

# Frequency of Acute Complications of Pyogenic Meningitis in Children During Hospital Stay

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## ABSTRACT

**Objective:** To determine the acute complications of pyogenic Meningitis in children during hospital admission.

**Study Design:** Descriptive / observation Hospital based study.

**Place and Duration of Study:** This study was conducted at the Pediatrics Department DHQ Teaching Hospital D.I.Khan for a period of 01 year from March 2017 to February 2018.

**Materials and Methods:** 100 patients age 3 months to 12 years with clinical features of acute bacterial meningitis were included in study. Children with tuberculosis meningitis, VP shunt associated meningitis, mental retardation and age less than 3 months or more than 12 years were excluded from study. CSF analysis and C/S was done in call cases from pathology department of Hospital. Specific investigations were done for acute complications where they were needed which include serum electrolytes, Blood glucose, PT, APTT serum osmolarity, creatinine, CT brain. All patients were observed for acute complications for 14 days.

**Results:** Total 100 patients age 3 months to 12 year's diagnosed as acute bacterial meningitis were included in study. Out of these 59% were male and 41% female. 50% were below 1 year age. 29% were between 1 to 5 year age while 21% were between 5 years and 12 years age. Acute complications were observed in 31% children. The various acute complications were, subdural effusion 15%, septic shock 5%, hemiparesis 6%, acute hydrocephalus in 2%, cerebral edema in 2% and cranial nerve palsy 1%. Subdural effusion, Hydrocephalus and cerebral edema was more Common below 1Year while cranial nerve palsy, hemiparesis and septic shock were more Common above 1 Year.

**Conclusion:** Acute bacterial meningitis is serious infection in children resulting in significant acute complication, mortality and morbidity. In next millennium our success will depend upon effective vaccination strategies which has reduced disease burden in developed countries.

**Key Words:** Acute bacterial meningitis, acute complications cerebral spinal fluid (CSF) hydrocephalus.

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## INTRODUCTION

Acute bacterial meningitis first recognized in 1805 is infection of leptomeninges and sub arachnoid space. A more descriptive term is meningoencephalitis as inflammatory process involves the meninges, sub arachnoid space, and the brain paranchyma<sup>1,7</sup>. Worldwide two third of cases of acute bacterial meningitis occurs in children below 15 year age. So major burden is shared by pediatrician. In pediatric age group more than 75% cases occur below 5 year age. And out of these 50% cases occur below 1 year of age.<sup>2,3,14</sup>

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Acute complication starting within few days of illness include cerebral oedema, Syndrome of inappropriate antidiuretic hormone secretion, septic shock, disseminated intra-vascular coagulation, subdural effusion, ventriculitis, cranial nerve palsy, hemiparesis, and status epileptics.<sup>4,5,6</sup> Developmental retardation seizures, Delay in acquiring language, Visual impairment, behavioral problems, and hearing impairment are long term sequelae.<sup>4,13</sup>

Despite intensive care and therapeutic development the condition is still responsible for high rate of morbidity and mortality. It is among 10 major causes of mortality from infectious disease mainly in pediatric population.<sup>7,8,9</sup>

Acute bacterial meningitis has a mortality of 8-20% with a relapse rate of 3-4%.<sup>10</sup> 10-20% cases develop neurodevelopmental sequelae if not treated properly and promptly.<sup>4, 11</sup> In Pakistan 5000 deaths in infancy and almost twice as many handicap cases in infants occur each year due to this disease.<sup>12</sup> Despite advances in prevention and medical management acute bacterial meningitis remains an important cause of mortality and morbidity which not only takes life of so many children

but also live large number of them handicapped, crippled, deaf and blind, causing a lot of problems for family, community, as well as country.<sup>14,15</sup>

**MATERIALS AND METHODS**

This descriptive hospital base study was carried out in department of pediatrics DHQ Hospital D.I.Khan from March 2017 to Feb 2018. 100 Consecutive children's age 3 month to 12 years with clinical features that were suggestive of acute bacterial meningitis and confirmed by CSF examination admitted in pediatric unit were included in study. Children's less than 3 month or older than 12 years, children with tubercular meningitis, ventriculo-peritoneal shunt associated meningitis, children with mental retardation or other neurological disorder were excluded from study. Detailed history and physical examinations was carried out in all patient and all were subjected to cerebrospinal fluid analysis, including microscopy, gram staining, CSF culture and sensitivity. Specific test like CT Brain, Serum electrolytes, serum osmolarity PT/APTT, urea, creatinine were done in specific patient depending the complications where they were needed.

Standard treatment for acute bacterial meningitis was given to all patient for 14 days and were observed for acute complications for 14 days. Outcome of patient was noted in form of discharge, died, left against medical advice (LAMA) and shifted to other ward like neurosurgery for management of complications.

**RESULTS**

During these 1 year study the total number of admission to pediatric department of DHQ teaching Hospital D.I.Khan were 8050. Total number of patients enrolled were 100, comprised of 1.69% of total admission in pediatric unit.

Out of these 100 patients with acute bacterial meningitis, 59% patients were male and 41% patients were female. 50% patients were below the age of 1 year, 29% patients were between 1-5 year age years. The greater percentage 79% were 0.25 to 5 years age i.e. below 5 years age. 21% patients were between 5 and 12 years. During the course of treatment, antibiotic were changed as per protocol in 25 patients (25%). The added antibiotics were vancomycin, ceftazidime and meropenem.

Acute complications that were observed during observation time were:

- Subdural effusion in 15% patients. 13% patients were below 1 year: and 2% patients were above 1 year. In 13 patients effusion resolved with conservative treatment while 2 patients were referred to neurosurgical intervention.
- Septic shock was seen in 5% patients during the course of treatment. All receive aggressive treatment with antibiotics and Iontropic agents coupled with supportive care. Hemiparesis and

Paraparesis were seen in 6% patients with C.T. finding of either intracranial haematoma in 1% patient, infarction in 2% patients and ischaemia in 3% patients. Hemiparesis and paraparesis was present with mild to moderate weakness at discharge. Acute Hydrocephalus was seen in 2% patients that were below 6-months age and were referred to neurosurgical department and undergone ventriculo-peritoneal shunt. Cerebral edema was observed in 2 patients that responded to fluid restriction and osmotic diuretics. Cranial nerve palsy was seen in 1 patients (1%), involving the 6<sup>th</sup> bilaterally, that resolved in the hospital.

- The overall frequency of acute complications in our study was 31%, and subdural effusion was the most common complication, which occurred in 15% patients. There was significant difference in acute complications in children below 1 year and above one year age. Subdural effusion, hydrocephalus and cerebral edema were common below 1 year age (P. value < 0.005), while hemiparesis, cranial nerves palsy and septic shock were more common above 1 year age (P. value < 0.005).

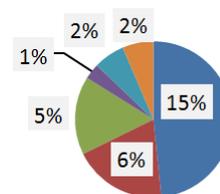
**Outcome:** Out of 100 patient admitted with acute bacterial meningitis, 69% patients were completely cured in the hospital and were discharged. 18% patients died during the course of treatment i.e. day one to day 14. The frequency of acute complications was 31% in this study. Three patients were discharged after 14 days observation in critical condition.

**Table No.1: Acute complications during hospital stay.**

Complication	Frequency	Percentage
Subdural effusion / Emyema	15	15%
Hemiparasis + paraparesis	6	6%
Septic shock	5	5%
Cranial nerve palsy	1	1%
Acute hydrocephalus	2	2%
Cerebral oedema	2	2%
<b>Total</b>	<b>31</b>	<b>31%</b>

n=100

- Subdural effusion / Emyema
- Hemiparasis + paraparesis
- Septic shock
- Cranial nerve palsy
- Acute hydrocephalus
- Cerebral oedema



**Figure No.1: The Frequency Distribution of Complications**

## DISCUSSION

The total number of admissions in pediatric department during the study period were 5080 and acute bacterial meningitis accounted for 1.96% of all our pediatric hospitalizations during the study period. The mean age of presentation was 31.46 months similar percentage of hospitalization to the pediatric Unit due to acute bacterial meningitis has been reported in national and International studies. Ahmad I, et al reported a frequency of 1.7% of all Pediatric admission due to this disease in Pakistan while the International studies reported frequency of 1.5% by Chinchankar et al, 2.6 by Kabra et al<sup>17,18,19</sup>. The community prevalence in International studies is 3/100,000 in USA, Thirumoothi MC, 16/100,000 in UK, Fortnum HM, Davis AC, 45.8/10,000 in Brazil<sup>20,21</sup>.

In the present study the overall percentage of acute neurological complication is 31%. The various acute complication and their percentage in the present study is sub-Dural effusion (15%), Hemiparesis (focal neurological deficit) is (6%) septic shock (5%), hydrocephalus 2%, cerebral Oedema (2%), cranial nerve palsy (1%). Similar and comparable acute complication has been reported in national and international study. A local study by Javaid BK et al, reported the same acute complications of meningitis in 29% of patient which is comparable to our study. In other study in India by Chinchankar N et al, the same acute complication were reported in 40% of patient which includes subdural effusion (18.5%), Hemiparesis (7.4%), Hydrocephalus and brain abscess (3.7%), cranial nerve palsy 5.5% and cerebral infarction (10.5%), which is comparable to our study which slightly increase intracranial nerve palsy and cerebral infarction, but overall similar results<sup>18</sup>.

In other study in Yemen by Sallam AK et al, the overall acute complication reported were 23% and various acute complication were same as in our study. In another study by Sergio A et al in Brazil between 2003 and 2008 the overall acute complication percentage 38.6% and same acute complication has been reported<sup>24</sup>. While another study Bari A, et al reported the same acute complication but with little lower percentage 17% and 19.4% into groups<sup>25,26</sup>. And similar results were seen with 24% complications rate in a study in arch Dis child by Qazi SA et al,<sup>26</sup>. But these little differences in various studies may be due to early or late presentation to hospital, local facilities available in hospital immunization status of patient and differences in vaccination coverage in rural versus Urban areas that needs further studies and research.

In our studies there is significant difference in various acute complication in small and older children. Sub duration effusion, Hydrocephalus and cerebral Oedema were more common in children below 1 year as compared to older children (P. value < 0.005) while

hemiparesis, septic shock and cranial nerve palsy were common above in older children (P. value < 0.005).

## CONCLUSION

Acute bacterial meningitis is serious infection in children resulting in significant acute complication, mortality and morbidity. In next millennium our success will depend upon worldwide scrutiny for pattern of antibiotic resistance, continuous development of new antimicrobials, more judicious use of drugs we already use and effective vaccination strategies which has reduced disease burden in developed countries.

### Author's Contribution:

Concept & Design of Study: Farman Ullah Burki  
 Drafting: Muhammad Ismail Khan  
 Data Analysis: Aftab Ahmad  
 Revisiting Critically: Farman Ullah Burki, Muhammad Ismail Khan  
 Final Approval of version: Farman Ullah Burki

**Conflict of Interest:** The study has no conflict of interest to declare by any author.

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