

## A DESCRIPTIVE STUDY ON RISK FACTORS AND COMORBID CONDITIONS OF CEREBRAL PALSY CASES ATTENDING DEIC, S.V.P.G INSTITUTE (SISHU BHAWAN), CUTTACK

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### ABSTRACT

**Objectives:** The objectives of the study were: (1) To study the sociodemographic profile of cerebral palsy (CP) cases attending the District Early Intervention Center (DEIC) at Sishu Bhawan. (2) To study the risk factors of CP. (3) To study the associated comorbid conditions of CP.

**Methods:** It is a hospital-based study conducted at DEIC, Sishu Bhawan, Cuttack, from July 2016 to June 2017. All cases (150) of CP children in the age group of 6 months–14 years attending DEIC during the study period were taken as study subjects. The mothers/caregivers of the children were interviewed, and the data thus collected were analyzed by the Statistical Package for the Social Sciences version 17.

**Results:** The mean age of the study subjects was 2.87 years±2.48 standard deviation. The male–female ratio was 2.4. The risk factors associated with CP were PIH, antepartum hemorrhage, low birth weight, hyperbilirubinemia, seizures, birth asphyxia, etc. The common comorbid conditions are malnutrition, mental retardation, seizure, hearing and vision impairment, speech difficulty, and behavioral problems.

**Conclusion:** Prevention of prenatal, perinatal, and postnatal risk factors of CP and better management of high-risk cases will reduce the occurrence of CP.

**Keywords:** Cerebral palsy, Malnutrition, Birth asphyxia, Seizure.

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### INTRODUCTION

Cerebral palsy (CP) is a disorder of movement, control, and posture caused by damage to the developing brain that may occur during pregnancy, around delivery, or within the first 3 years of life [1]. Major etiological factors linked to the development of CP vary in terms of their relationship to the time of delivery (i.e., prenatal, perinatal, and postnatal periods) [2,3].

CP is the most common childhood disability in the world and also in India [3,4]. Prevalence of CP ranges from 1 to 4/1,000 live births in the world [4]. In India, the prevalence is 2.83/1,000 children among the age group of 0–19 years [5].

Odisha, being a low-resourced state and having not so well developed health-care system, faces a high prevalence of CP [6]. Sishu Bhawan, Cuttack, is the apex referral center of Odisha in Pediatrics. Taking into account the disease burden, the study was therefore planned, with the primary focus on sociodemographic profile, risk factors, and comorbid conditions associated with CP children coming to the District Early Intervention Center (DEIC) of Cuttack district situated at Sishu Bhawan.

### Objectives

The objectives of the study were:

1. To study the sociodemographic profile of CP cases attending DEIC at Sishu Bhawan
2. To determine the risk factors of CP
3. To assess the associated comorbid conditions in CP.

### METHODS

#### Study design

Hospital-based cross-sectional study.

#### Study place

DEIC at Sardar Vallabhbhai Patel Postgraduate Institute (Sishu Bhawan), Cuttack.

#### Duration of study

July 2016–June 2017.

#### Study subject

All CP cases attending the DEIC of S.V.P. PG Institute at Cuttack.

#### Sample size

All cases attending DEIC during the study period were taken as study subjects.

#### Study instrument

A pre-designed and pre-tested semi-structured questionnaire was administered by the investigator.

#### Data collection

The parents/caregivers were interviewed after the treatment of the children in DEIC for data collection.

#### Statistical analysis

Data thus collected were analyzed using the Statistical Package for the Social Sciences version 17.

#### Methodology

Recommendation to conduct the study was obtained from the Institutional Ethics Committee, SCB Medical College, Cuttack. All diagnosed cases of CP children in the age group of 6 months–14 years attending DEIC, Cuttack, during the study period, i.e., September 2016–February 2017, were the study subjects. Data were collected on all the working days of the week. A total of 150 cases were studied during the study period.

After taking permission from the director of Sishu Bhawan, data were collected from the DEIC. The child was examined for confirmation of diagnosis, and history was taken from the mother/caregiver after taking the informed consent. The child was examined for anthropometric parameters first and then assessed for milestones of development and comorbid conditions associated with CP.

## RESULTS

A total of 150 children with CP from 6 months to 14 years were taken as study subjects. The mean age of the study subjects was 2.87 years $\pm$ 2.48 standard deviation. The highest participants were in the age group of 0–3 years, i.e., 89 (59.3%) (Table 1).

**Table 1: Age distribution of study population (n=150)**

Age group	Number	Percentage
0–3 years	89	59.3
3–6 years	51	34
6–12 years	5	3.3
12–14 years	5	3.3
Total	150	100

Mean age of the children was 2.87 years $\pm$ 2.48 standard deviation

**Table 2: Sociodemographic profile of the study subjects (n=150)**

Sl. no.	Parameters	Number (%)
1	Gender	
	Male	106 (70.7)
	Female	44 (29.3)
2	Caste	
	General	85 (56.7)
	OBC	28 (18.7)
	SC	35 (23.3)
	ST	2 (1.3)
3	Religion	
	Hindu	147 (98)
	Muslim	3 (2)
4	Residence	
	Urban	31 (20.7)
	Rural	119 (79.3)
5	Family type	
	Nuclear	27 (18)
	Joint	123 (82)

**Table 3: Distribution of CP cases according to socioeconomic characteristics (n=150)**

Sl. no.	Parameters	Mother n (%)	Father n (%)
1. Education	Graduates/PG	14 (9.3)	15 (10)
	Intermediate	25 (16.7)	27 (18)
	High school	59 (39.3)	75 (50)
	Middle school	30 (20)	16 (10)
	Primary school	11 (7.3)	6 (4)
	Illiterate	11 (7.3)	11 (7.3)
2. Occupation	Professional	0	0
	Semi-professional	0	0
	Clerk, shopkeeper,	0	12 (8)
	Farmer		
	Skilled worker	0	7 (4.7)
	Semiskilled	0	80 (53.3)
	Unskilled	0	48 (32)
	Unemployed	150 (100)	3 (2)
3. Socioeconomic status	Class I (upper)	4 (2.7)	
(modified BG Prasad classification)	Class II (upper middle)	5 (3.3)	
	Class III (middle)	31 (20.7)	
	Class IV (lower middle)	71 (47.3)	
	Class V (lower)	39 (26)	

CP: Cerebral palsy

Out of 150 CP cases, 106 (70.7%) were male and 44 (29.3%) were female. CP was more prevalent among male children, and the male-to-female ratio was 2.4:1 (Table 2).

Socioeconomic status was calculated by modified B G Prasad classification, and 71 (47.3%) parents were in the class IV (lower middle) category (Table 3).

In this study, the majority of CP cases (75.3%) have a history of term delivery, and 44.7% of the cases had a birth order of 2 (Table 4).

In our study, the maternal age at delivery was 26–30 years in 47.3% of cases. Consanguineous marriage was seen in 9 (6%) parents. Polyhydraminous and oligohydraminous, intrauterine infection, and pregnancy-induced hypertension (PIH) were present in 26 (17.3%), 16 (10.7%), and 12 (8%), respectively. Other maternal conditions associated with CP were antepartum hemorrhage (APH), GD, history of fever, trauma, drug intake, abnormal thyroid function tests, and multiple pregnancy (Table 5).

It was observed that 72.70% cases were delivered by normal vaginal delivery and majority were institutional deliveries 135 (90%). It was found that 141 (94%) children had vertex presentation, 3 (2%) had breech presentation, and 6 (4%) had face presentation. There were 37 (24.7%) low birth weight (LBW) babies. The majority, i.e., 91 (60.7%) cases, had birth asphyxia. Birth trauma was seen in 3 (2%) children of CP (Table 6).

Seizure was the most common risk factor in the postnatal period, i.e., 68 (45.3%), followed by hyperbilirubinemia (Table 7).

In this study mental retardation was found as most common (53.3%) comorbid condition among all study cases. Behavioral problems were found in 64 (42.7%) of all cases. Seizure was found in 68 (45.3%) cases,

**Table 4: Obstetric history of study subjects (n=150)**

Parameters	n (%)
GA at delivery	
Term	113 (75.3)
Preterm	37 (24.7)
Birth orders	
1 <sup>st</sup> order	65 (43.3)
2 <sup>nd</sup> order	67 (44.7)
3 <sup>rd</sup> order	3 (2)
4 <sup>th</sup> order	12 (8)
>4 <sup>th</sup> order	3 (2)

**Table 5: Prenatal factors of mothers of CP children (n=150)**

Sl. no.	Mother status	n (%)
1	Maternal age at delivery	
	<18	5 (3.3)
	19–25	60 (40)
	26–30	71 (47.3)
	31–35	14 (9.3)
2	Consanguineous marriage	9 (6)
3	PIH	12 (8)
4	APH	8 (5.3)
5	Gestational diabetes	4 (2.6)
6	Poly/oligohydramnios	26 (17.3)
7	Fever	10 (6.7)
8	Trauma	3 (2)
9	Drugs taken	10 (6.7)
10	Intrauterine infection	16 (10.7)
11	Abnormal TFT	8 (5.3)
12	Multiple pregnancy	2 (1.3)

CP: Cerebral palsy, PIH: Pregnancy induced hypertension, APH: Antepartum hemorrhage, TFT: Thyroid function tests

out of which 54 (50.9%) were male. There was a statistically significant association between seizure and sex of the study subjects ( $p=0.032$ ) (Table 8).

Malnutrition was seen in 56 (37.3%) cases, and 100 (67.1%) had speech problems. The difference in speech problems among male and female children was significant ( $p=0.009$ ). Vision impairment was seen in 25 (16.7%), and hearing impairment was found in 39 (26%)

**Table 6: Distribution of perinatal factors among study subjects (n=150)**

Perinatal factors	n	Percentage
Mode of delivery		
Normal	109	72.7
Forcep	3	2
Ventouse	2	1.3
LSCS	36	24
Place of delivery		
Home	15	10
Hospital	135	90
Duration of labour		
Normal	107	71.3
Prolonged	43	28.7
Types of presentation		
Vertex	141	94
Breech	3	2
Face	6	4
Birth weight		
Normal	96	64
LBW	37	24.7
VLBW	17	11.3
Birth asphyxia		
Yes	91	60.7
No	59	39.3
Birth trauma		
Yes	3	2
No	147	98

LBW: Low birth weight, VLBW: Very low birth weight

**Table 7: Postnatal risk factors among study subjects**

Sl. no.	Postnatal risk factors	Number	Percentage
1	Seizure	68	45.3
2	Sepsis	3	2
3	Hyperbilirubinemia	54	36
4	CNS infection (meningitis and encephalitis)	3	2
5	Intracranial bleeding	6	4
6	Metabolic (hypoglycemia and dyselectrolytemia)	12	8
7	Trauma	3	2

cases. Cognition and socialization defects were found in 46 (30.7%) and 76 (50.7%) who had feeding problems. The difference in feeding problems among male and female children was significant ( $p<0.05$ ). Sleep disorder was found in 27 (18%) cases (Table 8).

## DISCUSSION

The majority of the study subjects were in the 0–3 year age group, which was similar to a study conducted by Jinat *et al.*, i.e., 59.33% of CP cases were of 1–3 years [7]. In this study, most of the CP cases were diagnosed in the early age group because of the active participation of the mobile health team of RBSK, which had increased screening and early detection of CP children from the community.

In our study, males were more affected than females, and the ratio was 2.4:1, which was similar to Puneet *et al.*'s study, where the sex ratio observed was 2.42:1 [8]. Males have a higher incidence of brain-based developmental disabilities as they are prone to extreme prematurity and its complications. The gender differences in the immature brain are strongly influenced by intrinsic differences between male and female cells. This is due to their distinct chromosomal complements [9]. The present study shows that the maximum cases, 119 (79.3%), were living in rural areas, which was similar to Raju *et al.*'s study [10]. Major families were in class IV (lower middle) category of SES, i.e., 71 (47.3%), which was similar to Vykuntaraju *et al.*'s study, where lower middle SES was 53% [11].

More cases of CP were found in initial birth orders, and the incidence of CP decreases with an increase in birth order. A similar study by Jinat *et al.* showed that 46% ( $n=138$ ) were 1<sup>st</sup> born children and 31% ( $n=93$ ) were 2<sup>nd</sup> born [7]. Incidence of CP was less in higher-order births, which could be because of improved knowledge, attitude, and practice of parents in seeking obstetric and perinatal care.

Preterm birth is definitely a risk factor of CP, which was seen in 37 (24.7%) cases, similar to Puneet *et al.*'s study, i.e., preterm delivery was 122 (25.4%) [8].

Consanguinity was observed in 9 (6%) cases. Prevalence of consanguineous marriage is decreasing due to an increase in awareness. History of consanguinity among parents of children with CP suggests the role of genetic factors in the pathogenesis of CP [11]. In this study, pregnancy-induced hypertension (PIH) was present in 12 (8%) of mothers, which was similar to Vykuntaraju *et al.*'s study, i.e., 6% [11]. APH was present in 8 (5.3%) of mothers, which was similar to Puneet *et al.*'s study, i.e., 29 (6%) [8].

The findings on mode of delivery of the children were similar to Vykuntaraju *et al.*, study. They found in their study that vaginal delivery 81%, instrumentation 3% and cesarean section 12% [11].

**Table 8: Associated comorbid conditions in study subjects (n=150)**

Sl. no.	Conditions	Male (%)	Female (%)	X <sup>2</sup>	df	p-value	Total (%)
1	Malnutrition	41 (38.7)	15 (34.1)	0.280	1	0.597	56 (37.3)
2	Seizure	54 (50.9)	14 (31.8)	4.589	1	0.032	68 (45.3)
3	Mental retardation	57 (53.8)	23 (52.3)	0.028	1	0.867	80 (53.3)
4	Behavioral problems	44 (41.5)	20 (45.5)	0.198	1	0.656	64 (42.7)
5	Speech problems			9.339	2	0.009	
	Difficult speech	52 (49.1)	15 (34.9)				67 (45)
	No speech	27 (25.5)	6 (14)				33 (22.1)
	Normal speech	27 (25.5)	22 (51.2)				49 (32.9)
6	Vision impairment	19 (17.95)	6 (13.6)	0.412	1	0.521	25 (16.7)
7	Hearing impairment	29 (27.4)	10 (22.7)	0.347	1	0.556	39 (26)
8	Cognition and socialization defect	33 (31.1)	13 (29.52)	0.037	1	0.848	46 (30.7)
9	Feeding problem	47 (44.3)	29 (65.9)	5.787	1	0.016	76 (50.7)
10	Sleep disorder	16 (15.1)	11 (25)	2.067	1	0.151	27 (18)

In our study, birth asphyxia was the most common risk factor, i.e., 91 (60.7%), followed by hyperbilirubinemia in 54 (36%) cases. These findings were similar to a study by Tinuade *et al.* [12]. In present study, mental retardation and seizure were the common comorbid conditions associated with CP which was similar to the findings of Vykuntaraju *et al.* [11].

## CONCLUSION

The situation analysis on CP children at DEIC, Cuttack, throws light on various social factors of CP, such as low education and SES. Preterm birth, consanguineous marriage, PIH, APH, polyhydramnios and oligohydramnios, multiple pregnancy, LBW, instrumental delivery, birth asphyxia, seizure, hyperbilirubinemia, etc. are the risk factors. Most common comorbid conditions were mental retardation, seizure, malnutrition, vision, hearing, speech, and sleep problem. It indicates that prevention of prenatal, perinatal, and postnatal risk factors and better management of high-risk cases will reduce the occurrence of CP.

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## AUTHOR'S CONTRIBUTIONS

Study conception and design – Ram Chandra Giri and S Sandhibigraha. Data collection – S Sandhibigraha. Analysis – Rama Chandra Giri and S Sandhibigraha. Draft and manuscript preparation – S Sandhibigraha, R C Giri, N Karmeeand V Acharya.

## CONFLICTS OF INTEREST

The authors declare that there were no conflicts of interest.

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