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Computed tomographic study in young epileptics in Kashmir, India

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Abstract: *Background:* Infectious diseases like neurocysticercosis and neurotuberculosis are endemic in Indian subcontinent and are important causes of epilepsy. Epileptic children are prone to have poor school performance, higher levels of anxiety and depression apart from low self esteem. These treatable condition could be easily picked up on neuroimaging like cranial computed tomography (CT) scan and treated accordingly at an earliest. *Objectives:* To assess the role of cranial computed tomography scan in children having epilepsy. *Material and Methods:* Seventy two children between the age of 1 month and 14 years were prospectively enrolled, who had atleast two unprovoked seizures greater than 24 hours apart, and all those children where seizures result from acute central nervous system insult were meticulously excluded. Diagnosis of epilepsy was based on detailed history, thorough clinical examination, routine laboratory tests with additional specific tests like electroencephalogram (EEG) and CT scan brain. *Results:* Males constituted 62.5% and females 37.5% of our sample (p=0.247). The EEG was abnormal in 68.1% of all subjects, among which EEG was abnormal in 69.8% of generalized seizures, 64.7% in partial seizures and 1% in undetermined seizures. The spectrum of various seizure types in our study was generalized seizures in 73.6%, partial seizures in 23.6% & undetermined seizures in 2.8%. The incidence of these lesions in hospitalized young epileptics was 31.9%, in order of their frequency, it was cerebral atrophy and dilated ventricle (18.8% each); calcifications (15.5%); encephalomalacia and pachygyria (9.4% each); HIE changes, tuberous sclerosis (6.3% each); leucodystrophy, thin corpus callosum, large cisterna magna, granuloma and periventricular leukomalacia (3.1% each). The intracranial structural lesions were present in 22.6% of generalized seizures, 64.7% of partial seizures, none of undetermined seizures (p=0.004). *Conclusion:* Abnormal cranial CT scan were more commonly seen in patients having remarkable family and personal history, abnormal clinical details, partial seizures and persistent altered sensorium or neurodeficit.

Keywords: Brain, computed tomography, epilepsy, intracranial structural lesions.

Introduction

Evidence based deep rooted impact of epilepsy on socio-economic status, and consequences of missing an epilepsy, or treating it inappropriately, can be disastrous in terms of impaired education, employment, and driving prospects, unnecessary medication, and diminished self esteem. The prevalence of epilepsy is approximately 0.5-1 case per 100 persons [1]. The prevalence rate of pediatric epilepsy in Indian subcontinent is 5.59/1000 with no gender and geographic difference, a rate surprisingly similar to the rate in developed countries [2]. The quality standards subcommittee of American Academy of Neurology recommend routine EEG as part of diagnostic evaluation; [3] other studies have recommended computed tomography based on structural abnormalities of brain as causative agents in approximately 30% cases [4]. The intracranial structural lesions (ISLs) associated with morphological changes in the brain or cranial cavity are important cause of symptomatic epilepsy. The common lesion include cerebral atrophy, ring enhancing lesions, dilated ventricles, infarct, porencephaly, calcifications, hydranencephaly, Dandy-walker variant, gyral enhancement, prominent thalami and basal ganglia hypodenisity [5]. On an average 38% of cranial CT scans were abnormal in epileptic children in various studies [6-9] and abnormal scans were more common in patients with partial seizures, abnormal neurological examination, focal paroxysmal discharges or slowing on EEG [1,7-8].

Material and Methods

This prospective study was done over a period of one year from August 2008 to July 2009 in the Department of Pediatrics, GB Pant Hospital, which is a referral hospital of Government Medical College, Srinagar. The sample size of the study included 72 children as per our inclusion criteria. 1), cases with at least two unprovoked seizures greater than 24 hours apart. 2), age between 1 month and 14 years. All those children with seizures resulting from acute central nervous system insults were meticulously excluded. The diagnosis of epilepsy was done on historical grounds, detailed clinical examination (general as well as systemic), including ophthalmological evaluation where ever needed in addition to routine investigations like complete blood count, blood sugar, serum electrolytes, serum calcium kidney function tests and liver functions. Additional investigations included cranial ultrasonography, electroencephalography (EEG) by 8 channel machine from recorder's and medicare system-Chandigarh, computerized axial tomography (CAT) with or without contrast by GE HI speed FXI spiral CT scanner from Siemens, and reports were categorized as normal and abnormal. Data was recorded as percentages and all inferences were drawn by using SPSS15.0 & Minitab Statistical Packages.

Results

Study results are depicted in the Tables 1-8.

Table-1: Type of seizures in the studied subjects

Type of seizure	n	%age
Generalized seizures		
Generalized tonic clonic seizures	42	58.3
Tonic seizures	3	4.2
Myoclonic seizures	4	5.5
Infantile spasms	1	1.4
Absence seizures	3	4.2
Total	**53**	**73.6**
Partial seizures		
Simple partial seizures	7	9.7
Complex partial seizures	8	11.1
Secondary generalized seizures	2	2.8
Total	**17**	**23.6**
Undetermined seizures	2	2.8
Total	**2**	**2.8**

Table-2: Age and gender distribution of the studied subjects

Age (yr)	Male		Female		Total		p value
	n	%	n	%	n	%	
1 month to 1 year	16	35.6	6	22.2	22	30.6	0.247 (NS)
2 to 5 years	22	48.9	13	48.1	35	48.6	
6 to 14 years	7	15.6	8	29.6	15	20.8	
Total	**45**	**62.5**	**27**	**37.5**	**72**	**100.0**	
mean ± SE	**3.3 ± 0.5 (4m to 13 yr)**		**4.4 ± 0.8 (2m to 13 yr)**		**3.7 ± 0.4 (2m to 13 yr)**		

Table-3: Seizure types across age of the studied subjects

Type of seizure	1 month-to 1 year		2 to 5 year		6 to 14year		p value
	n	%	n	%	n	%	
Generalized seizures							0.527 (NS)
GTC seizures	12	54.5	22	62.8	8	53.3	
Tonic seizures	1	4.5	2	5.7	0	0.0	
Myoclonic seizures	2	9.1	2	5.7	0	0.0	
Infantile spasms	0	0.0	1	2.9	0	0.0	
Absence seizures	2	9.1	1	2.9	0	0.0	
Total	**17**	**77.3**	**28**	**80.0**	**8**	**53.3**	
Partial seizures							
Simple Partial seizures	3	13.6	0	0.0	4	26.7	
Complex Partial seizures	2	9.1	4	11.4	2	13.3	
Sec generalized seizures	0	0.0	1	2.9	1	6.7	
Total	**5**	**22.7**	**5**	**14.3**	**7**	**46.7**	
Undetermined seizures	0	0.0	2	5.7	0	0.0	

Table-4: Seizure types across gender of the studied subjects					
Type of seizure	**Male**		**Female**		**p value**
	n	**%**	**n**	**%**	
Generalized seizures					
GTC seizures	26	57.8	16	59.3	0.803(NS)
Tonic seizures	2	4.4	1	3.7	
Myoclonic seizures	3	6.7	1	3.7	
Infantile spasms	1	2.2	0	0.0	
Absence seizures	3	6.7	0	0.0	
Total	**35**	**77.8**	**18**	**66.7**	
Partial seizures					
Simple partial seizures	5	11.1	2	7.4	
Complex partial seizures	4	8.9	4	14.8	
Sec generalized seizures	0	0.0	2	7.4	
Total	**9**	**20**	**8**	**29.6**	
Undetermined seizures	1	2.2	1	3.7	

Table-5a: Electroencephalogram in the studied subjects		
Electroencephalogram	**n**	**%**
Normal	23	31.9
Abnormal	49	68.1

Table-5b: Electroencephalogram across the various seizure types in the studied subjects					
Type of seizure	**Normal**		**Abnormal**		**p value**
	n	**%**	**n**	**%**	
Generalized seizures					
Generalized tonic clonic seizures	14	33.3	28	66.7	0.594 (NS)
Tonic seizures	1	33.3	2	66.7	
Myoclonic seizures	1	25.0	3	75.0	
Infantile spasms	0	0.0	1	100.0	
Absence seizures	0	0.0	3	100.0	
Total	**16**	**30.2**	**37**	**69.8**	
Partial seizures					
Simple partial seizures	3	42.9	4	57.1	
Complex partial seizures	3	37.5	5	62.5	
Secondary generalized seizures	0	00.0	2	100.0	
Total	**6**	**35.3**	**11**	**64.7**	
Undetermined seizures	1	50.0	1	50.0	

Table-6: Incidence of ISLs across age & gender of the studied subjects							
Age (years)	**Male**		**Female**		**Total**		**p value**
	n	**%**	**n**	**%**	**n**	**%**	
1 month – 1 year	4	28.6	1	11.1	5	22.7	0.595(NS)
2 years - 5 years	7	50.0	6	66.7	13	37.1	
6 years – 14 years	3	21.4	2	22.2	5	33.3	
Total	**14**	**31.1**	**9**	**33.3**	**23**	**31.90**	

Table-7: CT Scan across various seizure types in the studied subjects					
Type of seizures	**Normal**		**Abnormal**		**p value**
	n	**%**	**n**	**%**	
Generalized seizures					
Generalized tonic clonic seizures	33	78.6	9	21.4	0.004 (Sig)
Tonic seizures	3	100.0	0	0.0	
Myoclonic seizures	2	50.0	2	50.0	
Infantile spasms	0	0.0	1	100.0	
Absence seizures	3	100.0	0	0.0	
Total	**41**	**77.4**	**12**	**22.6**	
Partial seizures					
Simple Partial seizures	1	14.3	6	85.7	
Complex Partial seizures	3	37.5	5	62.5	
Secondary generalized seizures	2	100.0	0	0.0	
Total	**6**	**35.3**	**11**	**64.7**	
Undetermined seizures	2	100.0	0	0.0	

Table-8: Spectrum of intracranial structural lesions (ISLs) in the studied subject		
CT Finding	**n**	**%**
Normal	49	68.1
Abnormal	23	31.9
Cerebral Atrophy		
Focal cerebral Atrophy	3	18.8
Diffuse Cerebral Atrophy	3	18.8
Dilated Ventricle	6	18.8
Calcification	5	15.5
Encephalomalacia	3	9.4
Pachygyria	3	9.4
HIE Changes	2	6.3
Tuberous Scelerosis	2	6.3
Leucodystrophy	1	3.1
Thin corpus Callosum	1	3.1
Large Cisterna Magna	1	3.1
Granuloma	1	3.1
Periventricular Leukomalacia	1	3.1

*More than one abnormality was present in seven of scans

Notable points from our results were: 1) Males constituted 62.5% and females 37.5% of our sample (p=0.247). 2) The EEG was abnormal in 68.1% of all subjects, among which EEG was abnormal in 69.8% of generalized seizures, 64.7% in partial seizures and 1% in undetermined seizures.

The spectrum of various seizure types in our study was generalized seizures in 73.6%, partial seizures in 23.6% & undetermined seizures in 2.8%. 2) The incidence of intracranial structural lesion (ISL) in hospitalized young epileptics was 31.9%. 3) The spectrum of intracranial structural lesion (ISL) in hospitalized young epileptics in decreasing order of their frequency was cerebral atrophy and dilated ventricle (18.8% each), calcifications (15.5%), encephalomalacia and pachygyria (9.4% each), HIE changes, tuberous sclerosis (6.3% each), leucodystrophy, thin corpus callosum, large cisterna magna, granuloma and periventricular leukomalacia (3.1% each). 4) The intracranial structural lesions (ISLs) were present in 22.6% of generalized seizures, 64.7% of partial seizures, none of undetermined seizures and this was statistically significant (p=0.004).

Discussion

Our study revealed 73.3% patients had generalized seizures, 23.6% had partial seizures and 2.8% had undetermined seizures. The generalized tonic clonic seizure was most common (58.3%) in all the age groups and

both sexes, with male predominance, an observation quite similar to the study results of other authors [5,10] Commonest epileptic age group in our patients were between 2-5 years and these presented with generalized seizures depicting cortical maturity in this age which is in conformity with the observation made by Korff C et al [11]. Overall 69.8% of patients with generalized seizures, and 64.7% patients with partial seizures had abnormal EEG which are in approximation with the other studies [10,12].

The CT scan was abnormal in 31.9% epileptic patients a statistically significant observation duly supported by other authors [5,10,12-13]. This observation was especially remarkable in patients who had either family history of epilepsy, abnormal clinical details, partial seizures, or persistent altered sensorium after an epileptic episode, implying a favorable diagnostic role of CT scan brain in these patients. The commonest intracranial structural lesions, equally was cerebral atrophy and dilated ventricle (18.8% each), a similarity for cerebral atrophy with past studies [5,10,12-13]. However parallel commonest lesion in our study is dilated ventricles, which could be because of high prevalence of consanguinity here in Kashmir.

Striking finding of our study was that none of our cases did show any ring enhauncing lesion which are thought to be mostly due to neurocysticercosis and occasionally due to tuberculoma, which is in contradiction with the studies done [14-16] in rest of India. This difference may be because of culture of proper boiling of water and milk before consumption and non consumption of pork here in Kashmir. Studies done by Maytal [17] et al have revealed that only 6% of children who presented with cryptogenic seizures had an abnormal CT. By contrast, the CT was abnormal in 60% of children whose seizures were considered to be symptomatic [17]. Similar results were obtained by Sharma and coworkers [18]. In our patients CT Scan yield was quite high in patients having abnormal neurological examination, dysmorphic features and abnormal EEG, duly supported by the study done by Hirtz [3] et al.

From these studies and our observation, it is evident that neuroimaging of children with seizures should be recommended for those who are at risk for neuroimaging abnormalities, to prevent the preventable and/or curative disaster. These include an abnormal neurologic examination, clinical details suggestive of ailments like malignancy, sickle cell disease, bleeding disorder, a closed head injury, or travel to an area endemic for cysticercosis [18].

Conclusion

Based on our findings we recommond neuroimaging in all children with abnormal clinical examination, remarkable family and personal history, endemicity of neurocysticercosis and tuberculosis, and persistant altered sensorium or focal deficit following an epileptic fit.

References

1. Annegers JF. The epidemiology of epilepsy. In: Wyllie E, ed. The Treatment of Epilepsy: Principles and Practice. Baltimore, Md: *Williams & Wilkins,* 1997; 165-72.
2. Udhani V. Pediatric epilepsy-An Indian Prespective. *Indian J Pediatr*, 2005; 72: 309-13.
3. Hirtz D, Ashwal S, Berg A, Bettis D, Camfield C, Camfield P, et al. Practice parameter. Evaluating a first non febrile seizure in children. Report of the quality standard subcommittee of American academy of Neurology, the child neurology society and American epilepsy society. *Neurology,* 2000; 55:616-23.
4. Scolla Lavizani, Eichohcom K, Wethrick R, et al. Computerized transverse axial tomography in the diagnosis of epilepsy. *Eur Neurology*, 1997; 15:167-69.
5. Kapoor M, Talukder B, Chowdhary V, Puri V, Rath B. Intracranial structural lesions in young epileptics: a computed tomographic study. *Indian Pediatr*, 1998; 35: 537-41.
6. Kumar R, Navjivan S, Kohli N, Sharma B. Clinical correlates of CT abnormality in generalized childhood epilepsy in India. *J Trop Pediatr.* 1997; 43:199-03.
7. Mcabee GN, Wark JE. A practical approach to uncomplicated seizures in children. *Am Fam Physician* 2000; 62: 1109-16.
8. King MA, Newton MR, Jackson GD, Fitt GJ, Mitchell LA, Silvapulle MJ, et al. Epileptology of first seizure presentation: a clinical ,electroencephalographic and magnetic resonance imaging study of 300 consecutive patients. *Lancet,* 1998; 352:1007-11.
9. Kalra V. Management of childhood epilepsy. *Indian J. Pediatr.* 2000;67(1 Suppl): S12-S21.

10. Yang PJ, Berger PE, Cohen ME, Duffner PK. Computed tomography and childhood seizures disorders. *Neurology*, 1979; 29: 1084-88.
11. Korff C, Nordli DR Jr. Do generalized tonic-clonic seizures in infancy exist? *Neurology*, 2005; 65(11): 1750-53.
12. Ramesh Baheti, Gupta BD, Rajesh Baheti. A study of CT and EEG findings in patients with Generalized or Partial seizures in Western Rajasthan. *JIACM,* 2003; 4(1):25-29.
13. Bachman DS, Hodges FJ, Freeman JM. Computerized axial tomography in chronic seizures disorder of childhood. *Pediatrics* 1976; 58: 828-32.
14. Kalra V, Sethi A. Childhood neurocysticercosis: Epidemiology, diagnosis and course. *Acta Pediatr Jpn* 1992; 34: 365-70.
15. Sethi PP, Wadia PS, Kiyawat DP, Inchaporia NR, Kothari SS, Singla SA, et al. Ring or disc enhancing lesions in epilepsy in India. *J Trop Med Hyg* 1994; 97: 347-53.
16. Singhi P, Singhi S, Ramanathan RP, Bharti S. Neurocysticercosis in focal epilepsy in North India. *Epilepsia* 1995; 36:156.
17. Maytal J, Krauss JM, Novak G, Nagelberg J, Patel M. The role of brain computed tomography in evaluating children with new onset of seizures in the emergency department. *Epilepsia,* 2000; 41:950-54.
18. Sharma S, Riviello JJ, Harper MB, Baskin MN. The role of emergent neuroimaging in children with new-onset afebrile seizures. *Pediatrics,* 2003; 111: 1-5.

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