(International Print/Online Journal)

SJIF IMPACT FACTOR: 5.565
PUBMED-National Library of Medicine ID-101739732

ISSN (Print): 2209-2870
ISSN (Online): 2209-2862

International Journal of Medical Science and Current Research (IJMSCR)
Available online at: www.ijmscr.com
Volume 6, Issue 2 , Page No: 216-221
March-April 2023

IJMSCR

Clinical And Etiological Profile Of Acute Bacterial Meningitis In Children Admitted To Tertiary Care Hospital

Vivek Pandita ,Khurshid Ahmad Wani, Jawad Nazir Wani, Shugufta Roohi,
[1]Senior Resident Pediatrics MAMC new delhi, [2] Professor department of pediatrics government medical college srinagar, 3 senior resident pediatrics government medical college srinagar [4]assistant professor department of microbiology,SKIMS soura srinagar Kashmir

***Corresponding Author:**
Shugufta Roohi
Assistant Professor, Department of Microbiology, SKIMS Soura. Srinagar J&K India.

Type of Publication: Original Research Paper
Conflicts of Interest: Nil

Abstract

Background: Bacterial meningitis is one of the most serious pediatric infections . The objective was to study the clinical and etiological profile of acute bacterial meningitis in children

Materials and Methods: This study was an observational study conducted over period of two years from October 2016 to October 2018 in department of Pediatrics Government Medical College Srinagar, J&K. All the children in the age group of 1month to 18 years with diagnosis of acute bacterial meningitis based on clinical findings and cerebrospinal fluid (CSF) findings were included in study.

Results : In this study there were total of 100 patients. Majority of patients were in the age group of 1 month to 2 years(57%). The most common presenting features were fever (95%), vomiting (75%), neck stiffness (42%) and headache (30%).Gram staining revealed organism in 67 patients(67%) . CSF culture was positive in 59 (59%) patients .Most common organism isolated was streptococcus pneumoniae (24%). Other organisms isolated were kleibsella(9%),H.Influenzae(6%), Methicillin resistant staphylococcus aureus(6%), Methicillin sensitive Staphylococcus aureus (4%),Neissera Meningitidis(4%), Enterococcus(3%), E.Coli(2%) and Pseudomonas (1%)..Complications were seen in 11 (11%) patients in the form of hydrocephalus (4%), subdural effusion (3%), brain abscess(2%) and oculomotor nerve palsy (2%).97 patients were successfully discharged and 3 patients died .

Conclusion : Meningitis is serious disease in children requiring early diagnosis and prompt treatment to prevent morbidity and mortality ..The common presenting features are fever ,vomiting ,headache and neck stiffness. Lumbar puncture should be done prior to administration of antibiotics to increase the yield of culture

Keywords: Bacterial meningitis ; Cerebrospinal fluid ; Culture; Lumbar puncture

Introduction

A Bacterial meningitis in children is a life-threatening problem resulting in severe morbidity and mortality. The patient presents with fever, stiff neck, headache, nausea, vomiting, lethargy, anorexia, irritability, photophobia and positive Kernig's sign[1] .Bacterial meningitis is mainly caused by Streptococcus pneumoniae, Neisseria meningitidis, Haemophilus infuenzae and enteric Gram negative bacteria [2] .Alterations of host defense resulting from anatomic defects or immune deficits also increase the risk of meningitis from less-common pathogens such as Pseudomonas aeruginosa, Staphylococcus aureus, coagulase-negative staphylococci, Salmonella spp., anaerobes, and Listeria monocytogenes. Bacteria gain entry to the CSF (Cerbrospinal fluid) through the choroid plexus of the lateral ventricles and the

meninges and then circulate to the extracerebral CSF and subarachnoid space. Bacteria rapidly multiply because the CSF concentrations of complement and antibody are inadequate to contain bacterial proliferation. Chemotactic factors then incite a local inflammatory response characterized by polymorphonuclear cell infiltration. The subsequent inflammatory response is characterized by neutrophilic infiltration, increased vascular permeability, alterations of the blood–brain barrier, and vascular thrombosis. Meningitis-associated brain injury is not simply caused by viable bacteria but occurs as a consequence of the host reaction to the inflammatory cascade initiated by bacterial components[3]. In recent years, despite improvements in antimicrobial therapy and intensive care support, overall mortality rates related to bacterial meningitis of around 20 to 25% have been reported by major centres [4,5]. Early clinical suspicion and implementation of appropriate anti-microbial therapy are critical to minimize adverse outcomes [6,7]. The current standard for the identification of bacterial meningitis in developing countries remains to be microscopic examination and consequent culture of CSF. However, this approach might have some disadvantages with regard to the desired rapidity and sensitivity and the risk of false negative result is high because only a small number of microorganisms may be present in the specimens[8]. An etiological diagnosis of bacterial meningitis may be possible in less than 1 hour by latex agglutination, co-agglutination, or counter-immunoelectrophoresis. These methods have sensitivity comparable to those of microscopy and culture but are considerably less sensitive than Enzyme Linked Immuno-sorbent Assay (ELISA) or radio-immunoassay [9,10,11,12]. Rapid diagnosis and empirical therapy of meningitis on the basis of clinical findings are important, because stable neurological sequel such as hearing occur in up to one-half of survivors[13].The objective of this study was to determine clinical profile and etiology of patients diagnosed with meningitis in the age group of 1 month to 18 years.

Materials And Methods

This study was an observational study conducted in department of Pediatrics Government Medical College Srinagar, J&K over a period of two years from October 2016 to October 2018 after obtaining ethical clearance from ethical committee of GMC Srinagar.

Inclusion criteria:

All children aged 1 month to 18 years of age with one or more signs of meningitis (fever, headache, photophobia, nausea/vomiting, meningeal signs, altered mental status, seizures, and lethargy).

Exclusion criteria:

Patients with a known pre-existing neurological condition e.g. cerebral tumour, receiving antibiotics for a cerebral abscess, cerebrospinal fluid (CSF) shunt in situ, and neurosurgery within the previous two months.

Patients with demyelinating, metabolic, toxic or neurological degenerative diseases and HIV (Human immunodeficiency virus) infection were excluded.

A predesigned proforma was used to record the detailed history, examination and investigations of the patients admitted to the hospital. Baseline investigations were done in all patients and CSF (cerebrospinal fluid) samples were withdrawn using aseptic techniques after procuring informed consent from the guardian or the parent. Cerebrispinal fluid sample was subjected to routine biochemistry(sugar,protein) and cytology{total leukocyte count(TLC) & differential leukocyte count(DLC)}, gram staining and culture . CSF was preferentially collected prior to antibiotic treatment, consistent with the patient's condition and physician treatment.The diagnostic criteria for acute bacterial meningitis include:

1. Acute onset of fever ,headache, vomiting, nuchal rigidity or bulging AF.
2. Absence of parenchymal involvement.
3. Isolation of organism by gram staining or culture of the CSF/or classic CSF abnormalities as polymorphonuclear leukocytosis, decreased glucose concentration, and increased protein concentration.

Data was entered in Microsoft excel spreadsheet analysed using EpiInfo. Categorical variables were summarised as frequency and percentage. Continuous variables were summarised as mean and standard deviation or as five number summary (minimum,1st quartile,median,3rd quartile, maximum).

Volume 6, Issue 2; March-April 2023; Page No 216-221

Results And Observations

In this study there were total of 100 cases out of which 53 were males and 47 were females, with a male to female ratio was 1.1:1.Majority of patients in our study were in the age group of one month to two years as depicted in table 1.

The most common presentation in patients with CSF suggestive of bacterial etiology was fever which was present in 95 cases, followed by vomiting (75 cases), neck stiffness (42 cases), headache (30 cases) and bulging anterior fontanel (AF) in 27 cases . The less common presentations were altered sensorium and seizures which were present in 17 and 11 cases respectively (table 2.).

CSF biochemical and cytological analysis in bacterial meningitis patients showed neutrophilic pleocytosis, elevated protein and low sugar as depicted in table 3.

Gram staining was done in all patients of bacterial meningitis. On gram staining, organism was found in 49 cases and in 51 cases no organism was found. Among 49 cases where organism was seen on gram staining, gram positive cocci were seen in 35 cases, gram negative bacilli were seen in 10 cases, and gram negative diplococci were seen in 4 cases. (table 4)

CSF culture was negative in 41 cases and positive in 59 cases. Among 59 cases of culture positive cases, Streptococcus Pneumonia was detected in 24 cases, Klebsiella in 9 cases . H. Influenza and MRSA (Methicillin resistant staphylococcus aures) in 6 cases each, ,MSSA(Methicillin sensitive staphylococcus aureus) in 4 cases, Neisseria meningitidis in 4 cases, Enterococcus in 3 cases, E. coli in 2 cases and Pseudomonas aeruginosa in 1 case. (Table 5)

Majority of patients responded to treatment promptly. In nine patient there was clinical worsening despite appropriate antibiotic therapy. Contrast enhanced CT scan (Computed tomography) was done in these patients. CT revealed hydrocephalus in four patients, subdural effusion in three patients and brain abscess in two patients. In addition to these complications third cranial nerve palsy was seen in two patients as depicted in table 6

Among 100 cases , 97 patients were discharged and 3 patients died in hospital. Out of these 3 patients 2 had brain abscess and 1 had subdural effusion.

Table 1: Age distribution

Age group	**No. of cases**	**Percentage**
1 months to 2 years	57	57.00%
2 years to 5 years	23	23.00%
5 years to 10 years	14	14.00%
> 10 years	6	6.00%
Total	**100**	**100.00%**

Table 2: Clinical presentation

Clinical feature	No. of cases	Percentage
Fever	95	95%
Vomiting	75	75%
Neck Stiffness	42	42%

Volume 6, Issue 2; March-April 2023; Page No 216-221

Headache	30	30%
AF bulging	27	27%
Altered sensorium	17	17%
Seizures	11	11%

Table 3: CSF Parameters			
	Minimum	Maximum	Mean ±SD
CSF TLC	120	1400	498.67 ± 223
CSF Protein(mg/dl)	50	110	80.53 ± 19
CSF Sugar(mg/dl)	30	40	34.49 ± 5
CSF DLC Neutrophil %	65	95	86.76 ± 10
CSF DLC Lymphocyte %	5	20	13.09 ± 5

Table 4: Gram staining		
Gram staining	**No. of cases**	**Percentage**
Organism seen	49	49.00%
No organism seen	51	51.00%
Grand Total	**100**	**100.00%**

Table 5: Bacterial Culture		
ORGANISM	**No. of cases**	**Percentage**
S. Pneumonia	24	24.00%
Kleibsella	9	9.00%
H. Influenza	6	6.00%
MRSA	6	6.00%
MSSA	4	4.00%
Neisseria meningitidis	4	4.00%

Volume 6, Issue 2; March-April 2023; Page No 216-221

Enterococcus	3	3.00%
E. Coli	2	2.00%
Pseudomonas	1	1.00%
Culture negative	41	41.00%
Grand Total	**100**	**100.00%**

TABLE 6: Com plications

Complication	No. Of Patients	Percentage
Hydrocephalus	4	4%
Subdural effusion	3	3%
Brain abscess	2	2%
Oculomotor nerve palsy	2	2%

Discussion

This study was an observational study conducted at G.B.Pant Children hospital, an associated hospital of Government Medical College Srinagar, J&K over a period of two years from October 2016 to October 2018. This study included total of 100 patients out of which 53 were males and 47 were females revealing almost equal incidence in males and females. Studies by **Dhurbajyoti et al**[14], **Naz et al** [15] and **Qazi et al**[16] revealed preponderance in males. In this study majority of patients were in the age group of 1 month to 2 years . Similar results were reported by **Naz et al** [15] and **Iregbu et al** [17].The most common presenting feature in this study was fever (95%) followed by vomiting (75%), neck stiffness (42%) and headache (30%). In a study conducted by **Chinchankar N et al** [18] in Pune similar presentations were observed with fever being the most common presentation (96%).Similar results were reported by **Attia et al** [19]. **Berkley JA et al** [20] stated that neck stiffness was very strongly associated with evidence of bacterial meningitis. The mean CSF TLC was 498±223 with DLC revealing mean neutrophil percentage of 86.7±10 %.The mean CSF glucose and protein were 34.49±5mg/dl and 80.53±19 mg/dl respectively. Similar findings were seen in study by **Attia et al** [19]. Gram staining was done in all the CSF samples. Organisms were seen in 49 (49%) cases. In a similar study conducted by **Berkley JA et al** [20] at a district hospital in sub-Saharan Africa, organisms were found in 59.9% patients on gram staining. The CSF culture was positive in 59 (59%) which is similar to study by **Chinchankar et al** [18] in which CSF cultures was positive in 50% cases**.** The most common organism isolated on CSF culture was *S. pneumoniae* in a total of 19 (19%) cases followed by *kleibsella* in 9 (9%) cases. *H.Influenza* and Methicillin resistant *Staphylococcus aureus* were isolated in 6 cases each. *Neisseria* meningitides and Methicillin sensitive aureus were isolated in 4 cases each. Enterococcus was seen in 3 cases , E.Coli was seen in 2 cases and *Pseudomonas* species in 1 case. A study conducted in a tertiary care centre in South India by **Mani R et al** [21] depicted similar results with S. Pneumoniae being the most commonly isolated organism in the study population. The study reported 7 cases of staphylococcus aureus, 5 cases of Klebseilla and Pseudomonas each. **Kuti et al** [22] reported culture positivity in 62.7%.**Gaurav et al**

Volume 6, Issue 2; March-April 2023; Page No 216-221

[23] and **Attia et al** [19] reported culture positivity in 13.94% and 12% respectively. The relatively higher percentage of culture positivity in our study could be attributed to the fact that lumbar puncture was done prior to administration of antibiotics. In this study complications were seen in 11 (11%) patients in the form of hydrocephalus (4%), subdural effusion (3%),brain abscess (2%) and oculomotor nerve palsy (2%). **Attia et al** [19] reported complications in 17 % patients . **Cho et al** [24] reported complications in 20% patients. In this study mortality was seen in 3 % patients . **Attia et al** [19] and **Cho et al** [24] reported mortality of 10.1% and 9.5% respectively.

Conclusion:

Meningitis is serious disease requiring early diagnosis and prompt treatment to prevent morbidity and mortality. The most common presenting features are fever and vomiting . Lumbar puncture should be done prior to administration of antibiotics as it increases the CSF culture yield .Streptococcus pneumoniae is the most common causative agent. Meningitis is more common in young age group.

Volume 6, Issue 2; March-April 2023; Page No 216-221