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Antenatal Risk Factors of Children with Cerebral Palsy

Obaidul Haque*[1], EhsanurRahman[2] and Mohammad Habibur Rahman[3]

[1]*Professor and Head, Department of Physiotherapy, Bangladesh*

[2]*Assistant Professor, Department of Physiotherapy, Bangladesh*

[3]*Associate Professor, Department of Physiotherapy, Bangladesh*

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***Corresponding author:** Obaidul Haque, Professor and Head, Department of Physiotherapy, BHPI, CRP, Savar, Bangladesh

Abstract

Purpose: To identify possible antenatal risk factors affecting the development of cerebral palsy among children.

Methodology: Antenatal events were compared between 25 children with cerebral palsy (CP) and 25 controls in a retrospective case-control method. Antenatal factors were analysed as odds ratios, 95% confidence intervals and chi-square test. Factors associated with an increased risk of CP identified as antenatal risk factors were: maternal eclampsia, maternal hypertension, maternal diabetes, physical problem (e.g. fall down), maternal viral diseases, low birth weight (< 2500gm)

Results: Data was analysed by using SPSS version 20 and odds ratio was used. A total 50 participants with cerebral palsy minimum age group of mothers was 18 years and maximum age was 35 years. Among case the mean age of the participants was 26.5 years and boy ratio 54%(n=14) and girl ratio 46%(n=11). Highest mother education were primary 46% (n=23).The frequency of child born in area there were 42% (n=22) home, 22% (n=11) born hospital, 36% (n=18) born clinic and their physical problem 22.0% (n=11) were fall down, 16% (n=8) were weight lifting, 10% (n=5) were traumatic, no related cause 52% (n=26). The factors significantly associated with the cerebral palsy were antenatal care (OR- 1.833; 95% CI, 0.387-8.674, chi-0.22,P>0.05), Maternal Eclampsia (OR- 1.313; 95% CI, 0.308-5.598, chi-0.13, P>0.05), Medicine taken during pregnancy (OR 3.188; 95% CI, 0.99-10.17, p<0.05) cerebral palsy which is statistically significant, Physical problem (OR 5.76; 95%CI, 1.36- 24.36, chi-6.34, p<0.05), cerebral palsy which is statistically significant, maternal hypertension (OR- 11.15; 95% CI 2.86 to 43.46, p<0.05) cerebral palsy which is statistically significant. Maternal diabetes (OR 13.5; 95% CI- 3.55- 51.22, p<0.05) statistically significant. Birth weight (OR 46.00; 95% CI-8.02-263.62, p<0.05) cerebral palsy which is statistically significant.

Conclusion: Study demonstrated that, child birth weight, delayed crying and any pathology during pregnancy were independent factors associated with cerebral palsy in term new-borns child.

Keywords: Antenatal Factors; Cerebral Palsy

Introduction

Cerebral palsy (CP) consist of a group of permanent disorders of the development of movement and posture, causing activity limitation, that are attributed to non-progressive disturbances that occurred in the developing foetal or infant brain; The motor disorders of cerebral palsy are often accompanied by disturbances of sensation, perception, cognition, communication, and behaviour, by epilepsy, and by secondary musculoskeletal problems [1]. The term Cerebral palsy refers to any one of a number of neurological disorders that appear in infancy or early childhood and permanently affect body movement and muscle coordination but don't worsen over time [2]. The incidence of CP is considered to be 2 to 2.5 in 1000 live births and the prevalence of CP in the developing countries tends to be in a similar range [3]. In one study found that prevalence of cerebral palsy in Bangladesh was 6.1/1000 children [4]. The most recent consensus definition states that cerebral palsy is an "umbrella term covering a group of non-progressive, but often changing, motor impairment syndromes secondary to lesions or anomalies of the brain arising in the early stages of its development"[5].

Rational

The incidence of cerebral palsy worldwide is between 2 to 2.5 cases per 1,000 births [6] and gives burden on parents both physically and psychologically. Cerebral palsy is a chronic condition that have serious consequences for physical, cognitive

and behaviour functioning. Identifying risk factors for a disease is one of the methods used to gain understanding of its etiology. Identification of the risk factors of children with cerebral palsy will give us evidence by which we can take necessary measure to manage this condition as well as it can help to take preventive measures to minimize the sufferings of this condition. Since antenatal period maternal chronic diseases especially diabetes and cardiovascular diseases and neonatal low birth weight are emerging which eventually make them at higher risk of developing cerebral palsy. By conducting this research it is expected that some of these risk factors can be identified to minimize the cost of treatment, mortality, morbidity, however physical and psychosocial distress. Much other Health professional will get update knowledge about factors which causing Cerebral Palsy and this knowledge also will benefit a large number of people.

Methodology

Study Design

Hospital based unmatched case control study was conducted at the paediatric unit of Centre for the Rehabilitation of the paralysed (CRP), Savar. The children who had already been diagnosed with CP (based on the medical history, a clinical examination and imaging of the brain) and who attended at follow-up were interviewed using pretested questionnaires. Those children who were diagnosed as cerebral palsy were considered as cases and those who did not were kept in the control group. As it was a case control study, so the study began from the outcome or cerebral palsy and the investigator had to find out the exposure.

Study Site

The study was conducted in Paediatric unit at outdoor physiotherapy department of Centre for the Rehabilitation of the Paralysed (CRP), at Savar.

Study Duration

The duration of the study was from September 2015 to May 2016.

Study Sample

Total 100 cerebral palsy children were taken as sample for the study according to inclusion criteria.

Inclusion Criteria:

a. Maternal age was categorized as <18 years, 18-35 years and >35 years. Term and pre-term delivery was defined as delivery ≥36 completed weeks of gestation [7].

b. Confirmed cases of cerebral palsy by Paediatric doctor were considered as case.

c. Subjects who were siblings or special relatives of cases or other Paediatric problem excluding Cerebral palsy considered as control.

d. Both male and female were included.

e. Subjects who were willingly participated.

Results

Socio-Demographic Information

In this study the mean age of the children was 1.56 years with a standard deviation of 0.50. Majority of the children (56%) were 4 to 6 years old followed by 1 to 3 years old (44%).A total 46% (n=23) children were boy and rest of 54% (n= 27) were girls.

Mother Age During Child Birth

Among the 50 participants 50% (n=25) participants were between 18-22 years, 32% (n=16) were between 23-26 years, 14% (n=7) were between 27-30 years and 4% (n=2) were 31-35 years. Average mean age of mothers was 26.5 years andminimum age was 18 years and maximum age was 35 years.

Child Birth Area Age & Educational Status of the Mothers

Out of the 50 participants, most of them were at the age of 26 years or below and that was about 80% (n=41). Educational status of mothers showed that 8% (n=4) mothers could do signature, 46% (n=23) completed primary education, 38% (n=19) completed secondary education, 4% (n=2) completed degree education, 4% (n=2) completed master's degree.

Types of Physical Problem

Among the 50 mothers maternal fall down were 22.0% (n=11), 16% (n=8) were weight lifting problem, 10% (n=5) traumatic and 52.0% (n=26) were no related cause.

Risk Factors Associated with Cerebral Palsy

This study was a case control study and the mode of association between disease and risk factors was Odds ratio. 95% confidence interval was calculated for finding out the significant of the association. If 1 came between the lower bound and the upper bound of confidence interval it was considered as non-significance.

Antenatal Care and Cerebral Palsy

The Odds ratio for the antenatal care of the study was 1.833 suggesting cerebral palsy is 1.833 times as frequent in the mother who are taking antenatal care compared in the non-antenatal care mother. The confidence interval of odds ratio was ranging from 0.387 to 8.674 indicating that this association was not significant as 1 came between the intervals. The study identified that among 50 children 42% (n=21) were born at home, 22% (n=11) were born hospital, 36% (n=18) were born clinic.

Maternal Factors

Antenatal Care and Cerebral Palsy

Odds ratio of antenatal care was found to be 1.83 suggesting that cerebral palsy is 1.83 higher among mothers who had taking antenatal care compared to control group. The confidence interval of odds ratio was ranging from 0.387 to 8.674 which span 1 indicating that this odd was not significant. It was also supported by the results found in association analysis. In the association test using chi-square, the value was 0.22 which indicates among variables was not significant because p>0.05.

High Risk Pregnancy(Miscarriage)

Odds ratio of high risk pregnancy (miscarriage) was found to be 3.5 suggesting that cerebral palsy is 3.5 higher among mothers who had high risk pregnancy (Miscarriage and still birth) compared to control group. The confidence interval of odds ratio was ranging from 0.921 to 13.307 which do span 1 indicating that this odd was not significant. It was also supported by the results found in association analysis. In the association test using chi-square, the value was 3.571 which indicates among variables was not significant because $p>0.05$.

Medicine Taken During Pregnancy

Odds ratio of medicine taken during pregnancy was found to be 3.188 which indicating that cerebral palsy is 3.188 times more frequent among those who were taken antenatal medicine during pregnancy. The confidence interval of odds ratio was ranging from 0.99 to 10.17 indicating that this association was not significant. There is a relationship between having taken medicine during pregnancy and causing cerebral palsy which is statistically significant ($p<0.05$).

Maternal Eclampsia and Cerebral Palsy

Odds ratio of Maternal Eclampsia was found to be 1.313 which indicating that cerebral palsy is 1.313 highly frequent among those mothers who had compared with non-eclampsia group. The confidence interval of odds ratio was ranging from 0.308 to 5.598 which spans 1 indicating that odds of CP was not reach statistical significance.

Cousin Marriage

Odds ratio of cousin marriage was found to be 1.833 which indicating that cerebral palsy is 1.833% more frequent among those who had cousin marriage. The confidence interval of odds ratio was ranging from 0.387 to 0.8674 indicating that this association was significant.

Maternal Disease or Complication

Odds ratio of maternal disease or complication was found to be 2.47 which indicating that cerebral palsy is 2.47 times highly frequent among those who had maternal diseases. The confidence interval of odds ratio was ranging from 0.63 to 9.62 indicating that this association was not significant.

Physical Problem

Odds ratio of physical problem was found to be 5.76 which indicating that cerebral palsy is 5.76 times highly frequent among those who had physical problem during pregnancy. The confidence interval of odds ratio was ranging from 1.36 to 24.36 indicating that this association was not significant. But here chi square is 6.34 which indicates that there is a relationship between having physical problem during pregnancy and causing cerebral palsy which is statistically significant ($p<0.05$).

Maternal Hypertension

Odds ratio of maternal hypertension was found to be 11.15 suggesting that cerebral palsy is 11.15 higher among mothers who had hypertension compared to control group. The confidence interval of odds ratio was ranging from 2.86 to 43.46 which do not span 1 indicating that this odd was significant. It was also supported by the results found in association analysis. In the association test using chi-square, the value was 13.87 which indicates among variables was significant because $p<0.05$.

Maternal Diabetes

Odds ratio of maternal diabetes was 13.5 indicating that cerebral palsy was 13.5 times more chance among those mothers who had diabetes. The confidence interval of odds ratio was ranging from3.55 to 51.22 indicating that it was significant and also chi square test was 42.593 and it was also significant ($p<0.05$).

Discussion

Several antenatal factors investigated in this study of term and preterm and very preterm babies were associated with an increased risk of CP. According to the results of the present study, maternal diabetes, maternal hypertension, perinatal asphyxia, and high-risk pregnancy were independent factors that correlated with CP in term and near-term new-borns. In developing countries, 4 to 9 million infants experience birth asphyxia annually. There are 1 million neonatal deaths attributed to birth asphyxia each year, which comprises 20%-40% of all neonatal deaths.

Recommendation

Further multicentre and different geographical region with larger sample size is recommended to assess the antenatal factors for developing cerebral palsy children in Bangladesh.

Conclusion

This study showed that, perinatal asphyxia, child birth weight, delayed crying and any pathology during pregnancy such as maternal diabetes, maternal hypertension were independent factors associated with CP in term newborn. The findings were consistent with the notion that the most frequent causes of CP were adverse antenatal events, followed by restricted foetal growth. Previous studies had suggested that improving maternal care improves neonatal outcome. However, the extent to which preventing or treating these and other risk factors would reduce the incidence of CP in new-borns is unknown and merits for further study.

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