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Original research article

Children between age group of 2 month to 18 years of age with symptoms and signs suggestive of meningitis: Clinical Profile

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Abstract

Meningitis develop as a consequence of bacterial entry into the subarchnoid space either through hematogenous seeding, direct extension from a contiguous focus, or result of congenital, traumatic, or surgical disruption of normal anatomic barriers. This prospective study was being performed on children between age group of 2 month to 18 years of age with symptoms and signs suggestive of meningitis with CSF showing pleocytosis admitted in hospital. In the present study out of 56 cases, 55 cases had fever (98.21%), 47 cases had convulsion (83.92%), vomiting and altered sensorium was present in 27(48.21%) & 26(46.42%) cases followed by headache in 18 cases (32%) and excessive cry& irritable in 10 cases (17.85%). Thus the most common presenting complaints were fever followed by convulsion, vomiting, and altered sensorium.

Keywords: Meningitis, clinical profile, children

Introduction

The frequency of neonatal meningitis varies greatly between institutions and geographical areas with rates of about two to ten cases per 10,000 live births [1].

In a multicentric study from India, BM constituted 1.5% of Paediatric admissions in infants and children [2].

Haemophilus influenza type b has been reported to be the commonest cause of bacterial meningitis in children from India as well as other parts of Asia. Neisseria meningitidis is the commonest organism in epidemic forms of bacterial meningitis [2].

Once bacteria gain access to the subarachnoid space, components of bacterial cell wall (lipopolysaccharide, lipooligosaccharide, teichoic acid) stimulate generation of proinflammatory cytokines (TNF, IL-1β, IL-6, PAF and others). These in turn, increase adhesion of leucocytes to cerebral vascular endothelium, promoting increased blood-brain barriers permeability and migration of leukocytes into the subarachnoid space. White blood cell and endothelium derived reactive oxygen species, and perhaps nitric oxide, then participate in altering cerebrovascular reactivity [3].

Other compounds that may cause direct cytotoxic neuronal injury include reactive oxygen and nitrogen species (oxygen radical, nitric oxide, peroxynitrate, hydroxyl radical), excitatory amino acids and matrix metalloproteinases.

Cerebral edema represents a combination of vasogenic, cytotoxic and interstitial edema.

Cerebral perfusion is reduced in meningitis in approximately 30% of children due to disordered cerebral vasoreactivity, cerebral vasculitis and arterial or venous infarcts [4].

Increased intracranial pressure (ICP) results from increased CSF volume, brain edema and abnormalities of cerebral blood flow.

Meningitis develop as a consequence of bacterial entry into the subarchnoid space either through hematogenous seeding, direct extension from a contiguous focus, or result of congenital, traumatic, or surgical disruption of normal anatomic barriers [5].

Hematogenous spread is the most common cause of infection and may occur in the setting of other foci of disease (e.g., Pneumonia, Otitis media, Cellulitis) or as a consequence of spontaneous bacteremia. The common pathogens spread by the respiratory route, the initial event is colonization of the upper respiratory tract. The next step involves bacterial passage through or between mucosal cells to the submucosal space, with multiplication and survival. Organisms that enter blood stream through submucosal capillaries or lymphatic channels, and multiply because of the absence of circulating

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antibody and the presence of bacterial capsular polysaccharides, which permit the bacteria to resist phagocytosis. Portal of entry to the subarachnoid space appears to be the choroid plexus. Bacterial growth occurs freely because of the paucity of defences [6].

Methodology

This prospective study was being performed on children between age group of 2 month to 18 years of age with symptoms and signs suggestive of meningitis with CSF showing pleocytosis admitted in hospital.

Relevant epidemiological data is obtained in a self-administered pretested proforma.

1) Investigations:

a. Hb estimation
b. Blood count.
c. Blood CRP level by latex slide agglutination test (Semi-Quantitative Test)
d. Blood sugar estimation by using electronic glucometer
e. Chest X-ray and Mantoux test
f. CSF examination was done after obtaining sample by lumbar puncture under strict aseptic methods.

- CSF-cell type and cell count.
- CSF-Protein by pyrogallol red method.
- CSF-sugar by glucose oxidase method.
- CSF-Chloride.
- Gram stain, ZN stain.
- CSF culture on choclate agar.
- CSF CRP by latex slide agglutination test (Qualitative Test).

g. CT scan.

Results

During the study period, 56 children who fulfilled the inclusion criteria formed the study group, out of which 25 were bacterial meningitis (category 1), 13 were tubercular meningitis (category 2) and 18 viral meningitis (category 3).

Table 1: Table showing age distribution of cases

Age	Total	%
2mth-1 year	17	30.35
1-5 year	24	42.85
>5 year	15	26.78
Total	56	100

In the present study maximum cases were in the age group 1-5 years constituting 42.85% followed by 30.35% in the age group of 2mth-1 year.

Table 2: Distribution of cases according to sex

Sex	No. of Cases	Percentage
Male	33	58.9
Female	23	41.0
Total	56	100

In our study, 58.9% were males and 41% were females with Male: Female ratio of 1.4:1.

Table 3: Table showing clinical symptomatology of 56 cases

Symptoms	Total	Percentage %
Fever	55	98.21
Convulsions	47	83.92
Vomiting	27	48.21
Altered sensorium	26	46.42
Headache	18	32.14
Neurological deficit	12	21.42
ExcCry/Irritability	10	17.85
Ear Discharge	08	14.28

In the present study out of 56 cases, 55 cases had fever (98.21%), 47 cases had convulsion (83.92%), vomiting and altered sensorium was present in 27(48.21%) & 26(46.42%) cases followed by headache in 18 cases (32%) and excessive cry& irritable in 10 cases (17.85%). Thus the most common presenting

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complaints were fever followed by convulsion, vomiting, and altered sensorium.

Table 4: Table showing clinical manifestations in BM, TBM, VM

Complaint	BM		TBM		VM	
	n= 25	%	n=13	%	n=18	%
Fever	25	100	12	92.3	18	100
Convulsion	20	80	11	84.6	16	88.8
Vomiting	09	36	08	61.5	10	55.5
Altered Sensorium	08	32	06	46.1	12	66.6
Headache	06	24	06	46.1	06	33.3
Neurological Deficit	01	04	08	61.5	03	16.6

In bacterial meningitis, fever was present in 25 cases (100%) followed by convulsions in 20 (80%) and vomiting in 9 cases (36%). In tubercular meningitis fever was present in 12 cases (92.3%) followed by convulsion in 11 cases (84.6%) and vomiting in 8 cases (61.5%). In viral meningitis fever was present in 18 cases (100%) followed by convulsion in 16 cases (88.8 %) and altered sensorium in 12 cases (66.6%). However high incidence of neurological deficit seen in TBM that is 61% followed by VM (17%) and BM (4%), while higher incidence of altered sensorium seen in case of VM that is 67% followed by TBM (46%) and BM (32%).

Table 5: CSF laboratory findings in BM, TBM and VM

CSF		BM n=25	TBM n=13	VM n=18
Total count (cells/cu mm)	Range	110 - 5,200	130 – 564	10 – 196
	Mean	670.1	277	60.8
Protein (mg/dl)	Range	85-340	65-755	23 – 281
	Mean	179.4	265.6	115.7
Glucose (mg/dl)	Range	18-62	35-90	30-102
	Mean	37.6	58.6	61.2
Gram stain		03(12%)	0%	0%
Culture		06(24%)	0%	0%

In bacterial meningitis CSF for gram stain was positive in 03 (12%) of cases and culture positive in 06 (24%) of cases. Organisms isolated were pneumococci (03), E coli (01), Klebsiella (01) and meningococci (01).
TB and viral culture not able to do because of unavailability of laboratory instruments and high cost factor.

Discussion

In the present study 56 cases with diagnosis of meningitis were enrolled. Out of 56 cases 33 were male (58.9%) and 23 were female (41.0%). Ratio of male to female in the present study is 1.4 : 1.
In the present study fever, convulsion, vomiting and headache were the most common symptoms. The present study correlates with the study done by Chinchankar *et al.* [1], as fever and convulsions were the most common presenting complaints.
In BM there is wide range in the distribution of cells in the present study and study done by Clarke *et al.* [7] and John *et al.* [8] however there was no significant difference in the range of protein and sugar in the present study and other studies.
In the present study, the range of cells varied from 130 to 567 /$mm^{3,}$ protein from 65 to 755 mg/dl and glucose ranged from 35 to 90 mg/dl in tubercular meningitis, which correlates with the study done by John *et al.* [8].
In case of VM the present study showing CSF cells ranging from 10 to 196/mm^3, protein 23 to 281 mg/dl and sugar 30 to 102 mg/dl, where as corall *et al.* [4] had shown cells ranging from 23 to 471, proteins 26 to 178mg/dl and sugar 50 to 79 mg/dl.

Conclusion

- Male predominance was seen with male to female ratio of 1.4:1.
- The most common presenting complaints were fever (98.2%), convulsion (83.9%), vomiting (48.2%) and altered sensorium (46.42%).
- Gram stain revealed organisms in 3 (12%) cases and culture isolated organisms in 6(24%) cases of bacterial meningitis.

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