

Acute Bacterial Meningitis Among Children under Five Years of Age in Baghdad.

Huda S. Al-Rawazq* MBChB, MSc

Summary:

Background: The periodic review conducted of acute bacterial meningitis in children younger than 5 years of age in Baghdad to reflect changes in the epidemiological pattern of this infection.

Patients and Methods: Sixty patients with signs and symptoms suggestive of meningitis who were admitted to Central Teaching Hospital in Baghdad City were included in a prospective study started from the 1st October till the 30th of December 2009. By bacteriological study, biochemical and cytological study in the laboratory, WBCs in the blood with differential count was done to support the diagnosis of bacterial meningitis.

Results: Present study revealed that from (60) patients (6) cases (10.0 %) showed positive and (54) cases (90.0 %) negative cultures to CSF patients.

Conclusions: The administration of antibiotic before lumbar puncture associated with false negative CSF culture. Most cases of meningitis were under one year of age occurred in male more than female with bottle feeding. Fever was the most common presenting symptom followed by vomiting and convulsion.

Key Word: Meningitis, Bacterial etiologies, Baghdad.

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Introduction:

Bacterial meningitis may be defined as inflammation of the productive membranes covering the brain and spinal cord. (1) It is still one of the most dangerous infection diseases and causes serious complication in children. (2).

The types of bacteria that cause bacterial meningitis are varying by age group; in premature babies and newborns up to three months old. Common causes are group B *Streptococci* (subtypes III which normally inhabit the vagina and are mainly a cause during the first week of life) and those that normally inhabit the digestive tract such as *Escherichia coli* (carrying K1 antigen). Older children are more commonly affected by *Neisseria meningitidis* (meningococcus), *Streptococcus pneumoniae* (serotypes 6, 9, 14, 18 and 23) and those under five *Haemophilus influenzae* type B.(1) (3).

Recurrent bacterial meningitis may be caused by persisting anatomical defects, either congenital or acquired or by disorders of the immune system.(4)

The bacteria are spread by direct close contact with the discharges from the nose or throat of an infected person. Where the major risk factor for meningitis is the lack of immunity to specific pathogens associated with young age, additional

risk factors include recent colonization with pathogenic bacteria, close contact with individual having invasive disease crowding, poverty black race and male gender.(5) (6) The symptoms may include high temperature, poor feeding, vomiting lethargy and irritability; the clinical signs include bulging fontanelle, fever, drowsiness, convulsions and

purpuric rash. In older children the more classic signs of neck stiffness, headache and photophobia are more common. (7)The choice of initial treatment depends largely on the kind of bacteria that cause meningitis in a particular place. For instance in the United Kingdom empirical treatment consists a third-generation cephalosporin such as cefotaxime or ceftriaxone. (8) (9)

Patients & Methods:-

Patients:

Sixty patients with signs and symptoms suggestive of meningitis who were admitted to Child's Central Teaching Hospital in Baghdad City were included in a prospective study started from the 1st October till the 30th of December 2009. Data was obtained from the relative of the patients including age, sex, address, feeding, duration of symptoms before admission to the hospital, etiological agent.

Material & Methods:

Clinical examination was done to all patients concentrating on the physical signs of meningitis, lumbar puncture was done to all patients and CSF 2-3 ml was collected aseptically by physion and than bacteriological study by biochemical and cytological study in the laboratory, WBCs in the blood with differential count was done to support the diagnosis of bacterial meningitis.

In the bacteriological department we cultured the sample on blood & MacConkey and chocolate agar and incubated then done the Grams stain.

Also we do some supportive test to reach diagnosis (10):-

1- optochin disc for *Streptococcus*. Take chocolate

*Dept. of Anatomy, College of Medicine, University of Baghdad

agar and streaking the suspected bacteria on it then put the disc and incubate for 24 hr. there is no growth near the disc in case of *Streptococcus pneumoniae*.

2- oxidase test: add one drop of (1% tetramethyle p-phenylene diamine dihydrochloride) on filter paper then sample of bacterial colony rubbed on it. Production of dark violet purple color mean positive e.g. *pseudomonas*.

3- X and V factor *Haemophilus influenzae*

In present study take chocolate agar then inoculate the suspected bacteria on the plate and put X and V factor disc on it. Incubate 24-36 hr. then see the heavy growth near the disc.

4- biochemical test:

Inoculate the G-ve bacteria on biochemical media tubes like indol, urea, semisolid manitol, simmon citrate, then incubate for 18-24 hr. and read the reaction of each one e.g. *Escherichia coli*.

- In the biochemical department the exam sugar determination in CSF according to Manufacture company Biomaghreb.

- Examination of protein in CSF according to Manufacture Company Randox.

Results:-

Present study revealed that from (60) patients (6) cases (10.0 %) showed positive and (54) cases (90.0 %) negative cultures to CSF patients.

Table (1): The Relative Frequency of selected CSF bacterial isolates among cases with meningitis.

Total No. of CSF specimens examined = 60	No.	%
<i>Haemophilus influenzae</i>	2	3.3
<i>Streptococcus pneumoniae</i>	1	1.6
<i>Escherichia coli</i>	1	1.6
<i>Klebsiella pneumoniae</i>	1	1.6
<i>Pseudomonas</i>	1	1.6
All culture positive cases	6	10.0
All culture Negative cases	54	90.0

Table (2): Relative Frequency distribution of Age in the study sample.

Age Group	No.	%
< 1 month (neonate)	2	3.33
1-12 month (infant)	25	41.67
1-2 years	15	25.00
2-3 years	13	21.67
3-4 years	3	5.00
4-5 years	2	3.33
Total	60	100.0

Table (3): Relative Frequency distribution of Gender in the study sample.

Gender	No.	%
Female	19	31.67
Male	41	68.33
Total	60	100.0

Table (4): Relative Frequency distribution of Feeding in the study sample.

Feeding	No.	%
Breast	21	35.0
Bottle	27	45.0
Eating	12	20.0
Total	60	100.0

Table (5): Relative Frequency of selected clinical signs & symptoms in the study sample.

Positive signs & symptoms (n-60)	No.	%
Fever	59	98.4
Vomiting	32	53.3
Convulsion	25	41.7
Neck stiffness	7	11.7
Pallor	2	3.3
Irritability	2	3.3

Table (6): Relative Frequency of Selected Positive Bacterial :

-Age Group	Total No.	Positive bacterial No. %	
< 1 month (neonate)	2	1	50
1-12 month (infant)	25	4	16.0
1-2 years	15	1	6.67
2-3 years	13	0	0
3-4 years	3	0	0
4-5 years	2	0	0
-Gender			
Female	19	0	0
Male	41	6	14.63
-Feeding			
Breast	21	2	9.52
Bottle	27	3	11.11
Eating	12	1	8.33
-Positive signs & symptoms			
-Fever			
Negative	1	1	100
Positive	59	5	8.4
-Vomiting			
Negative	28	2	7.14
Positive	32	4	12.5
-Convulsion			
Negative	35	3	8.57
Positive	25	3	12.0
-Neck stiffness			
Negative	53	5	9.43
Positive	7	1	14.28

Discussion:

The rate of acute bacterial meningitis for 60 cases was 6 (10.0%); The low percentage of positive results may be due to that many cases are treated with antibiotics before lumbar puncture. Table (1) shows the types of bacteria that were detected as causative agents of acute bacterial meningitis in this study and it was clear that *Haemophilus influenzae* is the most common. Similar result by Riyadh (11) revealed that from (70) patients (9) (12.9%) were positive. The study results showed no significant difference ($P > 0.05$). Table (2) shows that most cases of meningitis were under one year of

age representing 25 (41.67%). The decreased ability to produce antibodies against polysaccharide capsular antigen in children less than 2 years of age may explain in part the increased susceptibility to *Haemophilus influenzae* and *Streptococcus pneumoniae*. (12) This agrees with Riyadh (28) (40 %) and Nihar (13). The results showed no significant difference ($P>0.05$). 41(67.33%) patients were males and 19 (31.67%) were females so the male to female ratio was 2:1 this agree with Riyadh 45 (64.3) patients were males and 25 (35.7%) were females. No significant difference ($P>0.05$) showed in Table (3). This study confirmed the common and established finding that acute bacterial meningitis are more frequent in bottle feeding 27 (45%) than in the breast feeding 21 (35%) as shown in table (4) (14)(15). Mature human milk play a protective role in breast-fed children contains considerable amounts of immunoglobulin, mainly the secretory immunoglobulin A (IgA) type that may play a role in such protection. It has been shown that such immunoglobulin have antibody specificities (16). The Table (5) shows that fever was the most frequent presenting symptom seen in 59 patients (98.4) that agree with Riyadh (69) patients (98.6%) and Emad (17) 65 (92.8%) followed by vomiting which occur in 32 (53.3 %) patients that agree with Emad 37 (52.85%) and convulsions in 25 (41.7%) that agree with Emad 25 (35.0%) and neck stiffness 7 (11.7%). No significant difference ($P>0.05$) was shown. The Table (6) showed relative frequency of selected positive bacterial and age, most cases of meningitis were under one year of age representing 4 (16.0%) bacterial positive similar result by Riyadh 3 (10.7%). The positive bacterial results in male 6 (14.63%) while Riyadh 4 (8.9%). Bottle feeding positive bacterial shows 3 (11.11%), Fever positive bacterial shows 5 (8.4%) and vomiting 4(12.5%) most frequent presenting signs & symptoms seen in Table (6) that agree with Riyadh no significant difference ($P>0.05$) was shown.

Conclusions:

Bacterial meningitis is one of the most serious infections in infants and older children causing high rate of mortality and morbidity, the administration of antibiotic before lumbar puncture associated with false negative CSF culture. Most cases of meningitis were under one year of age occurred in male more than female and with bottle feeding. Fever was the most common presenting symptom followed by vomiting and convulsion, normal CSF sugar and protein does not exclude bacterial meningitis.

Statistical Analysis:

The suitable statistical methods were used in order to analyze and assess the results, they include the followings:

Descriptive statistics: Statistical tables including observed frequencies with their percentages.

Inferential statistics: These were used to accept or reject the statistical hypotheses, they include the followings: -Chi-Square (χ^2).

P value more than 0.05 level of significance was considered statistically non significant difference.

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