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Original Research Article

Antibiotic sensitivity pattern of coagulase negative staphylococci in a tertiary care hospital of Southern Rajasthan

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ABSTRACT

Background: Coagulase negative staphylococci have been recognized as one of the important cause of hospital acquired infections in recent past. It has become difficult to manage these infections due to emergence of multidrug resistance to them. The aim of this study was to determine antibiotic sensitivity trend of all Coagulase negative Staphylococci isolates using modified Kirby- Bauer disk diffusion technique.

Materials and Methods: To assess the antibiotic sensitivity for coagulase negative staphylococci, Kirby-Bauer disc diffusion method on Muller-Hinton agar was used. The study findings were interpreted on the basis of CLSI standards. All coagulase negative staphylococci isolates were given a predetermined panel of antibiotics. Methicillin-resistant coagulase negative staphylococci were identified using Cefoxitin disk.

Results: The sensitivity to Linezolid, Vancomycin and Rifampicin was found in all 500 isolates of coagulase negative staphylococci in our study. However, they were resistant to Penicillin G (65%), Cefoxitin (56%), Ciprofloxacin (57%), Levofloxacin (32%), Gentamicin (21%), Erythromycin (67%), Clindamycin (60%), Cotrimoxazole (51%) Tetracycline (9%).

Conclusion: As CoNS have emerged as an important agent of hospital acquired infections, hence there is need of identification, speciation and resistance pattern of isolates for better management of patients.

1. Introduction

Coagulase negative Staphylococci (CoNS) are considered to be normal human flora and they can lead to hospital acquired infections in susceptible patients with underlying conditions.[1,2] In recent years, CoNS have emerged as one of important source of hospital acquired infections.[3,4] They can lead to infections in patients who are immunocompromised and can spread through contaminated devices like intravenous catheters, urinary catheters and orthopaedic prosthesis.[2,5] The management of these infections is difficult due to widespread use of antibiotics and development of multidrug resistance. The increase in antimicrobial resistance among CoNS isolates is worrisome.[5,6] In some previous studies S. haemolyticus, S. hominis and S. epidermidis were found to be resistant against multiple antibiotics.[7] The treatment of these infections is becoming difficult due to increase in methicillin resistant strains and increase in isolates having low sensitivity for glycopeptides.[8] The knowledge about antibiotic susceptibility pattern of CoNS is important in the management of patients as it is constantly undergoing change.[9] Hence we undertook this study with the objective to find out the antibiotic sensitivity pattern of CoNS isolates at our institute by using modified Kirby- Bauer disk diffusion technique.

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2. Materials and Methods

This study was carried out at the department of Microbiology, American International Institute of Medical Sciences Udaipur. This study was done over a period of 3 years after taking prior permission of institutional ethics committee. The primary identification of 500 isolates as CONS was done using basic tests. We performed basic tests to know colony morphology. Gram staining, tube & slide coagulase test and catalase test were performed. To exclude Stomatococcus and Micrococci species, Bacitracin sensitivity test was used. Kloos and Schleifer and Koneman classification was used for identification of species. We used Kirby-Bauer disc diffusion technique on Muller-Hinton agar to find out antibiotic sensitivity of CoNS isolates in our study. CLSI standards were used to interpret findings. All coagulase negative staphylococci isolates were given a predetermined panel of antibiotics, which included Penicillin G, Cefoxitin, Vancomycin, Linezolid, Gentamicin, Tetracycline, Ciprofloxacin, Levofloxacin, Erythromycin, Clindamycin. We used Cefoxitin (Cn-30 μg), to find out methicillin resistant CoNS (MRCONS).

3. Results

In this study, all 500 Coagulase negative staphylococci (CoNS) were responsive to Linezolid, Vancomycin and Rifampicin. However, they were resistant to Penicillin G (65%), Cefoxitin (56%), Ciprofloxacin (57%), Levofloxacin (32%), Gentamycin (21%), Erythromycin (67%), Clindamycin (60%), Cotrimoxazole (51) and Tetracycline (9%). The trend of antibiotic resistance among CoNS isolates in our study has been shown in Table 1. Methicillin resistance was found in 56% of CoNS isolates, whereas methicillin sensitivity was found in 44 % of CoNS isolates. Table 2, displays the antibiotic resistance trend of MRCoNS. In this study, 100% sensitivity for Rifampicin, Linezolid and Vancomycin was found among MRCoNS isolates. Penicillin G resistance was found to be 98.30 % in MRCoNS isolates, followed by 92.14% resistance to Clindamycin, 87.5% resistance to Erythromycin, 64% resistance to Ciprofloxacin, 62.50% resistance to Cotrimoxazole and 37.5% resistance to Gentamicin and Levofloxacin.

4. Discussion

In present study, all 500 Coagulase negative staphylococci (CoNS) were responsive to Linezolid, Vancomycin and Rifampicin which was similar to a study by Jayakumar et al.[10] In some previous studies also, all CoNS isolates were found to be sensitive to Vancomycin.[5,11,12] Similarly, the sensitivity for Linezolid and Vancomycin was found to be on higher side in study by Golia et al.[1] In study by Tayyar et al,[5] higher sensitivity for CoNS isolates was seen for Rifampicin which was similar to our study. In

Table 1: Drug resistance pattern of CoNS isolates

Drugs	OverallResistance (%)	S.epidermisis (n=153)	S.hemolyticus (n=127)	S.hominis (n=63)	S.capitis (n=60)	S.lugdunensis (n=57)	S.cohnii (n=40)
Penicillin G	65%	125	75	40	45	10	30
Cefoxitin	56%	85	95	30	30	10	30
Ciprofloxacin	57%	100	75	35	10	35	30
Levofloxacin	32%	50	50	30	5	5	20
Gentamicin	21%	30	40	5	5	0	25
Erythromycin	67%	90	100	45	35	35	30
Clindamycin	60%	80	95	40	20	35	30
Cotrimoxazole	51%	90	70	30	10	30	25
Tetracycline	9%	20	5	5	0	10	5
Rifampicin	0	0	0	0	0	0	0
Vancomycin	0	0	0	0	0	0	0
Linezolid	0	0	0	0	0	0	0

Table 2: Antibiotic resistance pattern of MRCoNS

Antibiotics	MRCoNS (N=280)	Percent %
Penicillin G	275	98.30%
Ciprofloxacin	180	64%
Levofloxacin	105	37.5%
Gentamicin	105	37.5%
Erythromycin	245	87.5%
Clindamycin	258	92.14%
Cotrimoxazole	175	62.50%
Tetracycline	20	7.14%
Rifampicin	0	0%
Vancomycin	0	0%
Linezolid	0	0%

our study maximum resistance was seen with penicillin which was similar to previous studies.[1,2,10,13] In our study resistance to Cefoxitin was 56%. In previous studies by Roopa et al,[12] Golia et al[1] and Mane et al,[2] the resistance to Cefoxitin ranged from 33% to 68.93%. The resistance to Ciprofloxacin among CoNS isolates was 57% in this study. Similarly higher resistance to Ciprofloxacin was seen in studies by Golia et al[1] and Mane et al.[2] The resistance for Levofloxacin was 32% in CoNS isolates in our study. In previous studies resistance to Levofloxacin was found to be ranging from 6.7% to 45.3%.[1,5] In our study Gentamicin resistance was 21%, which was similar to study by Golia et al[1] in which resistance to Gentamicin was found to be 24.6%. Erythromycin resistance came out to be 67% in this study, which was similar to previous studies by Golia et al[1] and Mane et al.[2]In a previous study by Begum et al,[14] 83% of isolates were resistant for Erythromycin. In our study resistance to Cotrimoxazole was found in 51% isolates. In previous studies by Tayyar et al[5]and Roopa et al,[12] the resistance to Cotrimoxazole was found to be ranging from 35.9% to 37.5%. In our study resistance for Tetracycline was found to be 9% which was similar to study by Tayyar et al.[5] Methicillin resistance was found in 56% isolates in our study. In some previous studies, Methicillin resistant was 67.7%, 67.5%, 56% and 52.83% in studies conducted by Surekha et al,[15] Koksal et al,[16] Usha et al[17] and Farooq et al[18] respectively whereas in study by Roopa et al[12]and Mir et al[19]resistance to Methicillin among CoNS was found to be 33% and 32.22% respectively. In our study resistance to Penicillin among MRCoNS was 98.30% which was similar to study by Sharma et al,[20] in which resistance to Penicillin among MRCoNS was found to be 100%. All MRCoNS isolates in this study were found to be sensitive for Rifampicin, Linezolid and Vancomycin. Similar pattern was seen in study by Mir et al[19] and Sharma et al.[20] In our study resistance to Gentamicin to MRCoNS was found to be 37.5% which was similar to study by Sharma et al.[20] In our study resistance to Erythromycin among MRCoNS was found to be 87.5% which was similar to study by Mir et al.[19] In our study resistance of MRCoNS to Ciprofloxacin was found to be 64% whereas in study by Sharma et al[20] resistance to Ciprofloxacin among MRCoNS was found to be 47.6%.

5. Conclusion

In our study, Coagulase negative staphylococci (CoNS) isolates showed higher susceptibility to vancomycin, rifampicin, and linezolid. Higher resistance rates to multiple antibiotics like penicillin, erythromycin and clindamycin were seen in our study. As CoNS have become an important cause of nosocomial infections, hence there is need of identification, speciation and resistance pattern of isolates for better patient management.

6. Conflict of Interest

There are no conflicts of interest in this article.

7. Source of Funding

None.

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