International Journal of Contemporary Pediatrics
Razanamanana SN et al. Int J Contemp Pediatr. 2023 May;10(5):633-636
http://www.ijpediatrics.com
pISSN 2349-3283 | eISSN 2349-3291

DOI: https://dx.doi.org/10.18203/2349-3291.ijcp20231138

Original Research Article

Risk factors for asphyxia neonatorum in full-term newborns at the University Hospital of Mahajanga Madagascar

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Received: 06 March 2023
Revised: 06 April 2023
Accepted: 11 April 2023

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ABSTRACT

Background: The aim of this survey was to study the risk factors associated with asphyxia neonatorum in full-term newborns in the neonatal unit in Child and Mother Complex at Androva Mahajanga Hospital.
Methods: This was a retrospective case-control study conducted from August 2016 through September 2018.
Results: The prevalence of neonatal asphyxia was 5.9%. Determinant factors for birth asphyxia were maternal education level below the tenth grade [OR=1.8 (1.2-2.6), p=0.003] especially if the mother was illiterate [OR=2.3 (1.5-3.6), p<0.001]; less than four prenatal care check-ups [OR=2.9(1.7-4.9), p<0.001]; presence of maternal disease during pregnancy [OR=2.4 (1.6-3.6), p<0.001], arterial hypertension [OR=3.4(1.6-7.2), p<0.001]; duration of labour ≥24h [OR=2.1 (1.2-3.6); p=0.007] ; rupture of membranes ≥12h [OR=2.9 (1.6-5.3), p<0.001]; labour outside teaching hospital [OR=21,1 (8,9-49,5), p<0,001]; home birth [OR=26.7 (3.6-199), p<0.001].
Conclusions: Good monitoring of pregnancy, training of providers in neonatal resuscitation, and an increase in technical platforms could reduce the incidence of perinatal asphyxia.

Keywords: Asphyxia neonatorum, Risk factors, Full term newborn

INTRODUCTION

The worsening of fetal oxygenation disturbance during delivery defines what is known as perinatal asphyxia, formerly called acute fetal distress.[1,2] The WHO estimates that 4 million children are born each year with asphyxia, of whom 1 million die and almost as many live with severe neurological sequelae.[3] The occurrence of asphyxia may be related to antepartum, perpartum, maternal and fetal risk factors.[4-7] The main objective of this study was to identify the risk factors associated with perinatal asphyxia.

METHODS

This study was conducted at the Teaching Hospital Androva Mahajanga, within the mother-child complex, in the neonatology department. It is an unmatched case-control study; retrospective, over a period of 26 months (August 1st, 2016 to September 30th, 2018). Cases were represented by all full-term newborns, between 37 and 42 weeks of amenorrhea (WA), with neonatal asphyxia i.e. with an Apgar score less than or equal to 3 at the first minute or less than or equal to 7 at the fifth minute or neonatal resuscitation until the 10th minute. And the controls were term neonates without signs of asphyxia,

randomly selected. Cases were included in a comprehensive manner; and controls were selected at random by drawing lots. The number of cases was identical to the number of controls. Newborns with congenital malformations and newborns with incomplete records were excluded. Maternal socio-demographic variables, pregnancy and delivery variables, and newborn variables were studied. The data collected were entered and analyzed in Excel for the analysis of prevalence. Then for the analysis of risk factors, the Epi info 7 software was used; the association will be considered as significant when p is less than or equal to 0.05. The confidence interval was 95%. Anonymity was respected.

RESULTS

During the study period, 230 cases of perinatal asphyxia were admitted, representing 5.9% of all admissions. The majority of the mothers had attained secondary school level (32%); 64% had stopped before the tenth grade and 5.7% were illiterate. Thirty-eight-point seven percent (38.7%) of the mothers had at least one pathology during pregnancy. The main pathologies that occurred during pregnancy were leucorrhea (26.5% of mothers), hypertension (13.5%) and pre-eclampsia (7.8%). One hundred and seventy-three mothers (75.6%) had four or more prenatal visits. The majority of mothers gave birth by vaginal delivery, 131 mothers (57%). One hundred and forty-seven mothers (63.9%) gave birth at the Teaching Hospital Androva, and 10.44% gave birth at home. For the majority of mothers, the labor lasted less than 24 hours (79%). For 184 mothers (80.4%), the water broke in less than 12 hours before expulsion of the baby. The analysis of risk factors associated with perinatal asphyxia is shown in Table 1.

Table 1: Risk factors of asphyxia neonatorum.

Factors	Cases	Controls	p	OR IC 95%
Mother's level of education <tenth grade	148	116	0,003	1,8 [1,2-2,6]
Level ≥tenth grade	82	114		
Illeterate mother	75	40	<0,001	2,3 [1,5-3,6]
Non illeterate mother	155	190		
Antenatal care check-ups <4	56	23	<0,001	2,9 [1,7-4,9]
Antenatal care check-ups ≥4	174	207		
≥1 pathology during pregnancy	89	48	<0,001	2,4 [1,6-3,6]
No pathology	141	182		
HTA during pregnancy	31	10	<0,001	3,4 [1,6-7,2]
No hypertension	199	220		
Membranes's rupture ≥12 hours	46	18	<0,001	2,9 [1,6-5,3]
Rupture of membranes <12 hours	184	212		
Duration of labour ≥24 hours	42	23	0,007	2,1 [1,2-3,6]
Duration of labour <24 hours	181	206		
Home delivery	24	1	<0,001	26,7 [3,6-198,9]
Others	206	229		
Delivery outside the hospital	83	6	<0,001	21,1 [8,9-49,5]
Delivery at the university hospital	206	229		

DISCUSSION

The prevalence of 5.9% of perinatal asphyxia was lower than that found in a study done in Senegal (20.6%), and much higher than that found by Bouiller et al (0.3%).[2,8] The disparity between these different values could be explained by the size of the populations, the criteria used to define perinatal asphyxia, but above all by the difference between the level of organization of the care of newborns in developed and developing countries.[9] The diagnosis was made in the absence of a cry at birth, the notion of resuscitation and the Apgar index at birth, for lack of explorations in Madagascar, including gasometry. Several studies done in other developing countries were done according to these same criteria.[10] On the other hand, in developed countries, asphyxia is only considered significant and likely to lead to neurological sequelae when there is a combination of persistent acidemia and depression in the postnatal minutes, followed by signs of post-asphyxia encephalopathy and associated with multisystemic signs in the days following the birth.9 However, in practice, the absolute criteria for intrapartum asphyxia are rarely met: Apgar score not collapsed, gasometry not available or moderately altered, uncertain anamnesis.[11]

Maternal education level below tenth grade was identified as related to perinatal asphyxia [OR=1.8 (1.2-2.6), p=0.003], and even more so if the mother was illiterate [OR=2.3 (1.5-3.6), p<0.001]. Similarly, illiteracy and primary education level were identified as risk factors for perinatal asphyxia, in a study done in Ethiopia in 2017 with AOR, 0.08; CI 0.035-0.049 and AOR, 0.04; CI 0.023-0.043 respectively. This could be

explained by the fact that women without formal education might find it difficult to benefit from reproductive health education. Maternal illiteracy is a very broad indicator of poor socioeconomic status, associated with malnutrition and frequent pregnancies, and also influences care-seeking during the prepartum period.[12] Thus, educating pregnant women and women of childbearing age about reproductive health in ways that are simple and understandable to them could be beneficial in reducing the occurrence of neonatal asphyxia.

Women who had less than four prenatal visits during their pregnancy were found to be at greater risk of delivering a baby with perinatal asphyxia [OR=2.9 (1.7-4.9), p<0.001]. Similarly, Majeed et al in 2006 in Iran found that poor pregnancy monitoring was a risk factor for perinatal asphyxia.[11] The presence of a disease during pregnancy was a risk factor for perinatal asphyxia [OR=2.4 (1.6-3.6), p<0.001] as well as in the study of D'Almeida et al (p= 0.004 OR 7.05 [1.84-26.96]).[13] Hypertension was found to be a risk factor for perinatal asphyxia [OR=3.4(1.6-7.2), p<0.001]. The Institute of Child Health states that gestational hypertension increases the risk of perinatal asphyxia by 2.7 compared to a control population.[14] A Moroccan study showed that perinatal asphyxia was more frequent in population of hypertensive mothers (p < 0.05).[15]

Currently, according to the new WHO model for antenatal care, the number of antenatal visits is being increased from four to eight.[16] Antenatal consultation plays an important role in the detection and prevention, and possibly treatment of pathologies during pregnancy.[12,17] Thus, an improvement in the level of antenatal care coverage and capacity building of obstetricians and midwives are important for the prevention of perinatal asphyxia.

Prolonged duration of labor was identified as a risk factor for perinatal asphyxia [OR=2.1 (1.2-3.6); p=0.007], as was also observed in Ethiopia (0.017; CI 0.012-0.9).[12] All forms of dystocia, especially dynamic dystocia, can cause abnormal prolongation of labor. They can lead to fetal suffering, which must be anticipated and sought in these circumstances. Indeed, a too long labor can exhaust the oxygen reserve of the intervillous space. It can also be a source of maternal overwork with ventilation disorders: hypocapnia and major respiratory alkalosis. These abnormalities in ventilation lead to a decrease in utero-placental flow and therefore to fetal hypoxia.[18] In front of prolonged labor, ensure good communication between midwives, obstetricians and pediatricians; thoughtful planning and preparation of equipment and personnel; clear and calm direction of resuscitation by a professional competent in neonatal resuscitation.[19]

Prolonged rupture of membranes longer than 12 hours was identified as a risk factor for perinatal asphyxia [OR=2.9 (1.6-5.3), p<0.001]. The same eventuality was found by Aslam HM and al in Pakistan (OR 9.25 95% CI 3.75-22.81, p≤0.01).[20]

Delivery outside the university hospital was associated with a higher risk of perinatal asphyxia, [OR =21,1 (8,9-49,5), p<0,001], as in the study by D'Almeida.[13] This risk is even greater if the delivery is performed at home [OR=26.7 (3.6-199), p<0.001]. whereas Wiegers and al, Janssen and al did not find a significant difference in the Apgar score at the fifth minute between home and hospital deliveries.[21-22] In fact, for home deliveries, it is difficult to have deliveries performed only by skilled personnel (midwife or obstetric nurse).[23] Thus, it would be beneficial to deliver parturients, especially those at risk, in a hospital with a neonatal unit, to have the newborn care provided by qualified personnel, and to have the basic equipment necessary for the care of the newborn.

Limitations

The retrospective character of the study was a limitation, as well as the absence of gasometry in Madagascar, which led to a definition of neonatal asphyxia to be purely clinical.

CONCLUSION

Perinatal asphyxia is still common. Modifiable and non-modifiable factors have been significantly linked to high risk of asphyxia neonatorum; such as maternal education level below the tenth grade, especially if the mother was illiterate, less than four prenatal care check-ups, presence of maternal disease during, arterial hypertension, duration of labour ≥24 h, rupture of membranes ≥12 h, labour outside teaching hospital and home birth. So, good monitoring of pregnancy to identify risk factors of asphyxia neonatorum; strengthening the knowledge and skills of health personal in pregnancy monitoring and neonatal resuscitation, and improving their technical platform could lead to a reduction of neonatal asphyxia.

ACKNOWLEDGEMENTS

Authors would like to thank all those who contributed directly or indirectly to the realization of this study.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Razanamanana SN, Raveloharimino HN, Rambeloson SH, Rabesandratana NH, Andrianarimanana DK. Risk factors for asphyxia neonatorum in full-term newborns at the University Hospital of Mahajanga Madagascar. Int J Contemp Pediatr 2023;10:633-6.