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Original Article

Clinical Profile of Patients with Cerebral Palsy – A Hospital-based Study

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Abstract

Background: Cerebral palsy (CP) is one of the leading causes of childhood disability worldwide with the greatest burden found in developing countries. Motor impairments are the hallmarks of CP, but in many individuals, other impairments such as vision, hearing, speech, cognition, behavior, and epilepsy may at times produce even greater activity limitation in daily life. Early diagnosis and comprehensive management with a multidisciplinary approach are required for satisfactory management of a child with CP. In low- and middle-income countries, there are gaps in knowledge especially in spheres of epidemiological research, intervention, and service utilization.

Materials and Methods: This cross-sectional observational study was conducted among the children coming to the inpatient and outpatient Department of Paediatrics SMGS Hospital, Government Medical College Jammu.

Aims and Objectives: The aim of the study was to study the clinical pattern and etiological factors of CP and to determine the prevalence of associated disabilities or handicaps in CP. Our study population included 100 cases of diagnosed CP up to 18 years of age.

Results: A total of 100 children of CP were evaluated of which 59% were boys and 41% were girls. CP patients belonged to various age groups as, <2 years (46%), 2–4 years (30%), 4–6 years (12%), 6–12 years (10%), and 12–18 years (2%). CP patients coming to our hospital belonged to various districts such as Jammu (27%), Rajouri (20%), Doda (17%), Reasi (11%), Udhampur (8%), Kathua (7%), Poonch (5%), and Samba (5%). The most common etiological factors were birth asphyxia (48%). The spastic type was the most common (65%), followed by ataxic (15%), dyskinetic (10%), and mixed (10%). Among the spastic quadriplegic, subtype was seen in 69%, diplegia in 23%, and hemiplegia in 8%. Speech delay was the most common associated problem (80%), followed by seizures (56%), feeding difficulty (46%), and contractures and deformities (20%). Formal vision assessment had been done in only 48% of the patients, among them, 30% had normal vision, 9% had refractive error, 7% were having strabismus, and 2% were blind. Spectacles were being used by only three patients. A mere 30% of the patients had undergone hearing assessment; among them, 6% were having moderate to profound hearing loss. Hearing aid was being used by two patients. Physiotherapy services were being availed by 47% of patients. Early intervention and appropriate rehabilitation services should be provided to such children to limit the disability. Medical college hospitals of India, where a number of these children report with their various problems, can play an important role as nodal centers for evaluation and registration of such patients.

Key words: Cerebral palsy, Quadriplegic, Severe asphyxia, Spasticity

INTRODUCTION

Cerebral palsy (CP) is one of the leading causes of childhood disability worldwide with the greatest burden found in developing countries.[1] Population-based studies from around the world report a prevalence of CP ranging from 1.5 to >4/1000 live births or children of a defined age group.[2] CP describes a group of permanent disorders of the development of movement and posture, causing activity limitation, that is attributed to non-progressive 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, behavior, by epilepsy, and by secondary musculoskeletal problems. In many individuals with CP,

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other impairments interfere with the ability to function in daily life and may at times produce even greater activity limitation than the motor impairments that are the hallmarks of CP.[1,3] Complete evaluation of a child with CP, therefore, should include an assessment of associated deficits such as vision, speech, hearing, sensory profile, oromotor evaluation, epilepsy, and cognitive functioning. CP is a chronic condition with considerable impact on affected individuals. Early diagnosis and comprehensive management with a multidisciplinary approach involving developmental pediatrician, neurologist, orthopedic surgeon, speech and language therapist, physio, and occupational therapist are required for satisfactory management of a child with CP.[4]

Since CP is a continuing problem, it is important to study and explore the causes and newer aspects of the condition for proper understanding and management. In high-income countries, CP registers have made substantial contributions to our understanding of CP. However, in low- and middle-income countries, there are gaps in knowledge especially in spheres of epidemiological research, intervention, and service utilization.[5] Till date, there is no exact database of the CP patients in India. Furthermore, there is a lack of large scale community studies estimating the exact prevalence of CP in India.

Limited data are available regarding the CP patients in Jammu region. Raina *et al.* in their study of 3966 children aged >10 years, from RS Pura, a town in the outskirts of Jammu, reported a prevalence rate of CP as 2.27%.[6]

It has been observed that children with CP often report to the outpatient or the inpatient section of the pediatrics department due to various medical problems and concerns about developmental delay. The present study was, therefore, planned to look into the clinical spectrum, etiology, comorbidities of these children, and to assess the continuum of care available to these children.

MATERIALS AND METHODS

This cross-sectional study was conducted among the children coming to the inpatient and outpatient Department of Paediatrics SMGS Hospital, Government Medical College Jammu over a period of 6 months, i.e., from August 2018 to January 2019. All the children presenting with neurodevelopmental delay were evaluated. A total of 100 children with neurological examination consistent with CP up to 18 years of age were included in the study. Children with noncentral motor deficits and progressive neurological disorders were excluded from the study. The study was approved by the Institutional Ethical Committee.

Medical records already available with the parents were scrutinized to find out the possible etiology and assessment of various comorbidities. Thorough history and clinical examination were done to find out the associated handicaps in the children. Data were also collected from the parents regarding whether the children have had a formal vision and hearing assessment, neuroimaging. Information was also sought on whether the children had availed physiotherapy, rehabilitation, and speech therapy services or attended any special school. The cases were classified based on modified Swedish Classification.[4,5] Data were compiled using Microsoft Excel.

RESULTS

- A total of 100 children of CP were evaluated of which 59% were boys and 41% were girls.
- CP patients belonged to various age groups as, <2 years (46%), 2–4 years (30%), 4–6 years (12%), 6–12 years (10%), and 12–18 years (2%).
- CP patients from the whole of Jammu region were reporting to the hospital. They belonged to various districts such as Jammu (27%), Rajouri (20%), Doda (17%), Reasi (11%), Udhampur (8%), Kathua (7%), Poonch (5%), and Samba (5%) [Figure 1].
- Patients presented to the hospital with various complaints such as seizures (46%), acute respiratory tract infection (18%), acute gastroenteritis (15%), and urinary tract infection (5%). 16% of the children had been brought to the hospital with developmental delay as the prime concern.
- The spastic type was the most common (65%), followed by ataxic (15%), dyskinetic (10%), and mixed (10%). Among the spastic quadriplegic, subtype was seen in 69%, diplegia in 23%, and hemiplegia in 8% [Figures 2 and 3].
- The most common etiological factor being birth asphyxia (48%), central nervous system (CNS),

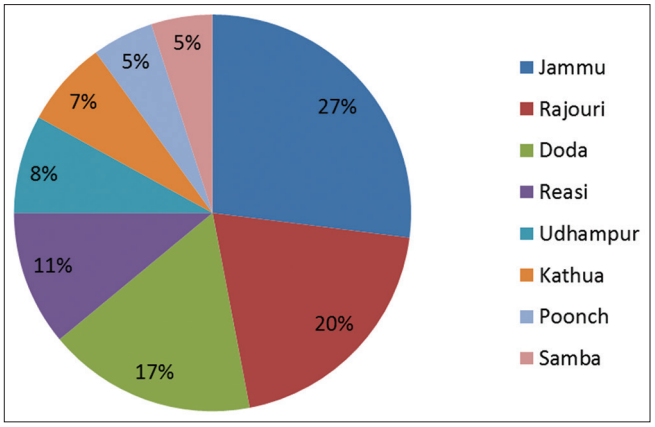

Figure 1: Demographic details of patients

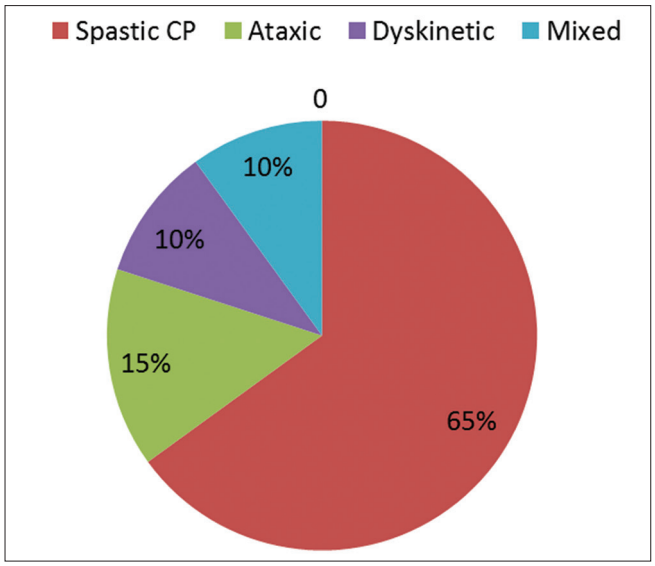

Figure 2: Types of cerebral palsy

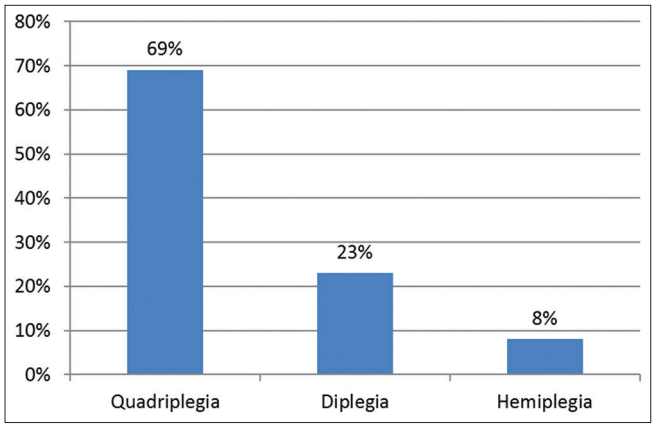

Figure 3: Types of spastic cerebral palsy

infections (20%), hypoglycemia (18%), and bilirubin encephalopathy (14%) [Table 1].

- The comorbid conditions affecting the patients were speech delay (80%), seizures (56%), feeding problems (46%), and contractures and deformities (20%).
- Only 48% of the patients had undergone formal visual assessment among them 30 patients had normal vision, nine patients had refractive error, seven patients were having strabismus, and two patients were blind. Spectacles were used by only three patients.
- Although 80% of the patient had speech delay, formal hearing assessment (BERA) had been done in only 30% of the patients. Among these, five patients were having moderate to profound hearing loss. Hearing aid was being used by only two patients.
- 47% patients were availing physiotherapy services, 15% had received physiotherapy in the past but discontinued as the parents were not satisfied by the role of physiotherapy, 22% were not aware of such services and their benefits, and 16% were living in the far-flung areas where such facilities were not available. Overall, 53% of patients were not undergoing any physiotherapy presently.
- Imaging which includes computed tomography/magnetic resonance imaging had been done in only 18% of the patients [Table 2 and Figure 4].

Table 1: Etiological factors

Paramter	Paramter
Birth asphyxia	48%
CNS infection	20%
Bilirubin encephalopathy	18%
Hypoglycemia	14%

Table 2: Comorbidities associated with cerebral palsy

Paramter	Paramter
Speech problems	80%
seizures	56%
Feeding problems	46%
Contractures and deformities	20%

DISCUSSION

The prevalence and pattern of CP vary between different geographical regions probably due to different etiological factors and different classifications used. A number of European countries have reported a significant decrease in the prevalence and severity of CP subtypes and associated impairments, most likely explained by advancements in obstetric and newborn care. In Norway, the prevalence of CP decreased from 2.62 per 1000 live births in 1999 to 1.89 in 2010.[7] In Slovenian children, the total prevalence of CP per 1000 live births fell significantly from 3.3 in 1981 to 2.3 in 1990.[8]

CP can affect both genders; however, boys are affected slightly higher than girls. In this current study, 59 were boys and 41 were girls, with a ratio of 1.4:1. Male sex preponderance has been reported in a number of studies by Tatavarti *et al.*,[9] Johnson[10] in Europe, Laisram *et al.*,[11] and Das *et al.*[12] in India.

CP children are brought to the medical college hospitals at an early age with either various medical problems or concern for delayed milestones. In the present study, 46% of the children were <2 years while 30% were between 2 and 4 years. Gowda *et al.* in their study of 100 children with CP at a tertiary care teaching hospital observed that age at presentation at the first diagnosis was <1 year in 28% and 1–4 years in 65%.[13] In the present study, the

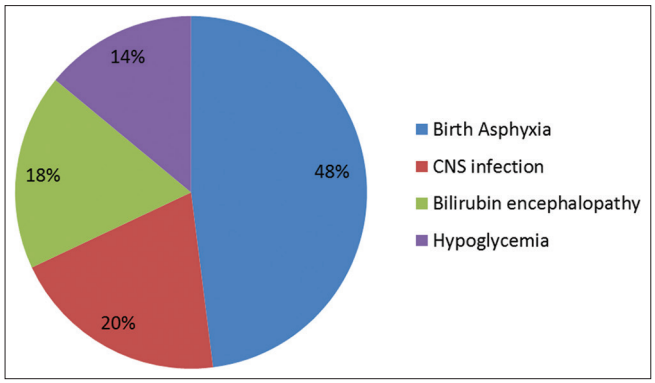

Figure 4: Factors predisposing to cerebral palsy

majority (65%) of the children had spastic CP, of which 69% were quadriplegic and 23% diplegic. Odding *et al.* in a study of the epidemiology of CP observed that it is more prevalent in deprived socioeconomic populations, with the majority having the spastic syndrome of which diplegic group is the smallest. Epilepsy is present in 20–40%, up to 80% have some impairment of speech and low visual acuity is reported in almost three-quarter of the children.[1] Singhi *et al.* in 2002, in a study from North India, reported quadriplegic spastic CP in 61% and diplegic CP in 20% of the total CP children.[15] In another study in 2013, Singhi *et al.* reported 51.5% spastic quadriplegia and 34.5% diplegia.[16] Das *et al.* reported 43% spastic quadriplegia and 12% spastic diplegia, Gowda *et al.* reported 71% spastic quadriplegia and 16% spastic diplegia.[12-14] Hence, our results are consistent with all these Indian studies.

The European countries have over the past three decades observed shifts in the types of CP manifestations with decreasing incidence of spastic quadriplegia as a result of improved perinatal care and better equipped newborn intensive care units. Hagberg *et al.* in a study of 216 children of CP from Sweden, born between 1987 and 1990, observed that hemiplegic, diplegic, and tetraplegic syndromes accounted for 22%, 66%, and 7% of preterms and 44%, 29%, and 10% of term children.[17]

Role of perinatal complications particularly birth asphyxia has been implicated strongly in developing countries. In our study, birth asphyxia accounted for 48% of patients. Our results are in conformity with studies of Singhi *et al.* who reported 45.3% cases and in another study 51.98%. They also reported that the majority of the patients were term institutional deliveries. In the present study, CNS infections were 20%, bilirubin encephalopathy 18%, and hypoglycemia 14%. Singhi *et al.* reported neonatal sepsis 30.6% and neonatal jaundice 35.14%. In another study, Singhi *et al.* reported neonatal septicemia 14.6% and neonatal jaundice 21.6%.[15,16]

The comorbid conditions/handicaps in the patients were speech problems 80%, seizures 56%, feeding problems 46%, and contractures and deformities 20%. Similar finding was reported in studies from other low- and middle-income countries Khandaker *et al.* in Bangladesh reported a prevalence of 3.4 per 1000 children, the majority (79.6%) having spastic CP. They also reported that 79.6% of these children had at least one associated impairment speech 67.6%, intellectual 39.0%, epilepsy 23.7%, visual 10.2%, and hearing 10.2%. In total, 78.2% never received rehabilitation. They observed that the diagnosis of CP is substantially delayed limiting opportunities for early intervention. There is a lack of available services and the majority of the children had preventable risk factors.[18] In the present study, physiotherapy services were being availed by 47% of the patients, among 53% patients who were not taking physiotherapy 22 parents gave the reason of not being aware of such services and their benefits, 15 parents were not satisfied with the role of physiotherapy and 16 parents were living in the far-flung areas where such facilities were not available.

In our study, only 48% had undergone formal visual assessment, out of which 18 children (37.5%) were having visual defects. The formal hearing assessment had been done in only 30% of the patients, out of which five patients were having moderate to profound hearing loss (16.6%). Dass *et al.* had also reported speech defect (76%), visual defect (23%), and hearing problems (18%). Singhi *et al.* reported speech problems (83.7%), visual defect (46.7%), and hearing problem (13.9%). Our results are consistent with these authors.[12,15] Sasmal *et al.* in a study of 140 patients of CP observed an overall incidence of ocular abnormalities as 42.1%. These were strabismus (36.4%), myopia (12.9%), hypermetropia (8.6%), astigmatism (3.6%), optic atrophy (2.1%), and nystagmus (2.1%). Cortical visual impairment was seen in 20.7%.[19]

CP is one of the leading causes of childhood disability worldwide, in developing countries, where rehabilitation services are either not available or are poorly availed. In a study from Nigeria Lagunju and Fatunde enrolled 82 children of CP for rehabilitative care, functional improvement and reasons for default and observed that at the end of 1 year, only 25.6% were still receiving rehabilitative care, 74.4% had defaulted from follow-up, and 13.4% had died.[20]

In a recent pilot study, on the infectious causes of childhood disabilities from rural subdistrict of Bangladesh, 57% of CP children had never received any rehabilitative support or services. Only 21.1% were attending regular school and just 0.2% were attending a special school.[21]

The clinical spectrum of CP in our country, thus, differs from that reported in western countries due to perinatal and postnatal morbidities such as birth asphyxia, CNS infection, bilirubin encephalopathy, and hypoglycemia. Furthermore, the percentage of children who have undergone visual and hearing assessment and undergoing rehabilitation is quite low. Timely diagnosis and initiation of appropriate management should be ensured to decrease the incidence of CP and associated disabilities or handicaps in the future. It is suggested that rehabilitation clinics should be set up for CP patients at every government medical college so that parents can be made aware of the disease, handicaps, prognosis, and management.

CONCLUSION

In this era of digital technology and artificial intelligence, it is high time that we develop a National CP population register in India to fill the knowledge gap, facilitate care, and management of these children. Medical college hospitals of India, where a number of these children report with their various problems, can play an important role as nodal centers for evaluation and registration of such patients. This will enable estimates of prevalence, help in infrastructure development to improve care of CP patients in India. Parents of CP children were made aware of the disease process, handicaps, and there management such as physiotherapy, visual aid, hearing aid, and treatment of other comorbidities/handicaps.

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