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ETIOPATHOLOGICAL STUDY OF MENINGITIS IN PEDIATRIC PATIENTS FROM A TERTIARY CARE TEACHING HOSPITAL OF JHARKHAND

Paediatrics

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ABSTRACT

Introduction: Meningitis is a life threatening infection and requires appropriate therapy at the earliest possible moment.
Aim: To find out the organisms responsible for causing acute pyogenic meningitis.
Method: Detailed history and thorough examination were done in suspected case of meningitis and a tentative diagnosis was made. Routine CSF examination was done and all patient are divided into 4 group pyogenic meningitis, tubercular meningitis, viral meningitis and extracranial infections. Culture of CSF was done to know the etiology.
Results: 132 patients met the inclusion criteria with 44 cases of pyogenic meningitis (Group I), 14 cases of tubercular meningitis (Group II), 48 cases of viral meningitis (Group III) and 26 without CNS infections (Group IV). Out of 132 cases only 20 cases were culture positive which was 15.15% of all cases. Streptococcus pneumoniae was the commonest organism cultured.

KEYWORDS

Bacteriological, Cerebrospinal fluid, Pyogenic Meningitis

INTRODUCTION

Meningitis is a devastating infection of the central nervous system that has a high mortality and morbidity. The goal is to begin antibiotic therapy within 60 minutes of a patient's arrival in the emergency room. Empirical antimicrobial therapy is initiated in suspected patients before the results of CSF Gram's stain and culture are known.[1] Delay in distinguishing bacterial from other infections of central nervous system may have irrevocable consequence, as the regenerative capacity of central nervous tissue is limited, so prompt and correct diagnosis to select appropriate therapy is required.[2]

METHODOLOGY

The study was conducted in the Department of Pediatrics and Neonatology, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand. Infants and children between 0-16 years admitted with suspicion of meningitis during the period of one year from Jun 2014 to May 2015 were included in the study group. Detailed history and thorough examination were done in each case and a tentative diagnosis was made. Blood and CSF samples were collected as a part of diagnostic work up. CSF specimen was collected by lumbar puncture under aseptic precautions. Routine CSF examination-cell type and count, protein and sugar was done.

Depending upon the CSF analysis cases were divided into 4 groups as follows: **GROUP-I: PYOGENIC MENINGITIS:** Appearance- CSF was cloudy or turbid, Cytology- Cell count >500 cells/cumm with neutrophil, Protein- >100 mg/dl, Sugar- Reduced significantly to below the 50% of blood sugar or <40 mg/dl. **GROUP-II TUBERCULOUS MENINGITIS:** Appearance- Straw coloured or turbid, Cytology- 200-500 cells/cumm with predominant lymphocyte, Protein- >200 mg/dl, Sugar- Not below 50% of blood sugar or above 40 mg/dl. **GROUP III: VIRAL ENCEPHALITIS:** The following CSF parameters were considered: Appearance: Colour- Clear, Cytology- 10-100cells/cumm with predominantly lymphocytic, Protein- 50-100 mg/dl, Sugar- >50 mg/dl, Gram and Ziehl Neelson stain - No organisms. **GROUP IV: EXTRA CRANIAL INFECTIONS:** The group consisted children of both sexes admitted with fever and seizures and in whom CNS infection was suspected. Subsequently clinical course and CSF analysis excluded CNS infection. CSF parameters: Appearance: Colour- Clear, Cytology- <5 cells/cumm, Protein- 20-40 mg/dl, Sugar- >50 mg/dl and Gram and Ziehl Neelson stain - No organisms

CSF was cultured on specific media: Trypticase soy agar, Columbia sheep blood agar, Chocolate agar with Polyvitex and Hemoline performance two phase aerobic (bottle). CSF cultures were further identified by: (*i*) specific antisera (DIFCO), specifically polyserum and type b serum for the *H. influenzae*, types A, B and C sera for *Neisseria meningitidis,* and *S. pneumoniae;* (*ii*) standard techniques for identification of *E. coli, staphylococcus, streptococcus etc.*

RESULTS

132 patients met the inclusion criteria with 44 cases of Pyogenic Meningitis (Group I), 14 cases of Tuberculous Meningitis (Group II), 48 cases of Viral encephalitis (Group III) and 26 without CNS infections (Group IV).

Graph 1: Group Distribution (n=132)

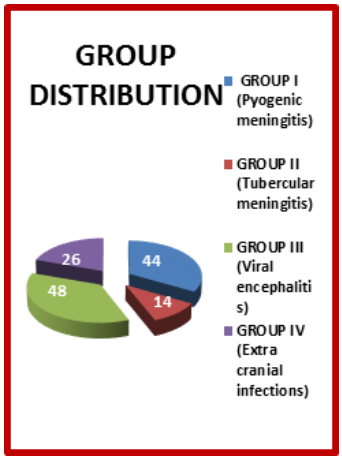


Table 1: CSF Culture Positivity In Different Groups

Culture	GP I	GP II	GP III	GP IV	Total
POS	20(45.4%)	0(0%)	0(0%)	0(0%)	20(15.2%)
NEG	24(54.6%)	14(100%)	48(100%)	26(100%)	112(84.8%)
Total	44(100%)	14(100%)	48(100%)	26(100%)	132(100%)

Table 1 shows that out of 132 cases only 20 cases were culture positive which was 15.15% of all cases. And all culture positive cases belonged to Group I. So culture positivity in Group I was 45.45%

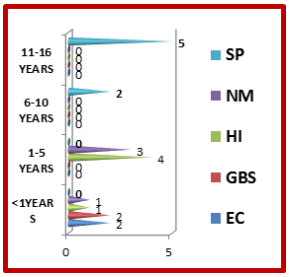
Table 2: Type Of Organisms In CSF Culture

Organism	Number Of Cases	Percentage
Group B Streptococcus (GBS)	2	10%
Escherichia coli (EC)	2	10%
Haemophilus influenzae (HI)	5	25%

Neisseria meningitides (NM)	4	20%
Streptococus pneumoniae (SP)	7	35%
TOTAL	20	100%

Table 2 shows the type of organism found in CSF culture. Most cases (35%) had Streptococus pneumoniae in their CSF culture. 5 cases had Haemophilus influenza as growth.

Graph 2: Age Group And Organisms Isolated



Group B streptococci and Escherichia coli were predominant in infancy especially neonates. Haemophilus influenzae and Neisseria meningitidis were predominance from 1 to 5yrs and Streptococcus pneumoniae common in older children. (Graph2)

DISCUSSION

It is a prospective study of cases comprising of suspected CNS infections in children from the community over a specific period of time. The number of cases involving in each group is not equal. The selection criterion for grouping was decided due to the fact that few of the cases referred to our center had received antibiotics before reaching our hospital. CSF culture negativity was probably due to prior antibiotic therapy received outside in the absence of documentation. Most of the Indian workers found similar problem with culture positivity, reports varying between 32-60%. John M, Ray IS, Macadene R, et all from St Johns medical college, Karnataka studied CRP in CSF of 212 patients with clinical features suggestive of meningitis, was studied which showed culture positivity rates of 6%, they also grouped the patients in similar way as ours.[3] A typical case of pyogenic meningitis without prior antibiotics may not create any diagnostic problem, but prior treatment with inappropriate and inadequate antibiotics may cause sufficient alteration in biochemistry and cytology of cerebrospinal fluid (CSF) and organisms may not get isolated from blood or CSF.[4] Moreover cerebrospinal fluid culture for pyogenic organisms are positive in only 30-60% of cases according to various Indian workers.[5]

In our study 20 cases out of 132 cases (15.15%) showed CSF culture positivity. All these cases belonged to Group I i.e. out of all 44 cases of Group I, 20 cases (45.45%) developed growth. Organisms identified showed Group B streptococci and Escherichia coli predominance in infancy especially neonates. Hemophilus influenzae, Neisseria meningitidis were predominant in 1 to 5 years age group. Streptococcus pneumoniae was common in older children. The low incidence of infection with *N. meningitidis* and relatively high incidence of *pneumococcal infection* has been noted by other Indian workers.[6,7]

CONCLUSION

Pyogenic meningitis is an important serious illness world-wide and is a medical emergency. It still remains major cause of death and long term neurological disabilities. Prompt diagnosis and aggressive management are the goals for which we need laboratory diagnosis as early signs and symptoms are often non-specific. Culture is a gold standard technique but it takes 24-48 hours for reporting.

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