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ORIGINAL RESEARCH ARTICLE

Clinico-demographic Profile of Childhood Encephalitis: A Hospital based Study

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ABSTRACT

Introduction: Childhood encephalitis have numerous etiologies, varied presentations and wide outcome ranges, varying from complete recovery to devastating neurological sequele and death. During 2016 nationwide, 11,651 case and 1301 deaths were reported to the National Vector Borne Diseases Control Programme (NVBDCP), with a case fatality rate (CFR) of around 11%. It is a major health problem in the state of Uttar Pradesh, several districts have been experiencing recurrent episodes of encephalitis with different magnitudes. Under this backdrop, the present study was undertaken to know the clinical profile of children admitted with encephalitis.

Materials and Methods: The present study was conducted in the Department of Pediatrics , Shri Ram Murti Smarak Institute of Medical Sciences over a period of 13 months (from January 2021 to February 2022). Total 74 cases of AES were included in this study. This was a prospective, observational, hospital based study. We collected relevant data of the encephalitis cases, analyzed and interpreted accordingly.

Results: In the present study, total 74 cases of AES were admitted in pediatrics department during the study period. Out of 84 AES patients, majority 45.9% were between one month to five years of age. Male were 59.5% and female cases were 40.5%. The common presenting clinical manifestations were fever with altered sensorium (100%) and seizures in 100% cases. Most common nerve involved was optic nerve in 81% of the cases. Signs of raised ICP was seen in 35.1% of the cases. Laboratory report, CSF analysis revealed 45.9% patients had normal CSF cell count, 51.3% of the patients had normal protein levels. 62.2% had clinical features for 3 to 7 days prior to presentation. 43.2% patients had altered mental status between 0 to 24 hours prior to admission. About 67.6% patients had GCS <8 and required intubation. CT scan head was performed in 13.5% cases and was abnormal in 40% cases. MRI Brain was done in 29.7% cases and most common area involved was thalamus in 36.4% cases.

Conclusion: The common clinical features in childhood encephalitis are fever, altered sensorium and seizures, that was seen in 100% of the cases. CSF cell count was found to be normal and abnormal in almost equal number of cases.

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INTRODUCTION

Childhood encephalitis have numerous etiologies, varied presentations and wide outcome ranges, varying from complete recovery to devastating neurological sequele and death.[1] The causes of viral encephalitis can be sporadic like herpes simplex encephalitis (HSE), or epidemic like Japanese B encephalitis (JE) etc. As the etiological agents are varied, the physicians treating such children are often constrained by the lack of availability of diagnostic testing for most of these agents. AES cases were mainly reported from Assam, Bihar, Jharkhand, Karnataka, Tamilnadu, Uttar pradesh, Manipur and Tripura.[2]

A number of lacunae in our knowledge, problems in epidemiological investigations, lack of diagnostic facilities, as well as difficulties in managing these critically ill children in smaller centers in India aggravate the sad plight of the situation. It has come to an observation that the pediatricians treating these children should be aware as to how to manage a child with suspected encephalitis, also specific antiviral therapy is lifesaving in some diseases and these should be diagnosed without delay.

Acute encephalitis is known for recurrent epidemics in India of numerous etiology and is characterized by increased fatality rate especially in children less than fifteen years of age. The patients present with acute onset of fever and altered consciousness with rapidly deteriorating clinical course leading to death within hours.

While Japanese encephalitis is leading diagnosed cause of encephalitis in India, other etiological agents include enteroviruses, scrub typhus, measles and other viruses are found circulating in the area. In many cases, however, no etiological agent is determined. The information that is missing is that the etiology of significant number of acute encephalitis syndrome cases till date remains incompletely understood and causes

of nearly 70 to 80% cases remain largely unknown. We tried to evaluate the clinical features at presentation and neuroimaging findings (for accurate prognostic significance) which acted as markers for outcome production so that families could be provided with accurate prognostic guidance.

Acute encephalitis is clearly a pressing public health emergency in India, recurrent epidemics of encephalitis of unknown etiology have occurred in the country. Between 2008 and 2014, there have been more than 44,000 cases and nearly 6000 deaths from encephalitis in India, particularly in Uttar Pradesh and Bihar.[3] In 2016, there was a rise in encephalitis cases, with over 125 children reportedly to dying in one hospital in Gorakhpur alone. Characterized by high case-fatality rate (CFR), the disease occurs in seasonal outbreaks every year, taking a heavy toll of life, especially of children less than 15 years of age. The children often present with acute onset of fever and altered sensorium, with rapidly deteriorating clinical course, leading to death within hours. Many children who survive have been left with residual disability impacting on long-term quality of life.

MATERIALS AND METHODS

The present study was carried out in the Pediatrics Department , Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly, Uttar Pradesh over a period of 13 months (from January 2021 to Februaury 2022). This is a tertiary care hospital located in the Rohilkhand region of Uttar Pradesh. This hospital provides healthcare services mainly to the people of rural and semi- urban population of Bareilly, Pilibhit and Nainital district (Uttarakhand). Most of the AES cases from these districts were referred to this hospital for proper care. This was a prospective, observational study. A total number of 74 encephalitis cases, admitted in pediatrics department over a period of thirteen months were included in this study. All 74 cases were evaluated thoroughly and relevant data were recorded accordingly.

International encephalitis consortium diagnostic criteria[4] was adopted for selection of cases under this study. Case definition of acute encephalitis syndrome (AES) clinically, a case of AES is defined as a person of any age, at any time of year with the acute onset of fever and a change in mental status (including symptoms such as confusion, disorientation, coma, or inability to talk) and/or new onset of seizures (excluding simple febrile seizures).

Inclusion Criteria

Children from 1 month to 18 years of age, children whose parents gave consent for enrolment in the study, children fulfilling the diagnostic criteria of encephalitis.

Exclusion criteria: Pre-existing neurological disorder, pre existing documented psychiatric/psychological disorder, pre-existing metabolic diseases, known immunocompromised state, children who would finally be diagnosed case of pyogenic meningitis, TBM, malaria, dengue, vasculitic syndrome.

The sample size was decided on the basis of formula Z2pq/d220, where p was the prevalence, q = 1-p and d was the precision.

A precision of 10% was assumed. Z = 1.96 at 95% confidence interval. Considering prevalence to be 15% over a period of one year in the casualty and OPD of Department of Paediatrics of SRMS IMS . The minimum number of cases required for this study were 55. Data was entered in Microsoft Excel 2011 and data was presented in the form of frequency tables. Data was analysed for comparing means and standard deviation of different variables. Chi square test/Fischer exact test for association was applied to get association between different variables. The t-test was also applied to compare the means of different variable.

RESULTS

In the present study, total 74 cases of AES were admitted in pediatrics department during the study period. Out of 84 AES patients, majority 45.9% were between one month to five years of age. Male were 59.5% and female cases were 40.5%. The common presenting clinical manifestations were fever with altered sensorium (100%) and seizures in 100% cases. Most common nerve involved was optic nerve in 81% of the cases. Signs of raised ICP was seen in 35.1% of the cases. Laboratory report, CSF analysis revealed 45.9% patients had normal CSF cell count, 51.3% of the patients had normal protein levels. 62.2% had clinical features for three tp seven days prior to presentation. 43.2% patients had altered mental status

Table 1: Demographic profile of patients

No	*Patient characteristics*	*N (74)*	*%*
1	Age		
	1–5 years	34	45.9
	6–10 years	24	32.4
	10–15 years	14	18.9
	>15 years	2	2.7
2	Gender		
	Male	44	59.5
	Female	30	40.5
3	Recent vaccination	8	10.8
4	Contact with animals	20	27
5	Travel history	6	8.1
6	Mosquito/tick bite	8	10.8
7	Fresh water contact	12	16.2

Table 2: Clinical features of patients

No.		N (74)	%
1	Duration of illness before presentation		
	0–3 days	28	37.8
	3–7 days	46	62.2
2	Duration of hospital stay		
	0–3 days	22	29.7
	4–10 days	24	32.4
	>10 days	28	37.8.8
3	Presentation at admission		
	Fever	74	100
	Seizures	74	100
	Altered mental status	74	100
4	GCS		
	3	12	16.2
	3-8	38	51.4
	>8	24	32.4
5	Cranial nerves		
	Olfactory	Could not be examined	
	Optic	60	81.1
	Occulomotor, trochlear, abducens	Could not be examined	
	Facial	4	5.4
	Vestibulocochlear	8	10.8
	Glossopharyngeal, vagus	10	13.5
	Spinal accessory	Could not be examined	
	Hypoglossal	Could not be examined	
6	Motor system		
	Tone		
	Normal tone	12	16.2
	Hypotonia	15	20.3
	Hypertonia	47	63.5
	Reflexes		
	DTRs		
	+	8	10.8
	++	26	35.1
	+++	40	54.1
	Superficial		
	Babinksi positive		
	Bilateral	53	71.6
	Unilateral	14	18.9
	Unresponsive	7	9.5
7	Brainstem reflexes		
	Bilateral pupil equal	46	62.2
	Pupils unequal	26	35.1
	Dolls eye positive	2	2.7
8	Signs of raised icp		
	Bradycardia	14	18.9
	Raised blood pressure	22	29.7
	Abnormal respiration	24	32.4
9	Need for intubation	50	67.6

Table 3: Lab investigations

S.No.			N (74)	%
I.	CBC			
1.	Hemoglobin			
		Normal	42	56.7
		Abnormal	32	43.2
2	TLC			
		Normal	20	27
		Leucocytosis	46	62.2
		Leucopenia	8	10.8
3.	Platelet count	Normal	58	78.4
		Thrombocytopenia	12	16.2
		Thrombocytosis	4	5.4
II.	CSF			
1	Cells			
	Normal	0–5	34	45.9
	Abnormal	5–100	20	27
		>100	14	18.9
2.	Protein			
	Normal	10-40	38	51.3
	Abnormal	<10	4	5.4
		>40	32	43.2
3.	Sugar			
	Normal	>2/3 blood sugar	36	48.6
	Abnormal	<2/3 blood sugar	38	51.4

between 0-24 hours prior to admission. About 67.6% patients had GCS < 8 and required intubation. CT scan head was performed in 13.5% cases and was abnormal in 40% cases. MRI brain was done in 29.7% cases and most common area involved was thalamus in 36.4% cases.

DISCUSSION

Out of total 4522 patients admitted in IPD during the study period, 74 patients were included in the study after fulfilling the study criteria. The hospital based incidence of children with encephalitis was 1.6% (1636 per 1,00,000). The case fatality rate among the children due to encephalitis was 10.8% (8 out of 74 patients) which was similar to the studies conducted in India and South Asian region.[5-12]

In the present study, maximum patients belonged to age group between one year to five year, 32 (43.2%) with a male preponderance. These observations were similar to other

Table 4: Neuroimaging findings

No.	*Imaging modality*			*N*	*%*
1	CT scan head	Normal		6/10	60
		Abnormal		4/10	40
			Area involved		
			Left parietal	4/10	40
2.	MRI brain	Normal		4	18
		Abnormal	Area involved		
			Corpus callosum	4/22	18.2
			Basal ganglia	6/22	27.3
			Cerebellum	4/22	18.2
			Pons	2/22	9
			Thalamus	8/22	36.4
			B/l cerebral hemisphere	2/22	9
			Temporal lobe	4/22	18.2
			Occipital lobe	2/22	9
			Parietal lobe	2/22	9
			Frontal lobe	4/22	18.2
			Subcortex	2/22	9
			Centrum semiovale	2/22	9

studies conducted in the state of Uttar Pradesh.[4,5] (Table 1) The present study revealed that among the clinical presentation, fever with altered sensorium and seizure were seen in 100% of the patients. Similar observations were made by different researchers in earlier studies like Kakoti G *et al.*[6], Jain P *et al.*[7]and Avabratha KS *et al.*[8]

About 51.4% patients had GCS between 3 to 8 and required intubation. Similar results were found in studies conducted by De *et al.*[13] and Tripathy *et al.*[14]

Optic nerve involvement was found in 60 (81.1%) of patients, facial nerve involvement was found in 4(5.4%) of 74 patients and glossopharyngeal and vagus nerve involvement was found in 10 (13.5%) of 74 patients. Other cranial nerves could not be examined owing to poor GCS of the patients. Deuri *et al.* concluded similar results in their study.[15] It was also found that 47 (63.5%) of 74 patients had hypertonia. About 15 (20.3%) of 74 had hypotonia and 12 (16.2%) of 74 had normal tone.

About 24 (32%) of 74 patients had signs of raised intracranial pressure with 14 (18.9%) of 74 patients had bradycardia, 22 (29.7%) had raised blood presssure, 24 (32.4%) of 74 patients had abnormal respiratory pattern. These observations were similar to those found in other studies[5] (Table 2).

In the present study, 34 (45.9%) of the patients out of 74 had normal CSF counts i.e., 0-5 cells/mm3, 54 (62%) had abnormal cell counts with 20 (27%) having cell count between 5 to 100 cells/mm^3 and 14 (18.9%) with cell counts > 100 cells/mm3. 38 (51.3%) of the patients had normal protein values between 10-40 mg/dl and 4 (5.4%) had protein values < 10 mg/dL, 32 (43.2%) had protein values > 40 mg/dL. Normal CSF glucose levels were found in 36 (48.6%) of the patients and abnormal glucose levels were recorded in 38 (51.4%) of the patients. Similar results were published in studies conducted in separate parts of the country.[8,13] (Table 3) NCCT head was performed in 10 out of 74 patients (13.5%), it was found that 6 out of 10 patients (60%) had normal findings. A total of 4 out 10 patients (10%) had left parietal lobe involvement.

MRI brain provides useful information regarding the etiology and alternative diagnoses. However, due to the cost and difficulties in transporting sick and unstable patients for MRI, it was conducted in 22 out of 74 patients (29.7%), it was found that corpus callosum was involved in 4 out 74 patients (18.2%), basal ganglia was involved in 6 out of 22 patients (27.3%), cerebellum involvement was found in 4 out of 22 (18.2%) of the patients, pons was involved in 2 out 22 (9%), thalamus involvement was found in 8 out 22 patients (36.4%), 4 out 22 patients (18.2%) had frontal lobe involvement (Table 4).

As per suggestive MRI findings present in some etiologies of viral encephalitis such as Herpes simplex encephalitis, JE, enterovirus encephalitis[3] it was ascertained that the most common etiology could be Japanese encephalitis virus followed by varicella.

CONCLUSION

As per the known facts, the present study also suggested that childhood encephalitis affected more of younger age group, presenting with fever, altered mental status and seizures. Optic nerve involvement was observed in maximum number of patients. Among the signs of raised ICP, hypertension was most remarkable. Most common area of the brain to be affected was thalamus.

The significant findings of the present study were that despite fulfilling the diagnostic criteria of International Encephalitis Consortium,[4] nearly half of the patients of childhood encephalitis presented with normal CSF findings and normal neuroimaging.

So for prognosticating a patient with clinical encephalitis, investigative results should not be entirely relied upon.

REFERENCES

1. John TJ, Verghese VP, Arunkumar G, Gupta N, Swaminathan S. The syndrome of acute encephalitis in children in India: Need for new thinking. The Indian journal of medical research. 2017 ;146:158.
2. Resource manual, National vector borne disease control programme, in India: Directorate General of Health services,

2014: Govt. of India.
3. Sharma S, Mishra D, Aneja S, Kumar R, Jain A, Vashishtha VM. Consensus guidelines on evaluation and management of suspected acute viral encephalitis in children in India. Indian pediatrics. 2012;49: 897-910
4. Venkatesan A, Tunkel AR, Bloch KC, Lauring AS, Sejvar J, Bitnun A, Stahl JP, Mailles A, Drebot M, Rupprecht CE, Yoder J. Case definitions, diagnostic algorithms, and priorities in encephalitis: consensus statement of the international encephalitis consortium. Clinical Infectious Diseases. 2013 Oct 15;57(8):1114-28.
5. Basu R, Kalamuddin M. An epidemiological study on clinical profile and short term outcome in children of acute encephalitis syndrome in a tertiary care centre of West Bengal with special reference to the various prognostic markers. J Dent Med Sci 2018;17:14-9
6. Kakoti, G., Dutta, P., Ram Das, B., Borah, J., & Mahanta, J. (2013). Clinical profile and outcome of Japanese encephalitis in children admitted with acute encephalitis syndrome. *BioMed research international*, *2013*
7. Jain P at al. Epidemiology & aetiology of AES in north India. Jpn J Infect dis 2014; 167: 197-203.
8. Avabratha KS, Sulochana P, Nirmala G, Vishwanath B, Veerashankar M, Bhagyalakshmi K. Japanese encephalitis in children Bellary Karnataka: Clinical profile and sequelae. International Journal of Biomedical Research. 2012;3(2):100-5.
9. Kumar P, Pisudde PM, Sarthi PP, Sharma MP, Keshri VR. Status and trend of acute encephalitis syndrome and Japanese encephalitis in Bihar, India. The National Medical Journal of India. 2017 Nov 1;30(6):317-20.
10. Narain JP, Dhariwal AC, MacIntyre CR. Acute encephalitis in India: An unfolding tragedy. The Indian journal of medical research. 2017 ;145:584.
11. Solomon T, Thao TT, Lewthwaite P, Ooi MH, Kneen R, Dung NM, White N. A cohort study to assess the new WHO Japanese encephalitis surveillance standards. Bulletin of the World Health Organization. 2008;86:178-86..
12. Chunsuttiwat S. (1989). Japanese encephalitis in Thailand. *The Southeast Asian journal of tropical medicine and public health*, *20*(4), 593–597.
13. de, Saumyen & Samanta, Sanjana & Halder, Sanjay & Sarkar, Pronabesh. Clinical Profile and Outcome of Children Admitted with Acute Encephalitis Syndrome in a tertiary Care hospital in West Bengal, India. IOSR Journal of Dental and Medical Sciences. 2015;14:8-12
14. Tripathy SK, Mishra P, Dwibedi B, Priyadarshini L, Das RR. Clinico-epidemiological study of viral acute encephalitis syndrome cases and comparison to nonviral cases in children from Eastern India. Journal of Global Infectious Diseases. 2019 Jan;11(1):7.
15. Deuri, A., & Kalita, D. (2016). Clinical profile and outcome of patients with acute encephalitis syndrome in a tertiary care hospital, Assam, India. *IOSR Journal of Dental and Medical Sciences*, 15(7), 35-40