

A RETROSPECTIVE STUDY OF COMMON BACTERIAL ISOLATES AND THEIR ANTIMICROBIAL SUSCEPTIBILITY PATTERN FROM SKIN INFECTIONS IN A TERTIARY CARE HOSPITAL IN GOA

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ABSTRACT

BACKGROUND

The aim of this study is to analyse the pattern of common bacterial isolates and to study the antimicrobial susceptibility pattern of these isolates from skin infections.

MATERIALS AND METHODS

This observational study was conducted using the skin swab culture and sensitivity reports collected retrospectively from the records maintained in the Department of Dermatology, Venereology and Leprosy over a period of one year from January 2015 to December 2015 in our hospital.

RESULTS

During the study, 361 non-repeat culture positive reports were analysed. Staphylococcus aureus (55.1%) was the most common organism isolated followed by Pseudomonas aeruginosa (11.9%). Other isolates include the species of CONS, Beta haemolytic Streptococcus, Escherichia coli, Acinetobacter, Enterobacter, Klebsiella, Proteus and Serratia. High sensitivity rates were observed against Linezolid (98.4%) in case of gram positive cocci and against Meropenem (80.1%) for gram negative bacilli in our study.

CONCLUSION

In order to prevent resistance against antibiotics, antibiotic stewardship program should be an integral part of every hospital setting.

KEYWORDS

Skin Swab Culture, Skin Infections, Antibiotic Susceptibility.

HOW TO CITE THIS ARTICLE: Kamat U, Ghodje R. A retrospective study of common bacterial isolates and their antimicrobial susceptibility pattern from skin infections in a tertiary care hospital in Goa. J. Evolution Med. Dent. Sci. 2017;6(2):114-117, DOI: 10.14260/Jemds/2017/29

BACKGROUND

In recent years, skin infections particularly due to multidrug resistant pathogens are increasingly being encountered in a hospital setting.^[1] Skin infections contribute to increase in the cost of medical care, longer hospital stay, increase in morbidity and have a significant role in the development of antimicrobial resistance.^[2]

The superficial skin infections commonly encountered are of bacterial origin and the examples include folliculitis, cellulitis, carbuncle, furuncle, impetigo and erysipelas.^[3] These infections are frequently treated with either topical or oral antibiotics.^{[3],[4]}

The commonly prescribed antibiotics are rendered resistant due to emergence of Methicillin Resistant and Vancomycin Resistant Staphylococcus aureus as well as ESBL producing and multi-drug resistant gram negative organisms in the community.

It is crucial to monitor the changing trends in bacteria causing skin infections and their antimicrobial susceptibility pattern to provide suitable antimicrobial therapy for curbing infection, reducing morbidity and ameliorate the quality of life.^[3]

The present study was undertaken to analyse the pattern of bacterial pathogens isolated from patients attending the O.P.D. as well as admitted to the ward and their antimicrobial susceptibility from skin swab culture reports in a tertiary care hospital.

MATERIALS AND METHODS

This retrospective study was conducted in the Department of Dermatology, Venereology and Leprosy. The records of 361 non-repeat culture positive samples were retrieved from the Department of Microbiology of this Institution over a period of one year from January 2015 to December 2015.

Inclusion Criteria

Single and mixed (only two organisms) growth showing Gram positive as well as Gram negative organisms were included in this study.

Exclusion Criteria

Mixed growth showing three or more organisms were excluded from the study.

All the bacterial isolates were identified and studied according to the standard procedures followed in the Microbiology Laboratory.^[5]

Financial or Other, Competing Interest: None.

Submission 30-11-2016, Peer Review 24-12-2016,

Acceptance 30-12-2016, Published 05-01-2017.

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DOI: 10.14260/jemds/2017/29



Antimicrobial susceptibility testing was performed according to the Clinical and Laboratory Standards Institute (CLSI) guidelines using the Kirby-Bauer disk diffusion technique.^[6] The antibiotics evaluated were Linezolid (30 µg), Trimethoprim-Sulfamethoxazole (1.25/23.75 µg), Clindamycin (2 µg), Azithromycin (15 µg), Ampicillin (10 µg), Levofloxacin (5 µg) and Vancomycin (30 µg) for gram positive cocci, whereas Gentamicin (10 µg), Amikacin (30 µg), Piperacillin/Tazobactam (100/10 µg), Meropenem (10 µg), Ceftazidime (30 µg) and Cefepime (30 µg) for gram negative bacilli. The data was analysed using SPSS software version 22.0 and the results were obtained as percentages.

RESULTS

Out of the 361 samples yielding bacteria on culture, 85.6% i.e. 309 samples had monomicrobial aetiology, while in 52 cases (14.4%), more than one organism was obtained on culture.

The most frequent bacterial combination in polymicrobial aetiology cases was one gram positive cocci and one gram negative bacilli.

As depicted in [Figure 1] gram positive cocci accounted for 70.1%, while Gram Negative Bacilli (GNB) accounted for 29.9% of the total. The predominant bacterial pathogen isolated was *Staphylococcus aureus* (55.12%) followed by *Pseudomonas aeruginosa* (11.9%).

The sensitivity of *Staphylococcus aureus* was 98.4% for Linezolid, 82.1% for Clindamycin, 45.8% for Trimethoprim/Sulfamethoxazole and 25% for Azithromycin [Table 1].

The overall sensitivity of the GNB was maximum against Meropenem (80.1%) followed by Piperacillin/Tazobactam (68.5%), whereas a low level of sensitivity was noted against the cephalosporins i.e. 36.4% for Ceftazidime and 41% for Cefepime [Table 2].

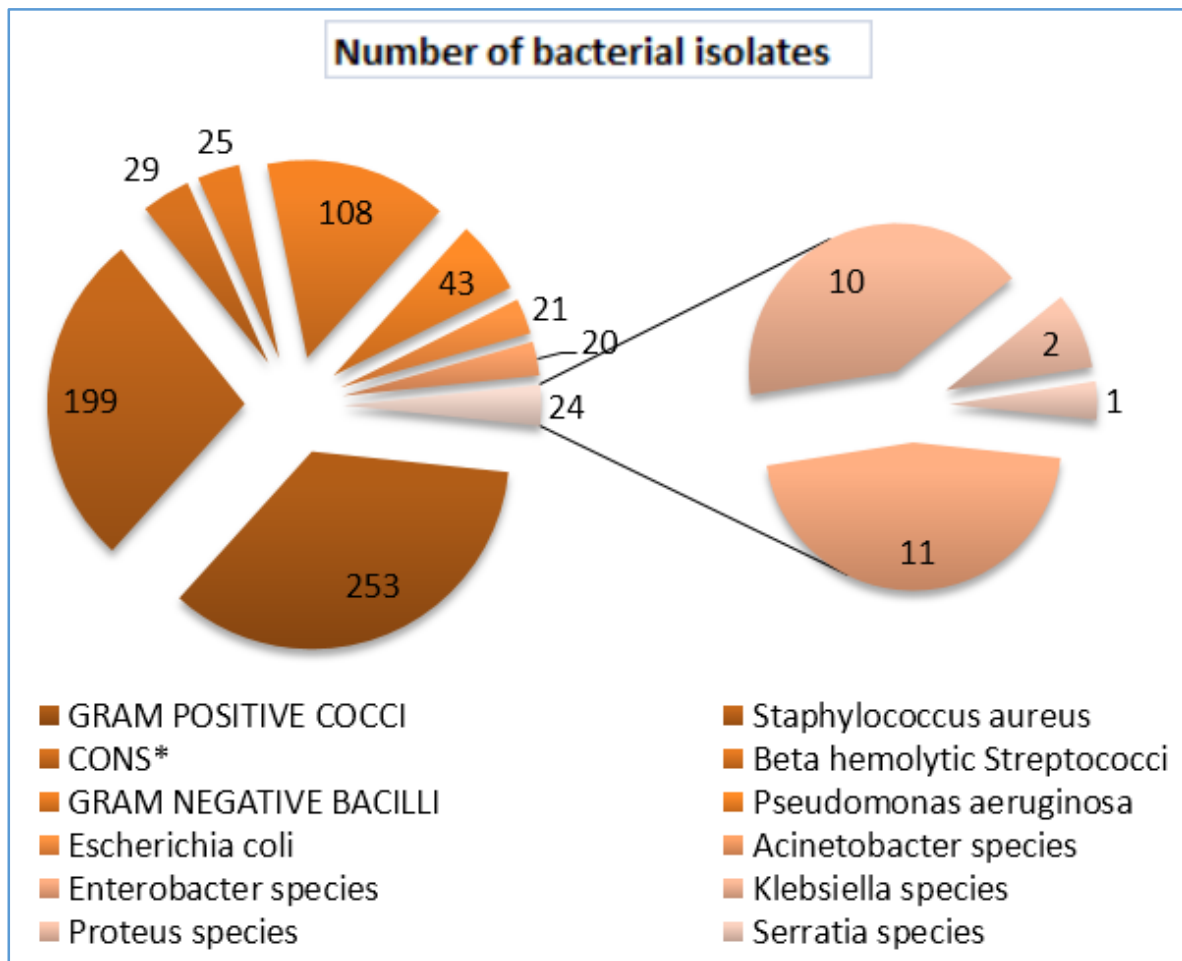


Figure 1: Bacterial Pathogens Isolated

*CONS = Coagulase Negative Staphylococcus

Bacterial Isolate	% Sensitivity						
	Linezolid	Clindamycin	Azithromycin	Trimethoprim/Sulfamethoxazole	Ampicillin	Vancomycin	Levofloxacin
St. aureus*	98.4	82.1	25	45.8	-	-	-
CONS**	96.8	76.7	30	40.7	-	-	-
Beta Haemolytic Streptococci	100	-	-	-	64.3	100	86.8

Table 1. Antibiotic Susceptibility Pattern of Gram Positive Cocci

* Staphylococcus aureus ** Coagulase Negative Staphylococcus.

Bacterial Isolate	% Sensitivity						
	Amikacin	Gentamicin	Levofloxacin	Ceftazidime	Cefepime	Piperacillin/ Tazobactam	Meropenem
<i>Pseudomonas aeruginosa</i>	50.1	52.3	57	28.1	30.5	60.2	78.1
<i>E. coli</i> *	72.8	70.4	68.2	50.2	50.3	80.4	90.2
<i>Acinetobacter</i> species	40.6	42.4	37	22	22.5	38	47
<i>Enterobacter</i> species	73.7	73.9	66.1	32.9	48.4	82.1	91.3
Others**	71.9	72	69.5	48.8	53.3	81.6	93.7
Total	61.8	62.2	59.6	36.4	41	68.5	80.1

Table 2. Antibiotic Susceptibility Pattern of Gram Negative Bacilli

**Escherichia coli*, **others include species of '*Klebsiella*, *Proteus* and *Serratia*.'

DISCUSSION

Among the reports obtained from skin swab culture, it is evident that the gram positive cocci (70.1%) were the commonest cause of superficial skin infections as compared to the gram negative bacilli (29.9%) which was in concordance with other studies.^{[1],[7]} Afroz et al (2015)^[3] observed a lower prevalence of GPC (42.6%) as compared to GNB (57.4%). The predominant organism was found to be *Staphylococcus aureus* (55.1%). This finding is in agreement with the works of Gupta et al (2008)^[1] and Miller et al (2015),^[8] whereas Rameshkannan et al (2014)^[9] opined that *E. coli* was the commonest isolate from pus culture reports. All the *Staphylococcus* isolates including CONS were highly sensitive to Linezolid (97.6%) as well as Clindamycin (79.4%), which is similar to the previous studies in India^{[9],[10],[11]} and abroad.^{[12],[13]} Beta haemolytic *Streptococci* were 100% sensitive to Linezolid and Vancomycin, which is in par with the results of Sader et al (2016).^[13]

The predominant GNB isolated from our study were *Pseudomonas aeruginosa* and *E. coli*. These results are similar to the studies conducted by other workers.^{[2],[3],[14],[15],[16]} Sensitivity of *Pseudomonas* to Meropenem (78.1%) and Piperacillin/Tazobactam (60.2%) is in accordance with the results of Afroz et al (2015)^[3] and Tärnberg et al (2016).^[17] *Escherichia coli* exhibited similar rates of sensitivity to Meropenem and Piperacillin/Tazobactam as compared to previous studies.^{[8],[18]} However, Rameshkannan et al (2014)^[9] encountered 67% of resistance against cephalosporins, which is similar to the rate from our study (61.3%).

CONCLUSION

Our analysis yields significant data of bacterial spectra and antimicrobial susceptibility in a tertiary care hospital setting in Goa. The predominant pathogens being *Staphylococcus aureus* and *Pseudomonas aeruginosa* showed a high degree of sensitivity to Linezolid and Meropenem respectively. The high diversity of the bacterial pathogens poses a challenge in the practical use of antibiotics and use of broad-spectrum antibiotics on widespread basis favours the pathogens due to selective survival advantage. Therefore, antimicrobial stewardship programs should be inculcated in every hospital setting.

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