Nigerian Journal of Paediatrics 1993; 20(4): 89-93

Pyogenic Meningitis in Samtah, Saudi Arabia

JO OBI* AND PS SUGATHAN**

Summary

OBI JO and SUGATHAN PS. Pyogenic Meningitis in Samtah, Saudi Arabia. *Nigerian Journal of Paediatrics* 1993; **20:** 89. In a retrospective study of 2050 admissions, over a period 25 months, 2.5 percent of the admissions were found to be cases of pyogenic meningitis. The total number of deaths during the same period was 90 and pyogenic meningitis accounted for 9.0 percent of this total mortality. The case mortality was 15.7 percent and 62.5 percent of these deaths occurred in infants. The predominant organism isolated from the cerebrospinal fluid was *H influenzae*, except in children under the age of two months in whom other organisms were implicated. *H influenzae*, *S pneumoniae* and *N meningitidis* constituted 76.5 percent of all the positive cultures. Clinical features of the CNS infection, such as neck stiffness, Kernig's sign and seizures were less often noted. Eleven patients had various complications which occurred more frequently in infants as well as in those who presented at hospital, five days or more, after the onset of illness.

Introduction

STUDIES in many parts of the world, have shown that bacterial meningitis still carries a high morbidity and mortality, despite advances which have been made in the development of antibiotics and chemotherapeutic agents. [1-3] Mortality, ranging from five to 50 percent and neurological sequelae estimated at 20 - 40 percent, have been reported. [3-5] Delays in diagnosis and institution of effective treatment have contributed to the high morbidity and mortality. Associated clinical conditions such as sickle-cell anaemia, bronchopneumonia and septicemia, appear also, to contribute to the poor outcome in the disease. [4 6 7] The present retrospective study was undertaken to document the clinical manifestations and causative bacterial organisms of childhood meningitis in Samtah, a town in the South Western region of Saudi Arabia and compare the findings with those from other parts of the country and elsewhere.

Samtah General Hospital, Saudi Arabia

Department of Paediatrics
**Senior Consultant
* Consultant

Correspondence: James O Obi
Department of Paediatrics
Assir Central Hospital
P O Box 34
Abha, Saudi Arabia.

Patients and Methods

Samtah General Hospital admits patients from its outpatient clinics, its emergency room and from 29 Primary Health Centres in the area. The hospital refers patients to King Fahad Central Hospital,

Gizan, which is a tertiary centre in the South West region of the country. Records of children with meningitis, admitted between August, 17 1988 and September, 16 1990, a period of 25 months, were studied and information abstracted from these records included age, sex, clinical presentation, duration of illness before admission, bacterial organisms, complications, associated illnesses and outcome of the disease. Diagnosis of pyogenic meningitis was based on the following criteria, as suggested by Dalton and Alison:[8] (a) identification of bacteria in the CSF by culture; (b) identification of bacteria in the CSF by Gram stain, (c) cerebrospinal fluid (CSF) pleocytosis with 60 percent polynuclear leucocytes; (a) CSF glucose less than 40 percent of simultaneous blood sugar (e) CSF protein greater than 80mg/l. Presence of criteria (a) and or (b) is sufficiently diagnostic, but in the absence of (a) or (b), diagnosis is made when criteria (c), (d) and (e) are all fulfilled. Diagnosis of partially treated meningitis is made when criteria (a) and/or (b) are not fulfilled, but criteria (c), (d), and (e) are and there is in addition, a history of antibiotic usage prior to the first lumbar puncture.

Results

During the 25-month period covered in the study, 51 cases of bacterial meningitis were recorded out of 2050 admissions in the paediatric ward; thus, meningitis represented 2.5 percent of the total admissions. The 51 patients (33 males and 18 females, ratio 1:8:1) were aged between one month and 4 years and 43 (84 percent) were under two years of age (Table 1). CSF culture was positive in 43 (84 percent) out of the 51 patients and sterile in eight (16 percent). Out of the 43 positive CSF cultures, *H influenzae* was found in 20 (46.5 percent), *S pneumoniae* in nine (21 percent) and *N meningococcus* in four (9.0 percent), while a miscellaneous group, comprising *Stept pyogenes, E coli,* group *A Strept, Staph aureus,* Enterobacter, Salmonella spp and Klebsiella spp constituted the remaining 10 (23.5) percent) isolates.

TABLE 1

Age Distribution and Mortality Pattern among 51 Patients with Meningitis.

Age (Years)	*No of Cases*	*Percent of All Cases*	*No of Deaths*	*Percent of Total Deaths*
<1	36	70.6	5	62.5
1 - 2	7	13.7	2	25.0
3 - 4	8	15.7	1	12.5
Total	51	100.0	8	100.0

Out of the 20 patients who had *H influenzae* meningitis, 19 (95.0 percent) were aged two years and below; seven (78 percent) out of nine patients with *S pneumonia* were also under the age of two years, while only one out of the four children with *N meningitides* was below two years of age. *S pneumonia* was isolated from the CSF of four patients with sickle-cell anaemia.

Clinical manifestations on admission are shown in Table 11. Forty-five (88 percent) out of the 51 patients presented with fever (rectal temperature > 37.5°C). Twentyfive (49 percent) patients presented with excessive crying and irritability. Sixteen children (31 percent) had seizures as a presenting problem. Meningeal signs (neck stiffness and positive Kernig's sign), drowsiness/coma, were the least frequent clinical manifestations. Seven children with altered sensorium might have been sedated in the dispensaries or emergency room before admission into the ward.

Out of the 51 patients, 11 (21.6 percent) had neurological complications (Table 111), for which transfer to a tertiary medical centre was undertaken. Seven (63.6 percent) of the 11 patients

with complications were admitted into the hospital five days or more, after the onset of illness. The average interval between onset of illness and admission for all the patients was 4.5 days.

TABLE 11

Presenting Symptoms and Signs in 51 Patients with Meningitis

Symptom	*No of Cases*	*Percent of Total*
Fever	55	88.0
Executive crying	25	49.0
Vomiting/diarrhoea	19	37.0
Refusal to feed	18	35.0
Seizures	16	31.0
Cough	6	11.7
Sign		
Drowsiness	17	33.0
Bulging anterior fontanelle	17	33.0
Neck stiffness	14	28.0
Positive Kerning's sign	12	24.0

Seven out of the 11 children with complications were infants. The organisms that were associated with complications (Table 111) included *H influenzae* (four cases) and *S pneumonia* (three cases); in four patients with complications, the CSF culture was sterile There were 33 patients (65 percent) who had associated diseases, the commonest of which was iron deficiency anaemia in 15 patients. Sickle-cell anemia was associated with four cases, in all of whom *S pneumonia* was isolated from the CSF. *H influenzae* was isolated from the CSF of three cases who also had otitis media. Eight (15.7 percent) of the 51 patients died. The total number of deaths recorded in the paediatric wards during the same period was 90; thus, bacterial meningitis accounted for nine percent of the total mortality. Of the eight deaths, five (62.5 percent) occurred in infants (Table 1). Death occurred in five (62.5 percent) out of the eight patients with associated diseases.

TABLE 111

Neurological Complications, Causative Organisms and Age of Patients with Meningitis

Complication	*Organism*	*Age (months)*
Ventriculitis and recurrent seizures	*H Influenzae*	4
Subdural effusion	*H Influenzae*	5
Brain abscess with recurrent generalized seizures	*H Influenzae*	6
Brain abscess	Pneumococcus	7
Subdural effusion and recurrent focal seizures	*H Influenzae*	8
Subdual effusion	Pneumococcus	8
Hydrocephalus	-	10
Subdural effusion	-	10
Left hemiplegia	-	10
Brain abscess	Pneumococcus	15
Recurrent focal seizures	-	30

Discussion

The present study has confirmed previous observation that the incidence and mortality of pyogenic meningitis is highest among infants. Our finding in this regard, is similar to the findings of Azubike [7] and Abomelha *et al* [9] in their studies of paediatric meningitis in the North Western and the Eastern provinces of Saudi Arabia, respectively Although bacterial meningitis may be responsible

for a small proportion of total childhood admissions, it usually contributed to a higher proportion of mortality. In the present study, meningitis accounted for 2.5 percent of total paediatric admissions, but accounted for six percent of total mortality. In the present study, *H influenzae* was the predominant causative organism in meningitis in children under the age of two years. This is similar to the findings in Tabuk (North Western) and in the Eastern province of Saudi Arabia, respectively. [7 9] Pneumococcal meningitis accounted for 23.8 percent of the cases in the Eastern province,[9] while in the North West province,[7] its prevalence was 18 percent. The risk of pneumococcal infection, including meningitis, is reportedly very high in patients with splenic dysfunction as often seen in patients with sickle-cell anaemia and other haemoglobinopathies.[10] It has been postulated that the high incidence of pneumococcal meningitis in the various studies from Saudi Arabia, may be due to the high prevalence of sickle-cell and thalassemia genes in the population.[11]

Some workers [8 12] have observed that the initial bacterial examination of the CSF in children with pyogenic meningitis may be negative in between five and 20 percent of cases. This false negative result may be obtained when lumbar puncture is carried out within 24 to 48 hours (early) of onset of meningitis. Similarly, there may be a failure to identify bacteria, if there are less than 10^3 colony-forming units per ml of CSF. In such a situation, the positivity may be as low as 25 percent, but may be as high as 97 percent, if the colony forming-units are up to 10^5 per ml. The high positive culture yield in the present study, may be attributed to the fact that CSF examination was carried out late, as there was a delay of an average of 4.5 days before hospitalization of the patients.

Clinical manifestations of meningitis such as neck rigidity, Kernig's sign and seizures were not prominent in the present series. This emphasizes the non-specific clinical presentation of meningitis in early infancy; therefore, a high index of suspicion is required for early diagnosis of meningitis in early infancy. Although *H influenzae* was the predominant causative organism in the present study, it was not isolated in patients under the age of two months. The five youngest infants with *H influenzae* in the series were aged three months. Pneumococci and *E coli* were however, cultured from the CSF of three infants under the age of two months. These findings are in agreement with those of previous workers. [1 9 10]

The frequency of neurological sequelae in our series was higher with *S pneumonia* and *H influenzae* than with other organisms, while recovery without neurological sequelae occurred with *N meningitides* as have been reported by other workers. [1 12] Our experience also shows that the complication pattern of meningitis among Saudi Arabian children is similar to reports elsewhere. [3 5-8] The complications were more in the patients who sought medical attention after five days of onset of illness. Although the incidence of childhood meningitis is generally low in Saudi Arabia, the mortality rate is high. Previous studies have reported that associated diseases predispose to poor prognosis. [6 7] In the present series, 62.5 percent of those who died, had associated diseases; except for iron deficiency anaemia, these associated diseases were, *per se* serious enough to cause death.

Acknowledgements

Our gratitude goes to Miss Mary PK, Head nurse and her colleagues in the Paediatric Department and to the Staff of Medical Records Department, for their assistance in data collection.

References

1 Obi J and Wemambu SNC. Childhood meningitis in Benin City. *East Afr Med J* 1980; **57:** 781-6.

2 Montefiore D, Alausa OK and Sobayo E. Pyogenic meningitis in Ibadan, Nigeria: a 15-month prospective study. *Scand J Infect Dis* 1978; **10** 113-7.

3 Jadavji T, Biggar WD, Gold R and Prober GG. Sequelae of acute bacterial meningitis in children treated for seven days. *Pediatrics* 1986; **78:** 21-5.

4 Baird DR, Whittle HC and Greenwood BM. Mortality from pneumococcal meningitis. *Lancet* 1976; **61:** 1344-6.

5 Herson VC and Todd JK. Prediction of morbidity in *Haemophilus influenzae* meningitis. *Pediatrics* 1977; **59:** 35-9.

6 Weiss W, FIgueroa W, Shapiro WH and Harrison F. Prognositic factors in pneumococcal meningitis. *Arch Int Med* 1967; **120:** 517-24.

7 Azubuike JC. Childhood bacterial meningitis in Tabuk, Saudi Arabia. *Ann Saudi Med* 1990; **10:** 145-8.

8 Dalton HP and Allison MJ. Modification of laboratory results by partial treatment of bacterial meningitis. *Am J Clin Path* 1968; **49:** 410-3.

9 Abomelha Abdulla, Uduma SA, Saleh MF, Al Rajeh S, Sibai MS and Al-Agib A. Childhood meningitis. *Ann Saudi Med* 1988; **8:** 274-8.

10 Austrian R, Lukens J and Seeler RA. Pneumococcal infection in sickle-cell anaemia. *Am J Dis Child* 1972; **123:** 614-5.

11 Alwamy BH, Niazi EL and Mouzan MI. Relationship of haemoglobin F and Alpha Thalassemia to severity of sickle-cell anemia in Eastern province of Saudi Arabia. *Ann Trop Paediatr* 1986; **6:** 261-5.

12 Haelemeskel H and Tafar N. Bacterial meningitis in childhood in African City. *Acta Paediatr Scand* 1978; **67:** 725-30.