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ASSESSMENT OF CLINICAL PROFILE AND LABORATORY PARAMETERS IN PATIENTS WITH SUSPECTED MENINGITIS AND THEIR OUTCOME AT A TERTIARY CENTRE, BAREILLY U. P.

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ABSTRACT: A prospective study was carried out in department of Pediatrics between January 2013–June 2014. All patients admitted as suspected meningitis meeting our inclusion criteria were followed till discharge. Clinical profile, laboratory parameters and outcome at discharge were assessed. Total 95 patients were enrolled in the study. Out of which 73 patients were followed up till discharge meeting our inclusion criteria. Forty seven (64.38%) were diagnosed as Tubercular meningitis, 22(30.13%) as pyogenic meningitis and 4(5.47%) as aseptic meningitis. CSF ADA, CSF glucose and CSF WBC count were significant in diagnosis of meningitis. Early detection and prompt therapy are most important factors in prognosis of meningitis.

KEYWORDS: Bacterial, tubercular, Viral meningitis, C S F ADA.

INTRODUCTION: Meningitis is inflammation of membranes which surrounds brain and spinal cord. It results from the lymphohaematogenous spread of micro-organism from distant site of primary infection. It is the major cause of morbidity and mortality in infants and children below 5 years.⁽¹⁾ The disease is caused mainly by bacterial or viral pathogens.⁽²⁾

Tuberculosis is also one of important cause of meningitis in children especially in developing countries. More than 2/3 cases of meningitis occurs in less than 5 years of life due to decreased immunity and high vascularity of the brain.⁽³⁾ The clinical presentation is vague due to immaturity of CNS in infants and children. B The incidence of tuberculosis is on the increase worldwide.⁽⁴⁾ Between 1 to 2% of children with untreated extracranial TB develop tubercular meningitis (TBM).⁽⁵⁾

AIM AND OBJECTIVES: To Study the clinical profile, cyto-pathological parameters of cerebrospinal fluid and outcome of the children admitted with suspected meningitis.

MATERIAL AND METHODS:

Study Design: Prospective study.

Study Period: January 2013 to June 2014.

Inclusion Criteria: Patients of age group 6 months to 14 years who were suspected to be a case of meningitis on the basis of history and clinical examination and CSF parameters were studied.

Suspected cases of meningitis were defined as per WHO. All patients with clinical symptoms of meningitis, example fever, headache, neck stiffness, vomiting and change in mental status and meningeal signs, bulging fontanel, papilledema, cranial nerve palsy and motor weakness of the limbs.

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EXCLUSION CRITERIA:

1. Old cases of meningitis treated outside the hospital before referral.
2. Children suffering from chronic illness or malignancy.
3. Children on immunosuppressive drugs.

Lumbar punctures were performed and fresh CSF samples were collected from all patients. CSF samples were subjected to analysis of protein, glucose, total and differential leucocyte count, gram staining, acid fast staining and culture sensitivity.

Consent was taken from guardians of patients and approval for study was taken from ethical committee of institute.

Findings	Pyogenic Meningitis	Tubercular Meningitis	Aseptic Meningitis
Gross appearance	Turbid	Clear or straw coloured , cob web on standing.	Clear
Proteins	Usually 100-500mg/dl	Elevated ,upto 300mg/dl,may be >500mg/dl	Normal
Sugar	Reduced,usually <40mg/dl	Reduced,usually <50mg/dl	Normal
Cells	100-10,000,usually 300-2000 , mainly polymorphs	10-500/mm ³ , (25-100)predominantly lymphocytes	Upto 100/mm ³ , Mononuclear predominance.
culture	Pyogenic organisms may be isolated.	Difficult to isolate tubercular bacilli.	Not helpful

Table 1

Vaccination history and history of close contact with a known patient suffering from pulmonary tuberculosis was elicited.

Chest radiograph and Montoux skin test were carried out for all patients. Nutritional assessment was done in all patients according to WHO classification. All patients received treatment as per standard protocol of etiological diagnosis. The mortality and morbidity of all cases were assessed at the time of discharge.

RESULTS: Total 95 Patients were enrolled in study. Out of 95 patients 22 were excluded meeting our exclusion criteria. 13 patients had already received treatment for meningitis from outside and later diagnosed as partially treated septic meningitis, 5 patients were already receiving antitubercular treatment and had neurological sequelae, 2 patients had postencephalitic sequelae and 2 patients were diagnosed as acute leukemia. Finally 73 patients met our inclusion criteria. Out of which 47 were diagnosed as tubercular meningitis, 22 as septic meningitis and 4 as aseptic meningitis.

Most of patients with tubercular meningitis were between 9 months to 4 yrs. (Mean age-2.4 yrs), those with bacterial meningitis ranged from 6 months to 3 yrs. (Mean age-1.9 yrs) and patients of aseptic meningitis ranged from 2 yrs. to 8yrs. (Mean age-5.5 yrs.) . At our institute males presenting with meningitis were more than females.

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Diseases	Tubercular Meningitis (n= 47)	Bacterial Meningitis (n=22)	Viral Meningitis (n=4)
Male	26(55.3%)	18(81.8%)	3(75%)
Female	21(44.68%)	4(18.18%)	1(25%)
Age(mean)	2.4years	1.9 years	5.5 years

Table 2: Age and Sex Distribution

At our institute fever followed by altered mental status, seizures, vomiting and headache were most common presenting complaints.

Neurological deficit was found in total of 22 patients at presentation. It was more common in cases with bacterial meningitis (36.3%) compared to TBM (29.78%). Whereas none of the cases with aseptic meningitis had neurologic deficit.

In our study history of contact with a known case of tuberculosis, usually a household contact, provided supportive evidence to the clinical diagnosis of TBM.

Tuberculin test is a useful tool for diagnosis of tuberculosis in children. We found positive tuberculin reaction in 20% cases of TBM. However, its diagnostic value is limited in the more severe forms of tuberculosis, like TBM and MTB.

In our study only 6(12.7%) cases of TBM had shown positive AFB from gastric aspirate showing poor yield of sample.

	TUBERCULAR MENINGITIS (N=47)	BACTERIAL MENINGITIS (N = 22)	VIRAL MENINGITIS (N=4)
fever	40 (85%)	18 (81.8%)	3(75%)
Altered sensorium	31 (65.9%)	14 (63.6%)	1(25%)
seizure	37 (78.7%)	18 (81.8%)	0
vomiting	35 (74.4%)	14 (63.6%)	4(100%)
headache	35 (74.4%)	16 (72.7%)	2(50%)
Neurological deficit	14 (29.78%)	8 (36.3%)	0
Papilloedema	10 (21.2%)	14 (63.6%)	0
BCG scar	11 (23.4%)	7 (31.8%)	0
Undernourished	19 (40.4%)	12 (54.5%)	0
Tuberculin positive	15 (31.9%)	0	0
h/o contact with TB	14 (29.78%)	0	0
Positive gastric aspirate for AFB	6 (12.7%)	0	0

Table 3: Comparative data of clinical features and examination findings in suspected meningitis

Our patients showed significant CSF leucocytosis with neutrophilic predominance (90%) and high CSF protein (>50 mg/dl) (72.7%) in bacterial meningitis compared to the nonbacterial meningitis group. ALL patients with TBM had greater than 90% lymphocytes in CSF. CSF glucose concentration is decreased <45 mg/dl in 72.7% of patients with bacterial meningitis and significantly above 45 mg/dl in all patients of the aseptic meningitis. In our study Low CSF glucose and elevated protein are other characteristic abnormalities seen in TBM.

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Newer diagnostic techniques have been introduced as CSF ADA levels for TBM. In our study CSF ADA was found to be >5 IU/L in 45(96%) of TBM cases.

We did CT scanning in 40 patients, as others either refused scanning or could not afford it:

- Basal enhancement in 25%.
- Hydrocephalus in 25%.
- Infarcts in 5.0%.
- Cerebral oedema in 8.0% and more than 1 finding in 32.0% of the patients.
- Normal study was in 29%.

	TUBERCULAR (N= 47) (%)	BACTERIAL (N= 22) (%)	VIRAL (N= 4) (%)
CSF leucocyte count (>501-1000/ μ l)	39 (82.9)	20 (90.9)	0
CSF leucocyte count (101-500/ μ l)	8 (17.02)	2 (9.09)	0
CSF leucocyte count (100/ μ l)	0	0	4(100)
CSF lymphocyte (>90%)	47(100)	0)	0
CSF neutophil (>90%)	0	22(100)	0
CSF PROTEIN (<100mg/dl)	0	0	4
CSF PROTEIN (100-250 mg/dl)	7 (14.8)	1 (4.5)	0
CSF PROTEIN (250-500 mg/dl)	15 (31.9)	5 (22.7)	0
CSF PROTEIN (>500 mg/dl)	25 (53.1)	16 (72.7)	
CSF GLUCOSE (<45mg/dl)	44 (93.6)	16 (72.7)	0
CSF ADA (>5 IU)	45 (95.74)	0	0
CSF culture	0	0	0

Table 4: Csf Analysis Data

	Improved	Neurological Sequelae	Deaths
T. B. M. (n=47)	33	14	2
Bacterial Meningitis (n= 22)	17	8	2
Aseptic Meningitis (n = 4)	4	0	0

Table 5: Outcome at Discharge

DISCUSSION: Our study showed that the frequency of bacterial meningitis is more prevalent in age group of 6 months to 3 years. Bacterial meningitis is the major cause of morbidity in children below the age of 5 years.^[1]

In our study TBM was found to be in the age group of 9 months to 4 years. Study done by Wilson et al found the greatest frequency of TBM cases in children between the ages 1 to 9 years.⁽⁴⁾

At our institute fever followed by altered mental status, seizures, vomiting and headache were most common presenting complaints. Similar study done by Vaswani et al showed that fever, headache, vomiting and altered mental status were the main complaints of the patients who were diagnosed to be meningitis.⁽⁵⁾

BCG vaccination, even though influenced by nutritional status, state of allergic reaction and time elapsed is expected to give protection against tuberculosis, especially of the central nervous system.

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In our study 23.4 % of the cases of TBM were BCG vaccinated. However, TBM has been reported in 11% to 35% of BCG vaccinated children.⁽⁶⁾

A positive tuberculin reaction was observed in 75% cases of TBM in one of the studies.⁽⁷⁾ even though others have reported a negative result in a large proportion of cases.⁽⁸⁾

In our study CSF culture did not grow any bacteria and none of the cases had isolated M. TB showing a low bacterial yield. Elerie J. Williams et al also could recover only 9 bacteria from culture of 199 CSF sample.⁽⁹⁾ The positivity of CSF cultures in TBM has been reported to vary from 8% to 58% by several workers in India.⁽¹⁰⁾

Our patients showed significant CSF leucocytosis with neutrophilic predominance (90%) and high CSF protein (>50mg/dl) (72.7%) in bacterial meningitis compared to the nonbacterial meningitis group. ALL patients with TBM had greater than 90% lymphocytes in CSF. CSF glucose concentration is decreased <45 mg/dl in 72.7% of patients with bacterial meningitis and significantly above 45mg/dl in all patients of aseptic meningitis. Most of the cells in CSF in TBM are lymphocytes and CSF lymphocytosis greater than 50% has been reported in 80% to 83% of the patients.⁽¹¹⁾

CSF glucose is typically normal in aseptic meningitis, although it may be decreased in cases due to enteroviruses, HSV-2, and VZV meningitis.⁽¹²⁾ In our study Low CSF glucose and elevated protein are other characteristic abnormalities seen in TBM. In our study Low CSF glucose and elevated protein are other characteristic abnormalities seen in TBM. Berengufer et al have reported low CSF glucose in 89% of their patients.⁽¹³⁾ Tandon et al have reviewed large series of publications and reported the incidence of low CSF glucose as varying from 50% to 95% patients.⁽¹⁴⁾

In our study only 6(12%) specimens yielded a positive culture of M. tuberculosis. The isolation of organisms from gastric aspirates for diagnosis of tuberculosis is low yield in pediatric practice.⁽¹⁸⁾

Newer diagnostic techniques have been introduced as CSF ADA levels for TBM. In our study CSF ADA was found to be >5 IU/L in 96% of TBM cases. A study done by Mishra et al showed CSF ADA level in TBM cases had significant correlation with CSF cell count ($P<0.01$), lymphocyte percentage ($P<0.02$) and protein concentration ($P<0.02$). Thus, the CSF ADA activity assay was found to be a simple, useful and rapid diagnostic test for the early recognition of TBM in children.⁽¹⁹⁾

Abnormalities reported on CT scan done are hydrocephalus, infarcts, basal enhancement, and cerebral oedema. Neurological deficit were seen in 30% of our cases. Neurologic disabilities ranging from mild to severe are reported in 10% to 50% of children who survived the infection.^(20,21) Normal study is reported in up to 20% of the cases,⁽²²⁾ whereas 29% of our cases had normal CT scan.

CONCLUSIONS: CSF parameters help to diagnose and differentiate various types of meningitis. CSF ADA is a simple, easy and rapid diagnostic test for early diagnosis of TBM.

Early detection and prompt therapy are the most important factors in prognosis of meningitis.

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