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Epidemiology and antibiogram of Coagulase Negative Staphylococci (CoNS) Isolated from various Clinical Samples in Tertiary Care Teaching Hospital in South India

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Abstract

Introduction and Objectives: In the last two decades CoNS has become recognized as a leading cause of nosocomial bacteremia, wound, bone, joint and urinary tract infections (UTI's). CoNS are one of the most frequent causes of nosocomial infections and are reservoirs of multiple antimicrobial resistant determinants. Hence, this study was done to speciate and to determine the sensitivity pattern of CoNS.

Materials and Methods: The present study will be carried out from April to June, 2018, where in 490 CoNS isolated from various clinical samples like urine, pus, body fluids, blood, sputum, and catheter tips etc & submitted to the department of microbiology in SVIMS Hospital, Tirupathi.

Results: Out of 490 CoNS species isolated majority were from blood samples 52%, rest were from pus 23%, urine 8%, catheter tip 7%, body fluids 6% & others 4%. Among 490 CoNS, majority were S.hominis (47%) and S.hemolyticus (41%) followed by other species. Methicillin Resistance was noted high in S.epidermidis (60%) followed by S.hemolyticus (32%), S.saprophyticus (20%), S.schleiferi (20%) & S.hominis (16%).

Conclusion: The increased recognition of pathogenic potential in CoNS and emergence of drug resistance among them shows the necessity to adopt simple lab methods to identify the species and determine the antibiotic resistant patterns which will be helpful in effective management of patients infected with CoNS.

Keywords: Coagulase negative Staphylococcus, Anti-microbial susceptibility pattern, Methicillin resistance.

Introduction

The Coagulase Negative Staphylococcus (CoNS) is a significant nosocomial pathogen has increased in recent years. Enormous increase and emergence of these strains has simultaneously led to a variety of infections and these organisms are also resistance to various antimicrobial agents. Nosocomial infections due to CoNS has increased and there found reservoirs of multiple antimicrobial resistant determinants [1-3]. CoNS, formerly regarded as harmless inhabitants of the skin and mucosal linings, may be present in a specimen as a contaminant or a pathogen [4-6]. CoNS are the commonly encountered pathogens in nosocomial infections, partly due to the growing appreciation of these groups of organisms as a opportunistic pathogens or due to increase in the use of medical devices such as catheters, shunts, heart valve graft material, implants and artificial joints in seriously debilitating and immune-compromised patients [7]. Drug users are at increased risk of infections due to CoNS [3].

More than 30 species of CoNS are recognized but only a few are commonly incriminated in human infections [8]. Most frequently isolated species of CoNS from infections is S.epidermidis. In the reports of national survey, this species has been remarkably quoted as primary nosocomial pathogen [9]. It has been implicated as the etiological agent in infections of wounds, urogenital tract, respiratory tract, meninges, conjunctiva and intravenous catheter associated infections [10]. S.haemolyticus has been documented as the second most common CoNS species recovered from documented infection sites. It has been implicated in naïve-valve endocarditis, septicaemia, peritonitis, wound, bone and joint infections [11]. S. warneri is a well recognised cause of catheter related bacteraemia, naïve-valve endocarditis, haematogenous vertebral osteomyelitis and ventriculo-peritoneal shunt associated meningitis [12]. S.saprophyticus was shown to be an important cause of urinary tract infections in young females. It is second to coliforms as the most common cause of acute urethral syndrome [13 & 14]. S.hominis has occasionally been isolated from infections causing catheter related sepsis in immune-compromised hosts [15]. S.simulans has been established as a cause of septicemia, osteomyelitis, septic arthritis, vertebral osteomyelitis and prosthetic joint infection [16]. S.schleiferi has been isolated from several human infections including brain empyema, wound infections, bacteraemia complicating vertebral osteitis, infection of hip prosthesis and indwelling catheter infections [17]. S.lugdunensis has been isolated from abscesses in the pelvic girdle region [18]. S.cohnii is an emergent opportunistic agent having been reported as a cause of community acquired pneumonia [19].

The postulated reasons for the current prevalence and clinical importance of these organisms include their great number on the skin, their selection as a result of wide spread usage of broad spectrum antibiotics in the hospitals, their ability to adhere and form bio- films on the surface of vascular catheters and other medical devices [2].

The present study was undertaken, to identify the most prevalent clinical isolates of CoNS by minimum number of tests necessary and sufficient to discriminate between the species & to determine the antimicrobial susceptibility pattern of these isolates.

Materials and Methods

The present study will be carried out from April to June, 2018 in the Department of Microbiology, Sri Venkateswara institute of Medical Sciences, Tirupathi. CoNS will be isolated from various clinical samples like urine, pus, body fluids, blood, sputum, and catheter tips etc submitted to the department of microbiology in SVIMS Hospital, Tirupathi.

The samples will be inoculated on Nutrient agar, Blood agar and Mac Conkey agar. The inoculated plates will be incubated at 37^0C overnight. In case of any growth on the plates, it will be processed according to the standard bacteriological techniques. The colonial appearance and morphological characteristics of the isolated bacteria will be noted. The isolated colonies will be subjected to preliminary tests like Gram staining, Catalase test, Coagulase (slide & tube) test and sugar fermentation tests. These preliminary tests will be followed by various biochemical tests to speciate CoNS as follows

1. Coagulase test (Slide & Tube Coagulase tests)
2. Urease test.
3. Sugar fermentation test (xylose, arabinose, sucrose, trehalose, maltose, mannitol).
4. Susceptibility to Polymixin-B and Novobiocin.
5. Anaerobic growth in thioglycollate broth

Results

A total of 490 CoNS isolates were obtained from various clinical samples. Out of 490 CoNS isolated, 51% were from male and 49% from female patients.(Fig:1)

52% were isolated from blood samples, rest from pus (23%), urine (8%), catheter tips (7%), body fluids (6%), others (4%). (Fig:2).

Among 490 CoNS, majority were S.hominis (47%) and S.hemolyticus (41%) followed by S.epidermidis (8%), S.saprophyticus (2%), S.schleiferi (2%). (Fig:3)

Methicillin Resistance was noted high in S.epidermidis (60%) followed by S.hemolyticus (32%), S.saprophyticus (20%), S.schleiferi (20%) & S.hominis (16%). (Fig:4)

Resistance to Vancomycin which is the drug of choice for methicillin resistant strains was observed in all the species of CoNS in the present study, which is an alarming sign. (Table:1)

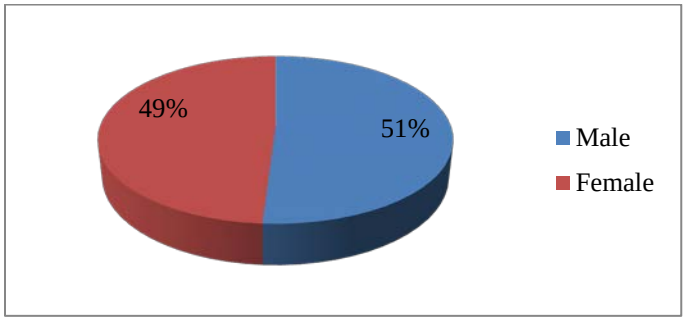

Fig. 1: Gender wise distribution of CoNS

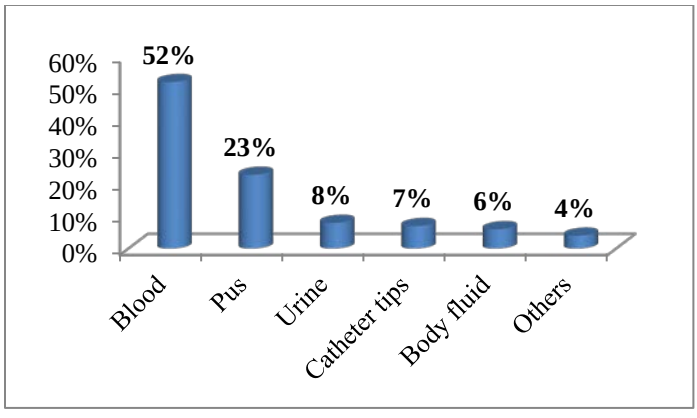

Fig. 2: Sample wise distribution of CoNS

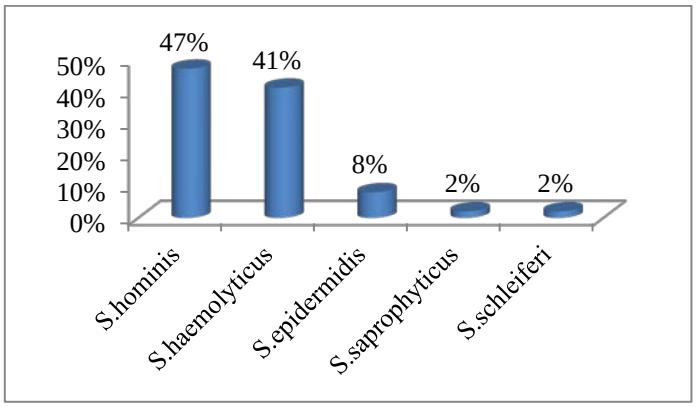

Fig. 3: Species wise distribution of CoNS

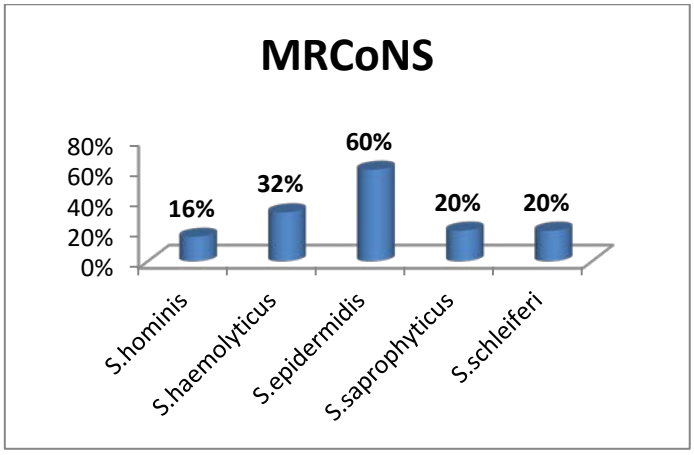

Fig. 4: Distribution of MRCoNS among isolated species

Table 1: Antibiotic sensitivity pattern of isolated CoNS species

Sn.	Organism	CFN	CF	CD	ER	COT	LZ	VAN
1	S.hominis (229)	16%	24 %	26 %	36 %	41%	2 %	Nil
2	S.haemolyticus (203)	32%	38 %	28 %	41 %	41%	5 %	Nil
3	S.epidermidis (38)	60%	56 %	68 %	64 %	79%	6 %	Nil
4	S.saprophyticus (10)	20%	Nil	Nil	Nil	10%	Nil	Nil
5	S.schleiferi f(10)	20%	Nil	10 %	10 %	20%	Nil	Nil

Legends: CFN- Cefoxitin, CF-Ciprofloxacin, CD-Clindamycin, ER-Erythromycin, COT Cotrimaxazole, LZ-Linezolid, VAN-Vancomycin

Legends: CoNS- Coagulase negative staphylococcus

MRCoNS- Methicillin resistant coagulase negative staphylococcus

Discussion

CoNS are generally considered normal inhabitants of skin and nares. CoNS are capable of causing only opportunistic infections, so many clinical laboratories do not identify clinical isolates of CoNS to the species level. As CoNS is increasingly being implicated as significant nosocomial pathogens, several reviewers has emphasized the need for species identification, which is possible only by a simple, easily adaptable, inexpensive method [4,5]. The species identification is important in monitoring the reservoir and distribution of CoNS involved in nosocomial infections and determining the etiological agent [6]**.** In our study S.hominis (47%) was the most common isolate. This correlates with other studies by K. Punitha Valli et al. (32.3%) [20], Saroj Golia et al. (46.3%) [21] ,C. Roopa et al. (50%) [22], S.S. Vijayasri Badampudi et al. (40%) [23]. The remaining species isolated were S.haemolyticus (41%), S.saprophyticus (2%), and S.Epidemidis(8%) S.schleiferi (2%). This prevalence is in concordance with various other studies. [20-23].

Conclusion

In our study most frequently encountered clinical isolates in our hospital were S.hominis (47%), followed by S.haemolyticus (41%), S.epidemidis (8%), S.saprophyticus (2%), S.schleiferi (2%). The present study revealed maximum number of CoNS isolates from blood samples. Differences in antibiotic sensitivity patterns indicate that speciation of CoNS is most useful for clinical and epidemiologic purposes. High resistance to antimicrobials was observed among S.epidermidis and S.hemolyticus which is alarming. So regular reporting & monitoring of antimicrobial resistance patterns of CoNS species is imperative to correlate clinically.

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