ORIGINAL RESEARCH PAPER

Volume-7 | Issue-8 | August-2018 | PRINT ISSN No 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

THE EMERGENCE OF COAGULASE NEGATIVE STAPHYLOCOCCI (CONS) AS SIGNIFICANT PATHOGEN: A STUDY FROM WAYANAD, KERALA

Microbiology

Deepthy B J* Assistant Professor, Department of Microbiology, DM WIMS Medical College, Wayanad, Kerala *Corresponding Author

Renci T Research Scholar, Department of Microbiology, Calicut University, Calicut, Kerala

ABSTRACT

Back ground: Coagulase Negative Staphylococci (CoNS) are the most common commensal flora of human skin and mucous membrane. Now it is being increasingly isolated as pure cultures in various samples and difficult to know predict whether it's a contaminant or actual pathogen.

Aims and objectives: This study was aimed to find out the emergence of Coagulase negative Staphylococci as significant pathogen and to identify out the most common species of CoNS involved in causing infections.

Materials and Methods: This Study was carried out in the Microbiology department of DM WIMS Medical College, Wayanad, Kerala. A total of 5220 samples were studied which included pus, wound, bacteremia, urinary and respiratory tract infections. CoNS were identified and antibiotic sensitivity test was carried out by Kirby baur disk diffusion methods

Results: Out of the 5220 samples, 141 were identified with significant growth of CoNS. Out of this, majority isolates were Staphylococcus epidermidis, 54 isolates which was closely followed by Staphylococcus haemolyticus with an isolation rate of 44, followed by Staphylococcus hominis 13 and 10 each of Staphylococcus warneri, Staphylococcus capitis and Staphylococcus lugdunensis. The antibiotic sensitivity pattern of the isolates revealed 73% resistance to Penicillin, 87% resistance to Ampicillin and 55% resistance to Cefoxitin (MR CoNS). There was less resistance to clindamycin, gentamycin, amikacin.

Conclusions: The study concluded that CoNS can be a pathogen even though they are the most predominant normal flora. ABST reports shows tha tdrug resistance CoNS isolates are becoming common. We noted 55% of isolates with cefoxitin resistance. The most susceptible drugs noted was vancomycin and linezolid

KEYWORDS

CoNS, Antimicrobial resistance, cefoxitin, Nosocomial Infections, Antibiotic resistance

Introduction

Coagulase negative Staphylococci (CoNS) are the most common flora of the human skin & mucous membrane and has recently noted as a potential pathogen specifically for nosocomial infection.[1,2] Nosocomial bacteraemia is most commonly caused by coagulase-negative staphylococci (CoNS), so it is important to explore the sources of CoNS for prevention and management of infections. This can cause infections at any site including abscess and wound infections. These microorganisms are also present in patients with indwelling medical devices such as central and peripheral venous catheters, valvular prostheses, artificial heart valves, pace-makers and orthopedic prostheses where they produce biofilm, which is the source of infection.[3] Most of the time these isolates are considered as contaminant and considered clinically significant when isolated in pure culture from infected sites and in repeated samples.4 CoNS are considered less virulent than S. aureus but now a days this is causing severe infections and developing drug resistance. Hence it is important to know the actual prevalence to control the emergence of drug resistant strains.[4] Extensive literature survey revealed that CoNS showed resistance against most of the common and frequently used therapeutic antibacterial agents. Distinction between a clinically significant pathogenic infection and contaminating CoNS isolates is difficult and remains a major challenge for clinicians.[5,6]. Therefore, this study was conducted to determine the frequency of CoNS in various infected specimens, to identify the different species causing infections and to find out antibiotic susceptibility pattern against these microbes.

Materials and Methods

The Study was carried out in the department of Microbiology DM WIMS Medical College, Wayanad, Kerala during a period of four months starting from January to April 2017. A total of 5220 samples were studied which included Pus and exudates, Blood, urine and Sputum. The isolates were identified using standard procedures and coagulase production was tested using tube Coagulase test. Coagulase negative staphylococcal isolates (CoNS) were further subjected for speciation studies7. If the samples is from a patient who had completed 72 hours of hospital stay is considered as nosocomial infection. Antibiotic susceptibility testing was done by Kirby – Bauer's disc diffusion method on Muller Hinton agar5.

Results

Out of the 5220 samples cultured 684 samples showed the growth of Gram positive isolates among these 141 were Coagulase negative staphylococci (CoNS). Out of the 141 CoNS isolates, majority isolates were Staphylococcus epidermidis, 54 (38%) isolates which was closely followed by Staphylococcus *haemolyticus* with an isolation rate of 44(44%), followed by Staphylococcus *hominis* 13(9%) and 10(7%) each of Staphylococcus *warneri*, Staphylococcus capitis and Staphylococcus lugdunensis. (Table 1) Pus was the most common samples with more number of CoNS isolates followed by blood sample.(Table 2) Most of the infections with CoNS were noted in females. Out of 141 isolates, 81 were from female patients and 60 were from male patients and majority of them were in the age group of 12 to 24 years. Antimicrobial drug sensitivity testing was done by Kirbey Bauer Disc Diffusion method. The antibiotic sensitivity pattern of the isolates revealed 73% resistance to Penicillin, 87% resistance to Ampicillin and 55% resistance to Cefoxitin (MR CoNS). There was less resistance to clindamycin, gentamycin, amikacin. In our study linezolid was one of the effective antibiotics against coagulase negative Staphylococci.(Table 3,Figure1)

Details of CoNS Isolates (Table 1)

Species of CoNS	Number of isolates	Percentage
Staphylococcus epidermidis	54	38%
Staphylococcus haemolyticus	44	31%
Staphylococcus hominis	13	9%
Staphylococcus capitis	10	7%
Staphylococcus wasssrneri	10	7%
Staphylococcus lugdunensis	10	7%

Isolation rate of CoNS from various clinical samples (Table 2)

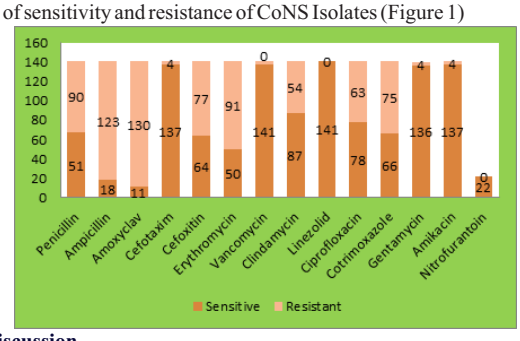
Species of CoNS	Pus	Blood	Urine	Sputum
Staphylococcus epidermidis	36	8	8	2
Staphylococcus haemolyticus	24	10	7	3
Staphylococcus hominis	3	8	2	-
Staphylococcus capitis	4	4	2	-
Staphylococcus warneri	6	4	-	-
Staphylococcus lugdunensis	7	-	3	-

Percenge of sensitivity and resistance of CoNS Isolates (Table 3)

Drugs	Percentage of sensitivity and resistance of CoNS Isolates (141 isolates)			
	Sensitive	Percentage	Resistant	Percentage
Penicillin	68	48%	73	52%
Ampicillin	18	12%	123	87%
Amoxyclav	11	9%	130	92%
Cefotaxim	137	97%	4	3%
Cefoxitin	64	45%	77	55%

Erythromycin	50	35%	91	65%
Vancomycin	140	100%	0	0
Clindamycin	87	62%	54	38%
Linezolid	141	100%	0	0
Ciprofloxacin	78	55%	63	45%
Cotrimoxazole	66	47%	75	53%
Gentamicin	137	97%	4	3%
Amikacin	137	97%	4	3%

% of sensitivity and resistance of CoNS Isolates (Figure 1)



Discussion

The study was conducted in the Department of Microbiology DM WIMS Medical college, Meppadi, Wayanad, over a period of 4 months starting from January to April 2017. A total of 5220 samples were studied and 141 isolates of CoNS were identified . About 684 samples were with the growth of Gram positive isolates only 141 samples revealed significant growth of coagulase negative Staphylococcal isolates. In a study conducted by Muhammad Murad Ehsan *et al*, in the year of 2013 showed that out of the 2989 samples, 1000 were isolated as Gram positive isolates, of which 381 were identified as Coagulase negative Staphylococci8. Out of the 141 isolates of CoNS 6 different species of Coagulase negative Staphylococcal species were identified which include 54 Staphylococcus epidermidis 44 Staphylococcus *haemolyticus*, 13 Staphylococcus *hominis* ,10 each of Staphylococcus *warneri* , Staphylococcus *capitis*, and Staphylococcus *lugdunensis* . A study conducted by Usha et *al*, also reported Staphylococcus *epidermidis* as the predominant species followed by Staphylococcus *haemolyticus*[9]

.

The present study was observed an infection rate in female (57%) was higher than males (43%). Females enrolled in the study comprises largely in teenage group. In another study conducted by B. Nagasrilatha et al, in the year of 2015, it is observed that out of 55 coagulase negative Staphylococcal isolates, 28 were from male patients and 27 were from female patients.10 Out of the 141 samples of coagulase negative Staphylococcal isolates, it is noted that 88% infection were acquired from hospital and 12% infection were community acquired. In a study conducted by B. Nagasrilatha et al, showed that out of 55 samples, 76.36% infection were obtained from hospital and 23.63% infection were community acquired.[10]

Different antibiotics were used to evaluate the susceptibility pattern of isolated CoNS according to recommendations of CLSI 2009 guidelines for Gram Positive Bacteria.[11] CoNS isolates showed high sensitivity to vancomycin and linozolid. [12]. These antibiotics may play an important role in the treatment and prevention of nosocomial infections of CoNS. However, CoNS species showed remarkable resistance to ampicillin, penicillin and other types of antibiotics listed in (Table 3). While bacteria continue to acquire resistance to antibiotics, selection of the appropriate agents is of paramount importance. Our results were consistent with the results observed by other institutions and studies.[13,14]

In this study 17 antimicrobial drugs were tested. Antimicrobial drug sensitivity testing was done by Kirbey Bauer Disc Diffusion method. The antibiotic sensitivity pattern of the isolates revealed 73% resistance to Penicillin, 87% resistance to Ampicillin and 55% resistance to Cephalosporins. There was less resistance to clindamycin, gentamycin, amikacin. In our study linezolid was one of the effective antibiotics against coagulase negative Staphylococci.

Conclusions

In conclusion, Coagulase negative Staphylococci have become one of the major cause of skin and soft tissue infections. The emergence of antibiotic resistance against Coagulase negative Staphylococci is a matter of serious concern. The present study shows highest resistance of coagulase negative Staphylococci against penicillin, ampicillin and amoxicillin clavulanic acid. This indicates that coagulase negative Staphylococci are becoming resistant to commonly used antibiotics. This is an alarming data on the role of coagulase negative Staphylococci as nosocomial pathogen. If this acquires resistance to major antibiotics is going to become a threat to the clinical settings. There for regular surveillance of antibiotic susceptibility testing to coagulase negative Staphylococci should be done to control the spread of coagulase negative Staphylococcal infections.

References

1. Javadpour S KE, Karmostaji A. Frequency and anti-biogram pattern of coagulase negative Staphylococcus in clinical specimens of Shahid Mohammadi Hospital in patients Bandar-Abbas, Iran. Afric J Microbiol Res 2010;4: 1581– 1583.
2. Couto I, Pereira S, Miragaia M, Sanches IS, de Lencastre H. Identification of clinical staphylococcal isolates from humans by internal transcribed spacer PCR. J Clin Microbiol 2001;39: 3099– 3103
3. Malik M RK. Significance of coagulase negative Staphylococcus species in blood culture. J Clin Diagn Res 2012;6: 632– 635.
4. Surekha. Y, Asangi, Mariaraj. J, Sathyanarayanan. M.S, Nagabhushan, Rashm, "Speciation of clinically significant Coagulase negative staphylococci and their antibiotic resistant pattern in a tertiary care hospital." Int J Biol Med Res. 2011;2(3):735-739
5. Nowak T, Balcerczak E, Mirowski M, Szewczyk EM. Detection of methicillin resistance in hospital environmental strains of coagulase-negative staphylococci. P J Microbiol 2006;55: 339– 343.
6. Gheibi S KM, Ilkhanizadeh B, AsghariSana F, Mahmoodzadeh H. Coagulase negative Staphylococcus; the most common cause of neonatal septicemia in urmia, Iran. Iran J Pediatr 2008;18: 237– 43.
7. U Mohan NJ, P Aggarwal. Species distribution and antibiotic sensitivity pattern of coagulase negative Staphylococci isolated from various clinical specimens. Indian J Med Microbiol 2002;20(1):45-6.
8. Muhammad Murad Ehsan. Identification and determination of coagulase negative Staphylococci species and antimicrobial susceptibility pattern of isolates from clinical specimens. African J Microbiol Res. 2013;6(8):1669-1674.doi:10.5897/AJMR11.076
9. Usha, M.G., Shwetha, D.C., Vishwanath, G.2013. Speciation of Coagulase negative staphylococcal isolates from clinically significant specimens and their antibiogram. Indian J.Pathol. Microbiol., 56:258-60s
10. Nagasrilatha B, Bharathi M, Sasidhar M, Shashikala A, Kusuma Bai S. Coagulase negative staphylococci as a pathogen from wound infections in a tertiary care hospital. Int. J. Med. Microbiol. Trop. Dis. (2016); 2(2): 67-70.
11. Clinical and Laboratory Standards Institute Performance standards for antimicrobia susceptibility testing: Nineteenth informational supplement. CLSI document no M100-S19 2009; CLSI.
12. Antony SJ, Diaz-Vasquez E, Stratton C. Clinical experience with linezolid in the treatment of resistant gram-positive infections. J. Natl. Med. Assoc. 2001; 93 (10):386-91
13. de Oliveira A, Sanches P, Lyra JC, Bentlin MR, Rugolo LM, de Lourdes Ribeiro de Souza da Cunha M. Risk factors for infection with coagulase-negative staphylococci in newborns from the neonatal unit of a brazilian university hospital. Clin Med Insights Pediatr 2012;6: 1– 9. [PMC free article] [PubMed]
14. Sheikh A MM. Identification and determination of coagulase-negativeStaphylococci species and antimicrobial susceptibility pattern of isolates from clinical specimens. Afric J Microbiol Res 2012;6: 1669– 74.