

EPILEPSY IN CHILDREN WITH CEREBRAL PALSY

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ABSTRACT - Objective: To describe the prevalence and characteristics of epilepsy in patients with cerebral palsy in a tertiary center. **Methods:** a total of 100 consecutive patients with cerebral palsy were retrospectively studied. Criteria for inclusion were follow-up period for at least 2 years. Types and incidence of epilepsy were correlated with the different forms of cerebral palsy. Other factors associated with epilepsy such as age of first seizure, neonatal seizures and family history of epilepsy were also analysed. **Results:** follow-up ranged between 24 and 151 months (mean 57 months). The overall prevalence of epilepsy was 62%. Incidence of epilepsy was predominant in patients with hemiplegic and tetraplegic palsies: 70.6% and 66.1%, respectively. First seizure occurred during the first year of life in 74.2% of patients with epilepsy. Generalized and partial were the predominant types of epilepsy (61.3% and 27.4%, respectively). Thirty-three (53.2%) of 62 patients were seizure free for at least 1 year. Neonatal seizures and family history of epilepsy were associated with a higher incidence of epilepsy. **Conclusions:** epilepsy in cerebral palsy can be predicted if seizures occur in the first year of life, in neonatal period and if there is family history of epilepsy.

KEY WORDS: epilepsy, cerebral palsy, neonatal seizures.

Epilepsia em crianças com paralisia cerebral

RESUMO - Objetivo: descrever sobre a prevalência e características da epilepsia em crianças com paralisia cerebral atendidas num serviço terciário. **Método:** um total de 100 pacientes com paralisia cerebral foi estudado retrospectivamente, tendo como critérios de inclusão o seguimento regular por pelo menos 2 anos. Os tipos e a incidência de epilepsia foram correlacionados com as diferentes formas de paralisia cerebral. Outros fatores associados com a ocorrência de epilepsia como idade da primeira crise, crises neonatais e história familiar de epilepsia também foram analisados. **Resultados:** o tempo de seguimento variou de 24 a 151 meses (média 57 meses). A prevalência total de epilepsia foi 62%. Os pacientes com as formas hemiplégicas e tetraplégicas de paralisia cerebral tiveram a maior incidência de epilepsia: 70,6% e 66,1%, respectivamente. A primeira crise ocorreu durante o primeiro ano de vida em 74,2% dos pacientes com epilepsia. As epilepsias do tipo generalizada e parcial foram as predominantes (61,3% e 27,4%, respectivamente). Trinta e três (53,2%) de 62 pacientes permaneceram há pelo menos um ano livres das crises. Crises neonatais e história familiar de epilepsia estiveram associadas com maior incidência de epilepsia. **Conclusões:** epilepsia na paralisia cerebral pode ser prevista se ocorrerem crises no primeiro ano de vida e no período neonatal, e se existe história familiar de epilepsia.

PALAVRAS-CHAVE: epilepsia, paralisia cerebral, crises neonatais.

Cerebral palsy (CP) is a chronic disorder of movement and posture. It is the result of a non-progressive damage of the immature nervous system caused by several factors¹ that have occurred in prenatal, perinatal or postnatal periods²⁻⁵. It can manifest itself in several ways, mainly as spastic, athetoid and ataxic palsies; moreover, it is one of the most common causes of motor disability in children and frequently is associated with other problems, such as mental retardation, sensory defects and epilepsy⁶.

The significance of epilepsy in patients with CP

is discussed controversially in the literature. There are studies showing that epilepsy varies from 12 to ninety percent in children with CP⁷⁻¹¹. Some authors argue that in certain types of CP occur higher rate of epilepsy⁶ and has been seen that about one third of the patients with CP exhibit seizures and this figure is proportional to the degree of motor and cognitive disabilities^{12,13}.

The present study aimed to describe the prevalence and characteristics of epilepsy in a population of patients with cerebral palsy.

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METHOD

In a retrospective study were reviewed the charts of 100 consecutive patients with cerebral palsy evaluated between 1996 and 1998 in the Pediatric Neurology Unit at Clinical Hospital of Federal University of Parana (HC-UFPR), for at least 2 years. The following data were obtained: gender, gestational age (prematures, matures, or postmatures newborns), follow-up period in the service, age at manifestation of CP, types of CP, its etiology (prenatal, perinatal, postnatal or unknown)¹⁴, its degree of severity (very severe: when patients do not have any postural control; severe: can walk with maximum support or, in hemiplegic patients it does not have voluntary manual grasp; moderate: can walk with some support or when the patient globally used the paretic hand without possibility of individual movements of the fingers and; mild: can walk independently)¹⁵. Mental subnormality (that was evaluate through the level of speech: aphasia, monosyllable, disyllable, sentences; and school performance: do not attend, special school, special classroom in regular school, normal classroom in regular school^{16,17} and; age at manifestation of epilepsy, types of epilepsy, use of antiepileptic drugs, neonatal seizures, family history of seizures and findings from electroencephalogram (EEG) and computed tomography (CT) scan of the brain.

Patients were included into CP types based upon the classification proposed by Nelson et al.¹⁸: spastic tetraplegia (spasticity of all four limbs with involvement of the arms more marked than or equal to that of the legs), spastic diplegia (spasticity of the lower extremities with a variable but a lesser degree of involvement of the upper limbs), spastic hemiplegia (spasticity of the arm and leg on one side), hypotonic and mixed forms (the last one encompass a combination of previous types, as well as athetoid, ataxic and dystonic, due to reduce number of cases).

Epilepsy was defined as the occurrence of at least two unprovoked epileptic seizures that were not diagnosed as neonatal or as febrile seizures¹⁹. The diagnosis was based on history, clinical description and EEG's findings. Epilepsies were classified in accordance with the International Classification of Epilepsies and Seizure Disorders (ILAE - 1989)²⁰, in which are defined four main categories: partial (including simple, complex and secondary generalized), generalized (including absences, tonic, clonic, tonic-clonics and myoclonics), infantile spasms and undetermined (when it does not fit in any of the previous category). Seizure outcome was defined as good when the patients were seizure free during the last year while using drugs and when they did not have any relapse of seizures two years after withdrawal of antiepileptic drugs (AED).

Results were evaluated by means of a descriptive method guided by the Statistic Laboratory of the Federal University of Parana, Brazil. Differences among groups were assessed by non-parametric tests: Fisher's Exact Test or chi-square test when appropriate and using the *EPI-INFO - Version 6.0* epidemiological package²¹.

RESULTS

A total of 100 patients with the diagnosis of CP were included in this study (49 girls and 51 boys). Ages ranged from 24 to 209 months (mean age 88,4 months) and the diagnosis of CP from 1 to 96 months (mean age 8,2 months). Followed up period ranged from 24 to 151 months (means 57 months). From them, 19 were prematures, 79 matures and only 2 postmatures.

As far as etiology of CP, 41 were prenatal, 37 perinatal and 10 postnatal. In 12 it could not be determined (Table 1). Fifty six were tetraplegic and most of them with very severe and severe disabilities, 17 hemiplegic, 10 hypotonic, 10 mixed and 7 diplegic (Table 2).

Sixty nine patients had seizures, and 62 (89.9%) of them developed epilepsy. The average age of the onset of epilepsy was 12.59 months, with the first seizure occurring during the first year of live in 74.2% of the patients.

The incidence and the types of epilepsy in 100 patients with cerebral palsy is shown in Figure 1.

The only significant difference of incidence of epilepsy in the different types of CP was in spastic hemiplegia when comparing with spastic diplegia since epilepsy occurred in twelve patients (70.6%) with spastic hemiplegia and in only two patients

Table 1. Etiology of brain lesion causing cerebral palsy (CP)

Causes	
Perinatal (n= 41)	Hypoxia (30) Jaundice (8) Hypoxia + jaundice (1) Prematurity (1) Fetal dystocia (1)
Prenatal (n=37)	Maternal Ingestion of alcohol (1) Profuse bleeding due to incomplete abortion (2) Eclampsia (4) Premature disruption of placenta (3) Fetal placental dysfunction (15) Infections: Cytomegalovirus (2) Toxoplasmosis (2) Rubella (1) Uterus rupture (1)
	Fetal Malformation (6)
Postnatal (n=10)	Meningoencephalitis (10)
Indeterminate (n=12)	

Table 2. Degree of severity in different forms of cerebral palsy (CP).

Types of CP	Very severe	Severe	Moderate	Mild	Total (n)
Tetraplegic	21	15	13	7	56
Hemiplegic	0	0	9	8	17
Diplegic	0	1	4	2	7
Hipotonic	2	1	4	3	10
Mixed	3	1	3	3	10

with spastic diplegia ($p < 0.03$). The distribution of types of epilepsy in the different forms of CP is shown in Figure 2. History of neonatal seizures and family history of epilepsy were correlated with a higher prevalence of epilepsy ($p < 0.004$ and $p < 0.02$ respectively) (Table 3).

There was not apparently any relationship between epilepsy and cognitive level; however, 38 of 46 children with both epilepsy and age above 59 months were unable to speak and 42 of them were placed in special schools or did not attend any type of school (Table 4). Twenty two (78.6%) of 28 children with aphasia and 15 (75%) of 20 patients who were not attending any type of school carried the diagnosis of CP tetraplegic.

Regarding response to anticonvulsant therapy, control of seizures was achieved in 33 cases (53.2%) and 8 of them are without any antiepileptic drug ($n = 29$) (Table 5).

Table 3. Factors associated with development of epilepsy in cerebral palsy (CP)

	CP With Epilepsy n = 62	CP Without Epilepsy n = 38	
Girl/boy	29/33	19/19	Ns
Neonatal seizures	30	3	$p < 0.004$
Positive family history	18	1	$P < 0.02$
CT scan abnormalities	48/57*	15/27**	Ns

Ns, not significant; *48 of 57 patients with CP and epilepsy showed computed tomographic scan abnormalities; **15 of 27 patients with CP and without epilepsy showed computed tomographic scan abnormalities.

Table 4. Relationship between mental subnormality and epilepsy

	CP With Epilepsy Age > 59 months n = 46	CP Without Epilepsy Age > 59 months n = 25	
Mental subnormality			
Language			
Unable to speak	38 (82.6%)	17 (68.0%)	Ns
Educational Establishment			
Especial school or did not attend	42 (91.3%)	21 (84.0%)	Ns

Ns, Not significant.

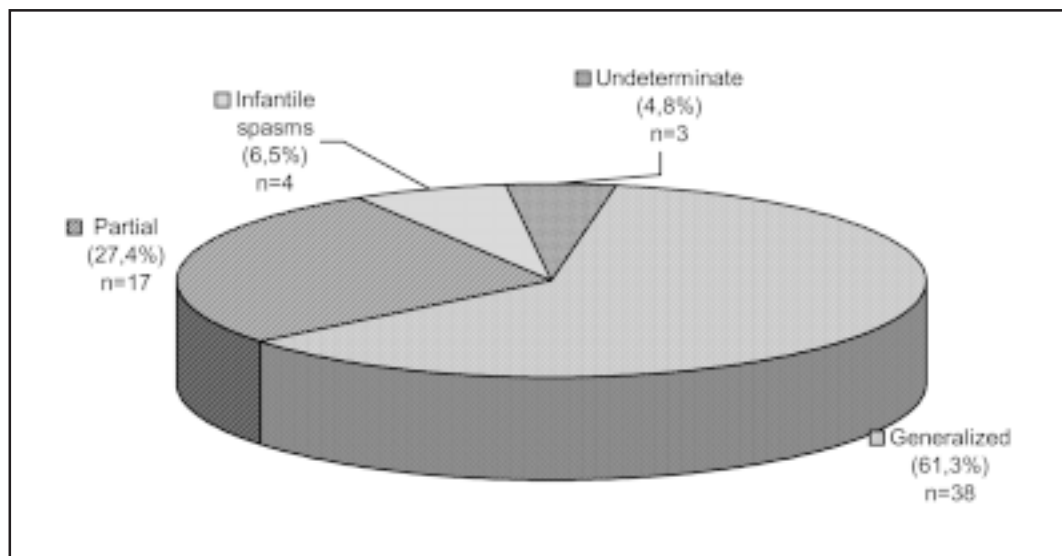


Fig 1. Incidence and types of epilepsy in 100 patients with cerebral palsy (CP)

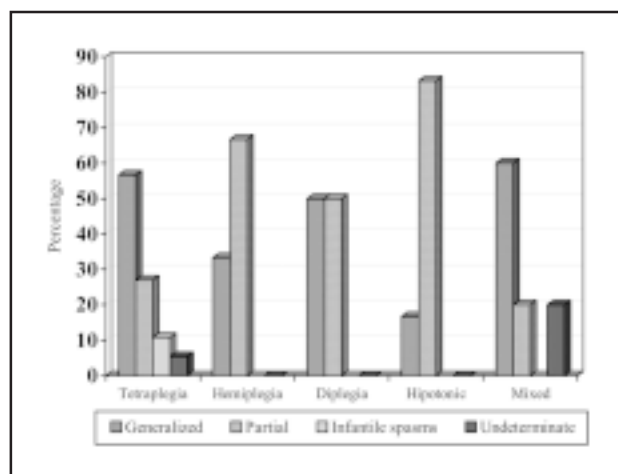


Fig 2. Types of epilepsy in the different forms of cerebral palsy (CP).

DISCUSSION

Epilepsy is one of the most prevalent neuroimpairment in childhood and is present in 4.0 – 8.8 per 1000 in population-based studies²². When other neuroimpairments (i.e., mental retardation and cerebral palsy) are present, the proportion of epilepsy in these children is strikingly higher²³. Although seizures can be controlled by pharmacotherapy, epilepsy remains a major cause of anxiety for the family who had children with CP.

The patients in this sample are not necessarily representative of the population of children and adolescents with CP since the HC-UFPR is a tertiary institution and for this reason a great number of patients coming to the clinic are the most severely affected.

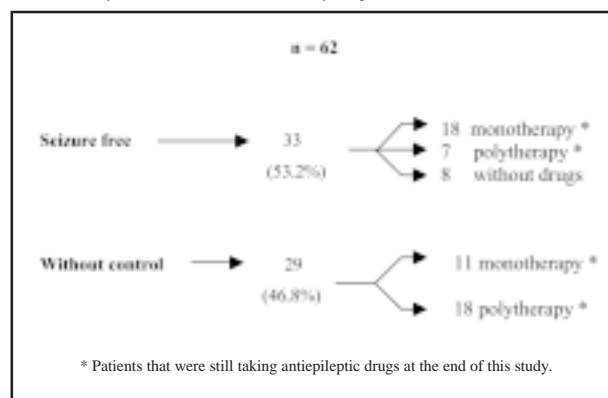
The literature mentioned that there is a straight relationship between epilepsy and degree of motor impairment, as well as their association with mental retardation^{13,24-26}. In our study this is also true, since the majority of tetraplegic patients presented epilepsy and intellectual impairment.

Approximately 74% of the children with CP had their first seizure under 12 months, which is in accordance with Zafeiriou et al.²⁷, while is in contrast with other studies in which the incidence is only 10%²⁸.

The incidence of epilepsy in our sample was greater when comparing with the literature^{29,30}, perhaps related to the higher degree of motor and mental disabilities of the patients studied in these population^{7,28}.

The predominant form of epilepsy was generalized, what is in accordance with some studies ac-

Table 5. Use of antiepileptic drugs (AED) and its success in seizure control in patients with cerebral palsy (CP).



* Patients that were still taking antiepileptic drugs at the end of this study.

complished in children with or without CP^{12,25,31}. Niedemayer³² justified this finding saying that the generalized epileptiform activity can be attributed either to a genetic predisposition, or to a quick secondary bilateral synchronization, such as the one induced sometimes by a frontal focus. On rare occasions, deep subcortical cerebral lesion can also generate this kind of epileptiform activity.

The presence of neonatal seizures has been a useful marker for subsequent epilepsy in CP²⁸. History of neonatal seizures were found in 30 (48.4%) patients from our population studied.

Normal CT findings were recorded in only 9 from 57 patients with CP and epilepsy, but this group showed a high degree of motor impairment (2 with very severe, 3 with severe and 4 with moderate motor disability) and when mental subnormality was evaluated all the patients were incapable to articulate words and do not attend any type of school and when so did it in especial schools. The generalized epilepsy was the predominant form in these patients and only 2 were seizure free, one on and the other without AED.

From the patients with CP and epilepsy treated with antiepileptic drugs, 33 (53.2%) were free of seizures, the majority of them on monotherapy. Similar results were obtained in other studies^{12,30,33}. Skatvedt³⁴ found a remission of epilepsy in 43.5% of 46 children with cerebral palsy after 1 year of follow-up. From the 8 patients without use of antiepileptic drugs that are more than 2 years under seizures control, 6 had the generalized form of epilepsy and 5 of them had mild degree of motor impairment. From 29 patients with epilepsy could not achieved a good control, 18 (62.1%) were on polytherapy.

In this study the majority of patients had a severe form of CP and as was mentioned before, there is straight relationship between degree of severity and occurrence of epilepsy. Neonatal seizures and positive family history were a common finding associated with epilepsy, and it is difficult to have seizure control in these patients.

Although none of the patients of this study was submitted to surgery intervention, the new antiepileptic drugs and advances on surgery intervention are promising in improving the care of epileptic children with mental retardation and cerebral palsy, offering a better quality of life and allowing the integration of these patients and their families in the society.

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