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Original Research Article

ASSESSMENT OF FREQUENCY OF CATHETER-RELATED BLOOD STREAM INFECTIONS AT PEDIATRIC SURGERY INTENSIVE CARE UNIT OF TERTIARY CARE CENTER

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ABSTRACT

Background: Catheter-related bloodstream infections are associated with an 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 a major cause of catheter-related infections and bacteremia among patients. **Material & Methods:** The present cross-sectional observational study was conducted at the Department of Pediatric Surgery of our tertiary care Hospital. The study was an observational study conducted over two years. The study was done at 95% confidence interval at 10% of maximum allowable error. The sample size of 100 patients was calculated by epi info software. Clearance from the hospital ethics committee was taken before the start of the study. Written informed consent was taken from each study participant. **Results:** In the present study we enrolled a total of 100 Patients who had clinical signs and symptoms of bacteremia and septicemia and were suspected of catheter-related blood stream infection due to indwelling central venous catheters were selected among patients admitted in Pediatric Surgery Intensive Care Unit. Out of the total study participants, it was found that 54% of study participants had CVC tip colonization which was followed by Central line-associated bloodstream infections which were present in 12% of patients. Catheter-related bloodstream infections were positive among 4% of patients and catheter-related candidemia was present among 3% of study participants. **Conclusion:** We concluded from the present study that Candida species were the most common important cause of catheter-related bloodstream infection among patients from Pediatric surgery intensive care units.

Keywords: catheter-related blood stream infection, bacteremia, septicemia.

INTRODUCTION

Catheter-related bloodstream infections are associated with an 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 the major cause of catheter-related infections and bacteremia among patients **(1).** Catheter-related bloodstream infections are described as infections of the bloodstream 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)**. The central venous catheters are commonly used among critically ill patients and their application sometimes leads to various complications such as catheter-related bloodstream infections **(3).**

Staphylococcus aureus (S. aureus), Gram-negative rods, Coagulase-negative Staphylococci (CoNS), Enterococci sp., and Candida sp. are among the most commonly reported causes of catheter-related bloodstream infections. The incidence of central venous catheters related fungemia is increased in the recent decade. The Candida species which are commonly a member of the normal flora of the skin, gastrointestinal tract can transiently colonize through skin breaches from the skin barrier and subsequently form colonization in central venous catheters which can lead to candidemia **(4)**. 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 **(5).**

Catheter-related bloodstream infections are diagnosed by taking paired samples, central venous catheter tip culture, and percutaneous blood samples from the peripheral vein. A definitive diagnosis of Catheter-related bloodstream infections requires that the same species of the organism grow from the percutaneous blood culture and the culture of the catheter tip **(6).** However, in the absence of any other etiology, all of the bloodstream infections among patients with an indwelling central venous catheter were denoted as Central line-associated bloodstream infections. Although it is a surveillance description, used for non-research purposes, this sometimes overestimates the number of infections that are attributable directly to the central venous catheters **(5).** Hence, the present study was conducted to assess the frequency of catheter-related bloodstream infections among patients admitted to the Pediatric Surgery Intensive Care Unit of our tertiary care center.

MATERIALS & METHODS

The present cross-sectional observational study was conducted at the Department of Pediatric Surgery of our tertiary care Hospital. The study was an observational study conducted over two years. The study was done at 95% confidence interval at 10% of maximum allowable error. The sample size of 100 patients was calculated by epi info software. Institutional Ethics Committee Clearance was obtained before the start of the study and written and informed consent for the procedure was obtained from all the enrolled participants/parents. Strict confidentiality was maintained with patient identity and data and not revealed, at any point in time.

All the study participants were subjected to general physical and clinical examination with 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 of catheter-related blood stream infection due to indwelling central venous catheters were selected among patients admitted to Pediatric 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 spreadsheet on Microsoft Excel 2016. The statistical analysis was done using the Statistical software package SPSS v22 and Epi Info v7.2. A p-value <0.05 with 95% confidence intervals was considered statistically significant.

RESULTS

In the present study, we enrolled a total of 100 Patients who had clinical signs and symptoms of bacteremia and septicemia and were suspected of catheter-related blood stream infection due to indwelling central venous catheters were selected among patients admitted in Pediatric Surgery Intensive Care Unit. Out of the total study participants, it was found that 54% of study participants had CVC tip colonization which was followed by Central line-associated bloodstream infections which were present in 12% of patients. Catheter-related bloodstream infections were positive among 4% of patients and catheter-related candidemia was present among 3% of study participants. (Table 1)

In the present study, out of total study participants, based on the organism associated with catheter-related bloodstream infections among patients admitted in Pediatric Surgery Intensive Care Unit, Out of the total CVC tip colonization, the most common organism associated was CoNS which was 31% out of the total colonization, Staphylococcus aureus was 27%, Candida species was 22%, Klebsiella species was 13%, Acinetobacter species was 4% and Enterococcus species was 3% out of the total colonization. Out of the total Central line-associated bloodstream infections, the most common organism associated was Candida species was 37%, Staphylococcus aureus was 25%, Klebsiella species

was 24% and Acinetobacter species was 14% out of the total central line-associated bloodstream infections. Out of the total Catheter-related bloodstream infections, the most common organism associated was Candida species was 88%, Staphylococcus aureus was 10% and Klebsiella species was 2% out of the total Catheter-related bloodstream infections (Table 2)

Table 1: Distribution of study subjects according to the frequencies of catheter-related bloodstream infections.

Parameters	Number of positive cultures
Frequency of CVC tip colonization	54
Frequency of Central line-associated bloodstream infections	12
Frequency of Catheter-related bloodstream infections	4
Frequency of catheter-related candidemia	3

Table 2: Distribution of study subjects according to the Organism associated with catheter-related bloodstream infections.

Organism associated with catheter-related bloodstream infections.	CVC tip colonization	Central line-associated bloodstream infections	Catheter-related bloodstream infections
CoNS	31%	-	-
Staphylococcus aureus	27%	25%	10%
Candida species	22%	37%	88%
Klebsiella species	13%	24%	2%
Acinetobactor species	4%	14%	-
Enterococcus species	3%	-	-

DISCUSSION

In the present study, we enrolled a total of 100 Patients who had clinical signs and symptoms of bacteremia and septicemia and were suspected of catheter-related blood stream infection due to indwelling central venous catheters were selected among patients admitted in Pediatric Surgery Intensive Care Unit. Out of the total study participants, it was found that 54% of study participants had CVC tip colonization which was followed by Central line-associated bloodstream infections which were present in 12% of patients. Catheter-related bloodstream infections were positive among 4% of patients and catheter-related candidemia was present among 3% of study participants. Similar results were obtained in a study conducted by Luigi R et al among 125 patients admitted in the Pediatric intensive care unit and reported similar results to the present study **(7).** Similar results were obtained in a study conducted by Fatima et al among 134 patients admitted in Pediatric intensive care unit and reported that the Frequency of catheter tip colonization was 60% while the frequency of CLBSI was found to be 12% similarly the frequency of CRBSI in patients from Pediatric surgery ICU was 5%. Out of 16 isolates from blood culture, there were only 06 isolates were found to be the same as isolated which were from CVP-tip of the 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% **(8).**

In the present study, out of total study participants, based on the organism associated with catheter-related bloodstream infections among patients admitted in Pediatric Surgery Intensive Care Unit, Out of the total CVC tip colonization, the most common organism associated was CoNS which was 31% out of the total colonization, Staphylococcus aureus was 27%, Candida species was 22%, Klebsiella species was 13%, Acinetobacter species was 4% and Enterococcus species was 3% out of the total colonization. Out of the total Central line-associated bloodstream infections, the most common organism associated was Candida species was 37%, Staphylococcus aureus was 25%, Klebsiella species was 24% and Acinetobacter species was 14% out of the total central line-associated bloodstream infections. Out of the total Catheter-related bloodstream infections, the most common organism associated was Candida species was 88%, Staphylococcus aureus was 10% and Klebsiella species was 2% out of the total Catheter-related bloodstream infections. Similar results were obtained in a study conducted by Ghislaine L et al among 149 patients admitted in the intensive care unit and reported similar results to the present study

(9). Similar results were obtained in a study conducted by Elif A et al among 201 patients admitted in the intensive care unit and reported similar results to the present study **(10).**

CONCLUSION

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

REFERENCES

1.Association of Maternal Risk Factors to Congenital Anomalies among Infants. A community-based study in rural areas of Haryana, India [Internet]. Available from: https://www.japi.org/q2f4e484/association-of-maternal-risk-factors-to-congenital-anomalies-among-infants-a-community-based-study-in-rural-areas-of-haryana-india.

2.Causative agents of intravenous catheter-related infections and their antibiotic susceptibilities. PubMed [internet]. Available from: https://pubmed.ncbi.nlm.nih.gov/12759215/.

3.Badkhal A, Thakre A, Joge U, Kawlkar U. Comparison of intravenous catheter infections and their antibiotic susceptibilities. 2016;3(11):3218-21.

4.Takai I, Sayyadi B, Galadanci H. A retrospective analysis of intravenous catheter-related infections a from a northern Nigerian teaching hospital. Int J Appl Basic Med Res. 2017;7(2):112. doi: 10.4103/2229-516X.205819. Available from: /pmc/articles/PMC5441258.

5.Dibaba B, Edosa D, Hajure M, Gebre G. Risk factors of candidemia and susceptibilities at Suhul general hospital, 2016: A case-control study. J Multidiscip Healthc. 2021 Feb 4;14:271-8. doi: 10.2147/JMDH.S269744, PMID 33568914.

6.Cohn LH, Soltesz EG. The evolution of catheter infections: 1902-2002 [internet]. Am Heart Hosp J. 2003;1(1):40-6. doi: 10.1111/j.1541-9215.2003.02081.x, PMID 15785175.

7. Rosa L, Cutone A, Coletti M, Lepanto MS, Scotti M, Valenti P, Raponi G, Ghezzi MC, Berlutti F. Biotimer assay: A reliable and rapid method for the evaluation of central venous catheter microbial colonization. J Microbiol Methods. 2017;143(2):20-5.doi: 10.1016/j.mimet.2017.09.016, PMID 28966069.

8.Fatima A, Mehdi N, Section AN. Pathology Frequency of Catheter Related Blood Stream Infections in a pediatric Surgery Intensive Care Unit. 2020;7(2):10-3.

9.Leleu G, Aegerter P, Guidet B, Collège des Utilisateurs de Base de Données en Réanimation. Systemic candidiasis in intensive care units: a multicenter, matched-cohort study. J Crit Care. 2002;17(3):168-75. doi: 10.1053/jcrc.2002.35815, PMID 12297992.

10.Aktaş E. Emre Nur sarı ASK. Causative agents of intravenous catheter-related infections and their antibiotic susceptibilities. Mikrobiyol Bul. 2011;45(1):86-92.

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