Sociodemographic Profile and Comorbidities of Children with Epilepsy Attending in Child Development Centre (CDC) of Dhaka Shishu Hospital

Humaira Rafiqa Quaderi¹, Shaoli Sharker², Shayla Imam Kanta³, Mustafa Mahbub⁴

Abstract

**Background:** Epilepsy is the most common conditions encountered in most paediatric neurology clinics in many parts of the developing world. It is important to understand the sociodemographic profile of children with epilepsy and also to recognize the comorbidities associated with them for planning management and developing wider services within the country.

**Objectives:** The present study aimed at understanding the socio-demographic profile and comorbidities of children with epilepsy, seeking treatment at a tertiary care hospital in Bangladesh.

**Methods:** This retrospective observational study was conducted in an epilepsy clinic of Paediatric Neuroscience Department of Dhaka Shishu Hospital (DSH) over a period of 3 years from January 2013 to December 2015. During this period 1 year follow up record of each patient was analysed. Information on biodemographic data, clinical and developmental assessment made by a multidisciplinary team was analysed.

**Results:** A total 120 children who had epilepsy were included in this study. The median age at presentation was 2.4 years. Male were 69(58%) and female were 51(42%). Most of the children came from rural area (58%, n=70). Middle income families were over presented (58%). 82% had a history of perinatal asphyxia. Motor, speech impairment and malnutrition were found more who had H/O perinatal asphyxia (P value 0.002, 0.005 and 0.03 respectively.

**Conclusion:** In conclusion, epilepsy is one of the commonest neurological morbidity in our environment. This study has provided important information about sociodemographic profile and associated comorbidities in children with epilepsy. This information can be used as a guideline for developing services for children with epilepsy and in prevention of some detectable causes in our countries like birth asphyxia which is found large number in this study.

**Key words:** Epilepsy, sociodemographic profile, CDC.

---

1. Assistant Professor, Department of Pediatric Neuroscience, Bangladesh Institute of Child Health (BICH), Dhaka Shishu (Children) Hospital, Dhaka.
2. Assistant Professor, Department of Pediatric Neuroscience, Bangladesh Institute of Child Health (BICH), Dhaka Shishu (Children) Hospital, Dhaka.
3. Assistant Professor, Department of Pediatric Neuroscience, Bangladesh Institute of Child Health (BICH), Dhaka Shishu (Children) Hospital, Dhaka.
4. Professor and Head, Department of Pediatric Neuroscience, Bangladesh Institute of Child Health (BICH), Dhaka Shishu (Children) Hospital, Dhaka.

**Correspondence to:** Dr. Humaira Rafiqa Quaderi, Assistant Professor, Department of Pediatric Neuroscience, Bangladesh Institute of Child Health (BICH), Dhaka Shishu (Children) Hospital, Sher-e-Bangla Nagar, Dhaka-1207, Bangladesh. Cell: 01732202931, Email: dr.humaira25th@gmail.com

**Received:** 24 April 2019; **Accepted:** 21 May 2019
Introduction
Epilepsy is the most common childhood neurologic

disorder, affecting 0.5-1.0% of children younger than

16 years.1 Incidence and prevalence of epilepsy in

children are higher in developing countries.2,3 The

median lifetime epilepsy prevalence for developed
countries is 5.8 per 1000, whereas in rural areas of
developing countries is 15.4 per 1000.4 Another

population based studies report a prevalence rate

of Epilepsy among children to be 3.6 to 4.2 per 1000

in developed countries5 and around double these

rates in developing countries.6,9 In Bangladesh

epidemiological surveys confirm that seizure

disorders are common, one study showing a

prevalence rate of 68 out of every 1000 for ‘any

seizure history’ and 9 out of every 1000 for ‘any

unprovoked seizure’, in children aged 2 to 9 years.10

The difference of prevalence and incidence among
developed and developing countries is partly

explained by some risk factors such as head trauma,
CNS infections and perinatal injuries, which are
more common in poor regions, particularly in rural
areas.11 Several other study performed in different
developing countries showed that adverse perinatal
events were strongly associated with epilepsy.12,13
Adverse perinatal events were related to Delivery
methods used, nutrition during pregnancy,
sanitation, availability of midwives, and preference
for home deliveries.13 This adverse perinatal events
can be prevented with better antenatal and
perinatal care.14 Malnutrition is also associated with
an increased risk of epilepsy. In one recent study in
Benin, malnutrition was present in 22.1% of cases
versus 9.2% of controls.15 The incidence of epilepsy
is clearly highest in the first year of life16 and
decreases throughout childhood and adolescence.
The cumulative incidence rate of epilepsy by age 15
years is around 0.8%.17 Although there are some
occasional reports of differences between males and
females, these tend to be inconsistent. Prevalence
rates tend to be slightly higher in boys than in girls.18
In India, recent studies report a differential
distribution of epilepsy among various socio
demographic and economic groups with higher
rates reported for the male gender, rural
population, and low socioeconomic status.19
Epilepsy in children is associated with variable
comorbidities. Population-based studies show that
70-76% of children with epilepsy have some types
of disability or handicap affecting their daily life.20,21

Neurological comorbidities in children with epilepsy
are variable, including motor, cognitive
impairment, language impairment, vision and
hearing. Comorbid disorders contribute to the
disease burden experienced by patients and their
families and influence their quality of life and long-
term outcome.22

Various studies have explored the link between
socio-demographic profile and access to expert
health care and antiepileptic drug (AED)

prescriptions in children with epilepsy.23 Very little

is known about childhood epilepsies in Bangladesh.
This study was conducted within a tertiary care
children’s hospital in Dhaka city to provide baseline
information on sociodemographic profile and
comorbidities of children with epilepsy that will help
in developing integrated services for this group.

Materials and Methods
This retrospective study was conducted at the
outpatient services of the Paediatric Neurosciences
Department in Dhaka Shishu Hospital (DSH) over
a period of 3 years from January 2013 to December
2015. DSH is the largest tertiary care paediatric

teaching hospital in Bangladesh that provides care
to the children from all over the country. The Child

Development Center (CDC), is the outpatient
division of Paediatric neuroscience department of
Dhaka Shishu Hospital. Since 1992 it has provided,
for the first time in the country, a comprehensive
service for children with neurodevelopmental
impairments and disabilities. The core team includes
child health physicians, developmental therapist
and psychologist. There is a weekly epilepsyclinic.
A total of 120 children who had been seen
consecutively in the epilepsy clinic were
retrospectively enrolled into the study if they had
two or more unprovoked seizures. The children who
had febrile seizure were excluded from this
study. Information on biodemographic data,
perinatal history, clinical and developmental
assessment made by a multi-disciplinary team was
analysed. Epilepsy is defined as At least two
unprovoked (or reflex) seizures occurring >24 h
apart.24

Socioeconomic status of families was defined as
lower income if the monthly earnings were less than
5000 taka, middle income if it was between 5000-
<20000 taka, and higher income if it was more than
>20000-60000 taka.25 To assess the development of
the child Rapid neurodevelopmental assessment (RNDA) was done. Rapid Neurodevelopmental Assessment (RNDA) is an assessment tool designed to ascertain functional status, i.e., Neurodevelopmental Impairments (NDIs), across multiple neurodevelopmental domains; such as motor, cognition, vision, hearing, speech with grades of severity for each domain determined, so that appropriate interventions can be planned, and prioritized, according to the child’s ascertained NDI profile. Data was analysed in SPSS version 21.

Results
A total 120 children who had epilepsy were included in this study. Table I provides the socio-demographic profile of the study sample. The median age at presentation was 2.4 years (age range was <6 months to 15 years.) Male were 69 (58%) and female were 51 (42%). Male female ratio was 1.3:1. Most of the children came from rural area (58%, n=70). Middle- and lower-income families were more which was 58% (n=70) and 26% (n=31) respectively. Most of the parents had completed their primary and secondary education (48% and 19% respectively). Among the study population, 82% had a history of perinatal asphyxia, defined as delayed cry (more than 15 minutes) after full delivery of the baby, with poor motor tone and change in skin colour, neonatal seizures were found in 5% of participants and neonatal jaundice was found in 8% cases (Table II). Regarding associated comorbidities, motor, cognition and speech impairment were more and they were 82%, 81% and 71% respectively. Other comorbidities were vision, hearing, behavioural problem and malnutrition and they were 43%, 31% and 23% respectively (Table III). When we correlate the comorbidities with birth asphyxia, significant correlation was found between birth asphyxia and motor, speech impairment and malnutrition (P value 0.002, 0.005 and 0.03 respectively) (Table IV).

| Variables | Category       | Frequency (n) | Percentage (%) |
|-----------|----------------|---------------|----------------|
| Age       | <6 month       | 30            | 25             |
|           | 6-1 year       | 32            | 27             |
|           | >1 yr-5 yr     | 41            | 34             |
|           | 5-<10 yr       | 13            | 11             |
|           | >10 yr-15 yr   | 4             | 3              |
| Sex       | Male           | 69            | 58             |
|           | Female         | 51            | 42             |
| Residence | Urban          | 50            | 42             |
|           | Rural          | 70            | 58             |
| Income    | Higher income  | 19            | 16             |
|           | Middle income  | 70            | 58             |
|           | Lower income   | 31            | 26             |
| Education | Illiterate     | 11            | 9              |
|           | Primary        | 57            | 48             |
|           | Secondary      | 23            | 19             |
|           | Higher secondary | 13   | 11             |
|           | Graduates      | 16            | 13             |
### Table II
**Birth problems of study patient (n=120)**

| Birth problems          | Frequency (n) | Percentage (%) |
|-------------------------|---------------|----------------|
| Yes                     | 114           | 95             |
| Perinatal asphyxia      | 98            | 82             |
| Neonatal convulsion     | 6             | 5              |
| Neonatal Jaundice       | 10            | 8              |
| No                      | 6             | 5              |
| **Total**               | **120**       | **100**        |

### Table III
**Comorbidities of study patient (n=120)**

| Parameter          | Frequency (n) | Percentage (%) |
|--------------------|---------------|----------------|
| Motor              |               |                |
| Yes                | 97            | 81             |
| No                 | 23            | 19             |
| Cognition          |               |                |
| Yes                | 98            | 82             |
| No                 | 22            | 18             |
| Speech             |               |                |
| Yes                | 85            | 71             |
| No                 | 35            | 29             |
| Vision             |               |                |
| Yes                | 52            | 43             |
| No                 | 68            | 57             |
| Hearing            |               |                |
| Yes                | 37            | 31             |
| No                 | 83            | 69             |
| Behaviour          |               |                |
| Yes                | 27            | 23             |
| No                 | 93            | 77             |
| Malnutrition       |               |                |
| Yes                | 32            | 27             |
| No                 | 88            | 73             |

### Table IV
**Correlation between comorbidities and birth asphyxia of study patients (n=120)**

| Comorbidities                  | Birth asphyxia | Total | p value |
|--------------------------------|----------------|-------|---------|
|                                | Yes            | No    |         |
| Motor impairment               |                |       |         |
| Yes                            | 85 (71%)       | 12 (10%) | 97 (81%) | .002 |
| No                             | 13 (11%)       | 10 (8%) | 23 (19%) |       |
| Cognitive Impairment           |                |       |         |
| Yes                            | 80 (67%)       | 18 (15%) | 98 (82%) | .626 |
| No                             | 18 (15%)       | 4 (3%) | 22 (18%) |       |
| Speech problem                 |                |       |         |
| Yes                            | 75 (62%)       | 10 (8%) | 85 (71%) | .005 |
| No                             | 23 (30%)       | 12 (10%) | 35 (29%) |       |
| Vision impairment              |                |       |         |
| Yes                            | 46 (38%)       | 6 (5%) | 52 (43%) | .07  |
| No                             | 52 (44%)       | 16 (13%) | 68 (57%) |       |
| Hearing impairment             |                |       |         |
| Yes                            | 33 (28%)       | 4 (3%) | 37 (31%) | .120 |
| No                             | 65 (54%)       | 18 (15%) | 83 (69%) |       |
| Behavioural problem            |                |       |         |
| Yes                            | 19 (16%)       | 8 (7%) | 27 (23%) | .07  |
| No                             | 79 (66%)       | 14 (11%) | 93 (77%) |       |
| Feeding difficulties           |                |       |         |
| Yes                            | 33 (28%)       | 4 (3%) | 37 (30%) | .120 |
| No                             | 65 (54%)       | 18 (15%) | 83 (70%) |       |
| Malnutrition                   |                |       |         |
| Yes                            | 30 (25%)       | 2     | 32 (27%) | .03  |
| No                             | 68 (57%)       | 20    | 88 (73%) |       |
Discussion
Of the 120 children male was 58% and female was 42% and most of the children were within 5 years of age. Boys were over-represented in the study sample and this might be a reflection of a gender bias. Boys with disabilities are more likely than girls with disabilities to be brought to services by their families.\(^27\) Male was predominance in several other studies done in other developing countries. A study done in Nigeria in 2017 where Eyong et al found that among 107 children 79% were male and The age range 1-5 years had the highest number of children with epilepsy followed by those aged 6-10 years.\(^28\) Another study done in Bangladesh in 2003 where Banu et al\(^29\) showed that among 150 children who had epilepsy, the median age at presentation was 3 years and male was 68.9% and 65.6% came from urban area. Though the study was city-based, rural families were over-represented (58%), as because 85% of the estimated 130 million population of Bangladesh live in rural areas (UNICEF 2001).\(^30\) Although low-income families coming to general outpatients constitute over 60% of total attendance (unpublished hospital records), they comprised 26% in this present study. We found middle income families were over presented (58%) which is quite high than a study in Bangladesh where Banu et al found 37.1%.\(^29\) But Rani A et al\(^31\) in 2016 found most of the children diagnosed with seizure disorder were males and aged between 6 to 10 years and 43.3% came from urban area. Our finding is quite similar to those studies except that most of our patients were from rural area. In our study most of the patient came from middle income family (58%) and had completed their primary education level (48%). In a study Banu et al found Lower, middle, and higher income families were almost equally represented.\(^29\) In this study 82% had a history of perinatal asphyxia. In developing societies, environmental risk factors are in abundance. Perinatal brain insults constitute a major challenge in these countries. Several studies have investigated this aspect. This finding is quiet high to a study where Banu et al and Eyonget al found 46.4% and 17.8% epilepsy patient had history of perinatal asphyxia.\(^28,29\) One study from Kenya reported a strong association between convulsive epilepsy and previous head injury (odds ratio (OR)\(\frac{4.1}{2.1} - 8.1; \ p<0.0001\). Adverse perinatal events were also strongly associated with active epilepsy (OR\(\frac{5.7}{2.6} - 12.7; \ p<0.0001\)).\(^32\) These large number of children having history of perinatal asphyxia is alarming. This indicate an need for further investigation of underlying causes, and a need for measures within the community to reduce perinatal insults, to identify the new born infant at high risk, and to identify early intracranial infections and other preventable and treatable causes of secondary epilepsies.

In this study motor, cognition and speech impairment were more and they were 82%, 81% and 71% respectively. Other comorbidities were vision, hearing, behavioural problem and malnutrition and they were 43%, 31% and 23% respectively. The children who had history of birth asphyxia had more motor, speech problem and malnourished (p value, 0.002, 0.005 and 0.03 respectively). Recently, one study performed in five LMIC of Africa (South Africa, Tanzania, Uganda, Kenya and Ghana) aimed to describe the clinical features, the causes and the consequences of active epilepsy in those regions. The main comorbidities were malnutrition, cognitive impairment and neurologic deficit.\(^33\) A study done in Bangladesh where Banu et al showed 57%, children had associated nonconvulsive disability, among them 41% had major motor disability and 72.8% had poor cognition.\(^29\) Several other population-based prevalence studies of children with epilepsy reported that intellectual disability (full-scale intelligence quotient <70) was the most common comorbidity (30-40%).\(^34\) The occurrence of speech disorders may be as high as 27.5% in children with epilepsy.\(^35\) In this study we found 23% children had malnutrition. Malnutrition is also associated with an increased risk of epilepsy. In one recent study in Benin where Creping et al\(^15\) in 2007 found 22.1% of cases had malnutrition versus 9.2% of controls (p<0.0006).

There were several limitations to the study, which should be taken into consideration. It is a single centre study. Retrospective information was analysed in a tertiary care centre where families tend to bring only their severely impaired or disabled children, so we found every children had more than one comorbidities along with epilepsy. So the number of comorbidities were more in this study.

Conclusion
On the basis of records from an epilepsy clinic in a child development and neurology centre in Dhaka shishu hospital, this study has provided important
information about sociodemographic and associated comorbidities in children with epilepsy. This information can be used as a guideline for developing services for children with epilepsy as well as prevention of some detectable causes in countries like birth asphyxia which is found large number in this study. Our future plan is to follow up these patients and see their outcome and also to identify the challenges and difficulties in management that we are facing every day in our clinical practices.

References
1. Shinnar S, Pellock JM. Update on the epidemiology and prognosis of pediatric epilepsy. *J Child Neurol* 2002;17:4-17
2. Breg AT, Langfitt JT, Testa FM. Global cognitive function in children with epilepsy: a community-based study. *Epilepsia* 2008;49:608-14.
3. Preux PM, Druet-Cabanac M. Epilepsy in sub-Saharan Africa: a review. *Lancet Neuro* 2005;14:21-31.
4. Ngugi AK, Bottomley C, Kleinschmidt I, Sander JW. Estimation of the burden of active and life-time epilepsy: a meta-analytic approach. *Epilepsia* 2010;51:883-90.
5. Holden KR, Mellits DE, Freeman JM. Neonatal seizures and Correlation of prenatal and perinatal events with outcomes. *Pediatrics* 1982;70:165-76.
6. Christianson AL, Zwane ME, Manga P, Rosen E, Venter A, Kromberg JG. Epilepsy in rural South African children-prevalence, associated disability and management. *South African Medical Journal* 2000;90:262-66.
7. Eriksson KJ, Koivikko MJ. Prevalence, classification, and severity of epilepsy and epileptic syndromes in children. *Epilepsia* 1997;38:1275-82.
8. Hauser AW. The prevalence and incidence of convulsive disorders in children. *Epilepsia* 1994;35:1528-67.
9. Hocaoglu C, Koroglu A. Childhood age epilepsy and family, INTECH Open Access Publisher. 2011 September. Available from:https://api.intechopen.com/chapter/pdf-perview/19697.
10. Durkin MS, Davidson LL, Hasan MZ, Hasan Z. Estimates of the prevalence of childhood seizure disorders in communities where professional resources are scarce: results from Bangladesh, Jamaica and Pakistan. *Paediatr Perinatal Epidemiol* 1992;6:166-80.
11. Newton CR, Garcia HH. Epilepsy in poor regions of the world. *Lancet* 2012;380:1193-1201.
12. Burton KJ, Rogathe J, Whittaker R, Mankad K, Hunter E, et al. Epilepsy in Tanzanian children: association with perinatal events and other risk factors. *Epilepsia* 2012;53:752-60.
13. Senanayake N, Roma´nGC. Neurological complications of malaria. *Southeast Asian J Trop Med Public Health* 1992;23:672-80.
14. Kannoth S, Unnikrishnan JP, Santhosh Kumar T, Sankara Sarma P. Risk factors for epilepsy: a population-based case-control study in Kerala, southern India. *Epilepsy Behav* 2009;16:58-63.
15. Crepin S, Houinato D, Nawana B. Link between epilepsy and malnutrition in a rural area of Benin. *Epilepsia* 2007;48:1926-33.
16. Olafsson E, Ludvigsson P, Gudmundsson G. Incidence of unprovoked seizures and epilepsy in Iceland and assessment of the epilepsy syndrome classification: a prospective study. *Lancet Neuro* 2005;14:627-34.
17. Hauser WA, Annegers JF, Kurland LT. Incidence of Epilepsy and Unprovoked Seizures in Rochester, Minnesota: *Epilepsia* 1993;34:453-68.
18. Cowan LD, Bodenstein JB, Leviton A. Prevalence of the epilepsies in children and adolescents. *Epilepsia* 2002;30:94-106.
19. Amudhan S, Gururaj G, Satishchandra P. Epilepsy in India II: Impact, burden, and need for a multisectoral public health response. *Annals of Indian Academy of Neurology* 2015;18:369.
20. Pastor PN, Reuben CA, Kobau R, Helmers SL. Functional difficulties and school limitation of children with epilepsy: findings from the 2009-2010 National Survey of Children with Special Health Care Needs. *Disabil Health J* 2015;8:231-39.
21. Sillanpaa M, Helen Cross J, Sillanpaa M. The psychosocial impact of epilepsy in childhood. *Epilepsy Behav* 2009;15:5-10.
22. Gaitatzis A, Sisodiya SM, Sander JW. The somatic comorbidity of epilepsy: a weighty but often unrecognized burden. *Epilepsia* 2012;53:1282-93.
23. Novelley RA, Schwartz MM, Mattson RH, Cramer JA. Behavioral toxicity associated with antiepileptic drugs: Concepts and methods of assessment. *Epilepsia* 1986;27(4):331-40.
24. Fisher RS, Acevedo C, Arzimanoglou A, Bogacz A. A practical clinical definition of epilepsy. *Epilepsia* 2014;55:475-82.

25. The United Nations *Children’s Fund*. Statistic-State of the children of the world. UNICEF, 2007.

26. Khan NZ, Muslima H, Shilpi AB, Begum D. Validation of rapid neurodevelopmental assessment for 2- to 5-year-old children in Bangladesh. *Pediatrics* 2013;131:486-94.

27. McConachie H, Huq S, Munir S, Kamrunnahar, Akhter N, Ferdous S, Khan N. Difficulties for mothers in using an early intervention service for children with cerebral palsy in Bangladesh. *Child Care Health Dev* 2001;27:1-12.

28. Eyong KI, Ekanem E, Asindi A, Chimaeze T. Clinical profile of childhood epilepsy in Nigerian children seen in a tertiary hospital. *Int J Contemp Pediatr* 2017;4:1138-41.

29. Banu HS, Khan NZ, Hossain M, Jahan A. Profile of childhood epilepsy in Bangladesh. *Developmental Medicine & Child Neurology* 2003;45:477-82.

30. UNICEF. (2001) *The State of the World’s Children* 2001: Early Childhood. New York: UNICEF.

31. Rani1 A, Thomas PT. Sociodemographic and clinical profile of children with epilepsy. *International Journal of Advanced Research* 2016;4:145-52.

32. Edwards T, Scott AG, Munyoki G. Active convulsive epilepsy in a rural district of Kenya: a study of prevalence and possible risk factors. *Lancet Neurol* 2008;17:50-56.

33. Wilmshurst JM, Birbeck GL, Newton CR. Epilepsy is ubiquitous, but more devastating in the poorer regions of the world... or is it? *Epilepsia* 2014;55:1322-25.

34. Reilly C, Atkinson P, Das KB, Chin RF. Neurobehavioral comorbidities in children with active epilepsy: a population-based study. *Pediatrics* 2014;133:86-93.

35. Sillanpaa M. Epilepsy in children: prevalence, disability, and handicap. *Epilepsia* 1992;33:444-49.