

## ORIGINAL ARTICLE

### EPIDEMIOLOGY AND SUSCEPTIBILITY OF NOSOCOMIAL BLOOD STREAM INFECTION IN PAEDATRIC PATIENTS

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#### ABSTRACT:

**Background:** A hospital-acquired infection (HAI), also known as a nosocomial infection, is an infection that is acquired in a hospital or other health care facility. This study was done to evaluate the prevalence of nosocomial blood stream infections (BMI) among children admitted in the ward in a medical hospital. **Materials and methods:** The total study participants were 240 including 128 boys and 112 girls. Complete history of patients was taken along with the clinical examination. All samples representative of BSI were analyzed for microbiological spectrum. All the study subjects were examined daily to assess the treatment and to detect any new infection. Patient's body temperature was also monitored regularly. All the routine investigations such as complete blood picture, blood sugar level and urine analysis were also done. **Result:** Positive culture was found in 75 children. Of the positive cultures, 46 were Gram-negative bacilli (GNB), 23 were Gram-positive organisms, and 6 were Candida species. Lactose fermenting Enterobacteriaceae i.e., Escherichia coli (13), Klebsiella pneumoniae (7), and Enterobacter (4); Pseudomonas accounted for (15) and Acinetobacter (6) of GNB. Among Gram-positive isolates, staphylococci were the most frequent (11), followed by Streptococcus pneumoniae (6), beta-hemolytic streptococci (4), and enterococci (1). **Conclusion:** Nosocomial BSI happened dominantly in exceptionally youthful or potentially basically sick youngsters. Gram-negative pathogens prevailed over all ages, and expanding antimicrobial resistance was seen in pediatric patients.

**Keywords:** Nosocomial infection; Bacterial strain, BSI.

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#### INTRODUCTION:

Nosocomial infection, is an infection that is acquired in a hospital or other health care facility. Such an infection can be acquired in hospital, nursing home, rehabilitation facility, outpatient clinic, or other clinical settings.<sup>1</sup> Infection is spread to the susceptible patient in the clinical setting by various means. Health care staff can spread infection, in addition to contaminated equipment, bed linens, or air droplets. The infection can originate from the outside environment, another infected patient, staff that may be infected, or in some cases, the source of the infection cannot be determined.<sup>2</sup> In some cases the microorganism originates from the patient's own skin microbiota, becoming opportunistic after surgery or other procedures that compromise the protective skin barrier.<sup>3</sup> Though the patient may have contracted the infection from their own skin, the infection is still considered nosocomial since it

develops in the health care setting. The nosocomial infections are caused by bacterial, viral and fungal pathogens.<sup>4</sup> The most common pathogens are staphylococci, pseudomonas, E-coli, Klebsiella mycobacterium tuberculi, candida, aspergillus, fusarium, trichosporon and malassezia all of these pathogens leads to increased risk of morbidity and mortality.

(BSIs), subsequent to immunosuppressive treatment have turned into a noteworthy reason for horribleness and mortality in this populace; expanding the length of hospital stay, as well as altogether expanding the cost of treatment.<sup>5</sup> Children with growth represent up to 20% of extreme sepsis in children, with Intensive Care Unit death rates as high as 62% in high-hazard children.<sup>6</sup> High cure rates accomplished in most adolescence malignancies are essentially balanced by toxic deaths, inferable chiefly to bacterial contaminations, which are the most well-known reason for preventable deaths in a creating nation.

Notwithstanding an expanding recurrence of nosocomial BSI, the extent caused by multiresistant pathogens is additionally rising. Regardless of advances in antimicrobial treatment, BSI drag out hospital stay, increment coordinate patient care costs and specifically cause mortality.<sup>7,8</sup> There have been few examinations concentrating on nosocomial BSI in pediatric patients. This study was done to evaluate the prevalence of nosocomial blood stream infections (BMI) among children admitted in a medical hospital.

**MATERIALS AND METHODS:**

The study was conducted in hospital in North India. Collection of data was done from patient records, analysis of infections, and their causes. Total study participants were 240 including 128 boys and 112 girls of age <16 years. Prior permission was obtained from district surgeon and ethical clearance was obtained. Detailed history and physical examination were reviewed in all patients' records. A nosocomial BSI was characterized as at least one blood culture taken no less than 48 h after confirmation yielding a pathogenic creature. On the off chance that the circulation system confine was a potential skin contaminant (e.g. diphtheroids, Propionibacterium spp., Bacillus spp., coagulase-negative staphylococci or micrococci), the majority of the accompanying criteria were required for the determination: the presence of an intravascular catheter; the start of antimicrobial treatment; and no less than one of the accompanying: temperature 38.0°C or 36.0°C; chills; systolic circulatory strain of 90 mm Hg. Blood cultures were prepared at the partaking hospitals. The recognizable proof of blood isolates and vulnerability testing were finished utilizing the normal techniques being used at the associated clinic research centers. Blood and urine specimen among study patients was taken after 48 hours of admission who developed fever after 48 hours of admission and followed till discharge from the hospital. Bacterial strains were identified with the help of gram staining and biochemical tests. All these study subjects were examined daily to assess the treatment and to detect

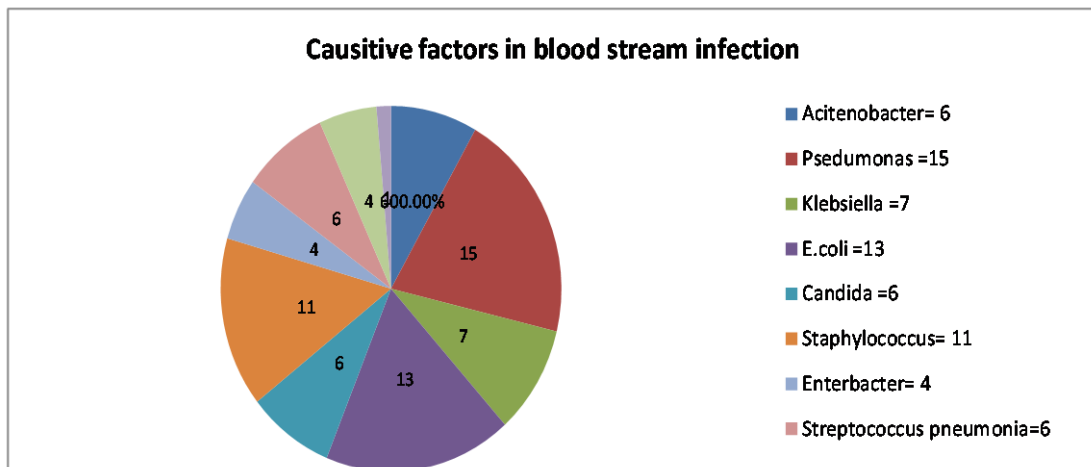
the confirmation of any new infection.<sup>8</sup> Patient's body temperature was also monitored regularly. The relevant investigations were performed according to the clinical presentation of patients and also after taking opinion from consultants of relevant departments.

**RESULT:**

A total of 240 culture samples were sent, of which 75 samples were representative of BSI. The culture positivity rate was higher from samples obtained from central lines (catheter/port) as compared to peripheral lines. Of the positive cultures, 46 were Gram-negative bacilli (GNB), 23 were Gram-positive organisms, and 6 were Candida species. Lactose fermenting Enterobacteriaceae i.e., Escherichia coli (13), Klebsiella pneumoniae (7), and Enterobacter (4); Pseudomonas accounted for (15) and Acinetobacter (6) of GNB. Among Gram-positive isolates, staphylococci were the most frequent (11), followed by Streptococcus pneumonia (6), beta-hemolytic streptococci (4), and enterococci (1).

**Table 1:** Details of children with positive culture

Variables	
Age (years)	8.6±5.4
<b>Sex</b>	
Boys	41
Girls	34
<b>Organisms</b>	
Gram negative	46
Gram positive	23
Fungus	6
<b>Risk factors</b>	
Ventilator	22
Central venous catheter	41
Urinary catheter	13



**Table 2:** Antibiotic resistance of gram negative organism

Antibiotics	E.coli (13)	Klebsiella (7)	Pseudomonas (15)	Acitenobacter (6)
Ampicillin	8	4	14	2
Cotrimoxazole	6	3	14	3
Ceftriaxone	7	3	3	3
Nitrofurantoin	2	4	12	4
Levofloxacin	11	5	5	2
Ciprofloxacin	2	1	3	1
Norfloxacin	9	4	7	2

**Table 3:** Antibiotic resistance of Gram-Positive organism

Antibiotics	Beta-hemolytic streptococci (4)	Staphylococcus (11)	Streptococcus(6)
Cotrimoxazole	2	9	4
Ampicillin	1	8	5
Norfloxacin	3	9	5
Ciprofloxacin	3	9	4
Cephoxitin	2	4	3
Levofloxacin	1	7	5
Linezolid	2	6	5
Cephalexin	3	4	4

**DISCUSSION:**

National observation thinks about concentrating on BSI are vital instruments that can identify particular issues identified with antimicrobial resistance.<sup>9</sup> What's more, BSI observation considers are best on the grounds that unbending and institutionalized clinical analytic criteria make information more solid and reasonable, maintaining a strategic distance from the issue of puzzling colonizing operators not straightforwardly identified with clinical sickness.<sup>10</sup> BSIs are likewise the most genuine and possibly life-debilitating irresistible ailments in the pediatric populace and in the larger part of cases antimicrobial treatment must be started experimentally. Consequently precision in anticipating the pathogens and the resistance profile is pivotal for fruitful treatment.

Culture inspiration rate in our investigation was 31.25%, which is similar with 11–38% in the west.<sup>11</sup> It can be credited to the way that the vast majority of our patients have a focal line, and drawing satisfactory volumes of blood for societies according to IDSA 2013 rules is a test in children. This is additionally affirmed by the just about 2 times energy rate from societies got from focal lines contrasted with fringe societies. Low culture inspiration rate might be the gathering of just single culture at our establishment in patients against the suggestion of two societies. This accentuates the need to gather sufficient volume combined or two fold societies to enhance culture inspiration rates which is critical for fitting and opportune anti-infection treatment for these wiped out youngsters.

Like other studies of BSI and/or healthcare related infections in, we observed a higher prevalence of gram-negative bacilli over gram-positive cocci (61.33% vs 30.6%, respectively), whereas the US SCOPE found that only 24% of infections were due to gram-negative

bacilli.<sup>10,11</sup> Of note, in the adult Br SCOPE population, the proportion of infections due to gram-negative bacilli was (58.5%).

Pseudomonas accounted for half of the total Gram-negative BSI.<sup>12</sup> Amikacin had good activity in the majority of Gram-negative isolates and fair activity in CRE isolates, making it good drug for combination antibiotic therapy. Resistance to antimicrobial agents was for the most part low in pathogens disengaged from pediatric patients.<sup>13,14</sup> Be that as it may, the patterns of expanding resistance that are known for grown-up quiet populaces can be seen in pediatric patients also, with an expansion of MRSA from 10% of every 1995 to 29% out of 2001. In Gram-negative segregates resistance rates were practically identical with information for grown-up tolerant populations.<sup>15,16</sup> Resistance to ciprofloxacin was low, which may be the consequence of the constrained utilization of this operator in pediatric patients.

Nosocomial BSI in youngsters are more successive in the extremely youthful, with one-half happening in kids of 4 year of age. In addition the greater part of these contaminations happen in basically sick kids (three-fourths happen in the ICU, three-fourths have focal venous catheters, one-half are accepting TPN and 40% are mechanically ventilated).<sup>17,18</sup> The Gram-positive pathogens, which prevail over the age range, have turned out to be progressively safe in the pediatric populace. The perception that almost one-portion of viridans bunch streptococcal segregates are penicillin-safe ought to be considered in choice of empiric antimicrobial treatment in pediatric patients with suspected nosocomial BSI.<sup>19</sup>

Our study is limited by two factors; one some of the samples may be from the same patient collected during the same episode at different times or during different episodes, thus overestimating the prevalence of resistant organisms

and second, the information on infection-related mortality is unavailable.

### CONCLUSION:

The nosocomial infection is one of major problems in the hospitals. We suggest large scale studies to be carried out among Indian population for prevention and management of nosocomial infections as this was small sample size study. The study on the community acquired infections should also be conducted. Even though the sample size was less, unequal distribution of samples according to gender and age due to which exact prevalence of nosocomial BSI was not calculated for independent variables, BRI infections mere presence among the present study cases cannot be ruled out. Hence, further systematic and standardized large scale studies are suggested in for prevention and management of these nosocomial BSI.

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