

# Clinical and Electroencephalographic Profile Of Children

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## ABSTRACT

### Background

Reports on pediatric electroencephalogram of Nepalese patients are rare.

### Objective

We aimed to study the relationship between provisional clinical and electrophysiological diagnoses of pediatric patients with documentation of demographic profiles, and type and frequency of the disorders/diseases.

### Methods

Electroencephalographic reports of 634 children from 2006 to 2009 were analyzed at neurophysiology laboratory, department of Basic and Clinical Physiology, B. P. Koirala Institute of Health Sciences, Dharan, Nepal, retrospectively. Chi-Square test was applied after detail descriptive statistics.

### Results

Male and female were 72.2 % (n=458/634) and 27.76 % (n=176/634) respectively. Most frequent EEG abnormality was seizure disorder (n=370, 59.39%), then febrile seizure (n=94, 15.08%) and birth asphyxia with hypoxic-induced encephalopathy (n=68, 10.91%). Electroencephalogram showed significant epileptiform discharges in seizure disorder (p=0.001, OR= 2.26, 95 % CI= 1.61 to 3.18) and in cerebral palsy (p=0.049, OR=6.88, 95 % CI=0.89 to 145.95), specifically in 6 to 12 (p=0.001, OR=2.94, 95 % CI=1.43 to 6.06) and one to five (p=0.019) years, respectively. Electroencephalogram detected significantly less epileptiform discharges (p=0.001, OR=0.25, 95 % CI= 0.15 to 0.42) in febrile seizure specifically in 1 to 5 years (p=0.003, OR=0.16, 95 % CI= 0.04 to 0.63).

### Conclusion

Predominant Electroencephalographic abnormality was seizure disorder, followed by febrile seizure and birth asphyxia with hypoxic-induced encephalopathy respectively. Electroencephalographic abnormality was highly associated with seizure disorder and cerebral palsy but was not associated with febrile seizure.

## KEY WORDS

*Children, EEG, epileptiform discharges*

## INTRODUCTION

The electroencephalogram (EEG) is the algebraic summation of electrical activity (excitatory and inhibitory postsynaptic potentials) of the brain as recorded from electrodes placed on the scalp.<sup>1</sup> Since it is a convenient and relatively inexpensive way to demonstrate the physiological manifestations of abnormal cortical excitability that underlies epilepsy, EEG continues to play a central role in diagnosis and management of patients with seizure disorders in conjunction with the remarkable variety of other diagnostic techniques.<sup>2</sup>

B.P. Koirala Institute of Health Sciences (BPKIHS) is a referral centre located at eastern part of Nepal. Patients coming for EEG at BPKIHS, range from transient loss of consciousness to seizure disorder. In addition, infants and children diagnosed with birth asphyxia with hypoxic-induced encephalopathy, meningitis, encephalitis, cerebral palsy, febrile seizures and others are also referred for EEG.

In the context of Nepal, there is virtually nonexistent literature and published data on reports on Pediatric EEG. Thus, we have attempted to study the relationship between provisional clinical and electrophysiological diagnoses of the pediatric patients with documentation of the demographic profiles, and the frequency of the disorders/diseases referred for EEG at BPKIHS. This study would provide the preliminary documented data of the clinico-electrodiagnostic relationship of the Nepalese children, which will open the avenues and provide background for the future research.

## METHODS

This descriptive retrospective study included all the children referred for EEG to the department of Basic and Clinical Physiology, BPKIHS, from the year 2006 to 2009. Most of them were referred from the Pediatric OPD of BPKIHS and some from outside BPKIHS. EEG reports of children from neonates to 12 years of age were enrolled in this study. An EEG database had been maintained of all the cases at EEG laboratory, which included demographic profiles, relevant clinical history and findings, provisional clinical diagnosis, and electrophysiological diagnosis.

All the reports recorded were analyzed by two trained consultants jointly and were tabulated. The patients were divided into three age groups (less than one, one to five and six to 12 years) according to the broad physiological EEG pattern.<sup>3</sup> The electroencephalographic findings of each case were divided into normal and abnormal. Epileptiform discharges in EEG were based on standard criteria.<sup>3</sup>

From the total 634 cases recruited, only 623 cases were enrolled and 11 cases were excluded from the study. Exclusion was done on the basis of EEG findings. EEG recording with equivocal findings or immature record or with inconclusive evidence or non-specific findings or

disagreement between consultants was excluded. Detail descriptive statistics was done in Microsoft Office Excel. Chi Square test was applied for the relationship between the provisional clinical diagnoses and electrodiagnoses. The study was conducted after the approval of the Ethical Review Board of the institute.

## RESULTS

In the duration of three years (2006 to 2009), the total number of pediatric EEG done was 634.

**Age:** The most common age group of children referred for EEG were six to 12 years (n=252, 39.75%), followed by age group of one to five years (n=239, 37.70%) and less than one year (n=143, 22.55%) respectively. In all age groups male were more (Table 1).

**Sex:** From the total cases of 634, 458 (72.24%) were males and 176 (27.76%) were females. In males, the most common age group was between one to five years (n= 178, 38.86%) followed by six to 12 years (n=169, 36.98%) and less than one year (n=111, 24.29%) respectively (Table 1).

Whereas, in females, the most common referral age group was between six to 12 years (n=83, 47.15%) followed by one to five years (n=62, 35.22%) and less than one year (n=32, 18.18%) respectively (Table 1).

**Table 1. Age and sex distribution of the patients referred for EEG during the year 2006 to 2009 at BPKIHS.**

Age group (year)	No. of patients (n=634)	Sex	
		Male (n=458, 72.23%)	Female(n=176, 27.76%)
<1	143(22.55%)	111(24.29%)	32(18.18%)
1-5	239(37.70%)	178(38.86%)	62(35.22%)
6-12	252(39.75%)	169(36.98%)	83(47.15%)

### Geographical belongings of patients coming to BPKIHS and referred for EEG

Most of the patients referred for EEG were from the Eastern part of Nepal. Most frequently, patients referred were from Sunsari district (n=231, 36.43%), followed by Morang (n=88, 13.88%) and Jhapa districts (n=74, 11.67%) respectively. The patients were as far as from more than 200 Km and from remote hill districts to plains. There were sizable patients from Bihar, India (Table 2).

### Relative frequency of cases referred for EEG during 2006 to 2009 at BPKIHS

From the 623 cases, 59.39 % (n=370) was seizure disorder, 15.08 % (n=94) was febrile seizure, 10.91 % (n=68) was birth asphyxia with hypoxic-induced encephalopathy. Others were meningitis/encephalitis 6.26 % (n=39), seizure disorder with co-morbidity 2.56 % (n=16) and cerebral palsy 1.60 % (n=10). According to the age group it was as follows:

**Table 2. Geographical belongings of patients coming for EEG at BPKIHS in the year 2006 to 2009.**

District	No. of patients, n=634
Sunsari	231(36.43%)
Morang	88(13.88%)
Jhapa	74(11.67%)
Dhankuta	29(4.57%)
Saptari	42(6.62%)
Udaypur	22(3.47%)
Dhanusha	38(6.20%)
Siraha	26(4.24%)
Ilam	9(1.42%)
Bhojpur	8(1.26%)
Terathum	11(1.73%)
Panchthar	9(1.42%)
Mahotari	10(1.63%)
Sankhuwasabha	3(0.47%)
Janakpur	8(1.26%)
Sarlahi	6(0.94%)
Taplejung	3(0.47%)
Khotang	1(0.16%)
Okhaldhunga	1 (0.16%)
Sindhuli	1 (0.16%)
Lahaan	1 (0.16%)
Bardibas	1 (0.16%)
Bihar (India)	22(3.47%)

**Table 3. Relative frequency of cases of EEG done during 2006 to 2009 at BPKIHS.**

Cases	Age group (years)			Total (n=623)
	<1 (n=142)	1-5 (n=237)	6-12 (n=244)	
Seizure disorder	36(25.35%)	136(57.38%)	198(81.14%)	370(59.39%)
Birth asphyxia with hypoxic-induced encephalopathy	68(47.88%)	-	-	68(10.91%)
Seizure disorder with co-morbidity	4(2.81%)	9(3.79%)	3(1.22%)	16(2.56%)
Febrile seizure	9(6.33%)	73(30.80%)	12(4.91%)	94(15.08%)
Meningitis/encephalitis	11(7.74%)	11(4.64%)	17(6.96%)	39(6.26%)
Cerebral palsy	5(3.52%)	5(2.10%)	-	10(1.60%)
Miscellaneous	9(6.33%)	3(1.26%)	14(5.73%)	26(4.17%)

Less than one year: The total number of cases was 142. The most frequent cases was birth asphyxia with hypoxic-induced encephalopathy (n=68, 47.88%) followed by seizure disorder (n=36, 25.35%). Likewise, other cases were meningitis/encephalitis (n=11, 7.74%), febrile seizure (n=9, 6.33%), cerebral palsy (n=five, 3.52%) and seizure disorder with co-morbidity (n=4, 2.81%) (Table 3).

One to five year: The total number of cases was 237. Seizure disorder (n=136, 57.38%) was the major cases referred for EEG, followed by atypical febrile seizure (n=73, 30.80%). Besides these cases, there were meningitis/encephalitis

(n=11, 4.64%), seizure disorder with co-morbidity (n= nine, 3.79%), and cerebral palsy (n= 5, 2.10%) (Table 3).

Six to twelve year: The total number of cases was 244. In this age group, most commonly referred cases for EEG was seizure disorder (n=198, 81.14%). Other cases included meningitis/encephalitis (n=17, 6.96%), and febrile seizure (n= 12, 4.91%) (Table 3).

#### Details of provisional clinical and electrophysiological diagnoses of pediatric patients referred for EEG during 2006 to 2009 at BPKIHS

From the 623 cases, EEG recording was found to be abnormal in 352 cases and normal in 271 cases (Table 4).

Seizure disorder and EEG: From the total 623 cases, 370 (59%) cases were clinically diagnosed as seizure disorder. In the EEG, from these 370 cases, 239 (64.59%) were consistent with clinical diagnosis and the remaining 131 (35.40%) were normal with no epileptiform discharges (Table 4).

Birth asphyxia with hypoxia-induced encephalopathy (BA with HIE) and EEG: From the 623 cases, 66 (10.59%) cases were BA with HIE. From the 66 cases, 33 (50%) EEG recordings showed epileptiform discharges and remaining 33 (50%) were normal (Table 4).

Atypical febrile seizure and EEG: From the total cases of 623, the cases of atypical febrile seizure were 94 cases (15.08%). From the 94 cases, only 27 (28.72%) EEG recordings showed epileptiform discharges and remaining

67 (71.27%) were normal (Table 4).

Meningitis/Encephalitis and EEG: From the 623 cases, meningitis/encephalitis was 39 (6.26%) cases. From these 39 cases, 20 (51.28%) EEG recordings were with epileptiform discharges and 19 (48.71%) were normal (Table 4).

Seizure disorder with co-morbidity and EEG: From the 623 cases, 16 (2.56%) referral cases were seizure disorder with co-morbidity. From these 16 cases, 11 (68.75%) EEG recording showed epileptiform activities and remaining five (31.25%) showed normal EEG (Table 4).

**Table 4. Co-tabulation of provisional clinical diagnoses and electro-diagnosis of patients referred for EEG during 2006 to 2009 at BPKIHS.**

Provisional Clinical diagnoses	No. of patients		Electro-diagnosis (EEG)	
	Enrolled (n=634)	Included (n=623)	Abnormal (n=352, 56.50%)(%)	Normal (n=271, 43.49%)(%)
Seizure disorder	372	370 (59%)	239(64.59%)	131(35.40%)
Seizure disorder with co-morbidity	17	16 (2.56%)	11(68.75%)	5(31.25%)
Febrile seizure	94	94 (15.08%)	27(28.72%)	67(71.27%)
Meningitis/encephalitis	42	39 (6.26%)	20(51.28%)	19(48.71%)
BA with HIE*	69	66 (10.59%)	33(50.0%)	33(50.0%)
Cerebral palsy	11	10 (1.60%)	9(90.0%)	1(10.0%)
Miscellaneous	29	28 (4.49%)	13(46.42%)	15(53.57%)

\*BA with HIE= birth asphyxia with hypoxic-induced encephalopathy

**Table 5. Relationship between provisional clinical diagnosis and electroencephalographic diagnosis of patients referred for EEG during 2006 to 2009 at BPKIHS**

Diagnoses	Cate-gory	EEG		p-value	Odds Ratio	Odds Ratio 95% CI	
		Ab-normal	Nor-mal			Lower	Upper
Seizure disorder	Yes	239	131	0.001	2.26	1.61	3.18
	No	113	140				
Seizure disorder with co-morbidity	Yes	11	5	0.316	1.72	0.54	5.74
	No	341	266				
Febrile seizure	Yes	27	67	0.001	0.25	0.15	0.42
	No	325	204				
Menin-gitis/en-cephalitis	Yes	20	19	0.497	0.8	0.40	1.60
	No	332	252				
BA with HIE*	Yes	33	33	0.259	0.75	0.43	1.28
	NO	319	238				
Cerebral palsy	Yes	9	1	0.049	6.88	0.89	145.95
	No	353	270				
Miscella-neous	Yes	13	15	0.271	0.65	0.29	1.48
	No	339	256				

\*BA with HIE= birth asphyxia with hypoxic-induced encephalopathy

Cerebral palsy and EEG: From the 623 cases, 10 (1.60%) cases referred for EEG were cerebral palsy. From these 10 cases, nine (90%) EEG recordings showed epileptiform discharges and only one (10.0%) showed normal EEG (Table 4).

#### Relationship between provisional clinical diagnoses and electroencephalographic diagnoses of pediatric patients referred for EEG during 2006 to 2009 at BPKIHS

The odd ratio was 2.26 (95 percent CI= 1.61 to 3.18) in seizure disorder and 6.88 (95 percent CI= 0.89 to 145.95) in cerebral palsy in which detection of epileptiform discharges by EEG in both the cases was significantly high (seizure disorder,  $p=0.001$  and cerebral palsy,  $p=0.049$ ). However, in febrile seizure the odd ratio was 0.25 (95 percent CI= 0.15 to 0.42) in which EEG detected significantly less ( $p= 0.001$ ) epileptiform activities (Table 5).

According to the age groups, in one to five years, odd ratio was 10.04 (95 percent CI= 1.25 to 217.46) in seizure disorder with co-morbidity in which EEG detected significantly high epileptiform discharges ( $p=0.012$ ). There was a significant relationship between cerebral palsy and EEG ( $p=0.019$ ). The odd ratio was 0.35 (95 percent CI= 0.18 to 0.66) in febrile seizure in which the EEG diagnosis was highly negative ( $p= 0.001$ ) (Table 6).

In six to twelve years, the odd ratio was 2.94 (95 percent CI= 1.43 to 6.06) in seizure disorder in which EEG significantly detected epileptiform discharges ( $p= 0.001$ ). The odd ratio was 0.16 (95 percent CI= 0.04 to 0.63) in febrile seizure in which the EEG diagnosis was significantly negative ( $p= 0.003$ ) (Table 6).

## DISCUSSION

The reports on EEG done of patients in whom EEG is indicated are rare in Nepal. We attempted to document the demographic profiles, relative frequency of disorders/diseases and clinico-electrodiagnostic relationship of 623 pediatric patients referred for EEG during 2006 to 2009 at BPKIHS. Further, we aimed to analyze the relationship between provisional clinical and electrophysiological diagnoses.

In our study, we enrolled the EEG reports of children from neonate up to 12 years of age as through late pre-school and into adolescence the characteristic features of the adult EEG emerge.<sup>4</sup> During the three-year study period, the number of male children undergoing EEG was almost three times more than that of female. Seizure disorder was one of most common indications for doing EEG. This is in alignment with published report that the seizures are common in male.<sup>5,6</sup> In male, most common age group was between one to five years followed by six to 12 years. There is report saying that seizures have peak frequency of age at onset in two to five years which is similar to our study.<sup>5</sup> However, the study did not differentiate the age group on sex basis. We found that the trend was opposite in female i.e. 6 to 12 years followed by one to five years.

**Table 6.** Relationship between provisional clinical diagnoses and electroencephalographic diagnoses of patients in terms of age group referred for EEG during 2006 to 2009 at BPKIHS.

Age group (years)	Diagnosis	Category	EEG		p-value	Odds Ratio	Odds Ratio 95% CI	
			abnormal	normal			lower	upper
<1	Seizure disorder	Yes	17	19	0.755	1.13	0.49	2.58
		No	46	58				
	Seizure disorder with co-morbidity	Yes	1	3	0.627	0.40	0.02	4.45
		No	62	74				
	BA with HIE*	Yes	33	33	0.261	1.47	0.71	3.03
		No	30	34				
	Febrile seizure	Yes	2	7	0.185	0.33	0.05	1.82
No		61	70					
Meningitis/encephalitis	Yes	4	7	0.754	0.68	0.16	2.75	
	No	59	70					
Cerebral palsy	Yes	4	1	0.174	5.15	0.52	124.35	
	No	59	76					
Miscellaneous	Yes	2	7	0.185	0.33	0.05	1.82	
	No	61	70					
1-5	Seizure disorder	Yes	68	68	0.156	1.45	0.84	2.52
		No	42	61				
	Febrile seizure	Yes	21	52	0.001	0.35	0.18	0.66
		No	89	77				
	Seizure disorder with co-morbidity	Yes	8	1	0.012	10.04	1.25	217.46
		No	102	128				
	Meningitis/encephalitis	Yes	6	5	0.561	1.43	0.37	5.59
No		104	124					
Cerebral palsy	Yes	5	0	0.019				
	No	105	129					
Miscellaneous	Yes	2	3	1.0	0.78	0.09	5.84	
	No	108	126					
6-12	Seizure disorder	Yes	154	44	0.001	2.94	1.43	6.06
		No	25	21				
	Febrile seizure	Yes	4	8	0.003	0.16	0.04	0.63
		No	175	57				
	Seizure disorder with co-morbidity	Yes	2	1	1.0	0.72	0.05	20.50
		No	177	64				
	Meningitis/encephalitis	Yes	10	7	0.159	0.49	0.16	1.51
No		169	58					
Miscellaneous	Yes	9	5	0.428	0.64	0.18	2.28	
	No	170	60					

In a box of contingency table had <5 cases then, Fisher Exact p values were taken.

\*BA with HIE= birth asphyxia with hypoxic-induced encephalopathy

Most of the patients referred for EEG were from the eastern part of Nepal simply because institute lies there. Most frequently, patients referred were from Sunsari district, followed by Morang and Jhapa districts respectively compared to other districts. It is probably be due to their proximity, accessibility and feasibility to BPKIHS. In addition, EEG services started since the establishment of BPKIHS. Nowadays, this service has been started in few neighboring towns outside BPKIHS.

Seizure disorder (59.39%) was the most common referral cases for EEG, followed by febrile seizure (15.08%) and birth asphyxia with hypoxic-induced encephalopathy (10.91%). Others were meningitis/encephalitis (6.26%), seizure disorder with co-morbidity (2.56%) and cerebral palsy

(1.60%). According to the age, in seizure disorder, most common age-group referred for EEG was six to twelve years (81.14%), followed by one to five years (38%). This finding in seizure disorder is vague. The referred cases of seizure disorder were not classified. Because brain growth and neurophysiological maturation are incomplete in children, epileptic seizures and epilepsy pose specific problems, as symptomatology is often dependent on age.<sup>4</sup> Likewise, in febrile seizure more referral group was one to five years (30.8%) which is most common seizure disorder in children younger than five years of age, followed by six to twelve years (4.91%).<sup>7</sup> The referral frequency for EEG in infections of nervous system (meningitis/encephalitis) was almost similar among the age groups (six to twelve years: 6.96 %;

less than one year: 7.74 % and one to five year: 4.64 %). In cerebral palsy, the referred age group was less than one year (3.52%) and one to five years (2.10%).

From the total 623 cases involved in our study, the total EEG recording was abnormal in 56.50 % and normal in 43.49 % cases (Table 4). In seizure disorder, EEG recording was abnormal in 64.59 % and normal in 35.40 % cases (Table 4). EEG showed significant epileptiform activities in seizure disorder (Table 5) and according to age group specifically in six to 12 years (Table 6). In seizure disorder with co-morbidity, EEG recording was abnormal in 68.75 % and normal in 31.25 % (Table 4). The EEG was highly positive (Table 6) in it specifically in one to five years.

Published figures for diagnostic sensitivity of EEG range between 25 to 55 %, 29 to 38 %.<sup>8,9</sup> On first EEG recording, some reports show that EEGs identify 29 to 55 percent of seizures,<sup>10</sup> other reports show only 56 %.<sup>10,11</sup> Even with expert clinical evaluation and repeated recordings, the sensitivity of EEG is 70 %, with a specificity of 78 %, or 80 to 90 %, or 69 to 77 %.<sup>9-11</sup> On a first standard EEG recording, around 40 % of children with seizures will have a normal record or up to about half of patients with epileptic disorders may have one normal inter-ictal EEG.<sup>8,9,12</sup> Around 10 % of patients or from 10 to 40 % with epilepsy never show epileptiform discharges.<sup>9,10</sup> Hence, a normal or negative EEG cannot be used to rule out the clinical diagnosis of an epileptic seizure. In our case, we found 64.59 % of seizure disorder and 68.75 % of seizure disorder with co-morbidity with abnormal EEG recording which is higher than the previous reported data. It could be because highly selected cases were referred for EEG as our hospital is a referral center. Additionally, our data include follow-up EEG recordings as well.

Early EEG is a reliable predictor of outcome in hypoxic induced encephalopathy. A normal or mildly abnormal EEG results within six hours after birth were associated with normal neurodevelopmental outcomes at two years.<sup>13</sup> An abnormal EEG pattern of suppression-burst or continuous low voltage within three to eight hours of life was associated with a poor outcome, whereas a normal EEG almost invariably indicated a good outcome in term infants.<sup>14</sup> The additional benefit of continuous EEG monitoring would be the ability to detect electrographic seizures.<sup>15</sup> The presence of electrographic seizures was correlated associated with a higher rate of abnormal neurodevelopmental outcomes.<sup>13</sup> Whether this is a reflection of underlying injury and whether seizures cause additional damage remains unclear.<sup>16,17</sup> However, we don't have an advance laboratory set up in NICU to record EEG immediately after birth. We recorded EEG of referral cases of neonates diagnosed with birth asphyxia with hypoxic-induced encephalopathy (n=66) who were less than one month in which 50 % had abnormal and 50 % had normal EEG. There is a scope to trace them and record EEG who had previous abnormal EEG to see their developmental outcome.

In febrile seizure (n=94), EEG recording was abnormal in 28.72% cases and normal in 71.27% cases (Table 4). Overall, EEG detected significantly less epileptiform activities in febrile seizure (Table 5). It was most common in one to five years and the EEG diagnosis was significantly negative in this age group. Studies have shown that the yield of routine EEG is low in neurologically normal children with febrile seizures even if the seizure is complex.<sup>18</sup> One study showed that overall, 6.5 % had febrile seizures (including complex) from 438 consecutive pediatric EEGs over a one-year period and none had epileptiform discharges.<sup>19</sup> Other showed that 15 % of all EEGs recorded for febrile seizures and only 4.85 % were abnormal with background rather than epileptiform abnormalities.<sup>20</sup> Therefore, there suggestions that the routine practice of obtaining EEG in neurologically normal children with febrile seizures is not justified.<sup>21</sup> Our findings are supported by these reports though abnormal EEG was more in our study than in these studies.

In meningitis/encephalitis (n=39), EEG was abnormal in 51.28 % cases and normal in 48.71 %. Abnormal EEG in meningitis has also been reported in 50 % by Kumar et.al; 33.33 % by Rose et.al ; and 17 % by Mizrahi et.al.<sup>22-24</sup> Regarding encephalitis, EEG is of value particularly in patients with herpes simplex type 1 encephalitis.<sup>25,26</sup> These reports are similar to our study results.

In cerebral palsy (n=10), EEG were abnormal in 90 % cases and normal in 10 % case (Table 3). EEG showed significant epileptiform activities in cerebral palsy (Table 5). In one to five years, the EEG was highly positive (Table 6). There are similar findings in other studies too. The incidence of EEG abnormalities is high (spastic tetraplegia and spastic diplegia: epilepsy in 60 %, EEG abnormalities in 80%). There is relatively high incidence (44%) of epileptiform discharges even in children without clinical evidence of seizures peaking between the ages of four and six years.<sup>27</sup> Similarly, there are studies showing that tetraplegic cerebral palsy had a higher incidence of epilepsy (60.5%). EEG was confirmed abnormal in epileptic cerebral palsy as 90.3 %, and in non-epileptic cerebral palsy as 39.5 %. Focal epileptiform activity, generalized slowing, and multifocal epileptiform activity were significantly frequent in epileptic cerebral palsy.<sup>28</sup>

Since it is a retrospective study, we have depended only on requisite form for the information of the patients. In future, we can design cross-sectional or longitudinal types of study, collaborate with the concern referral departments and can correlate the sign and symptoms of specific seizure disorder or other neurological disorders/diseases, family history/history of patients with EEG features, timing of the EEG recording and their follow-up.

## CONCLUSION

Male children had preponderance over female. Most common age group that underwent EEG was one to five

and 6 to 12 years whereas female had opposite trend. Predominant cases for EEG were seizure disorder, followed by febrile seizure and birth asphyxia with hypoxic-induced encephalopathy respectively. Abnormal EEG activity was highly associated with seizure disorder and cerebral palsy but was not associated with febrile seizure.

Strength of the study: The study is first of its kind since published data on reports of EEG done of Nepalese pediatric

patients with sample size like ours is almost absent. It has provided preliminary demographic profile, pattern and frequency of neurological disorders/diseases with relationship between provisional clinical diagnoses and electrophysiological diagnoses (EEG) of children referred for EEG of eastern Nepal. The data of our study builds a background and can be used for the future research in the related field.

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