



Clinico-Pathological Profiles and Outcomes of Acute Viral Encephalitis in Children

Sk. Serjina Anwar¹, Nazma Begum², Soofia Khatoun³, Rafia Rashid⁴

¹Medical Officer, Infectious Disease Hospital, Mohakhali, Dhaka, Bangladesh; ²Professor, Department of Paediatrics, Mugda Medical College, Dhaka, Bangladesh; ³Professor, Department of Paediatrics, Centre for women and Child Health, Dhaka, Bangladesh; ⁴ Post Graduate Student [FCPS], Department of Paediatrics, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh

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Abstract

Background: Encephalitis is an acute inflammatory process that affects brain tissue and is almost always accompanied by inflammation of the adjacent meninges. The disease is most commonly caused by viral infection. **Objective:** The purpose of the present study was to determine the clinical and cerebrospinal fluid profile of childhood encephalitis and to document Herpes simplex antibody status in cerebrospinal fluid. **Methodology:** This descriptive analytical study was conducted in Department of Paediatrics of Shaheed Suhrawardy Medical College Hospital and Dhaka Medical College Hospital from May 2011 to October 2011. A total of 30 children of encephalitis were included in this study. Cerebrospinal fluid (CSF) routine and Herpes Simplex virus (HSV) antibody in CSF were done to all patient. **Result:** Fever and convulsion was found in 29(96.7%) and 28(93.3%) cases respectively in studied patients. Altered level of consciousness was present in 29(96.7%) cases. Fever, convulsion and altered level of consciousness was statistically significant ($p < 0.05$). Glasgow coma scale (GCS) between 4 to 8 was found in 27 (90%) cases. Signs of meningeal irritation and cranial nerve palsies was found in 9 (30%) and 4 (13.3%) cases respectively. Exaggerated deep reflex was found in 23 (76.6%) cases whereas diminished deep reflex was found in 7 (23.3 %) cases. In cytological study of CSF, lymphocyte was found in 28 (93.3%) patients. Raised protein was found in 16(53.3%) and normal in 14 (46.7%) cases. Among the 30 studied cases 9(30%) cases were IgG positive for HSV, 21 (70.0%) were IgG negative and none were IgM positive. **Conclusion:** Fever, convulsion, altered sensorium and low GCS were common clinical profile in children. Normal colour, increase lymphocyte count, normal sugar level were significant findings in CSF study. [Bangladesh Journal of Infectious Diseases, June 2020;7(1):8-11]

Keywords: Encephalitis; virus; unconsciousness; convulsion; Cerebrospinal fluid; Herpes Simplex antibody

Correspondence: Prof. Nazma Begum, Professor and Head, Department of Paediatrics, Mugda Medical College Dhaka, Bangladesh; Email: nazmabegum29@ymail.com; Cell no: +8801819242374

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Introduction

Encephalitis is an acute inflammatory process that affects brain tissue and is almost always accompanied by inflammation of the adjacent meninges. The disease is most commonly caused by viral infection¹. Acute encephalitis is a severe neurological syndrome associated with significant morbidity and mortality. The centre for disease control and prevention (CDC) of Bangladesh estimates an annual incidence of approximately 20,000 new cases of encephalitis². In a recent study in Finland, the incidence of viral encephalitis in children was 1.4 per 100,000 persons per year.

Herpes simplex virus (HSV) was identified most often as the cause (16%), followed by varicella zoster (5%), mumps (4%) and influenza A virus (4%)³. Numerically the most important cause of encephalitis worldwide is probably Japanese encephalitis, as it produces 50,000 cases a year with about 15,000 deaths⁴. Japanese encephalitis effects east and southeast China, Korea, Japan, Taiwan, Southeast Asia, Papua new Guinea and Northern Australia⁴. A prospective hospital based study to identify the causes of encephalitis in Bangladesh began in June 2003 at Dhaka, Mymensingh and Rajshahi Medical College Hospitals. Ten of the patients (6.0%) tested positive for Japanese encephalitis, 2.0% was positive for HSV⁵. There are four recognized outbreaks of encephalitis in Bangladesh which leads to enormous public and government concern due to high mortality rate (25.0%). They were Japanese encephalitis infection, encephalitis caused by Nipah or Nipah like viruses in 2001, 2003 and 2004⁵.

Diagnosis of viral encephalitis is usually made on the basis of clinical presentation and the exclusion of other possibilities⁶. Even when sophisticated diagnostic neuroimaging techniques such as Computed Tomography (CT) or Magnetic Resonance Imaging (MRI) are available there may be no specific feature. Electroencephalography (EEG) and cerebrospinal fluid (CSF) finding may not be diagnostically helpful. The demonstration of sequential changes in antibody titer in sample of serum or CSF may be the only means of establishing the true agent in sporadic cases⁷. Fever with convulsion is the most common acute and potentially life threatening events encountered in pediatric population. The mortality of encephalitis is 70.0% in untreated patients, with severe sequelae among survivors. The purpose of this study was to determine the clinical and pathological profile and

also to document the outcome of viral encephalitis cases in children.

Methodology

This was a descriptive analytic study conducted out in Shaheed Suhrawardy Medical College Hospital and Dhaka Medical College Hospital over period of 6 months from May 2011 to October 2011. Thirty cases of age between 6 months to 12 years who presented with fever (Temperature $>100.5^{\circ}$) or history of fever, new onset of seizure, (local or diffuse central neurological findings (altered sensorium varying from irritability, lethargy to coma) were included in the study. Patients with positive CSF for bacterial meningitis, positive MP (malarial parasite) test, known case of cerebral palsy with seizure disorder, epilepsy and metabolic disorder were excluded from the study. The history and clinical presentation of all the suspected cases of encephalitis were recorded. CSF study and MP test were done to exclude meningitis and malaria. Second CSF samples were collected after 7 days of illness for detection of HSV antibody. An informed written consent was taken from the parents. As invasive procedure in the form of lumbar puncture was done so the procedure was explained to the parents and objectives of the study along with the benefit and risk were also explained. Pre-designed questionnaire was used for collection of data. After collection of data, analysis was done by computer software program SPSS version 16.

Result

Table 1 showed that most patients were found in the age group less than five years, which was more than a half (53.3%) of the studied patients. The mean (\pm SD) age was 5.2 ± 3.3 years with range from 1 to 11 years.

Table 1: Distribution of Patients by Age (n=30)

Age Group	Frequency	Percent
≤ 5 Years	16	53.3
6 to 10 Years	11	36.6
>10 Years	3	10.1
Total	30	100
Mean \pm SD (Range)	5.2 \pm 3.3(1 to 11 years)	

In this study 17(56.7%) cases were male and 13(43.3%) cases were female. Male and female ratio was 1.3:1 in the whole study patients.

Table 2: Distribution of the Patients by Sex (n=30)

Gender	Frequency	Percent
Male	17	56.7
Female	13	43.3
Total	30	100

Table 3 showed that fever and convulsion was found in 29(96.7%) and 28(93.3%) cases respectively in studied patients. Headache was found in 12 (40%), vomiting in 15 (30%) cases respectively. Altered level of consciousness was present in 29(96.7%) cases. Skin rash was found in 3 (10%) cases and contract with saliva, stool, urine and skin lesion was found in 1(3.3%) case.

Table 3: Distribution of the Patients According to Presenting Features (n=30)

Presenting Features	Frequency	Percent
Convulsion	28	93.3
Fever	29	96.7
Headache	12	40
Vomiting	15	50
Altered level of consciousness	29	96.7
Skin rash	3	10
Contact with saliva, stool, urine and skin lesions	1	3.3

GCS between 4 to 8 was found in 27 (90%) cases. Temperature was found in 29 (96.7%) patients which was stastically significant (p<0.05). Signs of meningeal irritation and cranial nerve palsies was found in 9 (30%) and 4 (13.3%) cases respectively. Exaggerated deep reflex was found in 23 (76.6%) cases whereas diminished deep reflex was found 7(23.3 %) cases. Planter was extensor in 18(60%) and paresis/paralysis was found in 12 (40%) cases. Eight cases presented with involuntary movement.

Table 4: Distribution of patients according to clinical examination (n=30)

Clinical Examination	Frequency	Percent
Glasgow Coma Scale (GCS)		
3	1	3.3
4 - 8	27	90
>8	2	6.6
Temperature	29	96.7
Sign of meningeal	9	30

irritation		
Cranial nerve palsies	4	13.3
Exaggerated	23	76.6
Diminished	7	23.3
Planter extensor	18	60
Paresis/Paralysis	12	40
Involuntary movement	8	26.6

In cytological study of CSF, neutrophilic was found in 2 (6.67%) and lymphocytic in 28 (93.3%) patients. Raised protein was found in 16(53.3%) and normal in 14 (46.7%) cases. CSF glucose was normal in 27 (96.7%) cases. Lymphocyte count and normal glucose in CSF was found statistically significant (Table 5).

Table 5: Distribution of patients according to CSF study (n=30)

CSF Study	Frequency	Percent	P value
Colour			
Normal	23	76.7	0.396 ^{ns}
Straw	7	23.3	
Cytological			
Neutrophil	2	6.67	0.043 ^s
Lymphocyte	28	93.3	
Protein			
Normal	14	46.7	0.337 ^{ns}
Raised	16	53.3	
Glucose			
Normal	29	96.7	0.031 ^s
Reduced	1	3.3	

Table 6 showed that among the 30 studied cases 9 (30%) were IgG positive for HSV and 21 (70.0%) were IgG negative and none were IgM positive.

Table 6: Distribution of the patients according to HSV antibody (n=30)

HSV Antibody Status	Frequency	Percent
IgG positive	9	30
IgG negative	21	70
IgM	0	0

Table 7 showed the outcome of the studied patients. Complete recovery was found in 9(30%) patients, 7(23.3%) patients improved but had some sequela, 4(13.3 %) patients died and 10(33.3%) received DORB.

Table 7: Distribution of the Patients According to Outcome (n=30)

Outcome	Frequency	Percent
Complete recovery	9	30
Improved with sequelae	7	23.3
Death	4	13.3
DORB	10	33.3

Discussion

Encephalitis is a complex severe neurological syndrome that is associated with significant mortality and morbidity. In this hospital based study maximum number of the patients was found in the age group less than five years, which was more than a half (53.3%). This is also found in the study by Glaser⁸ where younger the age group (lowest median age 11years) were mostly (23%) affected. Male female ratio was 1:3:1 in this study. The observation is same in the study conducted by Charles⁹. Glaser⁸ found slight male predominance.

In the study in Faridpur Medical College, Faridpur, Bangladesh it has been found that ratio of male to female is 1.9:1 that is male predominance¹⁰. According to presenting features fever, convulsion and altered level of consciousness were found statistically significant, other. A study of similar observation on encephalitis was also shown by a number of authors. They found out of 1570 patients 75.0% and 83.0% of the patients with viral encephalitis presented with fever and convulsion respectively^{11,12}. The Glasgow coma scale (GCS) was found between 4 to 8 in 90% of the studied patients.

The similar study by Gordon et al¹³ and Kimberton¹⁴ DW found low GCS (3 to 7) on admission. The CSF study of the cases showed lymphocyte predominance (93.3%). CSF protein was raised in 53.3% cases and sugar was normal in 96.7% cases. In a study conducted by Koskemi and Taskinen¹⁵ found that 110 cases of encephalitis with raised CSF lymphocyte count (53.5 cells/mm³) and CSF protein level of 67 to 71 mg/dl which had similarity with this study. In this study nine (30%) patients had IgG positive for HSV and 21 (70.0%) patients were IgG negative in CSF. In a population based study in United Kingdom herpes simplex virus was the most common virus accounting 33% in children¹⁶. Complete recovery was found in 30% of studied cases, improved with sequelae was found in 23.3% cases and 13.3% cases died. A study conducted by Granerod and Crowcroft¹⁶ in 194

cases of acute encephalitis observed mortality in 57(29%) patients, while 48(25%) cases had neurological sequelae at discharge. Anderson et al¹⁷ showed that several prognostic factors for death were younger age, convulsions at admission and limb weakness.

Conclusion

The study tried to find out the common clinical manifestations of childhood viral encephalitis along with CSF profile and HSV antibody status. Fever, convulsion, altered sensorium, low GCS and exaggerated deep reflexes were common clinical profile in children. Normal colour, increase lymphocyte count, normal sugar level were significant findings in CSF study and one third of cases were IgG positive for HSV.

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