-risk ratios, and the potential for the development of resistance [12].

This study has several strengths. First, we have studied microbiological spectrum and its susceptibility to the antibiotics widely used in acne vulgaris which is a very common problem yet less studied entity. In-depth analysis of this aspect has not been closely investigated by many experts in the field. Second, all the interviews were conducted by authors of the study only, which creates a sense of uniformity. The study has some limitations as well. Some may argue that the results obtained may not be applicable to general population. I agree because these findings are based on a single centre study from a western Uttar Pradesh. More multicentric studies need to be carried out. It's important because of changing drug-sensitivity of bacterial strains, it is

important to perform assessment of bacterial flora and antibiotic susceptibility of isolates in acne cases, especially in clinically severe and resistant to treat.

Conclusion

On the basis of observations of this study, it can be concluded that there is a need to discourage antibiotics' abuse and the implementation strategies for elimination of carriage of S. aureus. Rifampin is a suitable antibiotic for acne patients, but to achieve a better result, combination of rifampin with other antibiotics should be tried. It is also suggested that studies with bigger sample size on evaluation acne vulgaris treated by rifampin should be undertaken.

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