

***Salmonella* Meningitis in a Two Months Infant from Odisha, India: A Rare Case Report**

C. P. Khuntia¹, S. K. Kar², N. Mohanty³, H. K. Khuntia⁴ and B. Dwibedi⁵

¹Regional Medical Research Center (ICMR), Bhubaneswar, Odisha, INDIA

²Regional Medical Research Center (ICMR), Bhubaneswar, Odisha, INDIA

³SCB Medical College and Hospital, Cuttack, Odisha, INDIA

⁴Regional Medical Research Center (ICMR), Bhubaneswar, Odisha, INDIA

⁵All India Institute of Medical Science, Bhubaneswar, Odisha, INDIA

⁵Corresponding Author: bhagirathidwibedi@yahoo.com

ABSTRACT

Salmonella meningitis is a disease with high mortality in infants though incidence is rare. This article reports a case of *Salmonella meningitis* in a two months male infant, who presented with high fever, convulsion and difficulty in breathing. *Salmonella typhi* was isolated from cerebrospinal fluid (CSF), that showed resistance to Cephalosporins, Fluroquinolones, Macrolides and Aminoglycosides but susceptibility to Chloramphenicol and Cotrimoxazole. This case was admitted on fourth day of onset of illness and treated with parenteral Vancomycin and Ceftriaxone to cover both gram positive and negative bacterial agents of bacterial meningitis in a young infant, but succumbed to death on ninth day of illness. This indicated importance of *S. typhi* as a possible bacterial etiology and a great concern on resistance to the normally chosen antibiotics. An early suspicion can be suggested to reduce the risk of mortality. Environmental hygiene and household cleanliness practices also warrants attention, which were identified as possible risks for enteric infection in spite the baby was absolutely breast fed.

Keywords- *Salmonella*, Cotrimoxazole, Fluroquinolones, Aminoglycosides, Chloramphenicol, *S. typhi*.

I. INTRODUCTION

Salmonella meningitis though uncommon in young infants; is of great concern owing to high mortality rate (up to 89%) and complication or sequelae (Hung-Ming Wu et al., 2011 and Swann et al., 2014). It carries greater potential for relapse among survivors compared to meningitis caused by other gram negative bacteria (Elizabeth et al., 2000 and Hung-Ming Wu et al., 2011). It especially remained a threat to children below two years of age in both developed and developing countries (Schutze et al., 1997, Hung-Ming Wu et al., 2011). Center for Diseases Control (CDC), USA reported a third of the patients yielding *Salmonella* isolates from the Cerebro Spinal Fluid (CSF) were younger than 3 months and more than half were younger than one year (Molyneux et al., 2009). Moreover among *Salmonella* species *S. typhimurium* were seen to be dominant (75–88%), followed by *S. enteritidis* (8–16%);

while *S. typhi* (1–4%) was the least frequent contributor (Molyneux et al., 2000). Hence, early recognition of *Salmonella meningitis* and its acute complications becomes essential in young infants considering its adverse outcomes. But lack of reports on *Salmonella meningitis* from developing countries like India and active guideline or recommendation from pediatric societies on *Salmonella meningitis* management possibly keeps away the pediatricians, in considering its importance.

Case Report

We present here a case of a two-month old male baby of a low socioeconomic status family from rural area of Odisha in Eastern India. The baby was admitted to Pediatric ward of SCB Medical College and hospital, Cuttack with high fever, convulsion and difficulty in breathing. The patient was apparently healthy four days prior to attending the hospital. He presented with sudden onset of high grade continuous fever and had convulsion on the second day that started as a focal convulsion and later became generalized, lasting for around two hours. Convulsion episodes recurred on third and fourth day. The baby had received treatment that included one dose of Vancomycin (15 mg/kg/dose) through intramuscular injection daily in a local health care set up for initial four days and then brought to above said hospital with the cited problems. At admission the baby was drowsy having temperature of 102⁰ F, pulse rate 120/ min and respiration rate of 40/min. His body weight was 4000 gms. But, general condition deteriorated rapidly with repeated convulsions and gasping respiration with apnoeic spells. Hence the patient was shifted to Intensive Care Unit of Sardar Vallabh Patel Post Graduate Institute of Pediatrics; the specialized pediatric facility attached to the above medical college. Intravenous antibiotics Ceftriaxone (50 mg/kg/dose) plus Vancomycin (15 mg/kg/dose), anticonvulsants, ventilatory support with intubation and other supportive care were instituted under intensive observation.

Birth history revealed that he was born at term by normal vaginal delivery to a primi-gravida mother in a local health care center and birth weight was 2.2 kg without any significant postnatal illness or difficulty.

None of the family members had history of respiratory or gastrointestinal illness including enteric fever within last 4 weeks. However, the baby was belonging to a family with poor rural housing setting and living condition was recorded to be relatively unhygienic evident from potential stagnation of water body and presence of cattle shed in close vicinity of the living house.

Laboratory investigation showed hemoglobin level of 8.9g/dl, total leucocyte counts 13000/mm³ and platelet count of 2 lacs/mm³. Differential count showed 59% mononuclear cells and 40% Neutrophils with toxic granules. Serum electrolytes were within normal level. Serum urea level was 40 mg/dl and creatinine was 0.9mg/dl. CSF analysis was suggestive of pyogenic meningitis with high protein (270mg/dl), low sugar (14mg/dl) and WBC count of 1100/mm³. Neutrophil count was 30% and Lymphocytes were 70% in CSF cytology. CSF Culture was positive for *Salmonella typhi* where as the blood culture did not show any bacterial growth.

Salmonella typhi isolate was sensitive to Chloramphenicol, Cotrimoxazole, and resistant to Ciprofloxacin, Ceftriaxone, Ceftazidime, Cefotaxim, Amikacin and Ampicillin. Accordingly, parenteral Chloramphenicol was added on fourth day post hospitalization to the antibiotic combination already instituted. The baby showed no improvement in spite of above medication. The general condition was rapidly deteriorated with no spontaneous respiration, oliguria and deepening of coma. The baby succumbed to death on 5th day after hospital admission.

II. DISCUSSION

Salmonella infections are usually limited to gastrointestinal tract, but there has been an increasing concern on extra intestinal Salmonellosis especially meningitis (Molyneux et al., 2009). *Salmonella* meningitis is becoming an important clinical entity because of poor outcome though the incidence is low compared to other gram negative bacteria. Human beings acquire *Salmonella* by ingestion of contaminated food or water and primarily infect the alimentary tract with gastroenteritis as the most common clinical presentation. Focal infection like meningitis follow bacteremia which occurs as a result of migration of the organism across the gastrointestinal tract to blood stream then meninges. Pediatric population were seem to be more prone to such invasive infection (Sighal et al., 2012) and 50-75% cases of *S. typhi* meningitis in children occur in the first four months of life (Nwadike et al., 2012). An immature blood-brain barrier and poorly developed immune system in young children were thought to be responsible for such meningeal disease (Ofori and Scheld, 2003). Transmission of *Salmonella* infection from mother to baby is also possible when a pregnant woman is exposed to

Salmonella infection or she is an intestinal carrier (Molyneux et al., 2009).

Acute hydrocephalus, seizures, ventriculitis, abscesses, subdural empyema were reported as the clinical presentations in most salmonella meningitis cases (Hung-Ming Wu et al., 2011). High grade fever, anemia, seizures, malnutrition and diarrhea were the other clinical features and observed in more than half of the patients. (Ofori and Scheld, 2003). In this report *Salmonella* meningitis was observed in a two-month old infant having high grade fever with generalized seizure and without any gastrointestinal symptoms; who was of normal weight per age and absolutely breast fed. None of the family members had history of gastrointestinal illness or enteric fever. Possible risk factors for acquisition of the infection could be the unhygienic living condition reported as stagnant water body and cattle shed in the vicinity of the living house affecting maternal hygiene. Besides practice of daily cleaning the tongue of the baby with a cotton or cloth piece adapted by the mother could have been the possible route of infection. The use of well water or pond water without boiling or proper chlorination might be another source of infection Under nutrition in the child and unhygienic living condition or unhealthy practices were also shown earlier as the other factors for *Salmonella* meningitis acquisition (Ofori and Scheld, 2003).

Besides above risk of transmission in rural settings, treatment of *Salmonella* meningitis also seems to be evolving as a challenge because of antibiotic resistance though various drugs had been effectively used, like third generation Cephalosporin, Fluroquinolones. Chloramphenicol, Ampicillin and Cotrimoxazole. In a study on *Salmonella* meningitis in Malawi (Molyneux et al., 1998), in vitro sensitivity of isolates suggested susceptibility to Chloramphenicol similar to our observation. Unfortunately our case had fatal outcome inspite of Chloramphenicol addition that was mostly because it was started late i.e eighth day of onset of illness and or bacteriostatic action of Chloramphenicol against *Salmonella* (Preblub et al., 1984). Though the patient was initially treated with Ceftriaxone along with Vancomycin, it did not show any response which corroborated with the antibiogram profile showing resistance to the above antibiotics. Earlier studies also revealed poor response to Cephalosporine with a case fatality rate to be 28.6 % (Lecour et al., 1989) where as Cephalosporins, combined with Chloramphenicol had a high cure rate (> 80%) (Hung-Ming Wu et al., 2011). But few early reports of *S. typhi meningitis* available from India didn't reveal resistance to Chloroquinolones, Chloramphenicol, Cefotaxime & Ceftriaxone (Duggal et.al, 2015, Kumar et. al 1993).

There is no consensus of treatment of *Salmonella* meningitis in absence of clinical trial and cohort studies but as per available reports and expert opinion Ceftriaxone or Cefotaxim were being used as

suitable alternatives because of good penetration to CSF and low report of drug resistance of *Salmonella* (AAP, 2000). More ever, in view of above frequent concomitant use of antibiotics it is difficult to evaluate the agents critical for monotherapy of *Salmonella* meningitis. Therefore, combination of third generation Cephalosporin with other conventional antibiotics like Chloramphenicol may be fruitful in preventing case fatality with early suspicion of *Salmonella* meningitis and early treatment.

In conclusion, to the best of our knowledge this is the first report of multidrug resistant *S. typhi* associated meningitis in a young infant from Indian region and this would be useful to sensitize the clinicians that, *S. typhi* could be the causative organism of meningitis in tropical region; though it is rarest among the *Salmonella* species reported in meningitis. Hence prompt diagnosis in patients with fever and convulsion having socio-environmental risk for possible enteric infection with adequate investigation and initial empirical antibiotic combination designed to cover *Salmonella* infection along with a follow up plan for detecting & managing neurological sequelae may be considered essential. Community awareness and education to the mother on infant care also need to be stressed upon in vulnerable population to prevent risk of enteric infection in young infants, who are immunologically less competent.

ACKNOWLEDGEMENT

The authors are thankful to the concerned Pediatricians of the hospital, Parent and the patient and DG, ICMR for cooperation.

REFERENCE

- [1] American Academy of Pediatrics. Committee on Infectious diseases. *Salmonella* infections. In: Peter G, editor. Report of the committee on infectious diseases. 25th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2000 p. 503.
- [2] Duggal S, Rongpharpi S R, Kumar A, Gur R. *Salmonella* Typhi Meningitis in A Two Year Old Child: A Case Report. *National J of Laboratory Medicine*, 2015; 4(4): 59-61
- [3] Elizabeth H P, Louvois J D, Workman M R. Antibiotics for *Salmonella* meningitis in children. *Antimicrob Chemother* 2000; 46: 653-655.
- [4] Hung-Ming Wu¹, Wan-Yu Huang, Meng-Luen Lee, Albert D Yang, Ko-Ping Chaou, Lin-Yu Hsieh. Clinical features, acute complications and outcome of *Salmonella* meningitis in children under one year of age in Taiwan. *BMC Infectious Diseases* 2011; 11:30.
- [5] Kumar R, Gupta BK, Khurana S. Incidence of *Salmonella* meningitis in Ludhiana (Punjab). *Indian Journal of Pathology & Microbiology* 1993; 36(1):1-4.
- [6] Lecour H, Seara A, Cordeiro J, Miranda M. Treatment of childhood bacterial meningitis. *Infect* 1989; 17:343-346.
- [7] Molyneux EM, Walsh AL, Malenga G, Rogerson S, Molyneux ME. *Salmonella* meningitis in children in Blantyre, Malawi, 1996-1999. *Ann.Trop. Paediatr.* 2000; 20(1):41-4.
- [8] Molyneux E M, Mankhambo L A, Phiri A , Graham S M, Forsyth H, Walsh A L, Wilson L K, Molyneux M E. The outcome of non typhoidal *Salmonella* meningitis in Malwian children 1997-2006. *Ann Trop Pediatr* 2009; 29(1): 13-22.
- [9] Molyneux E M, Phiri A, Walsh A, Molyneux M E. Acute bacterial meningitis in children admitted to the Queen Elizabeth Central Hospital, Blantyre, Malawi in 1996-97. *Trop Med & Int Health* 1998; 3(8): 610-618.
- [10] Nwadike, V. U., Fowotade, A., Tuta, K. E., & Olusanya, O. O. A rare case of salmonella typhi meningitis in an eleven month old infant: a case report. *Annals of Ibadan postgraduate medicine* 2012; 10(1): 38-39.
- [11] Ofori A O, Scheld W M. Treatment of *Salmonella* meningitis: two case reports and review of the literature. *Int J Infect Dis* 2003; 7: 53-60.
- [12] Preblub S R, Gill C J, Campos J M. Bactericidal activities of Chloramphenicol and eleven other antibiotics against *Salmonella* spp. *Antimicrob Agents Chemother* 1984; 25(3): 327-330
- [13] Price E H, De Louvois J, Workman M R. Antibiotics for *Salmonella* meningitis in children. *J Antimicrob Chemother* 2000; 46(5):653-655.
- [14] Swann O, Everett D B, Furyk J S, Harrison E M, Msukwa M T, Heyderman R S.. Bacterial meningitis in Malawian infants <2 months of age: etiology and susceptibility to World Health Organization first-line antibiotics. *Pediatr. Infect. Dis. J.* 2014; 33(6):560-5.
- [15] Schutze G E, Schutze S E and Kirby R S. Extra intestinal Salmonellosis in children's hospital. *J Pediatr Infect Dis* 1997; 16(5): 482-485.
- [16] Sighal V, Salem E K, Rajesh S M, Coutinho A. Neonatal *Salmonella typhi* meningitis: A rare entity. *J Clin & Diag Res* 2012; 6(8):1433-1434