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Trends of Cerebral Palsy in Rajasthan, India

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Abstract The aim of this study was to determine the incidence of etiological factor and clinical features of children with cerebral palsy (CP) in Rajasthan. Five dissertations done in the Post Graduate Department of Pediatrics Ay., National Institute of Ayurveda, Jaipur with diagnosed case of spastic CP, from year 2010 to 2014 were included in the study. Age, sex, etiological factors, clinical classifications, and epidemiological characteristics as well as the problems associated with CP were analysed in all children. Of the total of 240 children male: female prevalence comes out to be 2.3:1. The most common etiologic risk factors were birth asphyxia and low birth weight in perinatal period; HIE, Respiratory distress syndrome and neonatal convulsions in the postnatal period. In clinical classification it was seen that maximum subjects 52.92% were found to be Diplegic followed by 27.50% cases were Quadriplegic in nature, 12.50% cases were found to have Hemiplegic pattern. Drooling of saliva was the most common associated problem. Study has found perinatal asphyxia as major cause of cerebral palsy and Diplegia as major presentation of CP in Rajasthan. The studies can help in further planning for reduction in incidence of CP in Rajasthan.
Keywords *Cerebral Palsy Rajasthan; Jaipur; India*

1. Introduction

Cerebral palsy (CP) describes a group of permanent disorder of the development of movement and Posture causing activity limitation that are attributed to non-progressive disturbances that occurring in the developing foetal or infant brain. The motor disorders of cerebral palsy are often accompanied by disturbances of sensation, perception, cognition, communication, behaviour, epilepsy, and secondary musculoskeletal problems [1]. Different studies have shown different incidence of spastic cerebral palsy. Having knowledge about epidemiologic characteristics of the disease, will be beneficial in terms of both treatment and prevention. The present study is selected to in order to review the trends of cerebral palsy present in Rajasthan state of India and its association with various etiological factors.

1.1. Need of Study

CP worldwide incidence is 2 to 2.5 per 1000 live births while in India it is 2-4 per 1000 live birth [2]. Cerebral palsy is still one of the major challenge with no complete management so far. In the recent years with the advent of more advanced neonatal resuscitation, increased maternal age etc. have

caused an increase in the incidence of cerebral palsy and its major etiological factors and incidence of associated problems varies in different part of the world hence study need to be done to evaluate incidences of CP area wise to understand the exact trend of CP at different part of world.

1.2. Aim and Objectives

Following study is done to review trends of cerebral palsy in Rajasthan state of India in order to establish the major etiological factors and risk factors prevalent in the state causing cerebral palsy.

2. Materials and Methods

All the children with Spastic cerebral palsy who attended OPD and IPD of PG Department of Pediatrics Ay., National Institute of Ayurveda, from 2010 to 2014, have been enrolled under departmental dissertation each year, all the incidence and prevalence were recorded in the dissertation strictly following the norms of the Institute. For the present study five research works [3-7] have been selected in order to analyze all the children of spastic cerebral palsy since 2010 to 2014 who attended institutes OPD and IPD. As children attending NIA OPD and IPD are equally from all over Rajasthan hence the study is limited to the state. The study was done to evaluate the trends of cerebral palsy prevalent in Rajasthan.

3. Results

Etiological factors have been evaluated for all children and properly recorded. The factors studied are sex, consanguinity, mother's age of conception, antenatal care of mother, birth order of child, mode of delivery, place of delivery, status of fetus presentation, Birth maturity of newborn, Birth weight, History of birth asphyxia have been evaluated (Table 1).

Table 1: *Showing Trends of Etiological Factors of Cerebral Palsy among 240 Children Screened in the Study during Year 2010 To 2014*

S. No.	Etiological Factors		Prevalence (n=240)
1.	Sex	Male	165 (68.75%)
		Female	75 (31.25%)
2.	Consanguinity	Present	212 (88.33%)
		Absent	28 (11.67%)
3.	Mothers Age of Conception	Appropriate age (20 to 35 years)	197 (82.08%)
		Late age (>35 years)	23 (9.58%)
		Early age (<20 years)	20 (8.33%)
4.	ANC Checkup	Proper	190 (79.16%)
		Improper	50 (20.84%)
5.	Birth Order	1st Child	139 (57.91%)
		2nd Child	72 (30.00%)
		3rd and above	29 (12.09%)
6.	Mode of delivery	Normal (SVD)	199 (82.91%)
		LSCS	23 (9.58%)
		Instrument aided	8 (3.33%)
7.	Place of delivery	Hospital	194 (80.83%)
		Home	43 (17.91%)
		Other	3 (1.25%)
8.	Fetal presentation	Vertex	208 (86.67%)
		Breech	20 (8.33%)
		Unknown	12 (5.00%)

9.	Birth maturity	Full-term	165 (68.75%)
		Pre-term	70 (29.17%)
		Post-term	5 (2.08%)
10.	Birth Weight	Normal	120 (50.00%)
		LBW	75 (31.25%)
		VLBW	20 (8.33%)
		ELBW	3 (1.25%)
		Over weight	9 (3.75%)
		Not known	13 (5.42%)
11.	Birth Asphyxia	Present	127 (52.91%)
		Absent	68 (28.33%)
		Not known	45 (18.75%)

Abv: ANC: Ante Natal Care; SVD: Spontaneous Vaginal Delivery; LSCS: Lower Segment Cesarean Section; LBW: Low Birth Weight; VLBW: Very Low Birth Weight; ELBW: Extremely Low Birth Weight

Apart from these major etiological factors were studied after categorizing them as antenatal factor, Perinatal Factors and postnatal factors (Table 2).

Table 2: *List of Various Etiological Factors Causing Cerebral Palsy (CP) and their Incidence among Children Evaluated Under Study*

Etiological Factors	Total Number of Cases	Percentage n=240
Antenatal Factors		
Hyperemesis	4	1.67%
Eclampsia	8	3.33%
Twins	9	3.75%
Hypothyroidism	5	2.08%
APH	4	1.67%
UTI	4	1.67%
HTN	5	2.08%
Placenta Previa	2	0.83%
Jaundice	6	2.50%
TORCH Infection	17	7.08%
Diabetes	8	3.33%
Fever	6	2.50%
Cervical Incompetence	3	1.25%
Other	5	2.08%
Perinatal Factors		
Prolonged 2nd Stage	57	23.75%
Meconium Stained Liquor	34	14.16%
Cord Prolapse	13	5.42%
Fetal Distress	77	32.08%
L.S.C.S.	23	9.58%
Pre Maturity	70	29.17%
Post Maturity	5	2%
L.B.W.	98	40.83%
Instrumental Delivery	8	3.33%
Breech	20	8.33%
Birth Asphyxia	127	52.91%
Postnatal Factors		
Sepsis	30	12.50%
HIE	87	36.25%
Seizures	45	18.75%
Hyper Bilirubinemia	37	15.42%

N.E.C.	8	3.33%
R.D.S	59	24.58%
Intracranial Hemorrhage	12	5.00%

Abv: APH: Antepartum hemorrhage; UTI: Urinary Tract Infection; HTN: Hypertension; TORCH: Toxoplasma Others Rubella Cytomegalovirus Herpes; LSCS: Lower Segment Cesarean Section; LBW: Low Birth Weight; HIE: Hypoxic Ischemic Encephalopathy; NEC: Necrotizing Enterocolitis; RDS: Respiratory Distress Syndrome

Major associated problems with CP have been evaluated; in the study maximum children were found to have drooling of saliva as major associated complaint followed by many other problems enlisted in table (Table 3).

Table 3: *List of Major Associated Problems with Cerebral Palsy*

Symptoms	Number of Cases	Percentage n=240
Speech	112	46.67%
Hearing	12	5.00%
Drooling	129	53.75%
Eye problems	94	39.17%
Feeding	109	45.42%
Mental Retardation	86	35.83%
Contractures	57	23.75%
Teething problem	82	34.17%
Constipation	66	27.50%
Malnutrition	72	30.00%
Sleep disturbance	87	36.25%
Seizure	46	19.17%

4. Topographical Incidence of Spastic CP

Of the total registered cases of Spastic C.P. (n=240) the maximum number of children i.e. 127 (52.92%) were found to be Diplegic followed by 66 (27.50%) children Quadriplegic in nature, 30 (12.50%) cases were found to have Hemiplegic pattern, 14 (5.83%) cases were monoplegic and 4 (1.67%) cases were having double hemiplegia.

5. Discussion

In the present study the sex wise prevalence comes out to be 2.3:1. Latest data also shows that, the incidence is higher in males than in females. Consistent with these results, Johnson et al. (2002) reported [8] boy/girl ratio as 1.33 in Europe and Laisram et al. (1992) reported [9] as 1.9 in India. Thus showing male predominance of CP. Consanguineous marriage was absent in maximum cases. This may be due to the fact that maximum cases in the study were of non-Muslim community (there is a widely recognized culture of consanguinity within Muslim communities) [10]; however consanguineous marriage is now supposed to be one of the factors of congenital cerebral palsy. A study conducted in Saudi Arabia reported 2.5 fold increase in the occurrence of CP in consanguineous families [11]. Mother's age of Conception was appropriate in maximum cases. Fletcher N.A. et al. (1993) [12] reported low paternal age and extremes of maternal age to be significantly associated with CP. But such condition was not found in this study. Mothers of maximum children with C.P. were found to have proper ANC check-up. Signifying the increased awareness toward proper ANC checkup; a positive output of Government advertisement for promoting proper care during pregnancy.

Maximum number of incidence of CP was found in 1st Birth order. Another study also indicated first pregnancy was associated more with incidence of CP [13]. The incidence of prolonged labour and other perinatal complications are associated with first pregnancy.

Maximum numbers of children with CP were delivered normally, followed by LSCS. In India still maximum deliveries are occurring normally in spite of the availability of LSCS due to cost factor in LSCS and lack of proper facility in remote areas and less awareness of merits of LSCS in complicated delivery among majority of people. An Indian data by Singhi P. et al. (2002) shows [14] that out of the studied children 85% were of normal delivery, 9.95% were with caesarean delivery while 3.7% were with instrumental delivery.

Maximum numbers of Children were delivered at hospital followed by delivery at home. Though if we compare the percentage of delivery in hospital to home delivery the rate of occurrence of CP will be seen more in home deliveries. In a study Home birth were significantly more common in the mother of children with Cerebral Palsy. Delivery in a non-hospital setting places the infant at a risk of some of the suspected associations of CP such as birth asphyxia [15]. Maximum number of cases had vertex presentation. The above findings may be due to the fact that vertex is most common presentation in pregnancy however abnormal foetal presentation have strong connection with CP [16].

Maximum numbers of cases i.e. (68.75%) were born as full term, while (29.17%) Preterm babies were recorded. Nearly 40% of cases were having low birth weight (Including VLBW, ELBW). In Indian society lack of awareness about balanced diet and health supplements is the major culprit for high incidence of low birth weight babies. Low birth weight is associated with higher rates of cerebral palsy. Maximum number of cases had a positive history of birth asphyxia and many others were found with no clear history present of birth asphyxia which can be added on either side thus showing high incidence of birth asphyxia in present study. According to WHO, between four and nine million new-born develop birth asphyxia each year; of these, an estimated 1.2 million die and at least the same number develop severe consequences such as epilepsy, cerebral palsy and developmental delay [17]. But many other research have given antenatal cause as major etiology for developing cerebral Palsy and perinatal asphyxia accounts for between 6% and 8% of cerebral palsy [18]. Overly inclusive definitions were associated with high rates of attribution of CP to birth asphyxia. This explains the high incidence of Birth asphyxia in study. For determining the exact asphyxia etiology to CP, cases with known or probable non asphyxia etiologies such as brain malformations, death of a co-twin, or metabolic or neuromuscular disease should be excluded, and a generalized definition need to be laid for considering a particular case to be included as exclusive birth asphyxia or not.

Among antenatal causes all causes were having equal incidence thus no one disease can be attributed to its major antenatal cause. Though incidence of TORCH was found maximum with 7.08% incidence which may be considered as comparatively important disease causing CP, laying importance of spreading awareness for its prenatal screening to avoid this cause of CP.

Clinical classification categorizes CP as spastic (quadriparesic, diplegic, hemiplegic), hypotonic/ataxic, dyskinetic and mixt-type CP. The most common types are the spastic types in worldwide. However, the distribution of the clinical subtypes of spastic CP cases differed from the results of western countries. In our study, 52.92% of cases were spastic Diplegic and 27.50% were spastic quadriparesic. In another study Eriman et al. [19] evaluated 202 children with CP and they reported that 34% was spastic Diplegic and 32% was spastic quadriplegic. Though the incidence in India is different. In an analysis of 1000 cases of CP from India, it was found that spastic quadriplegia constituted 61% of cases followed by Diplegia 22% [20]. Whereas, in European countries spastic

Diplegia is seen in significantly higher rates. Studies reported the ratio of spastic quadriparetic CP as 18% - 20.8% and spastic Diplegic CP as 40.9% - 54.9% in European countries [21-22].

6. Conclusion

To conclude, it was observed that birth asphyxia was the leading risk factors in CP etiology. Though it may occur secondary to other perinatal etiology hence perinatal cause cannot be neglected either and the most common CP prevalent in Rajasthan is Diplegic CP. The studies can help in further planning for reduction in incidence of CP in Rajasthan.

- *What is already known and what this study adds:*

Available studies on cerebral palsy provide findings regarding the causative factors and presentation of the disease. Present study adds some new findings and supports the previous one so that these findings will help in future research related to Cerebral Palsy.

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