



Acute bacterial meningitis in children with 1st episode of febrile seizures.

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Article received on:

10/04/2020

Accepted for publication:

20/06/2020

ABSTRACT... Objectives: To find out the frequency of acute bacterial meningitis (ABM) among children with 1st episode of febrile seizures (FS) at a tertiary care hospital. **Study Design:** Descriptive Cross-sectional study. **Setting:** Department of Pediatrics Medicine Children's Hospital and Institute of Child's Health, Multan. **Period:** October 2019 to March 2020. **Material & Methods:** A total number of 169 children who presented with 1st episode of acute FS, aged 6-60 months were included in this study. Data regarding age, gender, residential area and mother education was taken for each children. Once registered, lumbar puncture (LP) was performed along with a random blood sugar. Cerebrospinal fluid (CSF) was collected and analyzed to find out the frequency of FS among children having ABM. **Results:** Mean age of children was 24.44±12.26 months. There were 100 (59.17%) male children and 69 (40.83%) female children. there were 16 (9.47%) children having positive family history of FS. 97 (57.40%) children were belonged to rural area and rest of the others were belonged to urban area. ABM was found in 10 (5.92%) children. **Conclusion:** Frequency of ABM among children presented with FS is not high. ABM was diagnosed in 5.92% children presenting with 1st episode of acute FS.

Key words: Acute Febrile Seizures, Bacterial Meningitis, Cerebrospinal Fluid.

Article Citation: Urooj S, Saleem M, Khurshid A. Acute bacterial meningitis in children with 1st episode of febrile seizures. Professional Med J 2021; 28(1):42-46.
<https://doi.org/10.29309/TPMJ/2021.28.01.4712>

INTRODUCTION

Febrile seizure is the commonest convulsive disease among children affecting an estimated 2-5% of children aged 6-60 months.¹ FS is described as seizure linked with febrile illness without the presence of central nervous system (CNS) infections or acute electrolyte abnormalities among children 6 to 60 months of age without having any previous history of afebrile seizures.^{2,3} FS can be categorized as simple or complex. A simple FS is isolated, brief as well as generalized³ whereas a complex FS has focal onset occurring more than 1 time during febrile illness of the child or it lasts for > 10 to 15 minutes.⁴

Developmental delays and younger age are noted to have significant association with prolonged FS.⁵ Other factors like male predominance⁶, genetic factors, younger age as well as family history of FS are some of the notable factors having association with FS.⁷ Viral infections more than bacterial ones are usually found to

cause fever triggering FS. Among cases having FS, respiratory tract infections (RTIs) are the commonest causes contributing to 79.5% cases followed by gastroenteritis 5.5%, roseola infantum 2.9% and urinary tract infections (UTIs) 1.1% being some of the other most common causes.^{8,9}

Acute bacterial meningitis (ABM) is considered to be a life-threatening medical emergency and delays in starting treatment of ABM may go on to cause long-term neurodevelopmental sequelae. Cerebrospinal fluid (CSF) analysis supports clinical suspicion to rule out possibilities of meningitis. A study conducted by Siddiqui et al¹⁰ reported 7.6% ABM among cases having 1st episode of FS. Bacterial meningitis affects children beyond infancy period as convulsions linked with fever of acute onset.¹¹ Another study conducted by University of Benin Teaching Hospital, Nigeria¹¹ reported that bacterial meningitis was diagnosed in 4.2% children, aged 1 month to 6 years, who presented with convulsions and fever of acute

onset.

This study was proposed to be conducted among children presenting with 1st episode of FS in a tertiary care hospital to ascertain current magnitude of the ABM in our targeted population. This will help to early diagnose ABM and to reduce complications of ABM and disease related morbidity and mortality which will improve quality of life of our patients.

MATERIAL & METHODS

This descriptive cross-sectional study was done at “The Department of Pediatrics Medicine, Children’s Hospital and Institute of Child’s Health, Multan”, from October 2019 to March 2020. A sample size of 169 cases was calculated using WHO recommended sample size formula ($n = z^2 * p * (1 - p) / e^2$) by taking expected frequency of ABM in 1st episode FS as 7.6%¹⁰, and $q = 1 - p$ and $e = 4\%$ with 95% confidence level. A total of 169 children aged 6–60 months of both gender, presenting with first time episode FS were included. FS was defined as fever > 100.4 °F with convulsions (seizures) having history of abnormal spontaneous movements of any part of body with or without any of these; (assessed clinically): tongue bite, urinary incontinence, fecal incontinence. Children as diagnosed case of developmental delay and cerebral palsy (confirmed from patient record file), presented with any chronic systemic diseases (cardiac, renal, metabolic, malignancy, rheumatologic) on history and medical record, were excluded.

Study was started after approval of Institutional Ethical Review Committee of our Institution. Employing non-probability consecutive sampling technique was used. Informed consent was taken from parents/guardians. Demographic information like name, age, gender, weight was recorded.

Once enrolled, lumbar puncture (LM) was done and random blood sugar also investigated. CSF was collected aiming cell counts with differentials, proteins and glucose. CSF was assessed to find out cases with FS having ABM. ABM was labeled as a child presenting with fever and seizure on

the basis of all of the followings; CSF pleocytosis (white blood cell (WBC) count $> 5/ul$), Proteins > 40 mg%, Glucose $< 2/3^{rd}$ of blood sugar level.

Data was analyzed with statistical analysis program (SPSS version 20). Frequency and percentage was computed for gender, family history of FS, residential status, maternal education and acute bacterial meningitis. Mean \pm SD was presented for age. Effect modifiers like age, gender, family history, residential status and maternal education were controlled through stratification while post stratification chi square test was performed considering p -value ≤ 0.05 as statistically significant.

RESULTS

Mean age of children was 24.44 ± 12.26 months (ranging 6 months to 60 months). There were 100 (59.17%) male and 69 (40.83%) female children. A total of 16 (9.47%) children had positive family history of FS. Most of the children, 97 (57.40%) belonged to rural area and rest of the others were belonged to urban area. Regarding maternal education, there were 59 (34.91%) illiterate and 78 (46.2%) were having primary education.

ABM was found in 10 (5.92%) children and it was not found in remaining 159 (94.08%) children.

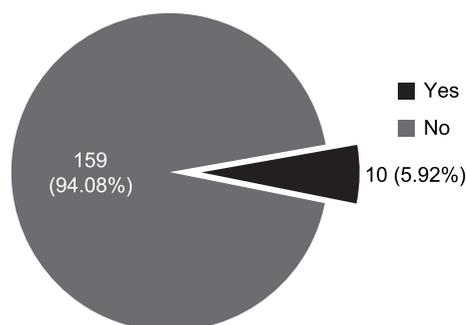


Figure-1. Frequency of acute bacterial meningitis (n = 169)

Stratification of age was performed, in children having age 6-20 months, 3 (30.0%) children were suffering from ABM and in 21-60 months, 7 (70.0%) were suffering from ABM, and compared with children without ABM, showed a statistically insignificant difference with p -value 0.227.

Study Variables		Acute Bacterial Meningitis		P-Value
		Yes (n=10)	No (n=159)	
Age Groups	6-20 months	3 (30.0%)	79 (49.7%)	0.227
	>20-60 months	7 (70.0%)	80 (50.3%)	
Gender	Male	7 (70.0%)	93 (58.5%)	0.473
	Female	3 (30.0%)	66 (41.5%)	
Family History of Febrile Seizure	Yes	2 (20.0%)	14 (8.8%)	0.2408
	No	8 (80.0%)	145 (91.2%)	
Maternal Education Level	Illiterate	2 (20.0%)	57 (35.8%)	0.26
	Primary	6 (60.0%)	72 (45.3%)	
	Secondary	1 (10.0%)	10 (6.2%)	
	Intermediate	-	11 (6.9%)	
	Graduate	1 (10.0%)	7 (4.4%)	
	Post-Graduate	-	2 (1.3%)	
Area of Residence	Urban	4 (40.0%)	68 (42.8%)	0.864
	Rural	6 (60.0%)	91 (47.2%)	

Table-I. Stratification of study variables with respect to acute bacterial meningitis (n = 169)

On stratification of Gender, ABM was found in 7 (70.0%) male children and it was found in 3 (30.0%) female children, and when compared with children without ABM, found an insignificant p-value of 0.473. Stratification was also performed on the basis of family history of febrile seizures and maternal education, and insignificant associations were found with ABM (p value = 0.260). Area of residence also did not have any significant association with the presence of ABM (p value = 0.864).

DISCUSSION

Incidence of bacterial meningitis has significantly declined among young children after the introduction of haemophilus influenzae type b (HiB) and *S. pneumoniae* vaccines.¹² In 2011, "American Academy of Pediatrics" (AAP) revised the guidelines for neuro-diagnostic evaluation of a case having simple FS.¹³ The revised guidelines did not support the routine use of LP among completely immunized infants against Hib and *S. Pneumoniae*, presenting with simple FS but endorsed LP as an option in those infants who present having simple FS with incomplete or undetermined immunization status.

Relationship between seizures and bacterial meningitis is well known, making it essential to

rule out any possibility of bacterial meningitis before making diagnosis of FS. FS can also be the only manifestation of bacterial meningitis among infants while complex features of seizure can also enhance of the risk of bacterial meningitis.^{14,15} Likewise, when these cases present having apparent FS, pediatricians cannot be sure about the risk of bacterial meningitis in these cases. In acute situations, the most difficult decision is to decide whether to go with a LM or not to rule out bacterial meningitis. Knowledge about the prevalence of ABM in subgroups of children having FS can help in making appropriate judgments in these tough situations.

In present study, bacterial meningitis was diagnosed in only 5.92% cases presenting with 1st episode of acute FS. Ehsanipour F et al from Iran also noted 3.6% cases of bacterial meningitis among children having FS.¹⁶ Al-Eissa YA from Saudi Arabia noted frequency of bacterial meningitis to be 3.5% among children having FS while this percentage was further reduced to 1.5% in 3 to 60 months age group.¹⁷ From France, Casasoprana A et al elaborated that frequency of bacterial meningitis was 1.9% among cases having 1st FS and aged less than 18 months.¹⁸ Ghobti and Shiva also recorded 4.7% bacterial meningitis among children having FS.¹⁹

Owusu-Ofori A et al²⁰ from Ghana reported a comparatively higher frequency of bacterial meningitis (10.2%) among children having FS while a study from Tunisia²¹ found bacterial meningitis among 10% cases aged less than 12 months having FS. These comparatively higher frequencies of bacterial meningitis among cases having FS could be due to difference in populations and different sets of diagnostic criteria adopted over the year by different researchers. Researchers from Nepal noted 4.5% of the children to have bacterial meningitis when presented with FS which is again very close to which we found in the present study.²²

We could not note any significant association of gender or age with the prevalence of bacterial meningitis which is in accordance with the previous studies.^{13,14}

Researchers from around the world have noted less prevalence of bacterial meningitis among FS cases and linked those to improved vaccination coverage rates in their population. Pakistan being an underdeveloped country, has a long way to improve their overall immunization rate which is currently around 50%. Improving immunization status as well as timely diagnosis of ABM can certainly minimize the burden of this seriously life-threatening condition among children in Pakistan.

CONCLUSION

Frequency of bacterial meningitis in children presented with febrile seizures is not high. Bacterial meningitis was diagnosed in 5.92% children presenting with 1st episode of acute febrile seizures.

ACKNOWLEDGEMENT

The authors are thankful to M. Aamir (Bahawalpur, Pakistan) for his assistance in statistical analysis of this research.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Saba Urooj	Data collection, Data analysis, Drafting.	
2	Maria Saleem	Methodology Literature review, Discussion.	
3	Asim Khurshid	Study concept, Supervision, Proof reading.	