

# Association between Risk Factors & Cerebral Palsy and Prevalence of its Different Types

AQSA GHAZAL<sup>1</sup>, SARFRAZ AHMAD<sup>2</sup>, SYEDA RAHAT<sup>3</sup>, SYEDA BUSHRA<sup>4</sup>

<sup>1</sup>DPT Physiotherapist (CH & ICH),

<sup>2</sup> Assistant Professor, Department of Physical Medicine & Rehabilitation,

<sup>3</sup> Physiotherapist Department of Physical Medicine & Rehabilitation, The Children's Hospital & Institute of Child Health, Lahore,

<sup>4</sup> Physiotherapist

Correspondence to: Dr. Aqsa Ghazal, Email: aqsamushraq287@gmail.com Cell: 03328462445

## ABSTRACT

**Background:** Cerebral palsy is a group of disorders relating to motor development due to non-progressive lesion of developing brain.

**Aim:** To find out different types of cerebral palsy, major risk factors and its association with cerebral palsy and to establish the importance of regular prenatal follow up in mother care centers on regular basis and to take early intervention to minimize risk factors.

**Study Design:** consecutive study

**Place and Duration of Study:** The Department of Physical Medicine & Rehabilitation (PM&R) of the Children's hospital & ICH Lahore from December 2018 to March 2019.

**Methodology:** We selected 120 patients of abnormal tone, posture and movement those were clinically diagnosed as cerebral palsy in this study. Data was collected from mothers of cerebral palsy children through a questionnaire consisting of variables of interest like birth history (prenatal, perinatal and post-natal factors) affecting the development of brain and association was found between major risk factors and cerebral palsy.

**Results:** One hundred and twenty cerebral palsy children with mean age 3.6 years and standard deviation was 1.7 included in our study. Of them 82 (68.3%) were male and 38 (31.6%) were female, 56 (46.6%) were delivered through C-Section and 64 (53.3%) children were delivered by SVD.

**Conclusion:** Major risk factors had significant association with cerebral palsy and regular prenatal checkups has great impact in reducing ratio of risk factors in CP. Spastic type of CP was found to be dominant 75%.

**Keywords:** Cerebral palsy, risk factors, department of PM&R, spastic cerebral palsy

---

## INTRODUCTION

Cerebral palsy (CP) is a disorder of movement control and posture resulting from a non- progressive lesion to an immature brain, occurring in utero, near the time of delivery or within the first 3 years of life<sup>1</sup>. Almost 2 to 3 out of every 1000 children have Cerebral palsy making it most common neurodevelopment motor disability in children. In United States, every year approximately 278 infants as diagnosed as cerebral palsy. Cerebral palsy is a clinical syndrome with a variety of prenatal, perinatal and post-natal risk factors. Evidence suggests that prenatal factors results in 70-80% of cases of CP<sup>2,1</sup>. During the prenatal period, abnormal development may occur at any time. The prenatal risk factors include abnormal brain growth, intra cranial bleed, intrauterine growth restriction and maternal infection such as (rupture of placental membrane, foul amniotic fluid and viral maternal infection<sup>3</sup>). The perinatal risk factors include prematurity, hypoxia, birth weight <2500g, asphyxia<sup>4</sup>, kernicterus and meningoencephalitis. In premature infants, the immaturity of brain cells and cerebral vasculature would explain the significance of prematurity as a risk factor for cerebral palsy<sup>5,4</sup>. The essential diagnostic sign of cerebral palsy is motor deficit causing ambulation delay or dysfunction and difficulty in self-care activities. The associated symptoms of cerebral palsy may be mental retardation, seizure disorder, locomotor dysfunction, visual, hearing and pulmonary problems. Cerebral palsy is classified on the type of neuromuscular

deficit into spastic (quadriplegic, diplegic, and hemiplegic), ataxic, dyskinetic, hypotonic and mixed<sup>6</sup>.

## SUBJECT AND METHODS

This study was conducted at the department of Physical Medicine & rehabilitation (PM&R) in The Children Hospital & ICH Lahore over a period of three months from January 2019 to March 2019. Informed consent was taken from parents or attendants to take data for research purpose after taking informed consent and approval from ethical committee. In this study, 120 patients of cerebral palsy with age between 1 to 7 years having, and whose parents gave informed consent were included in this study. These patients were diagnosed by taking detailed history from mothers of cerebral palsy children with help of Performa including different variables (mode of delivery, term of pregnancy, birth weight, gender, birth asphyxia, parity, maternal infection during pregnancy, meningoencephalitis, kernicterus, consanguinity, neonatal seizures, malnutrition, trauma during pregnancy and home and Dai assisted deliveries) were included. With the help of detailed history, development and neurological examination, the children were classified according to motor disorder into spastic (quadriplegic, diplegic, and hemiplegic), ataxic, dyskinetic, hypotonic and mixed type of CP. All qualitative variables were presented as frequencies and percentages and quantitative variables were presented as mean and standard deviation. Chi square is used to find association between major risk factors and cerebral palsy and P value <0.05 was considered significant.

Received on 03-02-2019

Accepted on 15-06-2019

## RESULTS

Table 1: Birth history and risk factors

Factors		F	Percentage
Mode of delivery	SVD	64	53.3
	LSCS	56	46.6
Term of pregnancy	Full Term	75	62.5
	Preterm	45	37
Place of delivery	Dai	4	3.3
	Home	13	10.8
	Hospital	103	85.8
Birth weight	Normal	53	44.1
	Low birth weight	74	61.6
<b>RISK FACTORS</b>			
Gender	Male	82	68.3
	Female	38	31.6
Birth asphyxia		73	60.8
Parity	Nuliparous	44	36.6
	Multiparous	76	63.3
Mother age	20-30 years	43	35.8
	30-40 years	77	64.1
Maternal infection during pregnancy		80	66.6
Meningoencephalitis		48	40
Kernicterus		38	31.6
consanguinity		78	65
Neonatal seizures		40	33
Malnutrition		20	16
Trauma during pregnancy		2	1.6
Home and dai assisted deliveries		2	1.6

Table 2: Types of CP according to neuromuscular deficit<sup>26</sup>

Types	F	percentage	Sub types	F	Percentage
Spastic	90	75	Quardiparesis	22	24.4
			Hemiparesis	32	35.5
			Diplelegic	36	40
Ataxic	10	8			
dyskinetic	13	16			
Hypotonic	2	2			
Mixed	2	2			

Table 3: Major Predisposing Factors

Factors	Risk factor present	Risk factor Not present	P-Value
Low Birth weight	74	46	<0.05
Male Gender	82	38	<0.05
Birth asphyxia	73	47	<0.05
Multiparous Parity	76	44	<0.05
Maternal infection during pregnancy	80	30	<0.05
consanguinity	78	42	<0.05

In our study 120 cerebral palsy children with mean age 3.6 years and standard deviation was 1.7 included. It was seen in our study showing in Table 1 that 103 (85.8%) children were delivered in hospital 13(10.8%) were delivered at home and 4 (3.3%) were delivered by Dai. Sixty four (53.3%) children were delivered by SVD and 56 (46.6%) were delivered through C-Section. Majority of children 75(62.5%) born at FT and 45 (37%) born preterm. Male were 82(68.3%) and 38(31.6%) were female. Significant association was found between male gender and cerebral palsy (P<0.05). Mothers of 76(63.3%) CP children were multiparous and 44(36.6%) were nuliparous and strong association was found between multiparity and CP (P<0.05)<sup>7</sup>. Risk factors profile of CP children vary by maternal age and there is greater frequency of CP with increased maternal age<sup>8</sup>. History of maternal infection during pregnancy seen in 80 (66.6%) cases and significant

association was found between maternal infection and CP (P<0.05)<sup>9,1</sup>. History of birth asphyxia was present in 73 (60.8%) and significant association was found between birth asphyxia and CP (P<0.05). Low birth weight was seen in 74(61.6%) and significant association was found between low birth weight and CP (P<0.05).

In our study 20(16.6%) CP children were malnourished and 2(1.6%) has H/O of trauma during pregnancy and 40(33.3%) were have H/O of neonatal seizures. Other risk factors including meningoencephalitis, kernicterus were seen in 48(40%), 38(31.6%) respectively<sup>10</sup>.

The results of our study provide some evidence of genetic aetiology in CP. Children have H/O consanguinity were 78(65%) and significant association was found between consanguinity and CP (P<0.05)<sup>11</sup>.

## DISCUSSION

In our study 120 cerebral palsy children with mean age 3.6 years and standard deviation 1.7 were included. It was seen in our study, 103 (88.8%) children were delivered in hospital, 13 (10.8%) were delivered at home and 4 (3.3%) were delivered by Dai. Sixty four (53.3%) children were delivered by SVD and 56 (46.6%) were delivered through C-Section. Most of C-section deliveries were due to prolonged labour, premature rupture of membranes and foetal distress<sup>12,2</sup>. Majority of children 75 (62.5%) were born at FT and 45 (37%) born preterm. Majority of cases 75 patients, born FT had an antenatal or other cause. In other 45 (37%) children who born preterm, had combination of sequences of antenatal and prenatal risk factors as most likely cause of CP<sup>13,12</sup>. Male dominance was seen in our study and 82 (68.3%) CP children were male and 38 (31.6%) were female. Significant association was found between male gender and cerebral palsy ( $P < 0.05$ )<sup>14</sup>. Mothers of 76 (63.3%) CP children were multiparous and 44 (36.6%) were nulliparous and strong association was found between multiparity and CP ( $P < 0.05$ ). History of maternal infection during pregnancy was seen in 80 (66.6%) cases and significant association was found between maternal infection and CP ( $P < 0.05$ ). History of birth asphyxia was present in 73 (60.8%) and significant association was found between birth asphyxia and CP ( $P < 0.05$ ). Low birth weight was seen in 74 (61.6%) and significant association was found between low birth weight and CP ( $P < 0.05$ ) as shown in Table 3. Different explanations can be suggested for this association; first, low birth weight and cerebral palsy is an epiphenomenon; secondly, intrauterine growth retardation causes those conditions which are responsible for brain damage; thirdly, growth restriction and low birth weight makes child more vulnerable to hypoxia and finally brain damage and low birth weight results in malformation or viral infection<sup>15</sup>.

In our study 20 (16.6%) CP children were malnourished and 2 (1.6%) had H/O of trauma during pregnancy and 40 (33.3%) had H/O of neonatal seizures. Other risk factors including meningoencephalitis, kernicterus were seen in 48 (40%), 38 (31.6%) respectively<sup>16</sup>.

The results of our study provide some evidence of genetic aetiology of CP 78 (65%) CP children have H/O consanguinity and significant association was found between consanguinity and CP ( $P < 0.05$ ) consanguinity is a social issue which leads to be addressed by govt and there is need for awareness to education, health care advisors and social marketing campaigns.

Our study reveals the need for regular prenatal checkups to decrease the ratio of risk factors of CP. Mothers should be educated for the importance of their visit maternal care centers for mothers and babies health<sup>4</sup>.

## CONCLUSION

Major risk factors including low birth weight 74 (61.6%), male gender 82 (68.3%), birth asphyxia 73 (60.8%), multiparity 76 (63.3%), maternal infection during pregnancy 80 (66.6%) and consanguinity 78 (65%) had significant

association with cerebral palsy and regular prenatal follow-up has great impact in reducing ratio of risk factors in CP<sup>17</sup>.

Spastic type of CP was found to be dominant 75%, of which diplegia (40%) is dominant followed by hemiplegia (35.5%) and quadriplegia (24.4%). Other types of CP included dyskinetic, ataxic, hypotonic and mixed.

## REFERENCES

- Martin Diamond, Michael Armento. Children with Disabilities. In: Joel A. DeLisa, Bruce M. Gans, editors. Physical Medicine & Rehabilitation. 4th edition. Philadelphia: Lippincott Williams & Wilkins; 2004. 1513-1514.
- Molnar GE. Cerebral palsy. In: Molnar GE, editor: Paediatric Rehabilitation. Baltimore: Williams & Wilkins; 1985: 481-492.
- Nelson KB, Blair E. Prenatal Factors in Singletons with Cerebral Palsy Born at or near Term. *N Engl J Med*. 2015 Sep 3;373(10):946-53. doi: 10.1056/NEJMra1505261.
- Egharevba OI, Kayode-Adedeji BO, Alikah SO. Perinatal asphyxia in a rural Nigerian hospital: Incidence and determinants of early outcome. *J Neonatal Perinatal Med*. 2018;11(2):179-183. doi: 10.3233/NPM-1759.
- Ingeborg Forthun, Allen J Wilcox, Katrine Strandberg-Larsen, Dag Moster, Ellen A Nohr, Rolv Terje Lie, Pål Surén, Mette C Tollånes. Maternal Prepregnancy BMI and Risk of Cerebral Palsy in Offspring. *Pediatrics*. 2016 Oct; 138(4): e20160874. doi: 10.1542/peds.2016-0874.
- Edwin Dias, Akshay Dias. Cerebral palsy: A brief review. *Acad J Pediatr Neonatol*. August 2017; 4(1). DOI: 10.19080/AJPN.2017.03.555687.
- Srinivasa Rao Tatavarti, Vidyullatha Arimilli. Subbalakshmi T.D.P. "Cerebral Palsy: Antenatal Risk Factors". *Journal of Evolution of Medical and Dental Sciences* 2015; 4(37), 6512.
- Schneider RE, Ng P, Zhang X, Andersen J, Buckley D<sup>4</sup>, Fehlings D. Kirton A et al. The Association Between Maternal Age and Cerebral Palsy Risk Factors. *Pediatr Neurol*. 2018 May;82:25-28. doi: 10.1016/j.pediatrneurol.2018.01.005.
- Yuan J, Wang J, Ma J, Zhu D, Zhang Z, Li J. Paediatric cerebral palsy prevalence and high-risk factors in Henan province, Central China. *J Rehabil Med*. 2019 Jan 1;51(1):47-53. doi: 10.2340/16501977-2486.
- Prosper OU Adogbo, Chika F Ubajaka, Nonye B Egenti, Amara MJ Obinwa, Wilson C Igwe. Evaluation of risk factors of cerebral palsy in a tertiary health facility, Nnewi, Nigeria: a case-control study. *IJMSPH*. 2015 August 15;5 (01): 109-114.
- Areeb Sohail Bangash, Muhammad Zaid Hanafi, Rabia Idrees, Nosheen Zehra Risk factors and types of cerebral palsy. *J Pak Med Assoc*. Jan 2014;64(1):103-7.
- Philips J. Steer. Peter Danielian. Fetal Distress in Labor. In: D.K. James, P.J. Steer, C.P. Weine, B. Gonik. High Risk Pregnancy Management Options. Third edition. Philadelphia: Elsevier Saunders; 2006. p.1450-1471.
- Baig S A, Khan N, Fatima A, Karim SA: Preterm birth and its associated risk factors, *J Pak Med Assoc*. 2013;63(3): 414-8.
- Suzanna C. Thompson, Jozef Gecz, Cerebral palsy: causes, pathways, and the role of genetic variants. *AJOJ*. December 2015;213(6):779-788. DOI: 10.1016/j.ajog.2015.05.034.
- Oskoui M, Coutinho F, Dykeman J, Jetté N, Pringsheim T An update on the prevalence of cerebral palsy: a systematic review and meta-analysis. *Dev Med Child Neurol*. 2013 Jun; 55(6):509-19. doi: 10.1111/dmcn.12080. Epub 2013.
- Michael V, Johanston. Encephalopathies. In: Robert M. Kliegman, Bonita F. Stanton. Nelson textbook of Pediatrics. 19th edition. Philadelphia: Elsevier Saunders; 2011. p.573-574.
- Bangash AS, Hanafi MZ, Idrees R, Zehra N. risk factors and types of cerebral palsy. *J Pak Med Assoc*. 2014 Jan;64(1):103-107.

