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ORIGINAL ARTICLE

FACTORS ASSOCIATED WITH DISABILITY IN CHILDREN BORN WITH NEONATAL ASPHYXIA

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ABSTRACT

Introduction: Perinatal asphyxia exposes the patient to a significant risk of sequel, the most frequent of which is cerebral palsy.

Method: A retrospective case-control cohort study was conducted over a period of 41 months at the Yaoundé Gynaecological-Obstetric and Paediatric Hospital (HGOPY). The aim was to determine the factors associated with neonatal asphyxia that leads to disability. The study population consisted of neonates who survived encephalopathy classified as Sarnat 2 or 3 (cases), and those who had an Apgar score >7 (controls). They were followed and examined by a neuropaediatrician. A total of 117 patients were selected: 39 asphyxiated and 78 non-asphyxiated. Matching was done according to age, sex, mode of delivery and place of birth.

Result: Of the 39 survivors of neonatal asphyxia 79.5% progressed to disability compared to 2.6% of those not asphyxiated (P: 0.000). The number of male children with disability was higher but not statistically significant P=0.623. Children born at our centre were also more likely to develop a severe disabilities P=0.6214. The majority of children with severe disabilities were born by cephalic presentation P: 0.4252.

Conclusion: In this study, only neonatal asphyxia was a risk factor for disability while other factors like sex, mode of delivery, place of birth were not significantly associated with the occurrence of disability.

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Introduction

For the past years, the majority of motor disabilities in children were systematically attributed to the circumstances of delivery.[1] Intrapartum asphyxia can cause multi-organ failure and neonatal encephalopathy. Presence of moderate or severe encephalopathy due to birth asphyxia exposes the baby to a significant risk of sequel, the most frequent being cerebral palsy, especially in its quadriplegic or dyskinetic form, and cognitive disorders.[2] We conducted this study to determine the risk factors associated with disability in children with birth asphyxia.

Methods & Materials

A retrospective case-control cohort study was conducted at an outpatient unit of a tertiary referral centre at Cameroon for over 41 months after approval from Institutional Research Ethics Committee for human health. The study population consisted of neonates who survived encephalopathy classified as SARNAT[3]2 or 3 (cases), and those who had an Apgar score > 7 (controls). Prior consents of the patient (parent or family member) were taken. Inclusion criteria included babies born at our centre or referred from another health facility with moderate to severe birth asphyxia, full term ,Apgar score less than 7 at 5 minutes at birth and/or neonatal encephalopathy (SARNAT 2 or 3).

Exclusion criteria were refusal to join the study, patients who have presented with a pathology that may affect the neurological development of the child such as kernicterus, neonatal meningitis, embryo-fetopathy, malformation, obstetrical trauma, metabolic disease).

We used a consecutive sampling of new-borns born with moderate or severe asphyxia during the study period.

To determine whether our sample size was at least above the minimum size required for statistical analysis, we used the Kelsey Fleiss and Fleiss formula appropriate for a retrospective cohort study of this type.[4] Matching was done by age, mode of delivery, gender and place of birth.

All children were examined thoroughly with emphasis on detailed neurological examination. Parameters like

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head circumference, postural, motor, neurosensory and cognitive abnormalities were noted.

Psychomotor development of each child was determined by conducting a Denver test.[5]

The patients were classified according to their disability according to the Amiel Tison model.[6]

Statistical analysis

The questionnaire template was done in an Excel 2007 workbook and using Epi info 3.5.3 software. The significance threshold was $p<0.05$.

Results

A total of 117 patients and were included in the study; 39 asphyxiated patients alongside a group of 78 non-asphyxiated patients.

The average age was 17.8974 for the asphyxiated and 17.906 for the non-asphyxiated. In both groups, the minimum age was 6 months and the maximum 36 months. The sex ratio was 1.1 in both groups. Children born at our institute were more in number. Of the 39 survivors of neonatal asphyxia, 31 (79.5%) progressed to disability, compared to 2 (2.6%) in the non-asphyxiated neonates and the difference was statistically significant. (OR= 147.25 P: 0.000) (Table 1). The number of male children with disabilities was higher (52%) than the number of female children (48%) but the difference between the sex was not statistically significant P=0.1220 (Table 2).

The majority of children with disabilities were between 18 and 36 months of age, but there was no statistically significant difference between the ages. P = 0, 1229 (Table 2). Children with disabilities born at our centre were 54.8% compared to 25.8% in other hospitals and 19.4% in health centres. Children born at our centre had more severe disability as compared to born at other centres, but difference was not statistically significant (Table 3). The majority of children with severe disabilities were born by the cephalic presentation but the difference was not statistically significant (Table 4).

Table 1. Classification of patients according to the presence of disability.

Handicap	Asphyxiates Effective(%)	Non asphyxiates Effective(%)	Total Effective(%)	Odds Ratio	IC	P
Yes	31 (79.5%)	2 (2.6%)	33 (28.2%)	147.25 (29.581%)	732.86	0.00
No	8 (20.5%)	76 (97.4%)	84 (71.8%)			

Table 2. Classification of asphyxiates by age

Handicap / Age group	6-11(%)	12-17(%)	18-36(%)	TOTAL	P
Severe	3(12.5)	6(25)	15(62.5)	24(100)	0.1229
Moderate	1(25)	0(0)	3(75)	4(100)	
Mild	2(66.7)	1(33.3)	0(0)	3(100)	
No	6(75)	2(25)	0(0)	8(100)	

Table 3. Classification of asphyxiates by place of birth.

Handicap / Birth-place	Health Center	HGOPY	Others hospitals	TOTAL	P
Severe	5(20.8)	14(58.3)	5(20.8)	24(100)	0.6214
Moderate	0(0)	2(50)	2(50)	4(100)	
Mild	1(33.33)	1(33.33)	1(33.33)	3(100)	
No	3(37.5)	4(50)	1(12.5)	8(100)	

Table 4. Classification of asphyxiates by mode of delivery.

Handicap / Delivery Mode	Vaginal route	Caesarean	TOTAL	P
Severe	21 (87.5)	3 (12.5)	24(100)	0.4252
Moderate	4(100)	0(100)	4(100)	
Mild	2(66.7)	1(33.33)	3(100)	
No	6(75)	2(25)	8(100)	

Discussion

Of the 39 survivors of neonatal asphyxia, 79.5% progressed to disability compared with 2.6% of the non-asphyxiated group. Halloran et al in their study also found disability rate higher in asphyxiated children compared to non asphyxiated.[7] Also, children born with asphyxia were 4.4 times more likely to develop an abnormal neurological examination than those without asphyxia. It is also higher than the 49% found by Massouade[8] in Algeria. For developing countries, it is higher than that of Begum et al[9] in Dhaka (Bangladesh) which was 60%. This superiority of results in our series can be justified by the difference in methodology in the different studies. The majority of children with disabilities were between 12 and 36 months of age. This finding is similar to that of Shah et al in Canada in 2006.[10] At the age of one year, the brain structure is better developed and allows a good appreciation of the clinical manifestations.[11] This could explain the gap and justify the majority diagnosis of disability after the age of 12 months.

The number of male children with disabilities was more than the girls. Begum et al also found a predominance of males with disabilities.[9] This could be explained by the fact that oestrogens influence the development of the brain of the foetus and the newborn and favour protection against ischemic lesions.[12,13] In addition, there is a neurobiological difference between the neurons of male and female subjects leading to a differentiation of responses during the occurrence of brain damage.[14]

Children with disabilities born at our centre were 54.8% against 25.8% in other hospitals and 19.4% in health centres, and developed more severe disabilities. The difference observed was not statistically significant. Halloran et al found that 16% of children born in the hospital had an abnormal neurological examination compared to 10% born in a clinic and 6% born at home.[7] Our hospital is a referral which can justify the high number of asphyxiated children born here.[15]

Conclusion

In this study, only neonatal asphyxia was a risk factor for disability. Factors like sex, mode of delivery, place of birth were not significantly associated with the occurrence of disability. We recommend improving strategies to prevent the occurrence of disability in neonatal asphyxiated children.

Compliance with Ethical Standards

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Conflict of Interest: None

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