



Original Article

Clinical Profile of Meningitis in Children

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Abstract

Meningitis is an emergency clinical problem in pediatrics. The mortality from meningitis is close to 100% in untreated individuals and can still be up to 40% in children who received appropriate antibiotic therapy in developing countries. A cross sectional study was done to address the common presentation of meningitis among the children. The study was conducted in the Pediatric unit of Rajshahi Medical College Hospital from March 2008 to July 2009.

A total of 130 suspected case of meningitis patients were included in the study. Among them 102 were diagnosed as meningitis of 66 children with pyogenic meningitis, 36 children with aseptic meningitis and 28 children without meningitis were taken as non meningitis group. This study showed that all patients (100%) had fever. 97 (95.10%) had symptom of convulsion. Vomiting was present in 62 (60.78%), excessive cry or irritability present in 50(49%) cases. This study expressed that 75 (73.53%) patients had bulged fontanel. Neck rigidity was present in 67 (65.69%). Only 32.35% had kernig's sign positive and 17.65% present with Brudginsky's sign positive. The infancy was the most vulnerable age for pyogenic meningitis. H. influenzae were the leading pathogen (24.24%) in infancy followed by S. pneumoniae (21.21%). The result shows that among 66 pyogenic meningitis, 26 (39.39%) were completely cured and 24 (36.37%) were cured with sequelae. Out of 36 aseptic meningitis 27 (75.00%) were completely cure.

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Introduction

Meningitis is defined as inflammation of the membranes that surround the brain and spinal cord. Microbiologic causes include bacteria, viruses, fungi, and parasites.¹ Approximately 10% of patients with bacterial meningitis die and 40% have sequelae including hearing impairment and other neurologic sequelae.³

Case fatality rates for bacterial meningitis are 4.5% in developed countries and 9.1% in developing countries^{4,5}. It further 40% of survivors develops neurological sequelae⁴. The mortality from meningitis is close to 100% in untreated

individuals and can still be up to 40% in children who received appropriate antibiotic therapy in developing countries. Most of these fatalities occur within 72 hours of admission to the hospitals. Data regarding TBM is not readily available as it is not a common disease in developed countries. However one study in India showed mortality from TBM to be 40% and late neurological sequelae to be 41.3%⁶ (In USA 9,000 to 12,000 cases of aseptic meningitis occur per year of whom 90% are under 30 years⁷). No published data regarding the incidence of aseptic meningitis is available from Bangladesh. Rapid

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and accurate diagnosis coupled with early appropriate therapy is the utmost importance in reducing morbidity and mortality of the patient.⁸

The symptoms of meningitis are similar for both bacterial and viral forms of the disease. But the clinical presentation is not uniform. Presentation depends upon age, causative organism and whether the infection is acute or chronic. The study was aimed to find out common presentation of meningitis among children of paediatric department of Rajshahi Medical College Hospital.

Objectives a). To address the common presentation of meningitis. b).To find out diagnosis by investigation

Material and Methods

STUDY DESIGN: - A hospital based descriptive cross sectional study among the admitted children.

PLACE OF STUDY: - All aspect of this study have been accomplished in the department of Pediatrics, Pathology and microbiology in RMC.

PERIOD OF STUDY: - The study was done from March 2008 to July 2009.**SAMPLE SIZE:** - During the period of data collection a total of 130 children with meningitis got admitted in to the hospital. Though the calculated sample for the present study was 108 but for more accuracy the estimated sample size has been inflated to 130.

Results:

One hundred thirty patients with suspected meningitis who met the inclusion criteria according to case definition were enrolled. The study population consists of 66 children with pyogenic meningitis, 36 children with aseptic meningitis and 28 children without meningitis were taken as non meningitis group. Results were presented by the help of appropriate tables, charts, diagrams and figures.

Result revealed that 50% children with pyogenic meningitis 28% with aseptic meningitis and 22% children were other than meningitis.

Table no. 1: Age distribution of patients

Age (year)	Pyogenic Meningitis n=66	Aseptic Meningitis N=36	Other than Meningitis N=28	Total
Infant	36	20	12	68
1-5	22	10	10	42
5- over	08	06	06	20
Total	66	36	28	130

INCLUSION CRITERIA:-Age 0 month to 12 yrs. Clinically diagnosed case of meningitis, who has undergone CSF study.

EXCLUSION CRITERIA:-A) Previously treated patient as meningitis. B)Patient with congenital CNS abnormality. C) Conditions in which lumber puncture (LP) is contraindicated. D) Immunocompromised patient.

DATA-COLLECTION PROCEDURE:- All clinical information is recorded in a pre-designed proforma that includes the particulars of the patients (Name, age, sex, address, date of admission). History, physical findings and investigation report are collected in the pre-designed proforma.

DATA ANALYSIS:-Data were collected entered and analyzed by SPSS program, version 11.5 according to standard procedure. The descriptive analysis included frequency distribution, mean, median and standard deviation as required. Univariate analysis was carried out to describe the characteristics of the study population while internal comparisons were done by using bivariate analysis or multivariate analysis. To examine the relationship between variable statistical significant test, chi-square test we done and estimate the correlation between variables in appropriate section (result).

This table showed that out of 66 pyogenic meningitis infant was 36, 36 aseptic meningitis 20 case was infant. Most of the patient in this study was infant 66. This figure showed that among 102 meningitis patients, most affected age group was infant. Total 56 patients (54.90%) were recorded in this age group. 32 patient (31.37%) were 1-5 yrs and only 14 patient (13.73%) were 5-over age group.

Out of 102 meningitis patients, 66 were pyogenic meningitis and 36 were aseptic meningitis. This table shows that about half of the patients of both pyogenic (54.55%) and aseptic meningitis (55.55%) were infant.

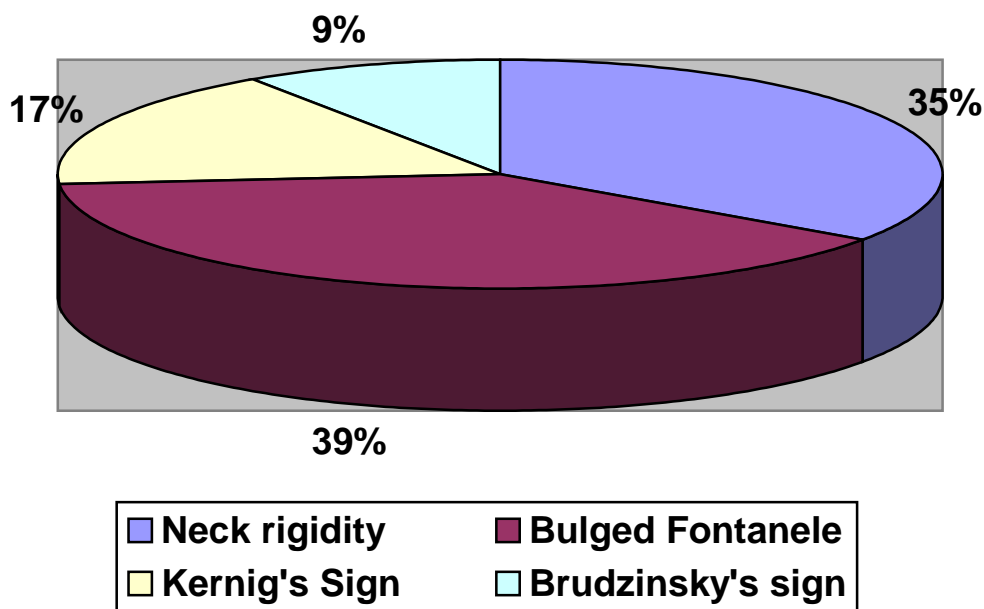
The result showed pyogenic and aseptic meningitis in male is 38 (57.58%) and 24 (66.67%) respectively. Whereas in female it is 28(42.42%) and 12(33.33%) respectively. Male children were affected more in both cases.

Table No. 2: Symptoms presents in meningitis patient

Symptoms	Frequency	Percent
Fever	102	100
Convulsion	97	95.10
Vomiting	62	60.78
Excessive Cry/Irritability	50	49.00
Headache :		
Present	44	43.14
Do not know	38	37.25
Absent	20	19.61

This table showed that all patients (100%) had fever. 97 (95.10%) had symptom of convulsion. Vomitting was present in 62 (60.78%), excessive cry or irritability present in 50(49%) cases. Headache present in 44(43.14%) and cannot mention in 38(37.25%) as in infant age group.

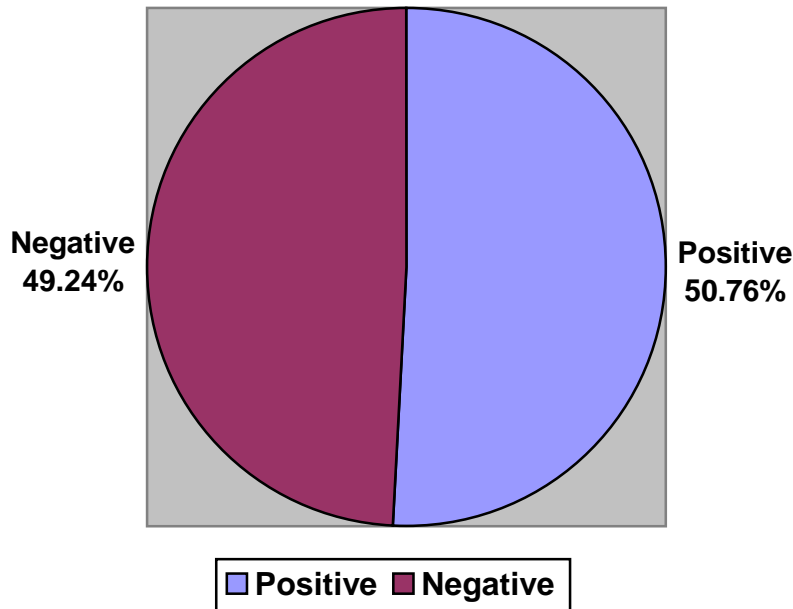
Figure No. 1: Sign present in meningitis patient



This figure expressed that 75 (73.53%) patients had bulged fontanel. Neck rigidity was present in 67 (65.69%). Only 32.35% had kernig’s sign positive and 17.65% present with Brudginsky’s sign positive.

Physical examination of CSF showed that 62% of CSF is clear and 38% is turbid among pyogenic meningitis and CSF is clear in all of the aseptic meningitis.

Figure No. 2: Findings of CSF culture of suspected case of meningitis



Culture of CSF was done for all suspected case of meningitis (130 patients). Among them culture positive in 66 (50.76%) cases were diagnosed as pyogenic meningitis. Culture is negative in 64 (49.24%) patients.

Table No. 3: Distribution of aetiopathogens of pyogenic meningitis according to age

Organism	Age			Total
	Infant	1-5 yrs	5-over yrs	
	No (%)	No (%)	No (%)	
S.Pneumoniae	14 (21.21)	11 (16.66)	5 (07.57)	30 (45.45%)
H. influenzae	16 (24.24)	9 (13.63)	1 (01.51)	26 (39.55%)
N.meningitis	3 (04.54)	2 (03.03)	2 (03.03)	7 (10.50%)
E.coli	3 (04.54)	0 (00.00)	0 (00.00)	3 (4.50%)
Total	36	22	08	66 (100%)

The infancy was the most vulnerable age for pyogenic meningitis. H. influenzae were the leading pathogen (24.24%) in infancy followed by S. pneumoniae (21.21%).

Among 1-5 yrs age group, *S. pneumoniae* (16.66%) and above 05 yrs of age *S. pneumoniae* (07.57%) were the leading pathogens.

It showed that latex agglutination test for CSF C-reactive protein was positive in 59 patients (45.38%) and was negative in 71 (54.62%). Among them 28 cases were diagnosed other than meningitis. Study reveal out of 102 case of meningitis, the result of latex agglutination test of CSF for C-reactive protein were positive in 59 case (57.84%) and were negative in 43 case (42.16%)

Table4: Outcome of patients in relation to culture of CSF

Result of culture	Complete cured	Died	Cured with sequelae	Total
Positive	26 (39.39%)	16 (24.24%)	24 (36.37%)	66 (100%)
Negative	27 (75.00%)	05 (13.88%)	04 (11.12%)	36 (100%)

This table shows that among 66 pyogenic meningitis, 26 (39.39%) were completely cured and 24 (36.37%) were cured with sequelae. Out of 36 aseptic meningitis 27 (75.00%) were completely cure.

Cure rate is more marked in aseptic meningitis and a remarkable number of pyogenic meningitis patients developed sequelae.

Discussion:

Bacterial meningitis is a major cause of death and disability among children. So prompt recognition and early appropriate treatment is essential. The result of this hospital based prospective study showed that meningitis is most common in infancy (54.90%). Males are more affected in both pyogenic (57.58%) and aseptic (66.67%) meningitis. The diagnostic findings in my study is matching with other study findings.⁹

In this study it was found that all the patients of meningitis were presented with fever (100%). Most of the patient (95.10%) presented with convulsion vomiting was present in (60.78%). Subjective complains of headache was (43.14%) but most of the patient as infant age group, can not mention about headache. Most of the young infant presented with irritability and excessive cry.

(Table -2).

In this study it was found that most of the patient (73.53%) had bulged fontanel. In young infant, bulging of the anterior fontanel is a most valuable sign of increased intracranial pressure before closing of fontanele.¹⁰ This finding is specific before closing of fontanel. Neck rigidity and kernig's sign are present in (65.69%) and (32.35%) respectively. In younger children (12 – 18 months) these signs are not consistently present

as myelination was not completed before this age group (**Figure –1**).

Result showed the physical findings of CSF in patient with pyogenic meningitis is clear to turbid where as in aseptic meningitis it is always clear. CSF protein was more elevated in pyogenic meningitis than aseptic meningitis and expected glucose was much reduced in pyogenic meningitis

The definitive diagnosis of pyogenic meningitis requires isolation of organism from CSF collected by LP. This is the gold standard method for diagnosis of bacterial meningitis. Other test of CSF like Gram stain, Latex agglutination test, PCR, C-reactive protein (CRP) are used to diagnosis of bacterial meningitis. In this study it is tried to perform CSF culture to isolate the organism and CSF C-reactive protein for the diagnosis of pyogenic meningitis and differentiate pyogenic from aseptic meningitis. We also compare the result of CSF C-reactive protein estimation with the result of culture of CSF.

One hundred thirty patients (130) were included in this study. Among them 66 (50.76%) was culture positive (pyogenic) meningitis and rest 64(49.24%) was aseptic meningitis and no meningitis group. The diagnosis of aseptic meningitis from this culture negative group based on suggestive clinical symptom (fever, convulsion,

Headache, Vomitting), Sign (Bulged fontanel, Neck rigidity), Physical, Biochemical, Cytological examination of CSF and CRP estimation from CSF, Exclusion of other possible diagnosis.

Among childhood meningitis, incidence of pyogenic meningitis (64.70%) is more than aseptic meningitis (35.30%). Pathogens isolated by CSF culture are *S. Pneumoniae* (44.45%), *H. influenzae* (39.39%), *N. meningitidis* (9.60%) and *E.coli* (6.56%). *S. pneumoniae* is the leading pathogens of childhood meningitis. The observation of present study was consistent with the previous study.¹¹ But in infant age group, *H. influenzae* prove to be the main responsible organism of pyogenic meningitis

(Table 3).

CSF-C-reactive protein was detected in 89.39% cases of pyogenic meningitis. 59 patients out of 66 pyogenic meningitis cases showed agglutination. The

C-reactive protein could not be detected in the CSF of aseptic meningitis.

Conclusion:

This study showed that all patients (100%) had fever. 97 (95.10%) had symptom of convulsion. Vomitting was present in 62 (60.78%), excessive cry or irritability present in 50(49%) cases. This study expressed that 75 (73.53%) patients had bulged fontanel. Neck rigidity was present in 67 (65.69%). Only 32.35% had kernig's sign positive and 17.65% present with Brudginsky's sign positive. The infancy was the most vulnerable age for pyogenic meningitis. *H. influenzae* were the leading pathogen (24.24%) in infancy followed by *S. pneumoniae* (21.21%). The result shows that among 66 pyogenic meningitis, 26 (39.39%) were completely cured and 24 (36.37%) were cured with sequelae. Out of 36 aseptic meningitis 27 (75.00%) were completely cure.

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