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## RESEARCH ARTICLE

### PREVALENCE OF NOSOCOMIAL BLOOD STREAM INFECTIONS THROUGH PERIPHERAL LINES

<sup>1</sup>\*Dr. Madhurima, E., <sup>2</sup>Dr. Srinivasa Rao, C.H., <sup>3</sup>Dr. Suneetha, N., <sup>4</sup>Dr. Satyanarayana, O. and <sup>5</sup>Dr. Rajaram, G.

<sup>1</sup>Post-Graduate, Department of Microbiology, S.V. Medical College, Tirupati

<sup>2</sup>Professor and Head, Department of Microbiology, S.V. Medical College, Tirupati

<sup>3</sup>Assistant Professor, Department of Microbiology, S.V. Medical College, Tirupati

<sup>4</sup>Professor, Department of Microbiology, S.V. Medical College, Tirupati

<sup>5</sup>Associate Professor, Department of Microbiology, S.V. Medical College, Tirupati

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##### Key Words:

CDC- Centre for disease control

CONS- Coagulase negative staphylococci

ICU- Intensive care unit

MRSA- Methicillin resistant staphylococcus aureus

PVCRBSI- Peripheral venous catheter related blood stream infections

#### ABSTRACT

**Introduction:** Peripheral intravenous catheter associated blood stream infections are a cause of nosocomial infections which can lead to substantial patient morbidity and increased health care costs. I took this study because more studies are only on central venous associated blood stream infections and PVC-BSI is submerged. **Aim:** To determine colonizing bacteria on peripheral intravenous catheter & their associated blood stream infections and to determine their antibiotic susceptibilities. **Methods:** Fifty patients from different medical intensive care units and post operative patients in maternity ward were included in study, conducted in department of microbiology, SVMC, tirupati. Five cms of peripheral venous tip should be cut aseptically placed in sterile container and 10ml of blood from another vein inoculated to BHI broth after 48 hrs of catheter insertion and processed according to conventional microbiological techniques **Results:** out of fifty patients fourteen showed positive tip culture and of which four showed positive blood cultures. Most common organisms are *Staphylococcus aureus*, *Coagulase negative Staphylococci*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Acinetobacter baumannii*, *Enterococci*. Most of them Multi drug resistant pathogens. **Conclusion:** Even though peripheral venous associated blood stream infections shows low incidence, it is remarkable in terms of patient morbidity and their safety. From the point of view of quality of care we recommend that hospitals emphasize increasing improvement initiatives with in a wider total quality process that includes adequacy of venous access, optimal insertion care maintenance & management of intravenous therapy.

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## INTRODUCTION

CDC defines health care associated infections refers to any systemic or localized conditions better result from the reaction by an infectious agent or toxin when hospitalized. Blood stream infections are the infectious diseases defined as the presence of viable bacterial or fungal microorganisms in the blood stream that elicit an inflammatory response characterized by the alteration of clinical, laboratory and hemodynamic parameters. Catheter associated blood stream infections are defined as the presence of bacteremia originating from an intravenous catheter. Peripheral intravenous catheters are essential for treatment purpose in over one billion hospitalized patients annually. Approximately 80% of hospitalized patients have one or more intravenous catheters during their hospital stay.

These are potential source of microorganisms to enter blood stream resulting in systemic and local infections.

The primary objective of the study is to estimate the prevalence of microbiological profiles of patients developing peripheral intravenous catheter related local and systemic infections and to study the antibiotic susceptibility pattern of organism isolated.

## AIMS AND OBJECTIVES

**AIM:** To estimate peripheral intra venous catheter associated blood stream infections.

**OBJECTIVES:** To isolate the colonising bacteria on peripheral intravenous catheter and to know prevalence of blood stream infections with catheter and their antimicrobial susceptibilities.

\*Corresponding author: Dr. Madhurima, E.,  
Postgraduate Department of Microbiology SVMC Tirupati.

## METHOD OF THE STUDY

The present study has been conducted in the department of microbiology, SVMC, Tirupati. A total of 50 patients were included in study during October 2018-April2019 from medical intensive care units and from post operative patients of maternity ward. Inclusion criteria: tips and peripheral vein blood collected after 48hrs of PVC insertion and patients above 18 years of age. Exclusion criteria: patients already admitted with the signs of sepsis and patients who don't give consent.

**Sample collection:** Patients with symptoms of phlebitis, infiltration, extravasation, and blockage and other symptoms like fever, chills and rigors are taken into consideration. 3-5 cm of peripheral venous tip cut aseptically and placed in a sterile container, and blood from another peripheral vein should be inoculated in to BHI broth and transport to lab as early as possible and processed according to conventional bacteriological techniques like roll plate method for tip culture, Grams stain and by other biochemical reactions. Antibigram of the isolated organisms was done on the Muller- Hintonagar by Kirby-bauer disc diffusion method.

## RESULTS

Out of fifty patients 15 tips are collected from post operative patients from maternity ward and 26 tips from medical icu's like cardiac icu, respiratory icu and high definition units which include critically ill patients. Twenty five patients shows no bacterial growth in both tip and blood culture. Eight tips showed commensals like diptheroids, micrococci and aerobic spore bearers in tip culture and no bacterial growth in blood cultures. Three tips showed poly-microbial growth in tips and micrococci in blood culture. Fourteen tip culture shows positive for organisms (0.28%) and out of which only 4 blood cultures showed positive for organisms(0.08%) and out of 4 positive blood cultures 3 blood cultures showed same organism as tip culture and one showed organism other than tip culture. The organisms isolated are *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Acinetobacter baumannii*, *Enterococci spp.*, *Candida spp.*, Out of 4 positive blood cultures two blood cultures showed methicillin resistant *staphylococcus aureus* and one showed *Acinetobacter baumannii* same as in tip culture. One blood culture showed *Pseudomonas aeruginosa* and tips culture showed *coagulase negative staphylococci*.

Out of 4 *staphylococcus aureus* two are Methicillin sensitive and two are Methicillin resistant and all are Vancomycin sensitive. Out of 4 CONS two showed Novobiocin and Methicillin sensitive probably *staphylococcus epidermidis* and two are MRCONS. Other gram negative bacteria are tested with antibiotics like Cefotaxime, Co-trimoxazole, Amoxicillin-Clavulnate, Amikacin, Imipenem, Piperacillin-Tazobactam and for *pseudomonas* Carbenicillin was added. *Acinetobacter* showed resistant to most of the drugs and enterococci isolated was Vancomycin sensitive.

## DISCUSSION

According to the obtain results PVC-RBSI one of the threats among hospitalized infections and patient safety.



Fig. 1. Roll plate method of catheter tip showing *Staphylococcus aureus* colonies



Fig. 2. MSA AST pattern

Table 1. List of organisms from tip culture

Tip Culture Organism	Number of Organisms
<i>Staphylococcus aureus</i>	4
<i>Coagulase negative staphylococci</i>	4
<i>Klebsiella pneumoniae</i>	2
<i>Pseudomonas aeruginosa</i>	1
<i>Acinetobacter baumannii</i>	1
<i>Enterococci</i>	1
<i>Candida</i>	1

Table 2. List of isolated organisms of blood culture compared to tip culture

Tip culture	Blood culture
<i>Staphylococcus aureus</i> (MRSA)	<i>Staphylococcus aureus</i> (MRSA)
MRSA	MRSA
CONS	<i>Pseudomonas aeruginosa</i>
<i>Acinetobacter baumannii</i>	<i>Acinetobacter baumannii</i>

Table 3. Comparison of my study with different studies

Study	% of MRSA
Parameswaranetal.,	40%
SermetKiskin A etal.,	35%
European study	33.30%
Present study	50%

In our study 28% shows catheter colonisation and 8% of catheters showed associated blood stream infections. Similar to this in a study of Turkish by Sermet Kesk in A et al has got similar rates like 27% of catheter colonisation and 12% of these catheters associated with blood stream infections. In a European study by A. Voss & M. Desco 24% showed catheter colonisation and 10% showed PVC-RBSI. In my study 50% of

blood stream infections due to *Staphylococcus aureus*(MRSA) and 25% are due to *Acinetobacter baumannii*, similar to studies like. In the Turkish study *Acinetobacter baumannii* showed 38% of CRBSI and out of which 45% showed Carbapenamase resistant and this study also showed 35% of out of which 80% are Methicillin resistant. In this study *P.aeruginosa* and *K.pneumoniae* accounted for 7.19% and 14.93% of tip colonization which is in concordance to study done in Manipal where *Pseudomonas* and *K.pneumoniae* accounted for 9.64% and 16.87% cases. In all the above mentioned studies Gram positive organisms, especially *Staphylococalspp* were the most common isolates. But a study done by Kaur et al., showed Gram negative organism as the most common isolate (*Acinetobacter spp*, 25 isolates).

## CONCLUSION

Peripheral intra venous catheters have unquestionable benefits in current medical practice, but their potential complications are also well known. One of the main complications is catheter-related bloodstream infection (CRBSI). Occurrence of these infections in a hospital set up leads to decrease in the quality of health care provided to the patients. These infections often result in prolonged hospital stay, thereby exposing the patients to the risks of acquiring multiple infections which in turn leads to increase in morbidity as well as mortality

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