

## REVIEW ARTICLE

**Salmonella Sepsis in African Children**

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Infection with both *Salmonella typhi* and non-typhi salmonella (NTS) is common among children in many African countries. *Salmonella typhi* predominates among older children and adults with the typical localising features of enteric fever. Nontyphoid salmonellae species are more often reported among children under 5 typically presenting as a febrile illness with no localising signs (1-3).

In studies from tropical Africa of paediatric bacteraemia, salmonella species were the commonest organisms isolated and accounted for 25% to 84% of all isolates, depending on the inclusion criteria (2-6). Invasive salmonellosis has been associated with the rainy season (1,2,6) malnutrition (2-6), anaemia (1-6) and with malaria parasitaemia (6). It is likely also to be associated with HIV infection, especially in the context of frequent bacteraemic relapses (7).

**Clinical Context:**

**Salmonella septicaemia should be suspected in all children with malaria in whom fever persists after they have received correct antimalarial treatment and in all febrile children, sick enough to require admission in whom there is no focus of infection on clinical examination.** The fever in severe malaria treated adequately with quinine is expected to return to normal by 3 days. Associated clinical features such as diarrhoea, cough and hepatosplenomegaly are common in children with invasive salmonellosis (1-3) but clearly lack specificity and are not likely to be helpful. A report from the Gambia found that 50% of blood culture isolates from children satisfying the WHO criteria for pneumonia presenting in wet season were salmonella spp (8). In a pneumonia study at Queen Elizabeth Central Hospital, salmonella spp were the second most common isolate on blood culture after pneumococcus (9). However, it is not certain that salmonella is actually a cause of pneumonia.

Experience over the last two years in the paediatric department at Queen Elizabeth Central Hospital, Blantyre, Malawi has shown that non-typhi salmonella account for almost half of over six hundred confirmed cases of septicaemia. The commonest isolate is salmonella typhimurium. As noted elsewhere the diagnosis is associated with anaemia, malnutrition and malaria (personal communication, A Walsh). HIV status is rarely known. Further, a one year prospective study found that *S. typhimurium* was the second commonest cause of neonatal meningitis following *Gp B streptococcus*, and the third commonest cause of bacterial meningitis beyond 2 months of age after *Streptococcus pneumoniae* and *H influenzae type B*. (10)

Salmonella was also the commonest organism isolated in studies of childhood septic arthritis in Malawi, Kenya and Zambia (11-13). The salmonella arthritis occurred in the rainy season and occurred in young children who were often malnourished and anaemic. The shoulder was the most frequently affected joint and Molyneux postulated that the repeated minor trauma sustained when children are lifted on to the mother's back by the upper arm may be the reason for the predilection for this site (11). No child with sickle cell disease was identified in these studies though salmonella sepsis especially osteomyelitis, is a recognised complication of this condition.

**Antibiotic resistance**

Antibiotic resistance has emerged and poses a difficult problem in some parts of the world, such as India, where first-line treatment for *Salmonella* infection is now ciprofloxacin. A similar problem is emerging in Africa. As early as 1984, Lepage and co-workers reported multiresistant *S. typhimurium* infection in Rwanda which required cefotaxime for successful treatment (14). The recent study from Zaire used ciprofloxacin to treat proven and suspected cases as the organism was said to be no longer susceptible to more widely available and cheaper antibiotics such as cotrimoxazole or chloramphenicol (4). Fortunately, at present in Malawi, salmonella isolates remain sensitive to chloramphenicol. When this situation changes, as is perhaps inevitable, the ability to effectively treat salmonella sepsis will be seriously affected. The epidemiology and transmission of salmonella infection along with the organisms ability to develop resistance to multiple antibiotics require further study if we were to aim for effective preventive measures.

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