

## Coagulase Negative Staphylococcus; A Cause of Nosocomial Blood Stream Infection



### Medical Science

**KEYWORDS :** Coagulase Negative Staphylococci (CoNS), Nosocomial blood stream infection, Antibiotic susceptibility, Neonates

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### ABSTRACT

*Coagulase Negative Staphylococci (CoNS) infrequently recognized as pathogen causing nosocomial blood stream infection .An attempt was made to find out incidence of CoNS positive Bacteremia with their antibiogram from all collected blood culture samples in our laboratory from the patients in those it was indicated. Out of 3326 received blood culture samples; 593(17.7%) was positive cultures. Out of all positive culture,85/593(14.33%)were obtained as CoNS positive bacteremia cases. The CoNS positive nosocomial blood stream infection is commonly found in neonates than other age group. The Staphylococcus epidermidis was most commonly isolated species ,and strains shows multidrug resistance, with maximum resistance 89.1% to Penicillin G, No resistance was seen to Vancomycin. Increase recognition of pathogenic potential of CoNS and emergence of drug resistance among them denotes the need to understand their antibiogram at their species level to plan empirical therapy.*

### INTRODUCTION :

Blood stream infection occurs two to seven times more often in Intensive Care Unit (I.C.U.) than other wards .Out of common infectious agents; like *Staphylococcus aureus*, Enterococci, enteric Gram negative rods etc [1]; in recent time Coagulase Negative Staphylococci (CoNS) emerging as significant pathogens especially in medical devices related infection [2].

Coagulase Negative Staphylococcal Bacteremia is frequently seen in Surgical I.C.U.[1] ,Neonatal I.C.U [3], Bone marrow transplant, patient on immunosuppressive therapy ,other organ transplant[4], patient with prosthetic valve endocarditis,[5] leukemia lymphoma[6], and any patient who is on one or more indwelling devices,prosthesis. As these bacteria produce slime [7] and have tendency to colonized on these devices.[3].Hence Nosocomial blood stream infection ultimately affect mortality, prolonged hospital stay and burdened the patient or hospital with extra cost of treatment[1]for these M.D.R. CoNS strains[7,8].Present study planed to observe the Coagulase Negative Staphylococcal bacteremia including their antibiogram in different age group, out of all blood cultures received in our laboratory, and rationalized the use of lifesaving antimicrobial agent.

### MATERIAL AND METHODS:

A total 3326 Blood cultures samples were collected with sterile precaution from patients admitted to the ICU, Neonatal ICU ,Critical care unit in hospital, after skin preparation with 2% iodine solution. Samples were inoculated into standard brain heart infusion broth in 5-10 times dilution. Subcultures were done after overnight incubation. Blood culture were usually examined for growth each day for seven days and sub culture routinely done after 24-48hours during 7 days of incubation [9,10].

The strain collected were initially identified by colony morphology (sheep blood agar), gram staining, catalase, coagulase (both slide and tube), for 4,24hrs and anaerobic acid from mannitol,Bacitracin(0.04u)and Furazolidone(100ug)susceptibility were done to exclude micrococcus and stomatococcus[8,9,10]. Further CoNS species identification also done with scheme developed in our laboratory after reviewing many references [8,9].The CoNS isolates were considered clinically significant only if isolated in pure culture or if same strain isolated twice [1].

Antibiotic susceptibility of all CoNS strains were performed on Mueller Hinton agar by Kirby Bauer disc diffusion method as per CLSI guidelines against commonly used antibiotics.;penicillin(10u),erythromycin(15µg),ciprofloxacin(5µg),gentamicin(10µg), cefotaxime(30µg), cotrimaxazole(25µg),chloramphenicol(25µg), amikacin(30µg), vancomycin(30µg). Methicillin(5µg) resistance was tested on Mueller Hinton agar supplemented with 5% sodium chloride and incubated at 35°Cfor 40hrs[10].

### RESULTS:

Out of 3326 received blood cultures,593 (17.8%) were came culture positive ,remaining 81.2% were sterile. The CoNS positive bacteremia seen in85/593(14.33%) of cases, 508/593(85.7%) came positive for organism other than CoNS. Although 85/3326(2.5%) blood stream infection occurs because of CoNS.

**Table-1 . ``The CoNS Among all Blood culture samples"**

**TABLE - 1  
CoNS AMONG ALL BLOOD CULTURE SAMPLE**

Samples	No of isolates	Percentage%
Sterile cultures	2733	82.17%
CoNS	85	2.55%
Other Positive culture	508	15.27%
Total sample	3326	100%

The distribution of CoNS positive bacteremia vary in different age group.CoNS positive blood cultures were found maximum37/85(43.52%) in neonatal cases from Neonatal ICU, than other age groups. Among CoNS species; *Staphylococcus.epidermidis* was most frequently isolated 63/85(74.1%)species, followed by *S.haemolyticus*13/85(15.29%).

**Table-2``Distribution of CoNS isolates in different age group."**

**TABLE - 2 DISTRIBUTION OF CONS ISOLATES IN DIFFERENT AGE GROUP."**

Sr. no	Age group	No of CoNS	Percentage (%)
1	Neonates	37	43.52%
2	1 month to 5yrs	29	34.11%
3	5 to 12 yrs	12	12.94%
4	Adult	08	9.4%
	Total	85	100%

Antibiotic susceptibility pattern studied for all strains revealed variability in resistance and sensitivity pattern. No resistance seen by all strains for vancomycin(30µg),with (90.3%) resistance to penicillin(10u);(69.8%)to erythromycin(15µg); (65.5%) to ciprofloxacin(5µg);(66.5%) to gentamicin(10µg), (68.2%) to cefotaxime(30µg);(73.6%) to cotrimaxazole(25µg); (49.1%) to chloramphenicol(25µg.); (38.4%) to amikacin(30µg);(69.8%) to methicillin(5µg).

### DISCUSSION:

Coagulase negative Staphylococcus are the most frequently reported pathogen in nosocomial blood stream infection[CDC1986, 11]especially patient with indwelling or implanted foreign polymer bodies. It favors their occurrence in ICU, Neonatal ICU [3] critical care unit [1] as in these sections of

hospital; patient is on one or more indwelling devices.

Our study show; CoNS were responsible for 14.33%(85/593) of bacteremia, out of all positive culture 593, from all collected samples 3326; correlate with Didier P. et al (22%), nearly to D. J. Winston et al [5] (17%). Both of them found even higher incidence of CoNS positive blood stream infection, may be because of group of patient included in their study like ICU (especially surgical), critical care unit and patient on immunosuppressive therapy; than other section of hospital; as they were on different indwelling devices [1,6]. Even higher incidence (95%) observe by Michael A. et al [4] where maximum number of patient were from critical care unit and transplant unit. Higher incidence of CoNS bacteremia also raises doubt about the proper method of collection to prevent contamination by skin commensals.

The CoNS positive bacteremia found maximum 37(43.5%) in Neonates than other age group in our study, correlate with other authors [12] study, 29% CoNS positive bacteremia (most common pathogen) in NICU, This favors the observation of I. Roy et. al also 16.5% CoNS positive bacteremia, especially more common in newborn with low birth weight, prematurity, birth asphyxia, or maternal risk factors [13].

The CoNS species *Staphylococcus epidermidis* was most frequently isolated species 74.11 % correlate with other authors observation [1,2,6] followed by *S. haemolyticus* 13(15.29%).

Antibiotic susceptibility profile of all CoNS strain shows multi drug resistance and variability in sensitivity and resistant pattern correlate for individual antibiotic not for others [7,8]. In our study resistant to methicillin was 69.8% nearly similar to (72%) by other author [11] not with U. Mohan et al. (28.3%). All strains were sensitive to vancomycin as by other authors [7]. The variability in sensitivity and resistant pattern may be because of the varied geographical distribution of strain as well as different antibiotic protocol use by different clinician in different hospital.

#### CONCLUSIONS:

The Coagulase Negative Staphylococci are one of the most common infectious agents responsible for nosocomial blood stream infection, especially when patient is on indwelling devices and Neonates with low birth weight, prematurity. It is therefore suggest that CoNS strain should not discard as contaminants as their pathogenic role in nosocomial blood stream infection is continuously proved in different clinical situation and patient on indwelling devices, age group. In present study variable resistance /sensitivity shown by all CoNS isolates against individual antibiotic, none had predictable pattern of antibiogram. Therefore it is appear to be mandatory that individual isolate should be identified up to species level with their antibiogram to decrease mortality and morbidity in CoNS Bacteremia patient.

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