

## ASSESSMENT OF FREQUENCY OF CATHETER RELATED BLOOD STREAM INFECTIONS AT CARDIAC SURGERY INTENSIVE CARE UNIT OF TERTIARY CARE CENTER

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### ABSTRACT

**Background:** The central venous catheters are commonly used among critically ill patients and their application sometimes lead to various complications such as catheter-related bloodstream infections. Catheter-related blood stream infections are described as infections of blood stream caused by an indwelling intravenous catheter which acts as a portal of infection.

**Material & Methods:** The Hospital based observational study was conducted at department of Cardiothoracic Vascular Surgery of S.M.S. Medical college Hospital from Oct. 2018 to Jan 2021. Total 300 patients having clinical signs and symptoms of bacteremia and septicemia and were suspected for the catheter related blood stream infection due to indwelling central venous catheters were included in our study. Clearance from hospital ethics committee was taken before start of study. Written informed consent was taken from each study participant. **Results:** Out of 300 study participants it was found that, 162 (54%) study participants had CVC tip colonization which was followed by Central line associated bloodstream infections which was present in 35 (11.6%) patients. A catheter-related bloodstream infection was positive among 13 (4.3%) patients and catheter related candidemia was present among 9 (3%) study participants respectively. **Conclusion:** We concluded from the present study that Candida species were the most common important cause of catheter related blood stream infection among patients from Cardiac surgery intensive care units.

**Keywords:** Catheter related blood stream infection, bacteremia, septicemia.

### INTRODUCTION

The central venous catheters are commonly used among critically ill patients and their application sometimes lead to various complications such as catheter-related bloodstream infections(1). Catheter-related bloodstream infections are described as infections of blood stream caused by an indwelling intravenous catheter which acts as a portal of infection. The central venous catheters are one of the main sources of hospital acquired bacteremia and catheter-related bloodstream infections(2). Catheter-related bloodstream infections are associated with the approximate mortality rate of 12% to 25%. Studies reported that some pathogens can form biofilm and colonize central venous catheters. These

colonizations are reported as major cause of catheter related infections and bacteremia among patients(3).

Various associated risk factors are associated with the increased risk of central venous catheters related bacteremia such as complications during catheter placement, catheter insertion without sterile barriers, microbial colonization of the insertion site, blood transfusions, parenteral nutrition, catheter placement for the long duration and placement at the femoral vein(4). Staphylococcus aureus (S.aureus), Gram-negative rods, Coagulase-negative Staphylococci (CoNS), Enterococci sp. and Candida sp. are among most commonly reported causes of catheter-related bloodstream infections. The incidence of central venous catheters related

fungemia is increased in recent decade. The *Candida* species which are commonly member of normal flora of skin, gastro-intestinal tract can transiently colonize through skin breach from skin barrier and sub-sequently form colonization in central venous catheters which can lead to candidemia(5).

However, in the absence of any other etiology, all of the bloodstream infections among patients with a indwelling central venous catheters were denoted as Central line-associated bloodstream infections. Although, it is a surveillance description, used for the non-research purposes, this sometimes overestimate the number of infections which are attributable directly to the central venous catheters(4).Catheter-related bloodstream infections are diagnosed by taking paired samples, central venous catheters tip culture and percutaneously blood sample from the peripheral vein. A definitive diagnosis of Catheter-related bloodstream infections requires that the same species of organism grow from the percutaneous blood culture and from the culture of catheter tip(6).Hence, the present study was conducted to assess the frequency of catheter related blood stream infections among patients admitted in Cardiac Surgery Intensive Care Unit of our tertiary care center.

## MATERIALS & METHODS

The Hospital based observational study was conducted at department of Cardiothoracic Vascular Surgery of S.M.S. Medical college Hospital from Oct. 2018 to Jan. 2021. Total 300 patients having clinical signs and symptoms of bacteremia and septicemia and were suspected forthe catheter related blood stream infection due to indwelling central venous catheters were included in our study. Clearance from hospital ethics committee was taken before start of study. Written informed consent was taken from each study participant.

All the study participants were subjected to general physical and clinical examination with special references to cardiovascular system and detailed history was recorded from all of them. All the study participants were subjected to routine blood investigation. Patients who had clinical signs and symptoms of bacteremia and septicemia and were suspected forthe catheter related blood stream infection due to indwelling central venous catheters were selected among patients admitted in Cardiac Surgery Intensive Care Unit. For the diagnosis, Paired samples, blood cultures and CVC tip culture were collected from the same patients.

All the recorded data was entered in an Excel spread sheet on Microsoft Excel 2016. The statistical analysis was done using the Statistical software package SPSS v22. A p-value <0.05 with 95% confidence intervals were considered statistically significant.

## RESULTS

Out of the total study participants it was found that, 162 (54%) study participants had CVC tip colonization followed by Central lineassociated bloodstream infections present in 35 (11.6%) patients. Catheter-related bloodstream infections was positive among 13 (4.3%) patients and catheter related candidemia was present among 9 (3%) study participants. (Table 1)

**Table 1: Distribution of study subjects according to the frequencies of catheter related blood stream infections.**

Parameters	Number of positive cultures
Frequency of CVC tip colonization	162 (54%)
Frequency of Central line-associated bloodstream infections	35 (11.6%)
Frequency of Catheter-related bloodstream infections	13 (4.3%)
Frequency of catheter related candidemia	9 (3%)

Our study reveals the facts, that Out of the total CVC tip colonization, the most common organism associated was CoNS (32.2%) followed by *Staphylococcus aureus* (26.1%), *Candida* species (22.6%),*Klebsiella* species (12.4%), *Acinetobactor* species (4.2%) and *Enterococcus* species (2.5%) respectively. Out of the total Central line-associated bloodstream infections, the most common organism associated was *Candida* species i.e.36.5% followed by *Staphylococcus aureus* (26.3%), *Klebsiella* species (24.4%) and *Acinetobactor* species (12.8%) respectively. In Catheter-related bloodstream infections, the most common organism associated was *Candida* species (89.2%) followed by

Staphylococcus aureus (9.4%) and Klebsiella species was present in 1.4% Catheter-related bloodstream infections (Table 2)

**Table 2: Distribution of study subjects according to the Organism associated with catheter related blood stream infections.**

Organism associated with catheter related blood stream infections.	CVC tip colonization	Central line-associated bloodstream infections	Catheter-related bloodstream infections
CoNS	32.2%	-	-
Staphylococcus aureus	26.1%	26.3%	9.4%
Candida species	22.6%	36.5%	89.2%
Klebsiella species	12.4%	24.4%	1.4%
Acinetobacter species	4.2%	12.8%	-
Enterococcus species	2.5%	-	-

## DISCUSSION

In our study, it was found that, 162 (54%) study participants had CVC tip colonization followed by Central line-associated bloodstream infections present in 35 (11.6%) patients. A catheter-related bloodstream infection was positive among 13 (4.3%) patients and catheter related candidemia was present among 9 (3%) study participants. Similar results were obtained in a study conducted by Fatima et al among 134 patients admitted in cardiac intensive care unit and reported that Frequency of catheter tip colonization was 60% while frequency of CLBSI was found to be 12% similarly the frequency of CRBSI in patients from cardiac surgery ICU was 5%. Out of 16 isolates from blood culture there was only 06 isolates were found to be same as isolated which were from CVP-tip of same patient and the

most common organism isolated was Candida species among the patients. Similarly the frequency of Catheter Related Candidemia was reported to be 5% (7). Similar results were obtained in a study conducted by Luigi R et al among 125 patients admitted in cardiac intensive care unit and reported similar results to the present study(8).

In present study, that Out of the total CVC tip colonization, the most common organism associated was CoNS (32.2%) followed by Staphylococcus aureus (26.1%), Candida species (22.6%), Klebsiella species (12.4%), Acinetobacter species (4.2%) and Enterococcus species (2.5%) respectively. Out of the total Central line-associated bloodstream infections, the most common organism associated was Candida species i.e.36.5% followed by Staphylococcus aureus (26.3%), Klebsiella species (24.4%) and Acinetobacter species (12.8%) respectively. In Catheter-related bloodstream infections, the most common organism associated was Candida species (89.2%) followed by Staphylococcus aureus (9.4%) and Klebsiella species was present in 1.4% Catheter-related bloodstream infections .Similar results were obtained in a study conducted by Elif A et. al. among 201 patients admitted in intensive care unit and reported similar results to the present study(9). Similar results were obtained in a study conducted by Ghislaine L et. al. among 149 patients admitted in intensive care unit (10).

## CONCLUSION

We concluded from the present study that Candida species were the most common important cause of catheter related blood stream infection among patients from Cardiac surgery intensive care units. Among patients admitted in cardiac surgery wards and ICUs if there is suspicion of catheter related blood stream infections then catheter related candidemia must also be considered as the etiology.

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