

Prevalence and risk factors for epilepsy in children with cerebral palsy – A prospective observational study

V. D. Raghavendran, S. S. Kumaran*, N. Balamurugan

ABSTRACT

Objectives: The objectives of the study were to find the prevalence of epilepsy in children with cerebral palsy and assess the risk factors for epilepsy in children with cerebral palsy design: Prospective observational study setting: Pediatric Outpatient Department (OPD) of Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry, subjects: A total of 79 children under 12 years of age with cerebral palsy were enrolled in the study. **Materials and Methods:** Mothers or caretakers of children with cerebral palsy who attended the pediatric OPD were interviewed to fill a printed structured questionnaire after consent. The details were recorded by the principal investigator. All children with cerebral palsy who had seizures were taken as cases. Children with cerebral palsy who did not have seizures were taken as controls. The data collected were tabulated in a Microsoft Excel datasheet and analyzed. The percentage of risk factors was estimated in both cases and controls. Chi-square test was done to calculate *P*-value. Statistical analysis was carried out using SPSS 20.0. *P*-value <0.05 was taken as statistically significant. **Results:** The total number of children with cerebral palsy recruited in our study is 79. Out of these 79 children, 46 (58.2%) had seizures and the remaining 33 (41.8%) children did not have seizures. Hence, the prevalence of seizures/epilepsy in children with cerebral palsy as per our study is 58.2%. Among the various risk factors analyzed, five factors were found to be statistically significant between both the groups, namely, consanguinity (*P* < 0.036), age of the mother <20 years at conception (*P* < 0.032), low birth weight (*P* < 0.001), neonatal intensive care unit (NICU) stay for more than 48 h (*P* < 0.02), and spastic quadriplegic type of cerebral palsy (*P* < 0.04). **Conclusions:** The prevalence of epilepsy in children with cerebral palsy in our study is 58.6%. Consanguinity, age of the mother <20 years at conception, low birth weight, NICU stay for more than 48 h, and spastic quadriplegic type of cerebral palsy are the risk factors for epilepsy in children with cerebral palsy.

KEY WORDS: Cerebral palsy, Epilepsy, Risk factors

INTRODUCTION

Children with cerebral palsy have seizures frequently, but not all children will experience them. Brain damage is usually the cause of seizures in children with cerebral palsy. The type of seizure will depend on the location of the brain injury. After a brain injury seizures may start in early infancy but may be hard to detect as infants have the tendency to make unexpected movements.^[1] Seizure occurrence and their control are one of the important determinants for better neurodevelopmental outcome in children with cerebral palsy. Some children with cerebral palsy despite having a brain injury do not have seizures. Understanding the risk factors for epilepsy in these

children in a resource-limited setting are vital as it would enable us in improving our management plan optimizing their neurodevelopment. Hence, it is very important for us to understand the risk factors for occurrence of epilepsy in children with cerebral palsy in our setting. Hence, this study was done with the objective to find the prevalence of epilepsy in children with cerebral palsy and assess the risk factors for epilepsy in children with cerebral palsy.

MATERIALS AND METHODS

Study Design

This was a prospective observational study.

Place of Study

This study was conducted at Sri Lakshmi Narayana Institute of Medical Sciences.

Access this article online

Website: jprsolutions.info

ISSN: 0975-7619

Department of Pediatrics, Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry, India (Affiliated to Bharath Institute of Higher Education and Research, Chennai, Tamil Nadu, India)

*Corresponding author: S. S. Kumaran, Department of Pediatrics, Sri Lakshmi Narayanan Institute of Medical Sciences, Puducherry, India (Affiliated to Bharath Institute of Higher Education and Research, Chennai, Tamil Nadu, India). Phone: +91-9943540516. E-mail: drkumaran83@gmail.com

Received on: 18-05-2019; Revised on: 12-06-2019; Accepted on: 16-07-2019

Study Period

The study was from January 2017 to August 2018.

Target Population

All children attending the Pediatric Outpatient Department (OPD) of Sri Lakshmi Narayana Institute of Medical Sciences.

Study Population

All children with cerebral palsy up to 12 years of age with recurrent episodes of seizures were included.

Inclusion Criteria

All children with cerebral palsy under 12 years of age attending pediatric OPD/admitted with any issue were included in the study.

Exclusion Criteria

Children whose parents refuse to give consent for the study were excluded from the study.

Sample size

All consecutive children with cerebral palsy within the study period were enrolled in the study. Based on the previous year statistics, the sample size was 42. In our study period, final sample recruited is 79.

Ethical considerations

Institutional review board clearance was obtained, and the written informed consent was obtained from parents before recruitment of the children into the study.

Methodology

Mothers or caretakers of children with cerebral palsy who attended the pediatric OPD were interviewed to fill a printed structured questionnaire, after obtaining their consent. The details were recorded by the principal investigator, and it included basic demographic details, antenatal, natal, and postnatal details. The clinical details of the child were recorded after examination along with inquiry regarding other risk factors and development history. The collected data were filled up by the principal investigator on the data entry form. All children with cerebral palsy who had seizures were taken as cases. Children with cerebral palsy who did not have seizures were taken as controls. The data collected were tabulated in a Microsoft Excel datasheet and analyzed. The percentage of risk factors was estimated in both cases and controls. Chi-square test was done to calculate *P*-value and analyze if there was statistical significance of those risk factors descriptively between the cases group and control group. Statistical analysis was carried out using SPSS 16.0. *P* < 0.05 was taken as statistically significant.

RESULTS

The total number of children with cerebral palsy recruited in our study is 79. Out of these 79 children,

46 (58.2%) had seizures and the remaining 33 (41.8%) children did not have seizures. Hence, the prevalence of seizures/epilepsy in children with cerebral palsy as per our study is 58.2%. Out of these 79 children, 47 (59.4%) are boys. There are 27 (58.6%) boys among the children with cerebral palsy who had seizures and 20 (60.6%) boys among the children with cerebral palsy who did not have seizures. The various risk factors which are analyzed and compared between both the groups and statistical significance measured with the *P*-value are depicted in Table 1. Among the various risk factors analyzed, five factors were found to be statistically significant between both the groups, namely, consanguinity (*P* < 0.036), age of the mother < 20 years at conception (*P* < 0.032), low birth weight (*P* < 0.001), neonatal intensive care unit (NICU) stay for more than 48 h (*P* < 0.02), and spastic quadriplegic type of cerebral palsy (*P* < 0.04). Presence of neonatal seizures, birth asphyxia, NICU admission, hypoglycemia in newborn, neonatal meningitis, neonatal jaundice, presence of microcephaly, and squint was found to be statistically not significant between both the groups.

DISCUSSION

Epilepsy is an important comorbidity in children with cerebral palsy and addressing this issue is vital. The prevalence of epilepsy in children with cerebral palsy is 58.6% in our study, and it is higher than the average prevalence of 10–40% as per other studies.^[2] About 59.4% were boys in our study, and it is similar to 63.2% as reported by Rajeshkannan and Ravikumar.^[3] Prematurity and neonatal seizures which were found to be statistically significant risk factors in other studies^[3-5,6] were not found to be statistically significant in our study. This is possibly due to better newborn care available around this region. Antenatal factors such as gestational diabetes mellitus, pregnancy-induced hypertension, maternal anemia, and maternal weight gain were found to be statistically insignificant in our study. This is possibly due to the lower complication rates prevalent in this area due to better obstetric care services available in this region. Home delivery which was found as an independent risk factor in other studies^[3,4,6-8] was not found to be statistically significant in our study. This may be due to the lower prevalence of home delivery in this region and high rates of institutional delivery in this locality which is possibly boosted by the incentives given in various government schemes such as Janani Suraksha Yojana and Janani Shishu Suraksha Karyakaram. Risk factors found to be statistically significant in our study were consanguinity, age of the mother < 20 years at conception, low birth weight, NICU stay for more than 48 h, and spastic quadriplegic type of cerebral palsy. Consanguinity as a risk factor needs

Table 1: Risk factors for epilepsy in children with cerebral palsy analyzed in our study

Risk factors studied	Cerebral palsy with seizures <i>n</i> =46 (58.2%)	Cerebral palsy without seizures <i>n</i> =33 (41.8%)	<i>P</i> -value
Consanguinity	13 (28.2)	3 (9.09)	0.036
Boys	27 (58.6)	20 (60.6)	0.864
Maternal infection during pregnancy	22 (47.8)	0	2.911
Age of mother at conception <20 years of age	17 (36.9)	5 (15.1)	0.032
History of epilepsy in family	0	0	0
Gestational diabetes mellitus	0	0	0
Pregnancy induced hypertension	1 (2.1)	0	0.393
Maternal anemia	3 (6.5)	1 (3.03)	0.485
Poor maternal weight gain during pregnancy	3 (6.5)	1 (3.03)	0.485
Normal vaginal delivery	36 (78.2)	27 (81.8)	0.698
Home delivery	6 (13.04)	6 (18.1)	0.530
Prematurity	0	2 (6.06)	0.090
Low birth weight	31 (67.3)	10 (30.3)	0.001
Birth asphyxia	40 (86.9)	27 (81.8)	0.353
Hypoglycemia in newborn period	1 (2.1)	0	0.393
Neonatal seizures	19 (41.3)	8 (24.2)	0.114
Neonatal jaundice	2 (4.3)	2 (6.06)	0.732
Neonatal meningitis	2 (4.3)	0	0.225
Newborn admission	20 (43.4)	13 (39.3)	0.716
Neonatal intensive care unit stay for more than 48 h	41 (89.1)	23 (69.6)	0.029
Microcephaly	9 (19.5)	10 (30.3)	0.270
Squint	7 (15.2)	6 (18.1)	0.725
Abnormal vision	0	0	0
Abnormal hearing	0	0	0
Spastic quadriplegia	34 (73.9)	17 (51.5)	0.040
Spastic diplegia	6 (13.04)	9 (27.2)	0.111
Spastic hemiplegia	2 (4.3)	3 (9.09)	0.393
Atonic	1 (2.1)	3 (9.09)	0.166
Dyskinetic	3 (6.5)	1 (3.03)	0.485

to be addressed more in detail, and further workup is required in these children before we make inference as we have not evaluated for neurometabolic causes in detail due to financial constraints. However, thyroid screening was done in all the children. Low birth weight and spastic quadriplegic cerebral palsy which were found as risk factors in our study is comparable to other published studies.^[2,6] The chances of hypoxia and brain damage are more in low birth weight babies compared to normal weight babies due to higher risk of complications. The brain insult in spastic quadriplegic cerebral palsy is more compared to the other types of cerebral palsy, and hence this could possibly be the reason for the high risk to develop epilepsy as we know any abnormal area in brain can be epileptogenic. The limitation in our study is the small sample size, and matching was done between cases and control as most of the children enrolled in the study had seizures and hence it was difficult to match the control group equally which needed more enrollments of children with cerebral palsy without seizures. All the risk factors which are identified to be statistically significant in our study are preventable by an efficient health-care delivery system and good health education strategies.

Further improving neonatal and obstetric care to greater heights would help in reducing these risk factors. This would enable us to reduce the prevalence of seizures in children with cerebral palsy which would help us to improve the neurodevelopmental outcome.

CONCLUSIONS

The prevalence of epilepsy in children with cerebral palsy in our study is 58.6%. Consanguinity, age of the mother <20 years at conception, low birth weight, NICU stay for more than 48 h, and spastic quadriplegic type of cerebral palsy are the risk factors for epilepsy in children with cerebral palsy.

REFERENCES

1. Cerebral Palsy Guidance. Home: Cerebral Palsy. Cerebral Palsy Associated Disorders: Cerebral Palsy and Seizure. Available from: <https://www.cerebralpalsyguidance.com/cerebral-palsy/associated-disorders/seizures>. [Last accessed on 2017 Sep 07].
2. Gururaj AK, Sztriha L, Bener A, Dawodu A, Eapen V. Epilepsy in children with cerebral palsy. *Seizure* 2003;12:110-4.
3. Rajeshkannan B, Ravikumar K. Risk factors for seizures in children with cerebral palsy. *IOSR J Dent Med Sci* 2017;16:9-11.
4. Kułak W, Sobaniec W. Risk factors and prognosis of epilepsy in children with cerebral palsy in North-Eastern Poland. *Brain Dev* 2003;25:499-506.
5. Zafeiriou DI, Kontopoulos EE, Tsikoulas I. Characteristics and prognosis of epilepsy in children with cerebral palsy. *J Child Neurol* 1999;14:289-94.
6. Zelnik N, Konopnicki M, Bennett-Back O, Castel-Deutsch T, Tirosh E. Risk factors for epilepsy in children with cerebral palsy. *Eur J Paediatr Neurol* 2010;14:67-72.
7. Sun Y, Vestergaard M, Pedersen CB, Christensen J, Olsen J. Apgar scores and long-term risk of epilepsy. *Epidemiology* 2006;17:296-301.
8. Singhi P, Jagirdar S, Khandelwal N, Malhi P. Epilepsy in children with cerebral palsy. *J Child Neurol* 2003;18:174-9.

Source of support: Nil; Conflict of interest: None Declared