

Original Article**Antenatal Risk Factors of Children with Cerebral Palsy: An Experience of Center for the Rehabilitation of the Paralyzed (CRP) in Bangladesh**Md. Anwar Hossain¹, Saida Sharmin², Atia Afrin³, Tunazzina Shahrin⁴, Mahabub Hossain⁵**Abstract**

Background: Cerebral palsy (CP) in children is an important global public health issue in terms of its outcome, quality of life, and life expectancy. **Objective:** To identify the types of cerebral palsy and the antenatal risk factors related to cerebral palsy in children attending a tertiary level specialized rehabilitation institution in Bangladesh. **Methods:** This cross-sectional, descriptive study was conducted, between September 2021 and January 2022, among 72 parents/caregivers of children with cerebral palsy at Center for Rehabilitation for Paralyzed (CRP), Dhaka, Bangladesh. Data were collected through face-to-face interview through semi-structured questionnaire. The mean and standard deviation were used to examine quantitative variables, whereas percentages were used to summarize qualitative variables. **Results:** The most common age group of children was of this study 3-5 years (59.7%). Female predominance (54%) was observed. Most of the respondents (61.1%) came from the joint family. At the time of childbirth, most (81.9%) of the respondents were in the 20-35 years age group. History of consanguinity was found in 19.4% cases. Among categories of the cerebral palsy, spastic type was the most prevalent (40.3%), followed by dyskinetic type (31.9%), mixed type (23.6%), and hypotonic type (4.2%). Among antenatal factors, maternal infection (13.9%), trauma during pregnancy (12.5%), maternal diabetes (13.9%) and hypothyroidism (11.1%), antepartum hemorrhage (12.5%), congenital brain malformation (4.2%) and maternal epilepsy (1.4%) were found as risk factors of cerebral palsy in children. **Conclusion:** Our study revealed that spastic type of cerebral palsy was the dominant form of the disease in children. The most affected age group of children was 3-5 years. Surprisingly, a female predominance was observed. Maternal infection (13.9%), diabetes (13.9%), and ante-partum hemorrhage (12.5%) were among the most common antenatal factors.

Keywords: Cerebral palsy, children, antenatal risk factors

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Introduction

Cerebral palsy (CP) is an important global public health issue and has an important outcome, quality of life, and life expectancy. Cerebral palsy is a common neurological condition in children.¹ It is a group of permanent disorder of the development

of movement and posture and children. It is a group of permanent disorder of the development of movement and posture among children. It is non-progressive disturbances that limits the activity. Along with motor disability, it is also characterized by disturbances of sensation, perception, cognition,

1. Assistant Professor, Department of Community Medicine, International Medical College, Tongi, Gazipur-1711, Bangladesh.
2. Associate Professor, Department of Community Medicine, International Medical College, Tongi, Gazipur-1711, Bangladesh.
3. General Physician, Hemayetpur, Savar, Dhaka-1340, Bangladesh.
4. Deputy Manager, Save the Children, Bangladesh Country Office, Gulshan-2, Dhaka-1212, Bangladesh.
5. B.Ed. (Hons.) Student, Institute of Education and Research (IER), University of Dhaka, Dhaka-1000, Bangladesh.

Correspondence to: Dr Md. Anwar Hossain, Assistant Professor, Department of Community Medicine, International Medical College, Tongi, Gazipur-1711, Bangladesh. Email: anwarhossain31bd@gmail.com

communication, behavior, epilepsy, and secondary musculoskeletal problems.² Globally, there are an estimated 17 million people living with CP.³ The incidence of CP is 2 to 2.5/1000 live births.⁴ In Bangladesh, a population-based surveillance study, the prevalence rate of CP is 3.4/1000 live births.³ Cerebral palsy has been suggested to be more prevalent in low- and middle-income countries (LMICs) than in high-income countries (HICs). This increased prevalence could be due to risk factors affecting fetal and postnatal brain development.⁵ Several risk factors play role in the development of cerebral palsy and may be present before or after pregnancy. It is essential for us to identify risk factors of cerebral palsy.⁶ The ideal management of cerebral palsy is comprehensive and effective physical rehabilitation, which is unfortunately expensive. The Centre for the Rehabilitation of the Paralyzed (CRP) of Bangladesh, provides medical treatment, rehabilitation and support services focusing on physical, emotional, social, psychological, and economic aspects. It promotes the development of skilled personnel in health care and rehabilitation in the country.⁷ However, even with the best rehabilitation, functional and physical recovery in cerebral palsy is rarely complete. Prevention, therefore, is of central importance.⁸ Hence, the findings of studies related to cerebral palsy may help physicians, administrators, and policy makers to identify preventive measures that help reduce the burden of this disease in our country. Therefore, the present study aims to see the types of cerebral palsy in children and the antenatal risk factors related to it.

Methods

The cross-sectional, descriptive study was conducted in the paediatric unit (both outdoor and indoor services) in the Centre for the Rehabilitation of the Paralyzed (CRP) at Savar in Dhaka, Bangladesh, between September 2021 and January 2022. A total of 72 conveniently selected parents/caregivers of children with cerebral palsy were interviewed face to face using semi-structured questionnaire. Confirmed case of cerebral palsy, both male and female children with the age of 6 months to 14 years were the inclusion criteria for selecting cases. Parents who refused to give consent and children below 6 months or above 14 years were excluded from this study. Data were checked and verified manually. Data analysis was done by using Statistical Package

for the Social Sciences (SPSS) version 23.0 for windows. Variables were summarized in tables by frequency and percentage.

Results

In this study, 43 (59.7%) respondents were in the age group of 3 to 5 years old followed by 21 (29.2%) was in the age group of 6 months to 3 years old, and 8 (11.1%) was in the age group of 5 to 14 years old. About 39 (54%) of the children were female and rest 33 (46%) were male. At the time of childbirth, 59 (81.9%) of the respondents were the age group of 20 to 35 years old followed by only 5 (6.9%) in the age group less than 20 years old. Majority 58 (80.6%) negative of consanguine marriage while only 14 (19.4%) shows positive results. 44 (61.1%) respondents were from nuclear family, while the rest 28 (38.9%) were living in the joint (extended) family. Regarding monthly family income, most (74.0%) of the respondents had monthly income between BDT 20,000 to 40,000 in a month (Table 1). Categories of cerebral palsy in those children were found: 29 (40.3%) spastic type, 23 (31.9%) dyskinetic type, 17 (23.6%) mixed type, and 3 (4.2%) hypotonic type (Figure 1). Among antenatal factors, maternal infection (13.9%), trauma during pregnancy (12.5%), maternal diabetes (13.9%) and hypothyroidism (11.1%), antepartum hemorrhage (12.5%), congenital brain malformation (4.2%) and maternal epilepsy (1.4%) were found as risk factors of cerebral palsy in children. (Table 2).

Table 1: Socio-demographic characteristics of the respondents

Variables	Category	Frequency	Percentage
Age of the children	6 months to 3 years	21	29.2
	3 to 5 years	43	59.7
	5 to 14 years	8	11.1
Gender	Male	33	46.0
	Female	39	54.0
Maternal age at childbirth	Less than 20 years	5	6.9
	20 to 35 years	59	81.9
	More than 35 years	8	11.1
Consanguinity of marriage	Negative	58	80.6
	Positive	14	19.4

Variables	Category	Frequency	Percentage
Family type	Nuclear family	28	38.9
	Joint(extended) family	44	61.1
Monthly Family income	Below BDT 20,000	8	11.1
	BDT 20,000 to 40, 000	53	74.0
	More than BDT 40,001	11	15.3
Total		72	100.0

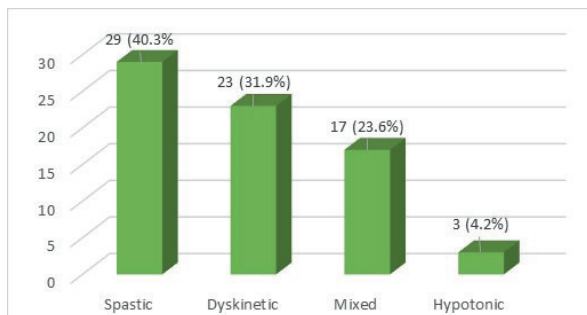


Figure 1. Bar diagram showing distribution of children based on motor impairment

Table 2: Antenatal risk factors related to cerebral palsy

Antenatal Risk Factors	Frequency (Percentage)
Maternal infection	10 (13.9)
Trauma during pregnancy	9 (12.5)
Pre-eclampsia	6 (8.3)
Maternal diabetes	10 (13.9)
Hypothyroidism	8 (11.1)
Antepartum hemorrhage	9 (12.5)
Congenital Brain malformation	3 (4.2)
Maternal epilepsy	1 (1.4)

Discussion

Cerebral palsy (CP) is one of the most common motor disabilities of childhood.^{6,8,9} This hospital-based study aims to understand the patterns and risk factors of cerebral palsy in our locality. Very little work has been done in our setting regarding the prevalence or etiology of cerebral palsy. In the present study, most (59.7%) of the respondents were mothers of children in 3-5 years age group followed by (29.2%) 6 months to 3 years age group, and (11.1%) 5-14 years age group. Gender distribution is an important factor in clinical medicine.¹⁰ The male embryo is suggested at a greater risk of damage or death.^{6,8} Stillbirth,

premature birth, congenital deformities, perinatal brain damage, and neonatal adverse outcomes are more common in male.^{6,8-10} However, in our study, sex distribution, more (54%) children were female than (46%) male. This result is also inconsistent with another Indian study as it reported higher incidence in male than female.² We assume that the shorter duration of study could avail a smaller picture of gender distribution of cerebral palsy in our country. Most (81.9%) of the respondent mothers were in 20-35 years age group followed by only 5(6.9%) in <20 years age group at the time of their childbirth. Mother's age of conception remains a crucial factor. Fletcher et al. reported low paternal age and extremes of maternal age to be significantly associated with CP.¹¹ However, such conditions were not observed in this study. Consanguineous marriage was found only in 19.4% cases of our study. Consanguinity of marriage is common within Muslim community of our country though. Consanguinity is a deeply rooted social trend among one-fifth of the world population mostly residing in the Middle East, North Africa, West and South Asia.^{12,13} The lower number of consanguinities in the present study may be due to the fact that Muslim communities in our country are now more conscious about the adverse effects of such marriage. Nevertheless, consanguineous marriage remains one of the crucial factors of congenital cerebral palsy. Cerebral palsy and related disorders in consanguineous families' children is around twice or more than in children of non-related parents.¹³⁻¹⁵ Clinical classification categorizes cerebral palsy as spastic, hypotonic/ ataxic, dyskinetic and mixed-types of CP of which the most common worldwide is the spastic category. However, the distribution of the clinical subtypes of spastic cerebral palsy differs across the globe. In our study, 40.3% of cases were spastic type. The dominance of the spastic type of cerebral palsy in this study and the general pattern of clinical classification is consistent with published data from other countries.¹⁶⁻¹⁸ Cerebral palsy is one of the most common physical disability in childhood yet in many cases the cause remains unknown.^{6,8,16} Several evidence showed that linking cerebral palsy to specific etiological factors is at the centre of attention among the researchers in this field worldwide.^{8,20-22} Risk factors taken into account in this study questionnaire are similar to those reported by others. In this study, maternal infection (13.9%), trauma during pregnancy (12.5%), maternal

diabetes (13.9%), hypothyroidism (11.1%), antepartum hemorrhage (APH) (12.5%), congenital brain malformation (4.2%) and maternal epilepsy (1.4%) were found as antenatal risk factors of cerebral palsy. In another study, about a quarter of the children had prenatal causes like maternal trauma, malnutrition, infection during pregnancy and multiple births.²² Research done in our country also showed antenatal factors responsible for developing cerebral palsy.^{2,8} As evidence suggested that improving maternal care improves neonatal outcome, Health Education Department should strengthen education, advocacy and access to resources among pregnant women to reduce risks of prenatal, natal and postnatal complications so that the incidence of cerebral palsy may get lower in the unborn children.²³

Our research was limited to cross-sectional, descriptive study design which limits the true association of the factors as well as fails to establish any causal relationship. It was a single-centre study in an urban setting; hence, the findings may not be generalizable to whole of the country. Moreover, probability sampling technique could not be employed to recruit the study unit; our samples were selected conveniently due to time

and budget constraints. As a result, there might be a selection bias. Last but not the least, most of the information about gestational factors was collected with a questionnaire based on the memory of the respondents, which may be liable to a recall bias.

Conclusion

Our study revealed that spastic type of cerebral palsy was the dominant form of the disease in children. The most affected age group of children was 3-5 years. Surprisingly, a female predominance was observed. Maternal infection, diabetes, and ante-partum hemorrhage were among the most common antenatal factors.

Conflict of interest: The authors declare no conflict of interest.

Ethical approval: This research was approved by the Institutional Review Board (IRB) of Mymensingh Medical College, Mymensingh, Bangladesh.

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