



A STUDY OF CLINICAL AND RADIOLOGICAL PROFILE OF CHILDREN WITH CEREBRAL PALSY

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ABSTRACT **Background:** Cerebral palsy (CP) is a group of permanent disorders of movement and posture causing limitation due to non-progressive disturbances in developing brain of fetus/infant. Often associated with impairments involving cognition, communication, sensation, perception, behavior, and epilepsy, in addition to secondary musculoskeletal complications. Evaluation of clinical patterns and radiological findings is essential for early diagnosis and management. **Methods:** This descriptive retrospective study was conducted at a tertiary care hospital over 18 months. A total of 150 children aged 6 months to 18 years diagnosed with CP were included. Data regarding demographic profile, antenatal, natal, and postnatal risk factors, clinical types, co morbidities, and MRI findings were collected and analysed using descriptive statistics. **Results:** Out of 150 children, 59.3% were males, with a mean age of 6.74 ± 4.68 years. Majority presented before 6 months of age (60.6%). Natal (70%) and postnatal (68%) risk factors predominated over antenatal factors (28%), with prematurity (34%) and birth asphyxia (30.7%) being the most common. Multiple overlapping risk factors were observed in several children; hence, the cumulative percentage exceeded 100%. Spastic CP was the predominant type (92%), with spastic quadriplegia (45.3%) being the most frequent subtype. Common co morbidities included intellectual disability (55.3%), epilepsy (41.3%), and musculoskeletal abnormalities (36%). MRI abnormalities were observed in 92% of cases, with periventricular leukomalacia (26.7%) and cerebral atrophy being the most common findings. **Conclusion:** Spastic CP, particularly quadriplegia, is the most common clinical presentation. Perinatal factors play a major role in etiology. MRI is a valuable tool in identifying underlying brain pathology. Early diagnosis and multidisciplinary management are essential to improve functional outcomes.

KEYWORDS : Cerebral palsy; Spastic quadriplegia; Periventricular leukomalacia; Neuroimaging

INTRODUCTION:

Cerebral palsy (CP) is a group of permanent disorders of movement, posture and tone, resulting from non progressive injury to the developing brain. It is commonly associated with disturbances in sensation, cognition, communication, behaviour, epilepsy and musculoskeletal abnormalities.

Globally, CP remains the most common cause of physical disability in children. In India, the prevalence is estimated to be approximately 2–3 per 1000 live births. The etiology is multifactorial, with antenatal, perinatal, and postnatal risk factors contributing to brain injury.

Neuroimaging, particularly MRI, plays a crucial role in identifying underlying brain abnormalities and correlating them with clinical types of CP.

Understanding the clinical spectrum and radiological patterns is essential for early diagnosis, targeted interventions, and improving long-term outcomes.

This study aims to evaluate the clinical and radiological profile of children with cerebral palsy. The objectives are to assess demographic characteristics and clinical types, identify antenatal, natal, and postnatal risk factors, evaluate associated co morbidities, and analyze radiological findings with their clinical correlation.

MATERIALS AND METHODS:

This descriptive retrospective study was conducted in a tertiary care hospital involving the Departments of Paediatrics, Orthopaedics, and Physiotherapy over a period of 18 months from January 2022 to June 2024. A total of 150 children aged between 6 months and 18 years diagnosed with cerebral palsy were included in the study. Children whose parents did not provide consent were excluded. Ethical approval was obtained from the Institutional Ethics Committee prior to the commencement of the study and written informed consent was obtained from parents or guardians.

A detailed history and comprehensive general and systemic examination were performed in all children, with particular attention to known risk factors associated with cerebral palsy. A complete

ophthalmological evaluation including fundus examination, hearing assessment, and magnetic resonance imaging (MRI) of the brain was carried out in all children.

For those who had undergone brainstem evoked response audiometry (BERA) and MRI previously, findings were recorded from available reports. Electroencephalography (EEG) was performed in children with seizures. Orthopaedic consultation was obtained for children with contractures.

Statistical analysis:

Data were analysed using SPSS software (version 16.0). Results were expressed as frequencies and percentages.

RESULTS:

A total of 150 children with cerebral palsy were included in the study, of whom 59.3% were males and 40.7% were females. The mean age of the study population was 6.74 ± 4.68 years. Most children (60.6%) presented before 6 months of age. Natal and postnatal risk factors were more prevalent, observed in 70% and 68% of children respectively, while antenatal risk factors were noted in 28% of cases. Since several children had more than one antenatal, natal, or postnatal risk factor, the overall percentages exceeded 100%. Prematurity (34%) and birth asphyxia (30.7%) were the most common identified risk factors.

Spastic cerebral palsy was the predominant clinical type, accounting for 92% of cases, with spastic quadriplegia being the most common subtype (45.3%), followed by diplegia (32%) and hemiplegia (12.7%). Mixed and dystonic types constituted 4.7% and 2.7% of cases respectively.

A high proportion of children had associated co morbidities, with intellectual disability (55.3%) being the most frequent, followed by epilepsy (41.3%), musculoskeletal abnormalities (36%), microcephaly (34.7%), and gastrointestinal disorders (32%).

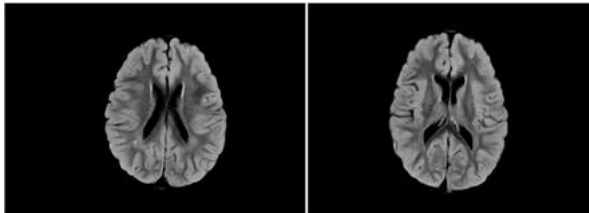
Magnetic resonance imaging (MRI) was performed in 80% of children, of whom 92% showed abnormalities. The most common radiological finding was periventricular leukomalacia (26.7%), followed by cerebral atrophy and sequelae of hypoxic-ischemic encephalopathy.

Table 1: Clinical Profile of Children with Cerebral Palsy (n = 150)

Variable	Category	Frequency (n)	Percentage (%)
Age Distribution	<5 years	77	51%
	≥5 years	73	48.70%
Gender	Male	89	59.30%
	Female	61	40.70%
Risk Factors	Antenatal	43	28%
	Natal	105	70%
	Postnatal	102	68%
Common Risk Factors	Prematurity	51	34%
	Birth asphyxia	46	30.70%
Type of CP	Spastic CP	139	92%
	Quadriplegia	68	45.30%
	Diplegia	48	32%
	Hemiplegia	19	12.70%
	Mixed CP	7	4.70%
	Dystonic CP	4	2.70%
Comorbidities	Intellectual disability	83	55.30%
	Epilepsy	62	41.30%
	Musculoskeletal abnormalities	54	36%
	Microcephaly	52	34.70%
	GI disorders	48	32%

Table 2: Radiological Findings in Children with Cerebral Palsy

Variable	Category	Frequency (n)	Percentage (%)
MRI Performed	Yes	120	80%
	No	30	20%
MRI Findings (n = 120)	Abnormal	111	92%
	Normal / Near normal	9	8%
Common MRI Abnormalities	Periventricular leukomalacia (PVL)	32	26.70%
	Cerebral atrophy	24	20%
	Encephalomalacia / HIE sequelae	6	5%
	Others (gliosis, malformations, etc.)	Remaining	—

Figure 1: MRI IMAGES OF PVL**Figure 2: CLINICAL IMAGE OF DYSKINETIC CP**

DISCUSSION:

Demographic Profile

The present study demonstrated a male predominance (59.3%), which is consistent with previous studies and may reflect gender-related

healthcare-seeking behaviour or biological susceptibility. Most children presented within the first six months of life, suggesting improved awareness and early referral practices. Early diagnosis is essential for timely initiation of rehabilitation and improved functional outcomes.

Risk Factors

Natal (70%) and postnatal (68%) risk factors were more common than antenatal factors (28%). Prematurity (34%) and birth asphyxia (30.7%) were the most frequent contributors. These findings are consistent with studies from developing countries, where perinatal complications remain major determinants. This highlights the need for strengthening antenatal, intrapartum, and neonatal care.

Clinical Types of Cerebral Palsy

Spastic cerebral palsy was the predominant type (92%), with spastic quadriplegia (45.3%) being the most common subtype. This pattern suggests severe and diffuse brain injury, often related to hypoxic-ischemic events. Similar findings are reported in Indian studies, whereas developed countries show a higher prevalence of diplegia due to improved survival of preterm infants.

Comorbidities

Comorbidities were highly prevalent, with intellectual disability (55.3%) and epilepsy (41.3%) being the most common, followed by musculoskeletal abnormalities and gastrointestinal disorders. This reflects the extensive nature of brain involvement and emphasizes the need for a multidisciplinary approach to management.

Radiological Findings

Neuroimaging abnormalities were observed in 92% of children who underwent MRI. Periventricular leukomalacia (26.7%) was the most common finding, particularly in preterm children, followed by cerebral atrophy and hypoxic-ischemic sequelae. These findings correlate with clinical presentation and support the role of MRI in etiological evaluation and prognostication.

Implications for Practice

Cerebral palsy is a complex disorder with multiple associated impairments. Early identification of risk factors, timely diagnosis, and comprehensive multidisciplinary management are crucial to reduce long-term disability and improve quality of life.

CONCLUSION:

The present study highlights that spastic cerebral palsy, particularly quadriplegia, is the most common clinical presentation, reflecting severe and diffuse brain injury. Perinatal factors, especially prematurity and birth asphyxia, remain the major etiological contributors, emphasizing the need for improved antenatal, intrapartum, and neonatal care. A high prevalence of associated comorbidities such as intellectual disability, epilepsy, and musculoskeletal abnormalities further underscores the multisystem involvement in cerebral palsy. Neuroimaging, particularly MRI, plays a crucial role in identifying the underlying brain pathology, correlating clinical subtypes, and aiding in prognostication. Early diagnosis, timely intervention, and a multidisciplinary approach are essential to reduce morbidity, prevent complications, and improve functional outcomes and quality of life in affected children.

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