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Original Research Article

Etiology, outcomes and co-morbidities among cerebral palsy children attending tertiary care hospital, India: a prospective study

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ABSTRACT

Background: Cerebral palsy is the most common aetiology for motor dysfunction among children worldwide. It is associated with range of co-morbid conditions that affects the quality of life. Cerebral palsy has been studied extensively in western countries and there are only few articles available on epidemiological information in developing countries and low resource settings. This study focuses on the aetiology, risk factors, types and co-morbidities in cerebral palsy.
Methods: Cerebral palsy children attending tertiary care hospital were prospectively recruited into the study. The study was conducted during January 2017 to July 2018. The cross-sectional study included complete prenatal, natal and postnatal history of the participants, BERA and Ophthalmological examinations were done.
Results: One hundred and fifty children with cerebral palsy were enrolled. The mean age of participants were 36±30 months. Male to female ratio was 2.19:1. The most common maternal risk factor among study participants was consanguinity in marriage (23.33%). 16% had prolonged labour and 10% had toxaemia during pregnancy. 47% of the children were born by institutional normal vaginal delivery. The most common neonatal risk factor was Birth Asphyxia (23%), low birth weight (20%) and neonatal sepsis (21%). 122 had spastic type of cerebral palsy. The most common morbidity associated with cerebral palsy was Gastro intestinal disturbances in 61% of the participants.
Conclusions: History of prolonged labour and birth asphyxia were risk factors for cerebral palsy. Spastic CP is the most common type. Malnutrition, Gross Motor delay, Seizures, Mental retardation were the most common morbidities associated with CP.

Keywords: Cerebral palsy, Co-morbidities, India, Risk factors

INTRODUCTION

Worldwide, the most common cause of motor impairment in childhood is cerebral palsy.[1-3] Cerebral palsy in children is significantly associated with morbidity and mortality.[4,5] Various events during pregnancy, labor and in immediate postnatal period can lead to cerebral palsy like hypoxia, infections, congenital brain malformations and trauma.[2,6] Range of morbidities are associated with cerebral palsy like seizure disorders, epilepsy, visual and cognitive impairment etc.[7] These co morbidities largely influence the outcome and quality of life in cerebral palsy patients. Results from national cerebral palsy registers and population-based studies in Europe, Australia, and the USA indicate that the cerebral palsy prevalence is about 1·8–2.3 cases per 1000 children.[8-10] A systematic review of 49 articles published between 1996 and 2013 included only one study developing country, showing the scarcity of epidemiological information regarding cerebral palsy from developing countries.[11,12] Globally, incidence of CP is approximately 2 to 2.5 cases per 1000 live births.[13] In India, it is estimated at around 3 cases per

1000 live births; however, being a developing country the actual figure may be much higher than probable figures. There are about 25 lakh CP children in India.

The various types of cerebral palsy reported are diplegia is the commonest form (30%-40%), hemiplegia is 20%-30%, and quadriplegia accounting for 10%-15%.[14] In an analysis of 1000 cases of CP from India, it was found that spastic quadriplegia constituted 61% of cases followed by diplegia 22%.[15]

METHODS

A prospective observational study of all children with cerebral palsy attending health care services at Chettinad Hospital and Research Institute, Tamil Nadu, India. The study was conducted in the period of January 2017 to July 2018. All children with cerebral palsy fulfilling the criteria and consented by the parents or guardian were recruited for this study. A total of 150 subjects were recruited and studied. Ethical approval for this study was obtained from the institutional ethical committee, Chettinad hospital and research institute.

Inclusion criteria

- Children up to the age of 15 years with complaints of spasticity or dysfunction in limbs and delayed developmental milestones and already diagnosed cases of CP were selected for this study.
- Those children of parents/guardian who gave informed consent for participation.

Exclusion criteria

- Children more than 15 years of age and Parents/guardian not willing to participate in the study.

After obtaining written informed consent from the parents/guardians, detailed history including the history of pregnancy, natal history and postnatal history were obtained. Comprehensive physical and systemic examination was done. As per neurological examination the cases were classified into the types of cerebral palsy. BERA and Ophthalmological evaluation were also done. Associated morbidities of cerebral palsy were analysed.

Statistical analysis

Statistical analyses were performed using SPSS version 20. Descriptive analysis was done. The results are reported in frequency.

RESULTS

A total of 150 subjects with cerebral palsy were enrolled in the study. All subjects gave consent for participation. All children have undergone various investigational modalities and were confirmed cases of CP. The mean age at presentation was 36 months ± 30months. The male to female ration among the participants were 2.19: 1.

Based on participant's history risk factors were analyzed. The maternal risk factors were consanguinity, prolonged labor, and toxemia of pregnancy, ante partum hemorrhage and diabetes. 35 of the participant's parents had consanguineous marriage. 24 of the children were result of prolonged labor. History of toxemia of pregnancy was present in 15 of the participants. 10 had ante partum hemorrhage and 4 had diabetes. Authors did not identify any subjects with cerebral palsy secondary to head trauma (Table 1).

Table 1: Descriptive analysis of maternal risk factors in the study population (N=150).

Maternal risk factors	Frequency	Percentage
Consanguinity	35	23.33
Prolonged Labour	24	16
Toxemia	15	10
APH	10	6.67
Diabetics	4	2.67

Mode of delivery was obtained from history. Majority 47% of the deliveries were normal deliveries conducted in institution. Second was 40% of home or domiciliary delivery. 13% were Lower Segment Cesarean Section (LSCS) (Table 2).

Table 2: Descriptive analysis of deliveries in the study population (N=150).

Deliveries	Frequency	Percentage
Home	60	40
Hosp NVD	70	47
LSCS	20	13

Neonatal risk factors play a major role in development of cerebral palsy. Among the 150 participants of this study, 23% had birth asphyxia, 20% were low birth weight babies. 21% had neonatal sepsis and 15% had history of seizures in neonatal period. 10% had neonatal jaundice. 11% were premature babies (Table 3).

Table 3: Descriptive analysis of neonatal risk factors in the study population (N=150).

Neonatal risk factors	Frequency	Percentage
Birth Asphyxia	35	23
LBW	30	20
Neonatal sepsis	32	21
Seizures	22	15
Neonatal jaundice	15	10
Prematurity	16	11

The most common type of palsy among the study participant was Spastic CP (81%). Out of which 72% of spastic CP had Quadriplegia and 25% had Diplegia.

Hemiplegia was seen in 3%, which was least common. Hypotonic CP was seen in7% of the participants. 8% had dyskinetic CP and 4% had ataxic CP (Table 4).

Table 4: Descriptive analysis of types of cerebral palsy in the study population (N=150).

Types of cerebral palsy	Frequency	Percentage
Spastic CP	122	81
Quadriplegia	79	72
Diplegia	38	25
Hemiplegia	5	3
Hypotonic	11	7
Dyskinetic	12	8
Ataxic	5	4

Various co-morbidities associated with CP were analyzed. Common among them were gastrointestinal disturbances in 92 participants. 60% of participants had malnutrition. 57% of the participants had delayed motor milestones. 68 of the CP children had features of mental retardation. 47 had history of seizures. 15% had visual disturbances and 18 had hearing impairment. 15 of the participants had speech impairment. These co-morbidities reduced the quality of life (Table 5).

Table 5: Descriptive analysis of associated morbidities of cerebral palsy in the study population (N=150).

Associated morbidities of cerebral palsy	Frequency	Percentage
Morbidity		
Malnutrition	90	60
Delayed motor milestones	86	57
Mental retardation	68	45
Seizures	47	31
Visual disturbances	22	15
Hearing impairment	18	12
Behavioral abnormalities	68	45
G.I disturbances	92	61
Speech disorders	15	10

DISCUSSION

This study aimed to determine the aetiology, clinical outcomes and co-morbidities in cerebral palsy patients in India. Authors recruited 150 children with diagnosis of cerebral palsy at Chettinad hospital and research institute during January 2017 to July 2018. The most common cause of cerebral palsy among the study participants was birth asphyxia, causing 23% CP in the study. The most common type of CP was spastic type among 81% of the participants. The most common co-morbidities were gastrointestinal disturbances, malnutrition, delayed motor milestones and mental retardation.

Birth asphyxia was the major contributor of cerebral palsy in this current study. This is in contradiction to studies conducted in developed countries. South Australia Cerebral Palsy Registry published in 2006 recorded that only two cases among forty-six CP neonates had a history of hypoxia and birth asphyxia during intra-natal period16. Recent reviews done from high resource settings state that intrapartum hypoxic events contribute only to 8 to 10% of all cerebral palsy cases.[17] In contrast, studies from African regions have concluded that birth asphyxia as primary etiology for CP contributing to 35% to 58% of the cases.[18-21]

In this study, 11% of the cases were result of prematurity. This is in contrast to the data from developed countries, which shows 78% of the cases are attributed to CP16. This difference can be attributed to the low survival rate of preterm neonates in low resource settings in developing countries. Neonatal sepsis contributed to 21% of the cases of CP, which are high compared developed countries. In a study conducted in Australia, only 2.4% of the population had sepsis during neonatal period.[22]

The limitations of this study are, only those children with cerebral palsy accessing healthcare services were studied. Children with milder forms of CP may be underestimated because they may not be seeking healthcare. The study was done in a tertiary care setup, only those who were affordable had access to it, thereby limiting the representativeness of the population. Future community-based studies on cerebral palsy patients are recommended. This can lay a path for developing effective interventions to improve the quality of life of the children. Future studies complain urban and rural settings and differences in the regional prevalence is recommended.

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