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## **Bacterial aetiology of septicaemia in children of post-neonatal age at the Institute of Child Health, Banzazzau, Zaria, Nigeria**

DOI:<http://dx.doi.org/10.4314/njp.v42i1.2>

Accepted: 28th September 2013

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**Abstract Introduction:** Septicaemia is a clinical syndrome characterized by systemic inflammatory response. It has been reported to be one of the major causes of morbidity and mortality among children in developing countries of the world.

**Objectives:** the aims of the study were to determine the prevalence of septicaemia in children brought to the Institute of Child Health Banzazzau, Ahmadu Bello University Teaching Hospital, (ABUTH) Zaria and to isolate the aetiological agents responsible for septicaemia in these children.

**Methods:** Blood samples of children (aged one month – 12 years) with clinical symptoms of suspected septicaemia was taken under strict aseptic condition and inoculated into thioglycolate broth then incubated for 24hrs Subcultures were made after the first 24 hrs onto blood, chocolate and MacConkey agar plates and also when there were signs of bacterial growth shown by turbidity of the samples. Identification of isolates was based on their morphology on

agar plates, Gram stain reaction and biochemical properties.

**Results:** The mean age was three years with a peak in the first year of life. The male: female ratio was 1:1.3. *Staphylococcus aureus* and *Salmonella* species were the commonest isolates accounting for 24 (43.64%) and 13 (23.64%) respectively. Other bacterial isolates included Coagulase negative staphylococci (CoNS) (7.27%), *Citrobacter* specie (10.94%), *Pseudomonas* specie (7.24%), *Proteus* species (3.64%) and *Klebsiella* species (3.64%).

**Conclusion:** Results show both Gram positive and Gram negative bacteria to be implicated with septicaemia with *Staph aureus* and *Salmonella* being the most frequent aetiological agents, children less than or equal to five years were mostly affected, there is a need for routine monitoring of bacterial isolates and the age group at risk.

**Keywords:** Bacterial isolates, children, septicaemia.

### **Introduction**

Septicaemia is a clinical term used to describe severe life threatening bacteraemia in which multiplying bacteria release toxins into the blood stream and trigger the production of cytokines causing fever, chills, toxicity, tissue anoxia, reduced blood pressure and collapse, septic shock is usually a complication with Gram negative bacilli and less frequently Gram positive organisms<sup>1</sup>, Purpura or petechiae may be present<sup>2</sup>. The inclining aetiology may be bacterial, fungal, viral or other stimuli<sup>2</sup>. This condition is frequently reported in neonates and young children<sup>3</sup> and those with severe malnutrition. There has been a substantial increase in the incidence of septicaemia during the last decade particu-

larly in developing countries and are commonly community acquired<sup>4</sup>. The epidemiologic pattern of septicaemia varies from one region to another and even within a particular region it varies with time and age<sup>5</sup>. In Nigeria, the epidemiologic pattern of neonatal septicaemia has received greater attention than in infants and children<sup>6-10</sup>. A number of reports showed that *Staphylococcus aureus* and gram-negative enteric bacteria including *Salmonella* are the most common causes of septicaemia in neonates and older children<sup>6,9,11-15</sup>. There is little information about the incidence of septicaemia in infants and young children in our locality hence the rationale behind this study. The aims of the study were to determine the prevalence of septicaemia in children brought to the Institute of Child Health Banzazzau, Ahmadu Bello Uni-

versity Teaching Hospital, (ABUTH) Zaria and to isolate the aetiologic agents responsible for septicaemia in these children.

## Materials and methods

A cross sectional study of children with suspected septicaemia was done. The consent of the medical and scientific ethical committee of the Ahmadu Bello University Teaching Hospital, Zaria was sought and obtained before the research work commenced. Informed verbal consent from parents or caretakers of the patients was also sought prior to collection of blood sample. This study was carried out between December 2005 - December 2006 in the Institute of Child Health, Ahmadu Bello University Teaching Hospital, Zaria in children brought to out-patient clinic. The ICH caters for children 12 years and below and provides outpatient services only. All children requiring admission are admitted into department of Paediatrics ABUTH Zaria.

Venous blood samples of children aged (one month-12 years) with clinical symptoms of septicaemia were collected under strict aseptic precautions. Two millimeters of blood sample was collected, inoculated into thioglycolate broth and then incubated at 37°C. Subcultures were made after the first 24 hrs onto blood, chocolate and MacConkey agar plates and also when there were signs of bacterial growth shown by turbidity of the samples. The culture bottles were then discarded after seven days if no detectable bacterial growth. Identification of isolates was based on their morphology on agar plates, Gram stain reaction and biochemical properties as described by Cheesebrough<sup>1</sup>.

## Results

### Prevalence

Out of 135 blood samples of children investigated, an incidence of bacterial septicaemia was recorded in fifty-five (40.74%) of the cases, *Candida albican* was isolated in one case.

### Age

The age range of the fifty-five children was from 30 days to 12 years with a mean age of 3 years. Majority of the children were less than or equal to five years, with a peak in the first year of life (29.1%), 50.9% of those implicated were between 13- 60 months and 17.3% were over 60 months of age.

*Salmonella* and *Staphylococci* were associated with septicaemia in almost all age groups. *Citrobacter* was isolated in children aged 3 and less, children below 1 year were implicated with one organism or the other except *Klebsiella* sp. Table 1 shows age distribution of children with suspected septicaemia and their respective pathogens.

**Table 1:** Age distribution of children with suspected septicaemia and their respective pathogens

Month	All organ-ism	<i>Staph aureus</i>	<i>Salmonella sp.</i>	<i>Citrobacter sp.</i>	<i>Proteus sp.</i>	CO NS	<i>Klebsiella sp.</i>	<i>Pseudomonas sp.</i>
1-12	16	7	3	3	1	2	-	1
13-60	28	13	9	3	-	1	1	1
>60	11	4	2	-	1	1	1	4

## Discussion

Septicaemia has been reported to be one of the major causes of morbidity and mortality among children in developing countries of the world<sup>4</sup>. The prevalence of suspected bacterial septicaemia in this study was 40.74%. This is lower than the incidences reported from Ilorin (49.1%), Calabar (48.9%) but similar to Ibadan (41.3%) among children<sup>12, 17, 14</sup>. However, this incidence may not be the actual incidence in the locality as neonates were excluded from this study. The observed incidence was generally community-acquired as only children on outpatient clinics were investigated. Although females were slightly in the majority, in contrast to other studies where males were reported to be more implicated, no evidence has been given to be responsible for gender difference. The most common bacterial aetiological agent was *Staphylococcus aureus* (43.64%).

The observation agrees with the reports from other centres, where *Staphylococcus aureus* septicaemia had a prevalence of 30.3%, 50%, 33.1% and 48.7% respectively<sup>12-14, 17</sup>. *Salmonella* is also another major cause of septicaemia, it accounted for 23.64% of bacteria isolated in this study. This incidence is much higher than (12.6%, *S. typhi* and 3.9%, *S. paratyphi*) as reported from Ibadan<sup>13</sup> and 10.7% reported earlier in the same locality<sup>14</sup>. *Salmonellae* was observed commonly associated with septicaemia in children aged five (5) and below, in contrast with an earlier report where *Salmonella* species displayed a high incidence of septicaemia in children of age bracket five and 11 years<sup>13</sup>. The high isolation rate of *Salmonella* may be due to inadequate facilities used in disposing human faeces, potable water and close contact between heavily faecally contaminated water supplies and humans. The incidence of *Klebsiella* septicaemia was quite low 3.64%, when compared with reports from Ibadan 21.4%, Kano 14.3% and Ilorin 7.3%<sup>14, 17, 12</sup>.

Coagulase negative Staphylococci previously considered a contaminant has been recognized increasingly as a cause of bacteraemia<sup>18</sup>. CoNS was isolated in 7.27% of cases, mostly affecting children below the ages of five years. Similarly in Ilorin CoNS was isolated highest (34.0%) in children less than five years<sup>12</sup>. It has been reported that the aetiologic agents of septicaemia may vary from place to place and even within the same region it varies with time and age.

Both Gram positive and Gram negative bacteria still pose a great threat to lives of children in this locality, there is need for regular monitoring of the aetiological

agents of septicaemia so as to determine any change in the epidemiologic pattern, this will help in the

management of septicaemia especially in our setting where there are limited laboratory facilities.

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