Incidence of epilepsy among patients with Cerebral Palsy (CP) in *Yayasan Pemeliharaan Anak Cacat* (YPAC) – Medan

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Abstrak

Epilepsi merupakan suatu kondisi kronis yang disebabkan oleh gangguan fungsi otak. Keadaan ini merupakan penyulit yang biasa ditemukan pada berbagai gangguan neurologis seperti kelumpuhan otak (cerebral palsy: CP) yang dapat mengakibatkan kerusakan otak lebih lanjut, terutama apabila disertai dengan serangan kejang yang berlangsung lama. Insidens epilepsi pada penyandang CP berkisar antara 25 – 35%. Insidens epilepsi yang sering pada pasien penyandang CP menunjukkan bahwa kedua kelainan tersebut agaknya mempunyai penyebab yang sama atau saling berhubungan. Kami melaksanakan suatu studi retrospektif untuk menentukan apakah insidens epilepsi berbeda tergantung pada tipe CP. Data diambil dari rekam medik, meliputi: nama, jenis kelamin, paritas, usia ibu, penatalaksanaan pra, peri dan pasca lahir serta hasil rekaman EEG. Pengolahan data menggunakan uji statistik X^2 pada P < 0,05. Didapatkan di antara 67 kasus dengan CP, 53 bertipe CP spastik, 13 kasus campuran dan 1 CP diskinetik. Lelaki 47,8%, Perempuan 52,2% dengan usia rerata 50,3 (SD 36,3) bulan. Pada 25 pasien dengan CP yang berhubungan dengan epilepsi ditemukan 72% dengan kejang umum, 20% dengan kejang parsial, dan 8% dengan spasme infantil. Insidens epilepsi ternyata menunjukkan perbedaan yang bermakna (P < 0,05) tergantung tipe CP dan usia kehamilan saat pasien dilahirkan. Disimpulkan bahwa insidens epilepsi pada pasien penyandang CP di YPAC medan ialah 37,3%, dan terdapat perbedaan bermakna sesuai tipe CP dan usia kehamilan saat pasien dilahirkan. ***(Med J Indones 2002; 11: 158-63)***

Abstract

Epilepsy is a chronic condition due to cerebral function disorders. Epilepsy occurs as a common complication of many neurological disorders such as cerebral palsy (CP) that can cause further brain damage if especially they are accompanied with prolonged seizure. The incidence of epilepsy among patients with CP varies, 25-35%. The high incidence of epilepsy among patients with CP suggests that these disorders has common or related origins. We carried out a retrospective study to determine the incidence of epilepsy among patients with CP registered July 1988 to June 1998 in YPAC Medan and to determine whether the incidence of epilepsy was different according to type of CP. Data was compiled from medical records, including name, sex, parity, mothers age, prenatal, perinatal, and postnatal history, and EEG resuts. Data were analysed using statistical computer program and its significance was evaluated by chi square test at p < 0.05. There were 67 cases with CP, 53 cases spastic CP, 13 cases mixed CP and one case dyskinetic CP. Of the 67 cases CP, 47.8% were male, 52.2% female with the mean age of 50.3 (SD 36.9) months. There were 25 (37.3%) patients CP associated with epilepsy, 72% general seizures, 20% partial seizures, and 8% infantile spasm. The incidence of epilepsy was significantly different among patients with CP associated with the type of CP and gestational age, p < 0.05. We concluded that the incidence of epilepsy among patient with CP in YPAC Medan was 37.3% and showed significant difference in CP according to type and gestational age. (Med J Indones 2002; 11: 158-63)

Keywords*: epilepsy, cerebral palsy, obstetric history, gestational age*

Epilepsy is a chronic disorder, the hallmark of which is recurrent, unprovoked seizures. Epilepsy occurs most frequently in infants and the elderly.[1] More recently, epilepsy has been defined as recurrent convulsive or nonconvulsive seizures caused by partial or generalized epileptogenic discharges in the cerebrum.[2] Epileptic seizures or attack are transient clinical event that result from abnormal and excessive activity of a more or less extensive collection of cerebral neurons.[3] Epileptic seizures are among the most common symptoms of disturbed brain function,[1] and can produce further brain damage, especially if the seizures last longer than 30 minutes.[2,4] Epidemiologic studies have shown that neurologic deficiets from birth such as mental retardation or cerebral palsy, are associated with high incidence of epilepsy. Although convincing evidence attributes some cases to specific etiologies, the cause of about 70% of all cases of epilepsy is unknown.[5]

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Cerebral palsy (CP) is a term used to describe a diverse grup of chronic nonprogressive disorders of movement, posture, and tone due to central nervous system insult during early development. The insult may occur prior to, at the time of, or shortly after birth. There are many factors both genetic and acquired, postulated as causes of CP.[6] Prematurity, birth trauma and perinatal hypoxia are all important etiologic factors of CP which can in part be prevented by modern obstetric and neonatal care.[4] CP is the most common serious disability affecting children, with an estimated prevalence of 2/1,000 population.[7,8] The incidence of epilepsy among patients with CP varies approximately one third of all children with this disease have epilepsy. The high incidence of epilepsy and cognitive disorders among patients who have CP suggests that these disorders have common or related origins.[9] There is no data describing about the incidence of epilepsy among patients with CP in the Institution for Crippled Children (Yayasan Pembinaan Anak Cacat = YPAC) Medan.

The purpose of this study is to determine the incidence of epilepsy among patients with CP in YPAC Medan and to determine whether the incidence of epilepsy is different among the types of CP.

METHODS

We carried out a retrospective study from August to December 1998 on all patients with CP registered July 1988 to June 1998 in YPAC Medan. After the proposal was approved by the chief of institute, the data were compiled from medical records of all patients with CP including name, sex, age, parity, maternal age, prenatal, perinatal, postnatal history, electroencephalogram (EEG) records, and diagnosis.

Diagnosis was based on a careful and detailed history, clinical manifestation, and supported by ancillary examination such as laboratory finding, EEG records, and CT scan to exclude a possible progressive state of disease. Diagnosis of CP was classified into spastic CP (spastic monoplegia, spastic hemiplegia, spastic diplegia, spastic paraplegia, spastic tetraplegia), dyskinetic CP (choreiform, athetoid, dystonic), ataxic CP and mixed form. Diagnosis of epilepsy was classified according to the International League Against Epilepsy, 1981.[3] All patients with CP suffered from single or recurrent epileptic seizures had EEG records and was interpreted by a pediatric neurologist. The patients were excluded if they had motor, posture and tone alterations due to brain insult at the age of more than 3 years or had incomplete data.

The data were analyzed using a statistical computer program and its significance was evaluated by chi square test a $p < 0,05$.

RESULTS

There were 74 patients registered July 1988 to June 1998. Seven patients were excluded; they consisted of five patients who had incomplete data because they were adopted children, two patients, each one suffered from trauma capitis and meningitis at the age of more than 3 years. Of the 67 eligible patients, there were 53 (79.1%) patients with pastic CP, 13 patients with mixed CP and one patient with dyskinetic CP. There were 32 (47.8%) male patients and 35 (52.2%) female patients, whose mean age was 50,3 (SD 36.9) months. Most characteristics of the 67 patients with CP were as follows: 62 (92.5%) patients were born to mothers aged 20-39 years, 40 (59.7%) patients were born to mothers of 1st parity, 54 (80.6%) patients were born spontaneously, 41 (61.2%) crying early at birth and 54 (80.6%) fullterm gestational age. Complete data were noted in table 1.

Table 1. General characteristic of patients with CP

Characteristic		No patients with CP
Population		67
Type of CP :	- Spastic	53
	- Dyskinetic	1
	- Ataxic	0
	- Mixed	13
Sex :	- Male (%)	32 (47.8%)
	- Female (%)	35 (52.2%)
Age (mo) :	- Range	6-174
	- Mean (SD)	50,3 (36.9)
	- < 12	6
	- 12-35	25
	- 36-59	14
	- 60-119	18
	- ≥ 40	4
Maternal age (year) :	- < 20	3
	- 20-39	62
	- ≥ 40	2
Parity :	- 1st	40
	- 2nd – 4th	20
	- 5th or more	7
Gestational age :	- Aterm	54
	- Preterm	13
Mode of delivery:	- Spontaneous	54
	- Vacum extraction	8
	- Cesarean section	5
Crying at birth :	- Immediate	41
	- Delayed	26

Twenty five (37.3%) of 67 patients with CP associated with epilepsy, which were clinically classified into 18 (72%) generalized seizures, 5 (20%) partial seizures, and 2 (8%) infantile spasms. All of the patients with CP associated with epilepsy had EEG records showing abnormality that supported the diagnosis. There were 13 patients with CP without epilepsy who had EEG records, 12 patients had abnormal EEG and one patient had normal EEG record.

Table 2 showed patients with pastic CP which was more frequent, 53 (79.1%) of all patients with CP and 16 (30.2%) patients of them were associated with epilepsy. Nine (69.2%) patients of 13 patients with mixed CP had epilepsy. There was significant different of the incidences of epilepsy among patients with CP according to these types of CP, $p > 0.05$.

Of the 54 (80.6%) patients with CP fullterm born, 17 (31.5%) were associated with epilepsy and 8 (61.5%) of 13 patients with CP preterm showed to have epilepsy. There was also a significant difference of the incidences of epilepsy in these 2 groups of CP associated with gestational age, $p > 0.05$ (Table 3).

We assessed the patients to suffer from birth asphyxia if there was delayed 1st crying after birth that caused them to be hospitalized longer. There were 41 (61.2%) patients with CP delayed crying at birth, 15 (36.6%) suffered from epilepsy. There were 26 (38.8%) patients with CP crying immediately after birth, 10 (48.5%) of these patients suffered from epilepsy. We did not find significant difference of the incidence of epilepsy among patients in these groups of cases, $p > 0.05$ (Table 4).

Table 2. Incidence of epilepsy among patients with CP according to type of CP

Type	CP with epilepsy		CP without epilepsy		Sub total	
	n	%	n	%	n	%
Spastic	16	23.9	37	55.2	53	79.1
Hemiplegia	2		8		10	
Diplegia	1		5		6	
Tetraplegia	13		22		35	
Monoplegia	0		2		2	
Dyskinetic	0	0	1	1.5	1	1.5
Mixed	9	13.4	4	6.0	13	19.4
Total	25	37.3	42	62.7	67	100

$X^2 = 7,4073$ df = 2 p=0,0246

Table 3. Incidence of epilepsy among patient with CP associated with gestational age

Gestational age	CP with epilepsy		CP without epilepsy		Sub total	
	n	%	n	%	n	%
Aterm	17	25.4	37	55.2	54	80.6
Preterm	8	11.9	5	7.5	13	19.4
Total	25	37.3	42	62.7	67	100

$X^2 = 4,0468$ df = 1 p=0,0443

Table 4. Incidence epilepsy among patients with CP associated with respiratory effort (crying) at birth

Crying at birth	CP with epilepsy		CP without epilepsy		Sub total	
	n	%	n	%	n	%
Immediate	15	22.4	26	38.8	41	61.2
Delayed	10	14.9	16	23.9	26	38.8
Total	25	37.3	42	62.7	67	100

$X^2 = 0,2394$ df = 1 p=0,8770

Table 5 showed the incidence of epilepsy among female patients was higher than among male patients. The difference was not statiscally significant, p > 0.05.

Of 67 patients with CP, we found most patients with CP, 62 (92.5%) born to mothers aged 20-39 years, and 23 (37.1%) of these patients suffered from epilepsy. There were 2 (40%) of 5 patients with CP whose mothers were < 20 years or ≥ 40 years old. Statistically there was no significant difference of the incidences of epilepsy among patients with CP associated with mother's age, $p > 0.05$ (Table 6).

The most common, 54 (80.6%) of the patients the with CP were born spontaneously and 22 (40.7%) of these patients were associated with epilepsy, higher than two (25%) of eight patients and one (20%) of five patients who were born through vacum extraction and caesarean section, respectively. There was no significant difference of the incidences of epilepsy among patients with CP associated with mode of delivery, $p > 0.05$ (Table 7).

We found that most patients with CP were born to mothers who were first parity. The incidence of epilepsy among patients with CP born to mothers ≥ 5th parity was 57.1% higher than patients born to mothers 1st parity and 2nd – 4th parity respectively 42.5% and 20%. The difference was not statistically significant, $p > 0.05$ (Table 8).

Table 5. Incidence of epilepsy among patients with CP according to sex

Sex	CP with epilepsy		CP without epilepsy		Sub total	
	n	%	n	%	n	%
Male	10	14.9	22	32.8	32	47.8
Female	15	22.4	20	29.9	35	52.2
Total	25	37.3	42	62.7	67	100

$X^2 = 0{,}9335$ df = 1 p=0.6270

Table 6. Incidence of epilepsy among patients with CP associated with mothers age

Mothers age (year)	CP with epilepsy		CP without epilepsy		Sub total	
	n	%	n	%	n	%
< 20	1	1.5	2	3.0	3	4.5
20 – 39	23	34.3	39	58.2	62	92.5
≥ 40	1	1.5	1	1.5	2	3.0
Total	25	37.3	42	62.7	67	100

$X^2 = 0{,}1592$ df = 2 p=0.9235

Table 7. Incidence of epilepsy among patients with CP associated with mode delivery

Mode delivery	CP with epilepsy		CP without epilepsy		Sub total	
	n	%	n	%	n	%
Spontaneous	22	32.8	32	47.8	54	80.6
Vacum extraction	2	3.0	6	9.0	8	11.9
Caesarea section	1	1.5	4	5.9	5	7.5
Total	25	37.3	42	62.7	67	100

$X^2 = 1{,}4305$ df = 2 p=0.4890

Table 8. Incidence of epilepsy among patients with CP associated with mothers parity

Parity	CP with epilepsy		CP without epilepsy		Sub total	
	n	%	n	%	n	%
1st	17	25.4	23	34.3	40	59.7
2nd to 4th	4	6.0	16	23.9	20	29.9
5th or more	4	6.0	3	4.5	7	10.4
Total	25	37.3	42	62.7	67	100

$X^2 = 4{,}1998$ df = 2 p=0.1225

DISCUSSION

This study showed the number of spastic CP was 79.1% and 66% spastic tetraplegia was slightly higher than some other studies: Evans et al reported 64.7% patients with spastic CP and 26% patients with spastic tetraplegia,[10] and Sharma et al reported 77.9% patients with spastic CP and 26.7% patients with spastic tetraplegia.[11] Spastic tetraplegia is a type of spastic CP which has more severe disability. Jarvis et al reported the distribution of CP rate among birth of normal birthweight. There was increasing in rate for tetraplegia CP and make a major absolute contribution to the number of children with CP.[12] Evans et al mentioned that the type of CP was a factor affecting survival. Most of the fatal cases (67% of those in which the type of CP is known) occurred in the spastic tetraplegia group, the children having additional impairments, especially mental ability. As well as those who have a mixture of ataxia and dyskinesia often with spasticity. Most of this group suffered from additional impairments and has appreciably reduced survival rate.[13]

This study showed that the incidence of epilepsy in 67 patients with CP was 37.3%. The clinical types of seizure were as follows; general seizures 72% followed partial seizures and infantile spasms, respectively 20% and 8%. Kaushik et al reported that 56% of 50 patients with CP were associated with epilepsy and the clinical type of seizures observed were generalised seizures 71% and partial seizures 29%.[14] This study revealed the incidence of epilepsy in patients with spastic CP was 30.2% and in patients with mixed CP was 69.2%. Statistically, there was a significant difference of the incidences of epilepsy among patients with CP according to the type of CP. Sharma reported the incidence of epilepsy in 480 patients with CP was 25.6%, which was 20,1% in the cases of spastic CP and 50% in the cases of mixed CP.[11] Appropriate treatment for epilepsy in patients with CP must be individualized base on the specific type of seizure, patient's age and likelihood of significant side effects. Delgado et al suggested discontinuation of antiepileptic drugs in children with CP can and should be practiced when possible after patients have been seizure-free for at least 2 years. Forty one and a half percent of patients had seizures relapses and no other factor known correlated significantly with the risk of seizure relapse.[15]

EEG has special value as regards to the management of the patients with CP. EEG is useful to confirm the presence of clinically suspected epilepsy, but does not differentiate CP from other neuropathologic conditions. Abnormalities in the EEG are common, particularly spike discharges or asymmetries, but these findings should be noted whether seizure are manifest or not.[6,16] In this study all CP patients with epilepsy had abnormal EEG that supported the diagnosis. Except one, all EEG of 13 patients with CP without epilepsy showed abnormalities. Gibbs[16] and Winfield[17] reported the EEG in patients CP with epilepsy were respectively 90.2% and 91% abnormal. Abnormal EEG was 55% in patients with spastic CP without epilepsy.[17] However, even though a child does not have seizures, if he has occipital spike he is prone to develop seizures; in this study 30 of the infants with occipital spike later develop seizures. Multiple spike are more common among the non educable than among educable group. Multiple foci of spike activity were found in 73% patients who were non educable, and abnormal EEG were seen in 71% of patient who were educable.[16] Kaushik found developmental retardation was more severe statistically in the patients with abnormal EEG than normal EEG.[14]

The prevalence of CP is rising, especially in very preterm babies, in whom there is increased survival as a result of improved obstetrical and perinata care.[9] Low birthweight infants now comprise about 50% of all patients CP, in early years which was 32% in earlier years.[18] Cummins reported that patient's prematurity birth contributed 40.4% of the CP. In this study we found only 19.4% CP patients with prematurite birth, and 61.5% of these patients suffered from epilepsy, statistically the incidence showed significant difference. It is possible that the cerebral lesion of CP might occur antenatally as part of a process that leads also to prematurity or impairment of fetal growth. Alternatively, the cerebral event might occur post natally as the brain of premature infant maybe more susceptible to insult.[6] In the premature newborn with spastic CP, periventricular leukomalacia (PVLM) and periventricular hemorrhagic infarction are the most common pathological finding.[6,9,19] Gurces mentioned that patients presenting with motor disability and PVLM had a high incidence of seizures.[20]

Historically, asphyxia during labour and delivery has been implicated as a major cause of CP. In the last decade, studies have revealed that asphyxia propably accounts for only a relative small proportion of patients. Torfs reported that if perinatal risk factors were delayed crying $\geq$ 5 minutes as a measure of both

asphyxia and abnormal delivery, 22% of patients with CP had birth asphyxia.[21] Our study showed 38.8% patients with CP associated with birth asphyxia, but the incidence of epilepsy in these patients did not show significant difference. Blair and Stanly estimated that only about 8% of all the children with spastic CP had suffered intrapartum asphyxia which could be the cause of their brain damage.[22] Concerning gender, many studies reported that more male CP patients were found than females, but this study revealed more female than male. Hadjipanayis reported, that in his study no sex differences were observed.[23] Evans reported the death rate among boys is higher than that among girls, although the difference is not statistically significant.[13]

Children born to mothers aged < 20 years or mothers aged $\geq$ 40 years had a CP prevalence, respectively twice and three time than children born to mothers aged 20-34 years. Women with $2^{nd} - 4^{th}$ parity were at lowest risk for having child with CP. In comparison, primiparous women were of similar risk, whereas women of high parity $\geq 5^{th}$ had nearly three times the risk.[24] In this study most patients with CP were born to mothers aged 20-39 years and were born spontaneously (ranging from primiparous women up to $\geq 5^{th}$ parity). There were no significant difference of the incidence of epilepsy among patients with CP associated with these maternal factors.

We concluded that the incidence of epilepsy among patients with CP in YPAC Medan was 37.3%. There was significant difference of the incidence of epilepsy in patients with CP according to type of CP and gestational age.

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