

# BACTERIAL MENINGITIS IN ADULTS AT THE UNIVERSITY OF CALABAR TEACHING HOSPITAL. A 5-YEAR RETROSPECTIVE STUDY 1993-97

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## ABSTRACTS

A retrospective study of cases of adult Bacterial meningitis managed at the University of Calabar Teaching Hospital Calabar over a 5-year period (1993-97) was carried out to determine the Clinical presentation, morbidity and the management outcomes during the survey period. A total of 66 patients whose case records were found intact were selected for the study. The case records of these patients were reviewed for clinical features on presentation, the initial results of investigations mainly lumbar puncture and cerebrospinal fluid analysis and nature of culprit organisms. The management outcome of each patient was also noted.

The study revealed that forty one out of 66 patients recovered fully from the illness after treatment, nineteen patients died and six patients left against medical advice. The predictor of morbidity and mortality were (a) late presentation with altered levels of consciousness or outright coma; (b) early presentation while fully conscious and (c) inadequate/inappropriate medication prior to arrival in hospital. Mortality rate was higher among patients who received inadequate antibiotics, presented late for treatment; and in those presenting with altered level of consciousness. The mortality rate was 59% and 52% respectively. The values for each category were statistically significant when compared with mortality rates of patients who presented very early for treatment, had adequate doses of antibiotics, and were fully conscious on arrival and during treatment,  $P < 0.05$ .

The common complications associated with adult bacterial meningitis were septicemia, aspiration pneumonia and cranial nerve palsies. Bacterial meningitis still remains an important cause of morbidity and mortality in this environment. Adequate therapeutic coverage, health education, and immunization where available, are required to control the scourge of this disease.

KeyWords: Adult Meningitis, Calabar.

## INTRODUCTION

Changes in government health policies, apparently dictated by severe socioeconomic difficulties in the past couple of years have adversely affected the clinical management of

emergencies in hospitals, particularly in developing countries. Bacterial meningitis is a globally recognized medical emergency whose management has been rendered particularly frustrating by some of the changes referred to above. (Moffot and Hanley 1998; Berkowitz et al. 1988).

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Many years ago, doctors and other health professionals responded promptly to emergency calls. Diagnoses were made early and treatment was appropriate, adequate and prompt. Hospitals provided the prescribed quality drugs and patients paid for them later on discharge. But today, some of the market-driven changes in health policy in Nigeria, introduced about eight years ago demand that patients, without exception, should go and buy their drugs when out of stock in the hospital or pay first before treatment is commenced. Many patients are unable to do that, as some will require several days to mobilize the necessary funds. This avoidable delay in the initiation of emergency drug therapy certainly contributes to the morbidity and mortality of this condition among such patients. Further, worried by the continuing deterioration of the patient's condition, the patient is withdrawn from the hospital by relations, for alternative treatment where most of them eventually die. These factors have affected the management of bacterial meningitis in our hospital from 1993-97 and the effect on the outcome of treatment and other meningitis-related problems in Nigeria form the subject of paper.

## SUBJECTS AND METHODS

The study involved a five-year review of adult bacterial meningitis cases managed at the University of Calabar Teaching Hospital, Calabar, Nigeria, from 1993-1997. All available case records of patients managed for bacterial meningitis during the study period were analysed. A total of 66 patients consisting of 48 males and 18 females, whose records were found intact, were reviewed. Data collected included age, sex, and mode of initial presentation, treatment received, various complications observed during treatment and management outcome. Only patients with definite bacterial causes were included in the study. This was confirmed by lumbar puncture and cerebro spinal fluid (CSF) examination.

## DIAGNOSIS:

Durand's (Duran et al 1993) diagnostic criteria for bacterial meningitis were used in checking the accuracy of the diagnosis of the 66 patients under review. Durand criteria for diagnosis of meningitis include:

- (a) Positive Neck and back rigidity
- (b) Fever
- (c) Headache
- (d) Seizures
- (e) Impairment of consciousness
- (f) Positive CSF culture of organism

The presenting clinical manifestations and the diagnosis were obtained and analyzed using above diagnostic criteria.

## DATA ANALYSIS

Where necessary, values were reported as percentages of number of cases involved. Mortality rate indices were compared using student's t-test. The differences were considered statistically significant when p-values were  $<0.05$ .

## RESULTS

TABLE I illustrates the clinical profile of the cases under review. A total of 66 patients aged 20-68 years formed subjects for the study. These consisted of 48 (72.7%) males and 18 (27.3%) females. Twenty-seven patients were fully conscious at presentation while 39 patients had altered level of consciousness on admission. Six patients later left the hospital against medical advice, while 19 patients died despite all efforts to rescue them. However, 41 patients recovered completely and were discharged home. Most of them were very active individuals such as students (n=15), businessmen (26) and civil servants (12).

TABLE II Shows the mortality indices among the patients reviewed. Patients who received inadequate antibiotic treatment had a higher

**TABLE I. CLINICAL PROFILE OF CASES UNDER REVIEW (n=66)**

| PATIENTS DATA                   |                                | NO OF PATIENTS | PERCENTAGES |
|---------------------------------|--------------------------------|----------------|-------------|
| Age                             | 20-30                          | 17             | 25.7        |
|                                 | 31-40                          | 20             | 30.3        |
|                                 | 41-50                          | 26             | 39.3        |
|                                 | 59-60                          | 2              | 3           |
|                                 | >60.                           | 1              | 1.5         |
| Sex                             | Male                           | 48             | 72.7        |
|                                 | Female                         | 18             | 27.3        |
| Mode of patient at presentation |                                |                |             |
| 1.                              | Coma                           | 16             | 24.2        |
| 2.                              | Altered level of consciousness | 23             | 34.8        |
| 3.                              | Conscious                      | 27             | 41          |
| Treatment outcome               |                                |                |             |
|                                 | Left against medical advice    | 6              | 9           |
|                                 | Died                           | 19             | 29          |
|                                 | Recovered                      | 41             | 62          |

**TABLE II. MORTALITY RATE INDICES AMONG PATIENTS (n=66)**

| PATIENTS DATA                         | NO OF PATIENTS              | PERCENTAGES | MORTALITY RATE |     |
|---------------------------------------|-----------------------------|-------------|----------------|-----|
| 1. ANTIBIOTIC RECEIVED                |                             |             |                |     |
| a.                                    | Adequate                    | 32          | 48.4           | 16  |
| b.                                    | Inadequate                  | 34          | 51.6           | 41  |
| 2. LEVEL OF CONSCIOUSNESS             |                             |             |                |     |
| a.                                    | Full conscious              | 27          | 41             | 7.4 |
| b.                                    | Altered level of conscious  | 39          | 59             | 44  |
| 3. TIME OF PRESENTATION FOR TREATMENT |                             |             |                |     |
| a.                                    | Early (0-5 days of illness) | 34          | 51.6           | 18  |
| b.                                    | Late >5 days of illness.    | 32          | 48.4           | 41  |

mortality rate than those who received adequate antibiotic treatment; 16% and 41% respectively. ( $p < 0.05$ ). Similarly, patients with altered level of consciousness had a higher mortality rate of 44% against 7.4% for those who were fully conscious on presentation ( $P < 0.001$ ). On the contrary, Patients who presented early for treatment

(<5 days of illness) had a lower mortality rate, of 18%, as compared to 41% for those who presented late for treatment (>5 days of illness) ( $p < 0.05$ ).

TABLE III Shows the complications seen in our patients (1993-97). Septicemia was the commonest complication presenting in 27.2% of the patients reviewed. This was followed

by aspiration pneumonia (15.2%) and cranial nerve palsies (13.6%) especially involving the third and seventh cranial nerves resulting in squint and facial nerve palsy (mostly of lower motor neurone type).

**TABLE IV** Shows the most frequently prescribed antibiotics in the treatment of adult meningitis in the University of Calabar Teaching Hospital, Calabar. over the review period Penicillin G, was the commonest antibiotic used (82%) while ampicillin was the least (18%).

### Bacterial Findings

Since antibiotic therapy of bacterial meningitis is directed at bacterial pathogens, it was important to identify them in the cases we studied. Gram-positive cocci (mainly

*Streptococcus pneumoniae*) was the most common pathogen and was isolated, in 43% of the cases. *Neisseria meningitidis*, *Haemophilus influenzae* and other rare pathogens caused 15% , 11% and 8% respectively. In 25% of cases, no pathogen was identified, as these patients had received some antibiotics before lumbar puncture was carried out.

### DISCUSSION

The diagnosis and treatment of acute bacterial meningitis represents a neurological emergency. (Moffot and Hanley 1998; Swatz 1985). Successful treatment and optimal outcome will depend on early diagnosis and rapid initiation of an appropriate antibiotic therapy that has an excellent range of

**TABLE III. ASSOCIATED COMPLICATIONS (n=66)**

|                           | NO OF PATIENTS | PERCENTAGES |
|---------------------------|----------------|-------------|
| 1. Septicemia             | 12             | 18.2        |
| 2. Aspiration pneumonia   | 18             | 27.2        |
| 3. Deafness               | 5              | 7.6         |
| 4. Cranial Nerve palsies  | 9              | 13.6        |
| 5. Others e.g. bed sores. | 2              | 10.0        |

**TABLE IV.** The most frequently prescribed Antibiotics in Adult BM at UCTH, Calabar. Nigeria. (n=66)

| NO | NO OF PATIENTS  | PERCENTAGES |
|----|-----------------|-------------|
| 1. | Penicillin G.   | 82          |
| 2. | Chloramphenicol | 58          |
| 3. | Gentamicin      | 42          |
| 4. | Cloxacillin     | 20          |
| 5. | Ampicillin      | 18          |

microorganism coverage (Moffot and Hanley 1998).

Untreated bacterial meningitis is usually fatal. The reported overall mortality rates range from 5-30%, with pneumococcal meningitis having the highest rate. (Duran et al 1993; Adams and Victor 1980; Swartz 1985). The overall mortality rate among our 66 patients was (31%) but among inadequately treated patients it was (41%). Our study showed that mortality correlated closely with inappropriate/inadequate treatment, impaired consciousness and late admission to hospital. Other studies have correlated mortality rates with late diagnosis and treatment, (Simon et al 1989) presence of bacteraemia, (Adams and Victor 1989); elevated cerebro-spinal fluid protein, (Hodges and Perkins 1985) the presence of hypoglycaemia, (Fraser et al 1973) and a variety of other concomitant disorders such as alcoholism, diabetes mellitus, multiple myeloma, head trauma and extremes of age. [Magnussen 1980; Wenger et al 1990; Hodges and Perkins 1975; Bohr et al 1984]. We had earlier reported that an increased mortality rate among pediatric patients with bacterial meningitis managed in this center was mostly as a result of late diagnosis of the condition. (Imananagha et al 1998).

It is often difficult to define precisely the pathogenetic mechanism of deaths in bacterial meningitis. However, some of the deaths among our patients were thought to be due to the effects of overwhelming infection with secondary septicemia, hypotension and/or cerebral oedema.

A slight majority (52%) of the patients received therapy that was deficient. The socio-economic problems currently prevailing in the country may be partly responsible. These factors, coupled with the ill-advised market-driven Government health-related policies like the "cash-and carry-drug-supply / investigations policy" make adequate and prompt treatment of bacterial meningitis patients in this country almost impossible.

However, patients who received adequate antibiotic therapy had a lower mortality rate of 16% when compared with those who received inadequate antibiotic therapy where the mortality rate was 41%. It is therefore obvious that one important factor that affected optimal outcome among our bacterial meningitis patients was prompt, appropriate, and adequate antibiotic therapy.

Late admission was another factor that influenced outcome. Thirty two (48%) patients were admitted late (i.e. after the 5<sup>th</sup> day of illness). As a result of the high cost of hospital treatment in this country, an increasing number of our people patronize traditional medical practitioners or indulge in self-medication before coming to hospital for treatment only when they do not get better. Most of the patients tried at least one of these methods of treatment and only further deterioration of the condition eventually forced them to come to hospital. The valuable time thus wasted may have contributed to the high mortality rate. For patients who respond appropriately, 10-14 days of antimicrobial therapy is usually adequate. This was confirmed from the results of our survey of the patients. The best indicators of therapeutic efficacy are resolution of fever, improved mentation, cardiopulmonary stability and absence of neurologic signs. Prolongation of fever may be due to subdural effusion, sinus thrombosis, mastoiditis, intercurrent infection, phlebitis or rarely brain abscess, and these require the continuation of therapy for a longer period and surgical intervention where indicated. (Magnussen 1980; Wenger et al 1990; Hodges and Perkins 1975).

In conclusion, our study has shown that treatment related mortality among adult Nigerian bacterial meningitis patients is still high. Therapeutic difficulties and other related factors are contributing to this high mortality. The study has also revealed that, in developing countries, outcome can be improved dramatically through health education,

immunization and commencing appropriate, adequate and prompt antibiotic therapy of patients immediately on presentation.

To enable poor patients get immediate and adequate supply of the required drugs and help sustain treatment for the recommended number of days, our hospitals should consider the establishment of Emergency Drug Revolving Loan Service in hospitals (in place of the cash-and-carry policy). This service should loan out the required drugs during the most critical stage in the management of medical emergencies and later recover them from the patients before discharge.

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