



## Original Research Article

# Comprehensive Study on Predisposing Factors of Cerebral Palsy

Authors

**Dr Vamshi Krishna Kondle, MD<sup>1</sup>, Dr Kranti Kondle, DGO<sup>2</sup>**

<sup>1</sup>Associate Professor, Department of Paediatrics, Kamineni Institute of Medical Sciences, Narketpally, Nalgonda, Telangana

<sup>2</sup>Junior Resident, Dept of Obg, RVM Institute of Medical Sciences and Research Center, Mulugu, Medak  
Corresponding Author

**Dr Vamshi Krishna Kondle, MD**

Associate Professor, Department of Paediatrics, Kamineni Institute of Medical Sciences, Narketpally, Nalgonda, Telangana

## ABSTRACT

*Cerebral palsy is a disorder of movement and posture that result from a non progressive lesion or injury of the immature brain. The prevalence of cerebral palsy among children is about 2 per 1000 live births. it is much higher in developing countries. To analyse the predisposing factors of cerebral palsy in Gulbarga area the present study conducted in government general hospital , basaveswar teaching & general hospital, Gulbarga attached to M.R medical college, Gulbarga were included in this study over a period of two years from march 2001 to march 2003 over 50 patients. majority of cases were belongs to 1-5 years (52%). male female ratio was 2.5:1. In the present study, etiological factors operating during the perinatal period comprise the major portion in 22 (44%) of the cases, followed by antenatal 11(22%) mixed 9 (18%) postnatal 7(14%) and unknown is 1(2%).*

**Keywords:** cerebral palsy, antenatal factors, perinatal factors, postnatal factors.

## INTRODUCTION

Cerebral palsy is a disorder of movement and posture that result from a non progressive lesion or injury of the immature brain. The definition includes a heterogeneous spectrum of clinical syndromes characterized by alteration in muscle tone, deep tendon reflexes, primitive reflexes and postural reaction. These neurological abnormalities often produce characteristic abnormal patterns of movement that are recognized as the hallmarks of cerebral palsy<sup>(1)</sup>. American academy of cerebral palsy arbitrarily fixed upper age limit

as 5 years (aacp. Upper age limit) internet. Cerebral palsy result from CNS injury sustained in early period of brain development usually defined as the first 3 to 5 years of life<sup>(2)</sup>.

For understanding patterns of origins and lesions within the cerebral palsy concept one has to consider fetal brain development, which occurs stepwise in bounded time sequence<sup>(3)</sup>. During development, brain structures are in a differential hectic stage of maturational progress, cellular, vascular, myelinating and so on. and are then temporarily and selectively more vulnerable. The

timing of adverse events to the brain determines the anatomical localization and type of lesion and thus the final neurological picture. Of importance to infants born preterm is the well recognised fragility of the periventricular watershed area in the 26-36<sup>th</sup> week of brain development with the high risk of periventricular hemorrhage and leucomalacias. On the other hand, of importance to term infant is the vulnerability of cortical sub-cortical structures, and the sensitivity of the basal ganglia, thalamus and brain stem to sudden dramatic birth asphyxia with extreme oxygen deprivation and total circulatory arrest. The site of lesion differs depending on the stage of brain development at the time of cerebral insult<sup>(3,4)</sup>.

Despite earlier optimism that cerebral palsy was likely to disappear with the advent of improvements in obstetric and neonatal care, there has apparently been no consistent decrease in its frequency in the past decade or two, since cerebral palsy is a continuing problem, it is important to consider its causes, the proportion of the total number of cases attributable to the known etiological categories, and the possibility that factors not yet explored may contribute to its development<sup>(5)</sup>.

### Current Trends

In contrast with little's day, we are fortunate in now having available the techniques for early identification and tools for early intervention which may enable survivors, even those with severe involvement, to develop. Some independent function with increasingly expanded to include multiple professionals instead of early orthopaedic approach. All of whom must deal with the array of needs of the developmentally disabled child and eventually make their contribution to society.

So the study of cerebral palsy demands a lot of attention and needs utilization of modern diagnostic tools like ultrasonography, CT Scan, MRI, etc. to illuminate the dark areas of knowledge regarding cerebral palsy<sup>(6)</sup>.

### AIMS AND OBJECTIVES

To analyse the predisposing factors, that have lead to the cerebral palsy in perinatal and postnatal period, in those patient who are admitted in government general hospital, basaveswar teaching & general hospital, Gulbarga attached to M.R medical college, Gulbarga.

### MATERIALS AND METHODS

In this study of cerebral palsy in children, patients of the age group of 0 to 12 were taken, 50 consecutive cerebral palsy patients attending to government general hospital, basaveswar teaching & general hospital, Gulbarga attached to M.R medical college, Gulbarga were included in this study over a period of two years from march 2001 to march 2003.

A Detailed history including antenatal, perinatla, post natal and developmental history along with past obstetrical history and associated handicaps were taken and clinical examination with particular emphasis on neurological examination were done, necessary investigations were done in each patients. Children more than 12 years age with cerebral palsy and in those with no clear history of perinatal events are excluded.

### RESULTS

A total of 50 patients were examined and diagnosis of cerebral palsy was established on clinical grounds. The various findings of the present study are as follows.

**Table 1:-** Age distribution of patients

| Age group                        | No.of cases | Percentage |
|----------------------------------|-------------|------------|
| Less than one year               | 4           | 8          |
| One year one month to 5 years    | 26          | 52         |
| 5 years I months to 10 years     | 18          | 36         |
| More than 10 years (10-12 years) | 2           | 4          |
| Total                            | 50          | 100        |

Maximum or about half of the total patients i.e 26 (52%) studied were in the age of one to 5 years, more than one fourth of the total patients in this study are of age 5 to 10 years i.e 18(36%). 4 cases (8%) were in the age of less than one year and in

the age group of 10 to 12 years, there were only 2 (4%) cases.

**Table-2** Sex Distribution

| Sex    | No.of cases | percentage |
|--------|-------------|------------|
| Male   | 36          | 72         |
| Female | 14          | 28         |
| Total  | 50          | 100        |

Out of 50 patients in the study 36 (76%) were male and 14 (28%) were females, showing a male predominance. In this study, the male: female ratio is 2.5:1.

**Table -3** Etiological factors

| Etiological factors | No.of cases | percentage |
|---------------------|-------------|------------|
| Antenatal           | 11          | 22         |
| Perinatal           | 22          | 44         |
| Postnatal           | 7           | 14         |
| Mixed               | 9           | 18         |
| Unknown             | 1           | 2          |
| total               | 50          | 100        |

**Table -4** antenatal factors

|                                        |    |    |
|----------------------------------------|----|----|
| Maternal age <20 or 30> years          | 28 | 56 |
| Toxemia                                | 5  | 10 |
| Bleeding                               | 3  | 6  |
| Infection (torch) and other with fever | 3  | 6  |
| Trauma                                 | 2  | 4  |
| Drugs                                  | -  | -  |
| Others (PIH)                           | 4  | 8  |

**Table -5** prenatal factors

| Perinatal factors                     | No.of cases | percentage |
|---------------------------------------|-------------|------------|
| Birth asphyxia                        | 33          | 66         |
| Prolonged 2 <sup>nd</sup> stage labor | 20          | 40         |
| Prematurity                           | 9           | 18         |
| Low birth weight                      | 15          | 30         |
| Forceps delivery                      | 3           | 6          |
| Twins                                 | 1           | 2          |

**Table-6** postnatal factors

| Post natal factors                     | No.of cases | Percentage |
|----------------------------------------|-------------|------------|
| Neonatal jaundice                      | 4           | 8          |
| Tb meningitis                          | 1           | 2          |
| Pyogenic meningitis                    | 1           | 2          |
| Others (encephalopathy or convulsions) | 1           | 2          |

In the present study, etiological factors operating during the perinatal period comprise the major portion in 22 (44%) of the cases, followed by antenatal 11(22%) mixed 9 (18%) postnatal 7(14%) and unknown is 1(2%).

### Antenatal factors

**Genetic factors-** there was one case with family history of cerebral palsy in our study.

**Table-7** Maternal age at birth of patients

| Maternal age       | No.of cases | percentage |
|--------------------|-------------|------------|
| Less than 20 years | 16          | 32         |
| 20-30 years        | 22          | 44         |
| More than 30 years | 12          | 24         |

In our study the age of mother at the time of delivery was less than 20 years in 16 (32%) cases, in 22(44%) cases, the age was 20 to 30 years and in 12 (24%) cases, the age was more than 30 years in cases of cerebral palsy.

**Table-8** Order of birth of the affected child

| Order of birth                     | No. of cases | percentage |
|------------------------------------|--------------|------------|
| First                              | 23           | 46         |
| 2 <sup>nd</sup> to 4 <sup>th</sup> | 20           | 40         |
| 5 <sup>th</sup> and above          | 7            | 14         |

The order of birth in the present study is 23 (46%) was found in first born, 20(40%) of cases were delivered as 2<sup>nd</sup>, 3<sup>rd</sup> or 4<sup>th</sup> child and 7 (14%) cases were 5<sup>th</sup> and above born child.

### Outcome of previous pregnancy

A history of previous stillborn/ IUD was present in four mothers. Thus, the incidence of previous reproductive casualties were 8% .

### Maternal infection

A history of fever lasting for more than one week was available in 3 instances, retrospective diagnosis of these infections are toxoplasmosis in one case and did not yield in other 2 cases.

**Table-9** Pre-eclamptic toxemia and antepartem hemorrhage

|                       | No.of cases | percentage |
|-----------------------|-------------|------------|
| Pre eclamptic toxemia | 5           | 10         |
| Ant partum hemorrhage | 3           | 6          |

In the present study 5 (10%) mothers had history of pre eclamptic toxemia and 3 (6%) had history of antepartem hemorrhage.

**Perinatal factors**

**Table-10** Distribution of Perinatal factors

| Perinatal factors |           | No.of cases | percentage |
|-------------------|-----------|-------------|------------|
| Birth asphyxia    |           | 33          | 66         |
| Abnormal labor    | prolonged | 20          | 40         |
|                   | assisted  | 3           | 6          |
|                   | forceps   | 1           | 2          |
| LSCS              |           | 1           | 2          |
| Prematurity       |           | 9           | 18         |

Asphyxia, presumptive diagnosis of birth asphyxia based on early neonatal events like delayed cry, cyanosis, limpness was obtained in 33 (66%) of cases.

Abnormal labor: in 40 % of case s, labor is prolonged and in one case (2%) it is LSCS.

Prematurity: in 9 (18%) of total cases it was retrospectively diagnosed as premature taking into accout gestational period and size of the baby at birth, as birth weight could not be accurately reported by the parents.82% were born at term.

Birth trauma: in our study, no cases of birth trauma was noted.

**DISCUSSION**

The present study of cerebral palsy was conducted to determine the clinical profile and predisposing factors. This study includes 50 consecutive cases of cerebral palsy in the age group of 0-12 years admitted to government general hospital, basaveshwar teaching & general hospital and sangameshwar hospital, Gulbarga attached to M.R medical collge, Gulbarga during the period from march 2001 to march 2003.

**Table-10** Age distribution

| Age                | Present study no. and percentage | Sharma et al no. and percentage |
|--------------------|----------------------------------|---------------------------------|
| Less than one year | 4(8)                             | 42(19.2)                        |
| 1-5 years          | 26(52)                           | 113(51.6)                       |
| 5-10 years         | 18(36)                           | 52(23.7)                        |
| More than 10 years | 2(4)                             | 12(5.5)                         |

In our study the maximum number of patients were in the age group of 1-5 years i.e 26 (52%) and 5-10 years 18 (36%). in the study by Sharma<sup>(7)</sup> et al, similar findings where in 51.6% were in the age group of 1-5years. This is because, during

this period developmental retardation becomes more and more obvious and parent become worried and the child is brought to the hospital.

**Table-11** Sex

| Study               | Male |            | female |            |
|---------------------|------|------------|--------|------------|
|                     | No.  | percentage | No.    | percentage |
| Garge et al (1965)  | 74   | 59.7       | 50     | 40.3       |
| Misra et al (1973)  | 39   | 62.9       | 23     | 37         |
| Sharma et al (1981) | 150  | 68.5       | 69     | 31.5       |
| Present study       | 36   | 72         | 14     | 28         |

A high incidence of the male sex has been reported by garg<sup>(8)</sup> et al, misra<sup>(7)</sup> et al and Sharma<sup>(7)</sup> et al and are consistent with our findings.

**Table-12** Etiology

| Study               | Antenatal(%) | Perinatal (%) | Postnatal(%) | Mixed (%) | Unkown(%) |
|---------------------|--------------|---------------|--------------|-----------|-----------|
| Udani pm (1963)     | 36           | 33            | 46           | 15        | -         |
| Sharma et al (1981) | 6.9          | 64.4          | 20.1         | -         | -         |
| Misra et al(1973)   | 22.6         | 37.1          | 25.8         | 6.4       | 8.1       |
| Present study       | 22           | 44            | 14           | 18        | 2         |

The distribution of etiological factors according to period of their operation shows that antenatal factors are involved in 22 % perinatal in 44% cases, 14% in post natal and mixed i.e antenatal and perinatal factors in 18% in the present study. Our findings are consistent with those of the study done by misra<sup>(7)</sup> et al. In Sharma<sup>(7)</sup> et al , the majority of cases were due to perinatal factors and in udani<sup>(9)</sup> pm study, majority were due to post natal factors.

**Antenatal factors**

Genetic factors- misra<sup>(7)</sup>et al ,Sharma<sup>(7)</sup> and udani<sup>(9)</sup> quoted 2,3 and 6 cases with family history of cerebral palsy respectively. There was one case with family history in our study.

Maternal age at birth of patients- in our study,44% of mothers delivered the affected child at 20-30 years and 245 mothers delivered the affected child after 30 years and 32% before 20 years of age.

Garg<sup>(8)</sup> et al reported that 20.2% of children were born to mothers below 20 years of age, 50.8% mothers were in the age between 20-30 years, 25

were above 30 years and 4% to mothers above 40 years of age.

The high incidence of 44% during 20-30 years may be because of common fertility age.

Order of birth- order of birth of the affected child, mother delivered the affected child as first born in 23 (46%) cases in our study and is consistent with those of udani pm<sup>(9)</sup> (40%). There was no relation between birth order and incidence of cerebral palsy.

Outcome of previous pregnancies- the incidence of previous reproductive casualties was 4(8%) cases in our study . udani gives a figure of 3%

Maternal infection – in our study of fever lasting for more than one week was available in 3 instances, restrospective diagnosis of these infection, one case is toxoplasmosis, other 2 cases did not yield cause. Udani pm<sup>(9)</sup> reported in 10 cases, garg<sup>(8)</sup> et al has quoted 2 cases of maternal tuberculosis.

Pre eclamptic toxemia and antepartum hemorrhage- in our study, PET was present in 5 (10%) of cases and APH in 3(6%). Garge<sup>(8)</sup> et al found PET in 16.9% and bleeding during pregnancy in 11.3% of mother.

**Table-13** Perinatal factors

| Study             | Prematurity (%) | Malpresentation (%) | Abnormal labor |          |       | Birth asphyxia (%) |
|-------------------|-----------------|---------------------|----------------|----------|-------|--------------------|
|                   |                 |                     | Prolonged      | assisted |       |                    |
|                   |                 |                     |                | Forceps  | LS CS |                    |
| Udani pm (1963)   | 9               | 4                   | 24             | -        | -     | 25                 |
| Garg et al (1965) | 35              | 12.1                | 15.3           | 3.2      | 1.6   | 28.2               |
| Manchanda (1963)  | 27              | -                   | -              | 4        | -     | 66.9               |
| Present study     | 18              | -                   | 40             | 6        | 2     | 66                 |

In our study perinatal is 66% and post natal is 14%. In the study by srivastava<sup>(10)</sup> et al (1992), post natal was 26.1 and garg<sup>(8)</sup> et al reported 25%. Prematurity- hagberg B and hagberg<sup>(3)</sup> G reported 68% of their diplegics were born preterm. In our study diplegics were born preterm in 80%. Our findings of 18% premature is comparable to the findings of manchanda<sup>(11)</sup> and garg<sup>(8)</sup> et al . A high

incidence of prematurity is seen in diplegics. This association is due to

- a) the fact that certain periventricular vascular structures make this region (periventricular of the preterm infant particularly vulnerable to brain ischemia)
- b) the pressure –passive cerebral circulation of preterm of infants, particularly when sick and generally depressed in state.
- c) the enhanced vulnerability of the actively differentiating and /or myelinating periventricular glial cells.

Malpresentation- in our study no case is found, which can be compared to manchanda.

Abnormal labour- in our study 48% cases were of abnormal labor, garg<sup>(8)</sup> et al reported 33% of abnormal labor cases.

In our study, history of forceps application is in 6%, which is higher than the reports of manchanda<sup>(11)</sup> and garg<sup>(8)</sup> et al . history of LSCS was present in 2% which is comparable to garg<sup>(8)</sup> et al (1.6%). The fact that delivery was abnormal does not prove that it was the cause of cerebral palsy.

Asphyxia- presumptive diagnosis of birth asphyxia was obtained in 33(66%) of our cases. Garg<sup>(8)</sup> et al reported 28.2% and manchanda<sup>(11)</sup> 66.9% which is comparable with our study.

Thus most of the perinatal factors, except genetic and birth trauma appear to play a significant role in the genesis of cerebral palsy often simultaneously and/or inter dependently operating in the same patient.

Our study findings were in consistent with manchanda, which gives a high incidence of birth asphyxia as 66.9%. lower figures can be ascribed to improved neonatal care.

**CONCLUSIONS**

The present study includes 50 consecutive cases of cerebral palsy admitted to government general hospital, basaveshwar teaching & general hospital and sangameshwar hospital, Gulbarga attached to M.R medical college, Gulbarga during the period from march 2001 to march 2003. From the analysis of the result of the above case studied,

following conclusion can be drawn -majority of the cerebral palsy i.e 52% cases were between the age group of 1-5 years. the incidence of cerebral palsy was more in males than in females with a male to female ratio of 2.5:1. the etiological factors responsible for thr development of cerebral palsy are perinatal (44%) antenatal (22%) and postnatal (14%) 2% of cases were having positive family history.

With these findings, we can conclude that if we prevent the common etiological factors, we could help in the effective implementation of RCH programme. With the advent of above mentioned newer investigation techniques, we can diagnose the cerebral palsy cases at the earliest age and decrease in the limitation of the children activity. This could help individually and also the socity by which they can be a part in many fronts in the development of our nation in particular and the world community in general.

#### BIBLIOGRAPHY

1. Pediatric rehabilitation by Gabriela molnar, 2<sup>nd</sup>edn, chap,11;p.193-217.
2. PCNA, june 1993;vol.40;no.3.
3. Hagberg b, hagberg g,in : “recent advances in ped”, 11:p.67-84.
4. Volpe’s neurology of the newborn, 3<sup>rd</sup>edn, p-266.
5. Nelson kb, ellenberg jh, antecedents of cerebral palsy: multivariate analysis of risks” new engl.j med. 1986; 315;81-86.
6. Alfrd l scherzer, Ingrid tscharmnuter,early diagnosis and therapy in cerebral palsy,2<sup>nd</sup> edition, p.8,10.12.
7. Misra pk, Sharma b,” cerebral palsy; a clinical study”, archives of child health, july 1973:183-189.
8. Garg bk and srivastava jr, “cerebral palsy : a clinical study of 124 cases with a review”. Ind, ped, 1965:195-206.
9. Udani pm,” cerebral palsy: a study of 100cases”, ind. jr.child health, 1963;12: 755-770.
10. Srivastava vk, laisram n, srivastava rk, “cerebral palsy”, Indian pediatri 1992;29:993.
11. Manchanda s, “cerebral palsy: a review of 275 cases”, ind. Jour of child health, 1963, ijch12;1:1963.