POSITIVITY OF LUMBAR PUNCTURE FOR ACUTE BACTERIAL MENINGITIS AMONG CHILDREN PRESENTING WITH FIRST FEBRILE SEIZURE

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ABSTRACT

OBJECTIVES

To determine the frequency of lumber puncture-proven acute bacterial meningitis among children with fever and seizures of first onset.

METHODOLOGY

From March 2020 to March 2021, a hospital-based descriptive cross-sectional study was conducted at the paediatrics department of Hayatabad Medical Complex Peshawar. The sample size for a total of 342 people was estimated using WHO software. The study included all children who had first-onset febrile seizures through OPD and the emergency department. All children underwent lumber punctures using a stringent aseptic procedure, and the hospital laboratory received the samples to look for bacterial meningitis. On a pre-made Proforma, details including name, age, and gender were entered. The gathered data were input into the computer for additional SPSS analysis version 23).

RESULTS

Most individuals were male and were lies in the 21-40 months of age group. Mean weight and length/height were evaluated, respectively. The majority had a history of 6-10 days of disease duration. Bacterial meningitis was found significantly ($p<0.05$) associated with age, gender and neurological deficit, while non-significantly ($p>0.05$) associated with the duration of diseases.

CONCLUSION

All children between the ages of 6 months and 60 months who presented with episodes of fever and seizures were found to have a statistically significant ($p<0.05$) association found among bacterial meningitis and age groups.

KEYWORDS: *Fever, Seizures, Lumber Puncture, Meningitis*

INTRODUCTION

A medical emergency known as bacterial meningitis is defined by meningeal inflammation brought on by bacterial infection.[1] Even with modern antibiotics and sophisticated pediatric intensive care, the disease's death rate is only about 5- 10% when treated, approaching 100% when left untreated.[2] Following hospital discharge, the incidence of neurological sequelae in survivors approaches 20% globally.[6] Therefore, it is crucial to identify meningitis in children and treat them appropriately 7 quickly. About 5-7 cases of bacterial meningitis occur for every 100,000 people.[8] The most frequent causes of acute bacterial meningitis in otherwise healthy infants in developed nations are Neisseria meningitides and Streptococcus pneumoniae.[9] Group B Streptococcus, Escherichia coli, H. influenzae, gram-negative bacilli, Listeria monocytogenes, and group A streptococci are some of the less frequent causal pathogens.[10] Determining the source of the fever is crucial in evaluating these kids, even though febrile seizure is caused by age-related hyperexcitability of the brain. In feverish children, bacterial meningitis may only manifest as seizures.[5] In 16.7% of children, a seizure may be the initial sign (of meningitis, and in 30% of these patients, a sign of meningeal irritation may not be obvious. In order to properly diagnose febrile seizure in children with fever and seizures, it is imperative to rule out underlying meningitis.[11] Making an appropriate choice doing an LP to exclude meningitis in these kids is always the main priority.[12] In order to assist doctors in making the best choices possible in these circumstances, it is important to be aware of the frequency of meningitis and its associated factors in children presenting with a febrile seizure. A lumbar puncture LP should be considered in children with complex seizures, prior antibiotic medication, age less than 12 months, or inadequate immunization history when there is no characteristic meningeal symptoms.[13] According to different studies, the prevalence of lumbar puncture-proven meningitis in children presenting with first febrile seizure is 4.5 percent, 7.6 percent, and 25.873.[3,4,5] The current research aims to estimate the

occurrence of acute bacterial meningitis in children with febrile seizures. In our society, meningitis in children is endemic, and to lower its mortality and consequences, early diagnosis and prompt treatment are crucial. Further adding to the confusion, febrile seizures can result from several illnesses, the most serious of which is meningitis, which can cause permanent disability or even death. This study will give us the most recent and updated information regarding the frequency of lumber puncture-verified acute bacterial meningitis among children with fever and first seizures. Additionally, the results of this study will be disseminated to other health professionals and used for research. It will facilitate local paediatricians in changing their procedures to accommodate better screening patients for febrile seizures and develop guidelines for future studies in this area.

METHODOLOGY

The design of the study Descriptive Cross-Sectional Study was conducted in the Department of Pediatrics at Hayatabad Medical Complex, Peshawar. The study duration was 12 months after approval from the institution's ethical committee. The sampling technique was consecutive (non-probability) sampling. The sample size was 342 using 4.5% proportions bacterial meningitis among children with febrile seizures, 95% confidence level and 2.2% absolute precision using WHO sample size calculations. An inclusion criterion of the study was that all children with a first episode of febrile seizures were included age group of 6 months to 5 years, including both genders. Children who were excluded had a history of hyperbilirubinemia of more than 5mg/dl after birth to reduce biases, children who have received antibiotics of any type in the last month, and children with recurrent seizures**.** If included, the above conditions act as confounders and will introduce bias in the study results. The study was conducted after approval from the hospital's ethical and research committee. All children presented with the febrile seizure of first onset were included in the study through OPD. The purpose and benefits of the study were explained to the parents of the child. They were assured of the purpose and benefits of the study and the risks involved, and they were explained that the study was done purely for research and data publication. All the children were subjected to detailed history and clinical examination. All children were subjected to lumber puncture under a strict aseptic technique, consent was signed before the procedure, and the sample was sent to the hospital laboratory to detect bacterial meningitis. All gathered data were examined using SPSS version 23. For numerical variables like age and disease duration, mean and SD was obtained. For categorical factors, including gender, neurological impairment, and bacterial meningitis, frequencies and percentages were determined. The chi-square test was used to stratify cases of bacterial meningitis according to age, gender, length of illness, and neurological disability, with a p-value of <0.05 considered significant. Tables and graphs were used to present all of the results.

RESULT

After analysis, results showed that the mean age of the subjects was 30.39±14.70 months. The majority of the individuals were male (59.9%). Among age categories, 49.1% (n=168) were lies in the 21-40 months of age group. Mean weight and length/height were 9.70±2.51 kg and 82.91±11.06cm, respectively, and 56.1% had a history of 6-10 days of disease duration. 38.9% were neurologically deficient. Bacterial meningitis was found in 61.1% of the individuals. Furthermore, bacterial meningitis was found to be statistically significant (p<0.05) associated with age, gender and neurological deficit, while statistically non-significantly (p>0.05) associated with the duration of disease.

Table 1: Socio-Demographic and Anthropometric Characteristics of Subjects

		f(%)	Means±SD
Gender	Male	205 (59.9)	
	Female	137 (40.1)	
Age Categories	6-20 months	81 (23.7)	30.39±14.70
	21-40 months	168 (49.1)	
	41-60 months	93 (27.2)	
Weight (kg)			9.70±2.51
Length/ Height (cm)			82.91±11.06

Table 2: Duration and Stratification of Disease and Presence of Neurological Signs

Variables		f% / Means± SD	P-Value
Duration of Disease		6.18±2.23	
No of days	0-5 days	150 (43.9)	0.655
	6-10 days	192 (56.1)	
Neurological Deficit	Yes	181 (61.1)	0.000
	No	161 (38.9)	

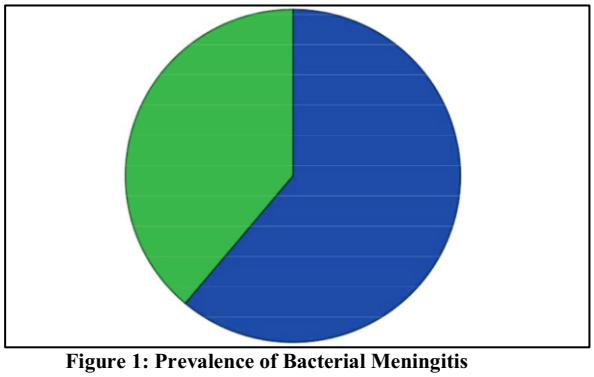

Figure 1: Prevalence of Bacterial Meningitis

Table 3: Stratification of Bacterial Meningitis among Gender and Age Groups

Variables		Bacterial Meningitis	P-Value
Gender	Male	72	0.009
	Female	65	
Age Group	6-12 months	64(17)	0.000
	21-40 months	100(68)	
	41-60 months	45(48)	

DISCUSSION

Improved results are produced by early detection and management of bacterial meningitis and brain abscess. A lumbar puncture should be performed as soon as there is suspicion of bacterial meningitis, and empirical antibiotic therapy should be started immediately. In the present study, the male made up more subjects (59.9%) than the female (40.1%). In a prior study by Sheer KS14, on CSF Analysis for the First Episode of Febrile Seizure in Children, 58 % of patients were males, and 42% were females. The subjects average age was 30.39 ± 14.70 months. Age groups of 6 to 20 months, 21 to 40 months, and 41 to 60 months each had 23.7 percent, 49.1 per cent, and 27.2 percent of the population, respectively. According to earlier studies, 21.4% of kids in the 6-to-12-month age range, 19.0% in the 12-to-18-month range, and 7.5% in the over 18-to-60-month range.[14] Another study by Prerna B et al on Meningitis in Children Presenting with First Febrile Seizures revealed that the subjects mean ages were 12.2 4.14 months, with 40% of them falling into the 6-12 months and 60% falling into the 12–18-month age groups, respectively.[15] The prevalence of meningitis as determined by lumbar puncture was 61.1 percent in the current study, compared to 48.57 per cent in a previous study by Amiraj S et al on Predictors of acute bacterial meningitis among children from Northern India who had experienced their first episode of febrile convulsion.[16] Children with seizures and fever had a 4.7 percent rate of meningitis, according to Ghotbi and Shiva.[17] A study was conducted in America, where the case fatality rate was 32%. Mortality was greater in infants with early onset sepsis/meningitis than in those with late infections (44% vs 22%, P< 0.0001; odds ratio, 2.8; 95% confidence interval, 1.9 to 4.1) and lesser in neonates infected by coagulase-negative staphylococci than in those infected by any other pathogen (12vs.39%, P< 0.001; odds ratio, 0.2; 95% confidence interval, 0.1 to 0.4). According to our study's findings, 61.1 per cent exhibited neurological deficits. According to a prior study by Ozden T et al., in 2013, 13.4 per cent had neurologic problems.[18] Because of the large sample size, the results of the current study were more significant than those of the previous research. Neurologic complications can develop at any time during bacterial meningitis. According to Prerna B et al, meningitis was prevalent in 80% of children with neurological deficits. A significant ($p<0.05$) association was observed between gender and bacterial meningitis in the current study, in contrast to the previous study by Tavasoli A et al on Frequency of Meningitis in Children Presenting with Febrile Seizures found a non-significant association among bacterial meningitis and gender.[3,15] The present study found a significant ($p<0.05$) association between neurological deficit and bacterial meningitis in children with fever and seizures. As previously indicated by Prerna B et al, stated that neurologic deficit ($P < 0.001$) was a strong indicator of meningitis in infants with febrile seizures.[15] In the present study, there was a statistically significant ($p<0.05$) association found among bacterial meningitis and age groups, as these findings were supported by previous research. In the age group of 6-12 months, 21.4% had meningitis. In 12-18 months, 19.3% had meningitis, and in the 18-60 months age group, 7.84% were detected with meningitis the differences that were found in our studies compared to the other studies were due to changes in the number of sample size, age and gender differences, duration of disease and differential procedures.[14]

LIMITATIONS

A sample size of this article is small.

CONCLUSION

It was observed that meningitis should always be evaluated as a differential diagnosis because it is frequently observed in pediatric patients who present with fever and seizures. All children between 6 months and 60 with fever and seizure episodes require a lumbar puncture and CSF analysis to rule out meningitis, even without signs of meningeal irritation. Therefore, it is suggested that the predictors be evaluated in more extensive prospective research. Patients with suspected meningitis who are hemodynamically stable and have no signs of cerebral edema or herniation syndromes should have lumbar punctures.

CONFLICT OF INTEREST: None

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