

Meningitis in Baghdad 1993 – 1998

Part 1: Acute Bacterial Meningitis

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Summary:

Background: There is a need for a periodic review of acute bacterial meningitis (ABM) since the pathogens responsible for infection vary with time, geography and patient's age. This study was carried out to describe the epidemiology of different types of meningitis and variables affecting the outcome (improvement, complication and death).

Patients and Methods: All the cases of meningitis diagnosed and treated at Ibn- Al-Khateeb Teaching Hospital for the period Jan. 1993 to Dec. 1998 were included in this study. The collected data were age, sex, occupation, date of admission, date of discharge, type of meningitis and outcome of the disease.

Results: Out of the total cases, 73.3% were ABM. High rate of ABM was among children < 5 years of age and a significant ($p = 0.01$) high rate was observed among male (60%) ($p = 0.01$). Predictors of outcome of meningitis were age, sex, residence, duration of hospitalization and type of meningitis.

Conclusion: ABM was predominantly observed in children. The high case fatality rate reported in this study was attributed to the deterioration of health services due to wars and sanctions in 1990s.

Key words: Acute bacterial meningitis, outcome, case fatality rate, Iraq

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Introduction:

Acute bacterial meningitis (ABM) remains a major cause of morbidity and long term neurological sequelae worldwide, and mortality remains high in developing countries 1, 2. There is a need for a periodic review of ABM since the pathogens responsible for the infection vary with time, geography and patients age 3. In Iraq, an epidemic of meningococcal meningitis was reported in Baghdad (1966-1967) 4. This study was carried out to describe the epidemiology of different types of meningitis and variables affecting the outcome.

Materials and methods:

All the cases of meningitis diagnosed and treated at Ibn- Al-Khateeb Teaching hospital for infectious diseases, Baghdad, for the period from Jan. 1993 to Dec. 1998 were included in this study. Criteria used for inclusion of cases in the study were the presence of a clinical picture compatible with a diagnosis of meningitis with either cerebrospinal fluid (CSF) biochemical and bacteriological examination and/or therapeutic response. Cases with post-traumatic meningitis and meningitis developed after cranial surgery were excluded. The collected data were age, sex, occupation, date of admission, date of discharge, type of meningitis and outcome of the disease (improvement, complication and death).

Results:

The association of meningitis (dependent variable) with the studied variables (independent variables) was tested by chi-square. P value less than 0.05 was considered significant. Out of the total cases (3399), 2490 (73.3%), 789 (23.1%) and 123 (3.6%) were ABM, viral meningitis (VM) and tuberculous meningitis (TBM), respectively. High rate of ABM was among children < 5 years of age. Rate of VM was higher among patients aged 5 – 19 years. The rate of TB meningitis was higher among old age groups. Significant high rates of ABM, VM and TBM were observed among males (60%, 67.4% and 53.7%, respectively). Most cases of ABM, VM and TBM were from center of Baghdad (63.6%, 70.8% and 43.9%, respectively). A significant higher case fatality rate (CFR) was noticed in TBM (20.3%) than in ABM (11%) and VM (0.6%) ($p = 0.01$). These data are shown in Table 1.

Discussion:

The finding that ABM was the most prevalent type (73.3%) is similar to that reported previously in Baghdad 6 (60%). Similar findings were reported in Yemen 7 (81.81%) and Saudi Arabia 8 (67.8%). The development of conjugate vaccines in the beginning of 1990s, especially type b Haemophilus influenzae and more recently the pentapneumococcal and the serogroup c meningococcal vaccines have contributed directly to changes in the epidemiological profile of these invasive diseases (direct effect) and of their carriage status (indirect effect) 9,11. Advent of conjugate vaccines was a

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remarkable achievement in the last decade (1990s), launching a new area in the history of modern vaccination. Iraq could not launch in the conjugate vaccine era due Gulf wars and sanction. *H. influenzae*, *S. pneumoniae* and *N. meningitidis* were important pathogens in meningitis in Iraq (62% 6, 72% 6 and 80.8% 12). Despite the availability of conjugate vaccine, important obstacles have hampered the introduction of this vaccine into the Asia continents. Information about the production, the estimated costs, and the use of vaccines on a large scale, as well as the safety and efficacy of these vaccines are essentials in this region. The reported rate of TBM (3.6%) is lower than that reported in Baghdad previously (7% 6 and 5% 12). This finding may be attributed to the strict implementation of immunization (Expanded Programme on Immunization, EPI) 14. However, a high admission rate of TBM was reported in 1989 15. The deterioration in health services during Gulf wars affect the immunization services 16.

Table 1 Characteristics of the studies sample

Variable	Meningitis			P value
	Septic No. (%)	Viral No. (%)	T.B No. (%)	
Age (year)				
1 – 4	1553 (62.4)	186 (23.7)	39 (31.7)	P= 0.01
5 – 19	661 (26.5)	514 (65.4)	24 (19.5)	
> 20	276 (11.1)	86 (10.9)	60 (48.8)	
Sex				
Male	1494 (60)	530 (67.4)	66 (53.7)	P = 0.01
Female	996 (40)	256 (32.6)	57 (46.3)	
Residence				
Baghdad (center)	1548 (67.6)	556 (70.8)	54 (43.9)	P = 0.01
Baghdad (peripher- al)	356 (14.3)	113 (14.4)	18 (14.6)	
Other Governorates	549 (22.1)	116 (14.8)	51 (41.4)	
Duration (day)				
0 – 3	261 (910.5)	102 (913)	17 (13.8)	P=0.00
4 – 14	1777 (71.4)	627 (971.8)	60 (948.8)	
> 15	452 (18.1)	59 (97.2)	46 (37.4)	
Outcome				
Improve- ment	2105 (86.7)	780 (99.2)	96 (78)	P = 0.00
Complic- a-tions	55 (2.3)	1 (1.1)	2 (1.6)	
death	267 (11)	5 (0.6)	25 (20.3)	

Table 2 Variable that affect outcome

Variable	Outcome of Meningitis			P value
	Improvement	Compli- -cation	Death	
	No. (%)	No. (%)	No. (%)	
Age (year)				
1 – 4	363 (50.7)	2 (33.3)	30 (33.3)	P= 0.01
5 – 19	277 (38.8)	3 (50.0)	31 (34.4)	
> 20	75 (10.5)	1 (16.7)	29 (32.2)	
Sex				
Male	1863 (62.5)	30 (51.7)	153 (51.5)	P= 0.001
Female	1118 (37.5)	28 (48.3)	144 (48.5)	
Residence				
Baghdad (center)	1945 (65.3)	37 (63.8)	177 (59.6)	P=0.01
Baghdad (peripheral)	430 (14.4)	8 (13.8)	36 (12.12)	
Other governorate	604 (20.3)	13 (22.4)	84 (28.3)	
Duration (day)				
0 – 3	175 (5.8)	3 (5.2)	148 (49.8)	P=0.01
4 – 14	2302 (77.2)	33 (56.9)	122 (41.1)	
> 15	504 (16.9)	22 (37.9)	27 (9.1)	
Type				
Septic	2105 (70.6)	55 (94.8)	267 (89.9)	P= 0.001
Viral	780 (26.2)	1 (1.7)	5 (1.7)	
TB	96 (3.2)	2 (3.4)	25 (8.4)	

Table 2 shows that the outcome of meningitis was significantly associated with age, sex, residence, duration of hospitalization and type of meningitis. Difficulties in transportation and other infrastructure system in 1990s 17 affect the admission rate and case detection. The reported high figure of TBM may be due deterioration in health services and living standards in 1990s 16-20. ABM was predominantly observed in children (62.4%). It is in agreement with that of several investigators 7,8,18. ABM is reported predominantly in adults in USA because of immunization practices adopted 21. The study revealed that CFR was 8.9%, which is higher than that reported previously in Baghdad 6 (6.2%) and in Basrah 22 (4.9%). It is lower than that reported in Yemen (14.28% 7 and 10% 24). The rate is much higher than that reported in Greece 25 (3.8%). The high CFR reported in this study may be attributed to deterioration of health services due to wars and sanction in 1990s 16-20, 26. High rate reported in Africa 27 (51%).

The CFR of TBM (20.3%) is similar to that reported in Baghdad (22.8% 15, 30% 28 and 21% 13).

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