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Insights into Epilepsy Characteristics Among Children Afflicted with Cerebral Palsy A Cross-Sectional Analysis

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ABSTRACT
Cerebral palsy (CP) and epilepsy often coexist, presenting complex challenges in diagnosis and management. This study explores their intersection, including gender disparities, nutritional concerns, etiological pathways and clinical manifestations. A cross-sectional study at Gadag Institute of Medical Sciences, Gadag, Karnataka, India investigated 68 paediatric patients with CP and epilepsy. Data from June 2023 to December 2023 were analyzed, focusing on demographics, birth history, birth weight, seizure characteristics, EEG findings and therapy. Out of 184 epilepsy patients, 37% had CP and those 68 patients were included in the study. Mean age was 58 months with a male predominance (51.4%). Malnutrition affected 37%, with 9% severe malnutrition. Spontaneous deliveries (66.2%) were predominant and 82.4% had normal birth weight. Generalized seizures (79.4%) were common, with abnormal EEG in 92.6%. Polytherapy was used in 73.5%. Most CP cases were spastic (94.1%). CP and epilepsy present complex challenges in paediatric care. Gender disparities, nutritional concerns and clinical manifestations highlight the need for comprehensive management strategies. Early identification of risk factors and tailored interventions are crucial for improved outcomes in affected children.

INTRODUCTION

Cerebral palsy is a neurological disorder that is characterized by impaired movement and posture due to disruptions in developing motor cells within the central nervous system[1]. Cerebral palsy presents a complex array of challenges in both diagnosis and management. This condition manifests through a diverse range of symptoms, which includes abnormalities in posture, movement, muscle tone and reflexes[2]. Diagnosis typically relies on identifying specific criteria including posturing/abnormal movement, oropharyngeal conditions, strabismus, tone irregularities, maldevelopment and reflex anomalies[3]. The global incidence of cerebral palsy is estimated to range between 1.5-3.0 cases per 1000 live births, with notable variations observed across different regions and populations[1]. Cerebral palsy can arise from various factors occurring before, during and after birth, such as oxygen deprivation, structural brain issues present at birth, prenatal infections, genetic factors and environmental factors[4]. Among spastic, atonic, ataxic and mixed cerebral palsy the spastic cerebral palsy is the most prevalent. It accounts for approximately 80% of cases[5]. Approximately 40% of individuals with cerebral palsy experience comorbid epilepsy[6]. Epilepsy is a neurological disorder marked by unpredictable and recurrent seizures from abnormal electrical activity in the brain[7]. The prevalence of epilepsy is generally higher among individuals with cerebral palsy compared to the general population[6]. The relationship between cerebral palsy and epilepsy shares underlying pathophysiological mechanisms and overlapping clinical features. The diagnosis primarily depends on clinical evaluation, involving medical history, neurological examination and tests like EEG and imaging[6]. The coexistence of cerebral palsy and epilepsy is potent to exacerbating the motor and cognitive impairment in children and potentially has long term challenges. Despite current research efforts, further studies are needed to understand the specific features of epilepsy in children with cerebral palsy. This deeper understanding will help doctors and researchers create better treatments tailored to the unique needs of these vulnerable patients.

MATERIALS AND METHODS

A cross-sectional study was conducted utilizing medical records of 68 patients from the Pediatric Outpatient Department Gadag Institute of Medical Sciences, Gadag, Karnataka, India, covering the period from June 2023 to December 2023. Subjects were selected using consecutive sampling from the eligible population meeting the inclusion criteria, which specified children diagnosed with both epilepsy and cerebral palsy. Exclusion criteria encompassed genetic disorders, congenital metabolic abnormalities and cases with incomplete data. Epilepsy was defined according to criteria involving seizure occurrence, recurrence risk and epilepsy syndrome diagnosis, with confirmation from medical records. Seizure types were classified as focal, generalized, or undetermined based on ILAE 2020 criteria. The onset of epilepsy was determined as the age at the initial seizure diagnosis. A family history of seizures was considered present if relatives with offspring relationships had a history of seizures. Cerebral palsy was defined as a disorder of movement and posture resulting from disrupted immature motor cells in the central nervous system, diagnosed based on four of six Surveillance of Cerebral Palsy in Europe criteria and confirmed through medical records. Cerebral palsy types included spastic, dyskinesia, ataxic and mixed. Electroencephalography (EEG) was employed for standard brain activity recording, involving 30 min of recording during both sleep and wakefulness without prior medication. Descriptive analysis was conducted using SPSS version 23.0, with numerical and ordinal data presented as frequency distributions and percentages in tables.

RESULTS AND DISCUSSIONS

The number of patients with both epilepsy and cerebral palsy during the study period was 68 (37%) who were selected for the study, out of the 184 epilepsy patients who visited the hospital. The mean age was 58 months, with 35 males (51.4%) and 33 females (48.5%). Out of all the patients included in the study 37% malnourished and 9% had severe malnutrition. Generalized seizures were the most common type 54 (79.4%). The history of central nervous system (CNS) infection was found in 10 subjects (14.7%). Abnormal EEG results were found in 63 subjects (92.6%). Epilepsy treatment in children with cerebral palsy and epilepsy using polytherapy anti-epileptic drugs (AEDs) was observed in 50 subjects (73.5%) (Table 2). Most types of cerebral palsy were spastic, with 64 subjects (94.1%) (Table 3).

The association between cerebral palsy and epilepsy is characterized by complex neurological interactions and diverse clinical manifestations. Cerebral palsy is a non-progressive motor impairment disorder that often co-occurs with epilepsy that is a chronic neurological condition characterized by recurrent seizures. This coexistence poses significant clinical implications, complicating diagnosis, treatment, and management of the condition. In this study we tried to explore the relationship between cerebral palsy and epilepsy, exploring various factors contributing to their intersection, including gender disparities, nutritional challenges, etiological pathways, and clinical manifestations. In our study cohort of 68 patients, the prevalence of epilepsy was found slightly more prevalent in males (51.4%), echoing findings from Christensen *et al*. which observed a higher incidence in male cerebral palsy patients[8]. Nutritional inadequacies

Table 1: Distribution of children based on Birth History and Birth Weight

Characteristics	No. of Subjects (n)	Percentage
Birth History		
Spontaneous Delivery	45	66.2
Caesarean Section	16	23.5
Vacuum Assistance	5	7.4
Forceps Assistance	2	2.9
Asphyxia on Delivery	23	33.8
Birth Weight		
Normal	56	82.4
Low Birth Weight	9	13.2
Very Low Birth Weight	2	2.9
Extreme Low Birth Weight	1	1.5

Table 2: Characteristics of Epilepsy in CP Children

Characteristics	n = 68
Onset, average (SB), months	20.5 (SD 29.3)
Seizure Type	n (%)
- Focal	6 (8.8%)
- Generalised	54 (79.4%)
- Unknown	8 (11.8%)
History of seizures at under 1 year of age,	45 (66.2%)
History of CNS infection	10 (14.7%)
Family history of epilepsy	1 (1.5%)
Brain abnormalities	
- Microcephaly	25 (36.8%)
- Hydrocephalus	4 (5.9%)
- Hypoplasia of the corpus callosum	1 (1.5%)
- Cerebral haemorrhage	2 (2.9%)
- Hemimegalencephaly	1 (1.5%)
- Brain atrophy	1 (1.5%)
EEG examination, abnormal	63 (92.6%)
Therapy, Polytherapy	50 (73.5%)

Table 3: Characteristics of Cerebral Palsy

Characteristic	n = 68
Cerebral palsy type	n (%)
- Spastic	64 (94.1%)
- Athetoid	2 (2.9%)
- Flaccid	2 (2.9%)

and growth impediments pervade children affected by cerebral palsy, stemming from factors including motor dysfunction and diminished mechanical stress on long bones. Our study underscored the substantial rates of malnutrition (37%) and severe malnutrition (9%), comparable with the findings of Da Silva *et al*'s. review, where he found that most of the studies showed a significant rate of malnutrition in the study population affected with epilepsy, they also included results from some studies which were in contrast to these findings[9]. The aetiology of cerebral palsy unfolds through prenatal, intranatal and postnatal pathways, with antecedent brain lesions preceding epileptic manifestations. Significant associations were found between specific delivery methods (e.g., caesarean section, vacuum-assisted and forceps-assisted deliveries) and cerebral palsy incidence, a theme echoed by Ekanem *et al.*[10]. Likewise, birth asphyxia's imprint (34.5%) was completely in contrast with Kumar *et al*. where it was 94%[11].

In our study the prevalence of spastic cerebral palsy was (94.1%), comparable to 93% as per the findings of McConnell *et al*.[12]. The clinical epilepsy type predominantly unfolded as generalized seizures (79.4%), that is somewhat comparable to Feroze *et al's*. study[13]. Early seizure onset particularly before the age of one, predicts the future epileptic predisposition. In our finding the family history of seizures heightened epilepsy risks, confirming prior research findings by B Mesraoua *et al*.[14]. Abnormal EEG manifestations were clearly visible (92.6%). Navigating epilepsy treatment in cerebral palsy patients remains a challenge, often necessitating polytherapy with antiepileptic drugs (AEDs) to quell seizures effectively. The current study sheds light on the complex interplay between cerebral palsy and epilepsy, highlighting gender disparities in epilepsy prevalence, nutritional challenges and the aetiology of cerebral palsy. These findings show the importance of addressing nutritional needs and monitoring growth in children with cerebral palsy, alongside the significance of delivery methods and birth asphyxia in the onset of cerebral palsy. Our study emphases the significance of early seizure onset and familial seizure history in predicting epileptic predisposition.

CONCLUSION

This study provides valuable insights into the co-occurrence of epilepsy and cerebral palsy among paediatric patients. The prevalence alongside gender disparities, nutritional challenges and clinical manifestations, demands the need to formulate comprehensive management strategies. Further research is required to enhance the understanding and improve outcomes for affected children.

REFERENCES

1. Sadowska, M., B. Sarecka-Hujar and I. Kopyta, 2020. Cerebral palsy: Current opinions on definition, epidemiology, risk factors, classification and treatment options. Neuropsychiatr. Dis. Treat., 16: 1505-1518.
2. Dan, B., 2021. New ethical issues in cerebral palsy. Front. Neurol., Vol. 12 10.3389/fneur.2021.650653
3. Barkoudah, E. and B. Aravamuthan, 2024. Cerebral palsy: Evaluation and diagnosis. UpToDate, Waltham, Massachusetts, USA., https://www.uptodate.com/contents/cerebral-palsy-evaluation-and-diagnosis
4. Elmagid, D.S.A. and H. Magdy, 2021. Evaluation of risk factors for cerebral palsy. Egypt. J. Neurol. Psychiatr. Neur., Vol. 57 10.1186/s41983-020-00265-1

5. Paul, S., A. Nahar, M. Bhagawati and A.J. Kunwar, 2022. A review on recent advances of cerebral palsy. Oxid. Med. Cell. Longev., Vol. 2022 10.1155/2022/2622310
6. Pavone, P., C. Gulizia, A.L. Pira, F. Greco and P. Parisi *et al.,* 2020. Cerebral palsy and epilepsy in children: Clinical perspectives on a common comorbidity. Children, Vol. 8 10.3390/children8010016
7. Encyclopedia Britannica, 2024. Epilepsy: Pathology. Encyclopædia Britannica, Inc., Chicago, Illinois, USA., https://www.britannica.com/science/epilepsy
8. Christensen, J., J.W. Dreier, Y. Sun, C. Linehan and T. Tomson *et al.*, 2023. Estimates of epilepsy prevalence, psychiatric co-morbidity and cost. Seizure, 107: 162-171.
9. Da Silva, D.C.G., M.D.B. da Cunha, A.D. Santana, A.M.D. Alves and M.P. Santos, 2022. Malnutrition and nutritional deficiencies in children with cerebral palsy: A systematic review and meta-analysis. Public Health, 205: 192-201.
10. Ekanem, P.E., A.C.K. Nyaga, N. Tsegay, H. Ebuy, E.A. Imbusi, R. Ekanem and N. Peter, 2021. Determinants of cerebral palsy in pediatric patients in northern Ethiopia: A hospital-based study. Neurol. Res. Int., Vol. 2021. 10.1155/2021/9993912.
11. Kumar, R., Julie, L. Shakeel, S.M. Mansoor, N. Durrani, K. Fatima and H. Shahid, 2023. Frequency of hearing loss in children with cerebral palsy and parents' perception regarding their child's hearing. TPMJ., 30: 1600-1604.
12. McConnell, K., E. Livingstone, O. Perra and C. Kerr, 2021. Population-based study on the prevalence and clinical profile of adults with cerebral palsy in northern ireland. BMJ Open, Vol. 11 10.1136/bmjopen-2020-044614
13. Feroze, N., T. Karim, K. Ostojic, S. Mcintyre and E.H. Barnes et al. 2023. Clinical features associated with epilepsy occurrence, resolution, and drug resistance in children with cerebral palsy: A population-based study. Dev. Med. Child. Neurol., Vol. 2023 10.1111/dmcn.15807.
14. Mesraoua, B., M. Ali, D. Deleu, H.A. Hail and G. Melikyan *et al.,* 2019. Epilepsy and cerebral palsy. Dev. Med. Child Neurol., Vol. 2019 10.5772/intechopen.82804