Clinical Spectrum, Comorbidities, and Risk Factor Profile of Cerebral Palsy Children: A Prospective Study

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Aim and Objective: Cerebral palsy (CP) is the most common motor disability in childhood. This study aimed to describe clinical spectrum, comorbidities, and risk factors associated with CP children. Materials and Methods: This hospital-based observational study was conducted in tertiary level hospital in Jaipur including 180 CP children aged 1–12 years, attending the Paediatric Neurology Outdoor and Child Development Centre. A detailed history of antenatal, natal, and postnatal events taken and thorough examination was performed to stratify children in proper topographical and physiological classification. Results: Mothers of 47.7% CP children were primigravida and 17.7% mothers had anemia during pregnancy. Among natal factors, asphyxia contributed to maximum cases (52.2%). Seizure in postnatal life was the second most common risk factor for CP after asphyxia. Spastic CP (84.4%) was the most common physiological type, and quadriplegia (56.6%) was the most common topographical type observed in this study. Intellectual disability (47.7%) followed by epilepsy (41.6%) was the most common comorbidity. Conclusion: Even with the advancement of health-care system, asphyxia is the most common risk factor, and spastic quadriplegia is the most common type of CP. There is still a need of improving the health facilities to overcome this costly and common neuromotor disability. Widespread knowledge of common risk factors that can predispose to CP can prevent the CP development to some extent and knowledge of clinical spectrum, and comorbidities can improve their targeted treatment which can improve their growth and social participation.

Keywords: Asphyxia, cerebral palsy, clinical spectrum, comorbidities, risk factors, spastic quadriplegia

INTRODUCTION

Cerebral palsy (CP) is the most common motor disability in childhood.[1] CP describes a group of permanent disorders of the development of movement and posture, causing activity limitation, that are attributed to nonprogressive disturbances that occurred in the developing fetal or infant brain. The motor disorders of CP are often accompanied by disturbances of sensation, perception, cognition, communication, and behavior, by epilepsy and secondary musculoskeletal problems.[2] Various studies had been carried out from all over the world for prevalence, reporting estimates of CP ranging from 1.5 to >4 per 1000 live births or children of a defined age range.[3-7] A number of factors contribute to the development of CP including antenatal, natal, and postnatal factors. The majority of factors affect brain during antenatal period. Intrapartum factors such as perinatal asphyxia also play role for the development of CP which have more contribution in developing countries. Prematurity also became an important factor as survival of preterm babies is increasing owing to better health facilities. Maternal malnutrition, infections, and anemia are some of the preventable factors.

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The physiological classification classifies CP children into spastic, dyskinetic, hypotonic, and mixed types on the basis of major motor abnormality while topographical classification divides them into monoplegia, diplegia, triplegia, quadriplegia, paraplegia, and hemiplegia, indicating involved extremities. Besides movement and motor dysfunction, common associated comorbidities are epilepsy, speech, hearing and vision impairment, oromotor dysfunction, and intellectual disability.

This study aimed to describe clinical spectrum, associated comorbidities, and risk factors associated with CP children presented to our hospital that will help in better understanding of etiology and presentation of CP children.

**Materials and Methods**

This hospital-based observational study was conducted from March 2012 to March 2013 in tertiary level hospital in Jaipur. One-hundred and eighty CP children aged 1–12 years were enrolled from Paediatric Neurology Outdoor and Child Development Centre. Detailed birth history including antenatal, natal, postnatal, socioeconomic status, and maternal nutritional status was taken. Detailed examination performed to classify CP children according to topography and physiological classification and also for associated comorbidities.

**Results**

In this study, most of children (35.56%) were in 3–4 years age group followed by 5–6 years age group (22.78%). Of the 180 children, males were 56.11% while females were 43.89% of total children [Table 1]. Mothers of 47.7% CP children were primigravida and 17.7% mothers had anemia during pregnancy. In other prenatal risk factors, antepartum hemorrhage, pregnancy-induced hypertension (PIH) and infections contributed to 5.5%, 4.4%, and 3.3%, cases respectively [Table 2]. Among natal factors, asphyxia contributed to maximum cases (45.5%). Almost 41.1 and 13.3% CP children were delivered by induced and assisted delivery. Small for gestational age (SGA) (25.5%) and prematurity (17.7%) were also common risk factors for CP [Table 3]. Seizure in postnatal life was the second most common risk factor for CP after asphyxia. Pathological jaundice and infections are responsible for 15.5% and 25% cases, respectively [Table 4].

Spastic CP (84.4%) was the most common physiological type and quadriplegia (56.6%) was the most common topographical type observed in this study. Spastic diplegia, hemiplegia, and triplegia are other topographical types. Hypotonic and dyskinetic types contributed for equal cases (5.5% each case) [Table 5].

**Discussion**

In the present study, we described the clinical spectrum, risk factor profile, and comorbidities associated with CP.
common risk factor in postnatal life for

prevalence of cerebral palsy: Autism

8 (4.4)

10 (5.5)

They found 2% mothers of CP children’s mothers had prolonged labor history. Our study also observed that of CP children had history of prolonged labor while in our study only 1.6% CP children’s mothers had prolonged labor history. Our study result was supported by similar finding in study performed by Gedam et al. They found 2% mothers of CP children had history of prolonged labor.[9]

In this study, 25.5% CP children were SGA at birth while 17.7% children were born preterm. O’Callaghan et al. estimated epidemiological risk factors of CP children and found that 43.9% and 29.3% CP children were SGA and preterm at birth, respectively.[12] Seizure (35.5%) was the most common risk factor in postnatal life for the development of CP, and majority of these cases were consequences of hypoxic ischemic encephalopathy. Pathological jaundice and infection contributed for 15.5% and 25% cases, respectively.

In developed countries, children of spastic diplegia CP are increasing as survival of preterm babies is improved, but in this study, spastic quadriplegia was the most common topographical type and contributed for 56.6% cases. Spastic diplegia (16.11%) was the second most common type. These results were consistent with results of study by Singhi et al. who reviewed clinical profile of 1000 CP children. Intellectual disability and epilepsy were the most common comorbidities associated with CP children while 27.7% CP children had speech delay. These results were supported by previous studies from developing countries. Other associated comorbidities are visual impairment, hearing defect, malnutrition, and oromotor dysfunction.

**Conclusion**

Even with advancement of health-care system, asphyxia is the most common risk factor, and spastic quadriplegia is the most common type of CP. There is still a need for improving the health facilities to overcome this costly and common neuromotor disability. Widespread knowledge of common risk factors that can predispose to CP can prevent the CP development to some extent and knowledge of clinical spectrum, and comorbidities can improve their targeted treatment which can improve their growth and social participation.

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**Conflicts of interest**

There are no conflicts of interest.

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**Table 5: Distribution of cerebral palsy children according to physiological and topographical classification, n (%)**

| Topographic type | n (%) |
|------------------|-------|
| Spastic (152)    | 102 (56.6) |
| Hemiplegia       | 18 (10) |
| Diplegia         | 29 (16.11) |
| Triplegia        | 3 (1.6) |
| Hypotonic        | 10 (5.5) |
| Dyskinetic       | 10 (5.5) |
| Mixed            | 8 (4.4) |

**Table 6: Associated comorbidities associated in cerebral palsy children**

| Comorbidity          | n (%) |
|----------------------|-------|
| Epilepsy             | 75 (41.6) |
| Hearing defects      | 18 (10) |
| Speech delay         | 50 (27.7) |
| Intellectual disability | 86 (47.7) |
| Vision impairment    | 18 (10) |
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