

Risk Factors of Cerebral Palsy Among Term Baby Attended at Crp: A Case Control Study

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ABSTRACT

Introduction: Cerebral palsy (CP) is one of the leading causes of chronic childhood disability, especially in developing countries where healthcare resources are limited.

Objectives: This study aimed to identify risk factors associated with CP among term-born infants in Bangladesh.

Methodology: An unmatched case-control design was used, including 30 term-born children with CP and 30 healthy term-born controls attending the Centre for the Rehabilitation of the Paralyzed (CRP). Data were collected via structured interviews with mothers, covering socio-demographic factors, antenatal history, intrapartum events, and postnatal complications. Odds ratios (OR) with 95% confidence intervals (CI) were calculated to measure associations.

Results: It showed significant associations between CP and birth asphyxia (OR=74.55, CI=4.16–1335.5), birth injury (OR=12.42, CI=1.44–101.49), and neonatal jaundice/convulsions (OR=19.46, CI=1.05–358.40). Hospital delivery was also significantly associated (OR=6.00, CI=1.48–24.29). Maternal age below 25 years, consanguineous marriage, and history of miscarriage showed elevated risk but were not statistically significant. These findings highlight the urgent need to improve obstetric care, prevent birth trauma, ensure timely management of asphyxia, and strengthen neonatal care services.

Conclusion & Recommendation: Early detection and intervention programs are crucial to minimize long-term disability and improve quality of life for children at risk.

CHAPTER-I

Introduction

Cerebral Palsy (CP) is recognized as one of the most common causes of chronic childhood disability globally, with a frequency ranging between 1.4 and 2.7 per 1,000 live births. This lifelong neurological motor disorder is a major public health issue, imposing a huge psychological, emotional, financial, and social burden on families. In Bangladesh, the overall prevalence of disability is estimated to be high, with one study finding a prevalence of 5.6. The estimated prevalence of CP specifically is up to 3.7 per 1,000 children in the country.

Historically, preterm delivery was a well-established risk factor for CP, and intervention efforts have led to a decline in CP rates among preterm infants. However, recent decades have seen an increase in the number of children with CP born at term (after 37 weeks of gestation), despite advances in obstetric and

neonatal care. Term-born children with CP often tend to be more severely impaired than their preterm counterparts. The causes and pathology of CP in term newborns are distinct from preterm infants; for instance, brain maldevelopments and gray matter lesions are more commonly seen in term-born CP infants.

The core issue addressed by this thesis is the significant gap in knowledge regarding the risk factors of cerebral palsy among term babies in Bangladesh, as no previous study had explored this specific area. Identifying these risk factors is crucial for developing evidence-based preventive and management strategies to minimize the suffering associated with this chronic condition.

Research Objectives:

The General Objective of the study was to identify possible risk factors associated with cerebral palsy among term babies.

The Specific Objectives were:

- To explore socio-demographic characteristics of patients with cerebral palsy.
- To find out maternal factors and cerebral palsy.
- To explore the association between intrapartum factors and development of cerebral palsy.
- To identify the association between antenatal, natal, and postnatal factors and development of cerebral palsy.

Operational Definitions

- Key variables were operationally defined for the study:
- Full Term Baby: Born after 37 weeks up to 40 weeks, 6 days.
- Normal Birth Weight: Approximately 2700 to 4000 grams (6 to 9 pounds).
- Birth Injury: Damage or injury to the child before, during, or just after the birthing process.
- Neonatal Convulsion: A clinical diagnosis of a convulsion during the neonatal period in the absence of metabolic disorder.
- Hyperbilirubinemia: A maximal bilirubin level greater than 10 mg.

CHAPTER-II

Literature Review

Cerebral palsy is defined as a non-progressive chronic disorder of movement and posture caused by damage to the developing brain before, during, or after birth (prenatally, perinatally, or neonatally). While the brain lesion itself is non-progressive, the functional manifestations (motor control, balance, posture) may change over time. The etiology is diverse and multifactorial.

The literature review summarizes key epidemiological data and known risk factors:

Global Prevalence: The overall prevalence of CP is reported to be around 2.0 to 2.5 per 1,000 live births in large databases like the Australian Cerebral Palsy Register (ACPR).

Sex Ratio: A male-to-female ratio of 1.5:1 is commonly observed in the CP population.

Term vs. Preterm CP: Although preterm birth is a major risk factor, the majority of births (93%) occur at term, suggesting between 120,000 and 217,600 new cases of CP occur each year in term babies globally.

Etiological Factors: Traditionally, it was assumed that most CP was caused by fetal trauma or asphyxia during birth. However, modern consensus suggests that birth-related events contribute to only a minority of cases, with over 70% resulting from the disruption of normal brain development before birth.

Specific Antenatal Factors Identified in Other Studies: Maternal anemia, hypertension, preeclampsia, eclampsia, antepartum hemorrhage, and multiple births have been identified as risk factors. Maternal infection is also noted to double the risk of CP in both term and preterm infants.

Postnatal Factors: Factors like neonatal asphyxia and birth trauma/injury are known risk factors. Severe birth events like uterine rupture or cord prolapse, though only accounting

for a minority of cases, are noted as “sentinel events”. Hyperbilirubinemia (jaundice) is also associated with CP.

The review highlights that while 80% of families do not know the cause of their child’s CP, the brain damage is estimated to occur antenatally, intrapartum, or neonatally in 80–90% of cases.

CHAPTER-III

Methodology

Study Design and Setting

The study utilized an unmatched case-control study design to investigate the association between risk factors (exposure) and the development of cerebral palsy (disease) among term babies.

Study Site: The Center for the Rehabilitation of the Paralyzed (CRP).

Study Period: The thesis was submitted in November 2016.

Study Population: Children born at term (after 37 weeks to 40 weeks, 6 days), with an age range of 0 to 12 years.

Sample Size and Sampling: A total of 60 participants were included: 30 cases (children with cerebral palsy) and 30 controls (normal, healthy children). Convenience sampling was used.

Data Collection: A structured, self-administered questionnaire was used to collect data from the mothers of both the case and control groups, covering demographic characteristics, and potential exposure to risk factors.

Data Analysis

Odds Ratio (OR) was calculated to measure the association between the risk factor (exposure) and CP (disease). 95% Confidence Intervals (CI) were used to determine the statistical significance of the association. An association was considered non-significant if the value 1 was contained within the calculated CI’s lower and upper bounds.

CHAPTER-IV

Results

The analysis of the 30 cases and 30 controls revealed the following significant associations between specific factors and the development of Cerebral Palsy in term babies:

Statistically Significant Risk Factors (95% CI excludes 1):

The key findings for the risk factors of cerebral palsy are summarized in the table below:

Variable (Exposure)	OR	95% CI (Lower - Upper)	Significance
Birth Asphyxia (Yes)	74.55	4.161 - 1335.5	Highly Significant
Birth Injury (Yes)	12.428	1.44 - 101.49	Highly Significant
Jaundice & Neonatal Convulsion (Yes)	19.46	1.05 - 358.40	Significant
Delivery Done at Home (vs. Hospital)	6.000	1.4841 - 24.29	Significant

Birth Asphyxia: This factor was identified as having the strongest association, indicating that children who experienced birth asphyxia were 74.55 times more likely to be in the CP group.

Birth Injury: Children with a history of birth injury were 12.428 times more likely to have CP.

Jaundice & Neonatal Convulsion: This combined factor showed that children exposed to both were 19.46 times more likely to have CP.

Place of Delivery: Delivery done at home was a statistically significant risk factor (OR 6.000) compared to delivery in a hospital.

Non-Statistically Significant Factors (95% CI includes 1):

Other potential risk factors were found to be associated with CP, but the association did not reach statistical significance in this study, as their 95% CIs included 1:

History of Miscarriage (Yes): OR 2.000 (CI: 0.6187-6.465).

Mothers Age Below 25 years: OR 2.7500 (CI: 0.9336-8.100).

The majority of mothers of CP children (73%) were below 25 years old during delivery, compared to 50% in the control group.

Cousin Marriage (Yes): OR 5.80 (CI: 0.6345-53.01).

Sex (Male): OR 1.3077 (CI: 0.473-3.61).

Other Findings

Gender: 53% of the cases were male and 46% were female.

Types of CP: The most common type observed was Diplegic CP (43%), followed by Dyskinetic CP (20%) and Quadriplegic CP (17%).

Mode of Delivery: Caesarian section was less frequent in the case group (50%) than the control group (70%), while normal vaginal delivery was more frequent in the case group (47%) than the control group (26%).

CHAPTER-V

Discussion

The discussion chapter interprets the results in the context of global literature and the unique environment of Bangladesh. The most crucial finding of the study is the confirmation that birth asphyxia, birth injury, and neonatal convulsion & jaundice remain major, statistically significant risk factors for cerebral palsy among term babies in Bangladesh.

Birth Asphyxia and Birth Injury: The extremely high Odds Ratios (74.55 and 12.428, respectively) for birth asphyxia and birth injury suggest that events during the intrapartum and immediate postnatal period are critically important for CP in term infants in this setting. This aligns with a historical view but highlights a major, contemporary problem in neonatal care in Bangladesh. The prevalence of CP is known to be higher in communities with poorer socioeconomic conditions, which may explain the high impact of these delivery-related risk factors.

Hospital vs. Home Delivery: The finding that delivery at home is a significant risk factor (OR 6.000) underscores the importance of institutional delivery for proper management of complications that can lead to CP, such as birth asphyxia and birth injury. Delivery in a hospital setting, where a doctor attends

a greater proportion of births compared to home settings, is noted as a key protective factor.

Mode of Delivery (C-section): The study noted a higher percentage of C-section deliveries in the control group (70%) compared to the case group (50%). This is discussed in light of modern literature, which suggests that increased C-section rates have not led to a decrease in overall CP rates and that C-sections do not prevent CP.

Other Factors: The non-significant association of factors like history of miscarriage, maternal age, and cousin marriage, despite a numerically high OR for the latter two, suggests that for term babies in this cohort, the perinatal events were the dominant causal pathway.

CHAPTER-VI

Conclusion & Recommendation

This study provides crucial evidence that birth asphyxia, birth injury, and neonatal convulsion and jaundice are the major and statistically significant risk factors associated with cerebral palsy among term babies attended at CRP. Furthermore, the study suggests that delivery in settings lacking medical facilities (i.e., home delivery) is a significant risk factor.

While other factors such as a history of miscarriage, cousin marriage, and maternal factors (infection, anemia, hypertension) were associated, they were not statistically significant in this specific case-control study. The study's strength lies in the professional diagnosis of all CP cases by a pediatrician or neurologist. A key limitation was the small sample size and the hospital-based nature of the study, which may not represent the total population, as well as the potential for recall bias from mothers regarding birth history.

Recommendation

Based on the findings, the thesis presents several recommendations for policymakers and healthcare service providers to mitigate the risk of CP in term babies:

Improve Labor Room Facilities: Focus on providing appropriate facilities and training in the labor room to prevent and manage birth asphyxia.

Strengthen Neonatal Care: Neonatal care services in Bangladesh need review, more attention, and support from governmental and non-governmental organizations, as neonatal complications are still the major risk factors.

Health Education and Institutional Delivery: Aggressive health education is necessary to raise public awareness and encourage pregnant women to deliver in well-equipped health facilities to adopt adequate preventive measures.

Screening and Treatment: Routine and regular screening for infections among pregnant women is needed. Education for pregnant women on the nature of neonatal jaundice is also recommended for early assessment and treatment.

Future Research: A larger-scale cohort study is recommended for future research to obtain more accurate results, particularly

regarding the temporal relationship between the identified risk factors and the development of cerebral palsy

CHAPTER-VII

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