

NEONATAL ANOXIA: A PREVALENCE STUDY

ANA CAROLINA ANDRADE LOPES ¹, PATRÍCIA GONÇALVES EVANGELISTA ², BRUNA ABREU RAMOS ²

ABSTRACT

Introduction: Anoxia is characterized by the decrease or insufficiency of oxygenation in the blood, which cannot properly supply the metabolic requirements. Neonatal Anoxia is one of the leading causes of death in children under two months of age and its incidence varies from 1 to 1,5% in several centers. **Objectives:** To determine the prevalence of neonatal anoxia in a reference public maternity hospital in Goiânia, Goiás; to identify the clinical profile of the newborns (NBs) affected with neonatal anoxia in both birth routes; to trace the profile of the infants born with anoxia in both birth routes; to determine the most incident risk factors for neonatal anoxia in both birth routes. **Methodology:** It was analyzed the prevalence and factors related to neonatal anoxia through the data collected in the newborn's admission form in a municipal maternity hospital in Goiânia, Goiás, from January 2017 to October 2018. **Results:** In this period, there were 7126 births, among which 36 newborns with Apgar scores from 0 to 5 were found for more than 5 minutes. Newborns younger than 37 weeks accounted for 26,7% in normal deliveries and 71,5% in cesarean deliveries. NBs smaller than 2500g totaled 33,3% in normal deliveries and 62% in cesarean deliveries. In both routes, the male gender was predominant. Urinary tract infection was present in 33,3% of pregnant women who had normal delivery and 38% of those who had cesarean sections. Meconial amniotic fluid was found in 9,5% of normal deliveries and 33% of cesarean. **Conclusion:** The prevalence of neonatal anoxia was 0,5% and is approaching the average of some Brazilian states. It was possible to relate prematurity, male gender, low birth weight, urinary tract infection, gestational hypertension and pre-eclampsia, meconium amniotic fluid and prolonged labor with neonatal asphyxia.

KEYWORDS: NEONATAL ANOXIA, PREVALENCE, RISK FACTORS.

INTRODUCTION

Anoxia is characterized by a decrease or insufficiency of oxygenation in the blood, which is unable to supply metabolic requirements correctly. The terms hypoxia and asphyxia can be used to characterize the same situation ¹. Adequate oxygen supply to tissues is essential for cells to maintain aerobic metabolism and vital functions ². Any process that compromises maternal oxygenation, decreasing blood flow from the mother to the placenta or from the placenta to the fetus, hinders gas exchange through the placenta or in the fetal tissue itself, or increases fetal oxygen requirements, can lead to perinatal asphyxia ³.

Neonatal anoxia contributes greatly to mortality rates. According to the Pan American Health Organization (PAHO), anoxia is a major cause of death in children under two months^{4,5}. The worldwide estimate is that four million newborns die each year, mostly due to preventable causes, the main causes of deaths in the neonatal period being premature birth (28%), serious infections (26%) and perinatal asphyxia (23%)⁶. The incidence of neonatal asphyxia varies from 1 to 1.5% in several centers and is directly correlated with gestational age and birth weight ⁷.

The American Academy of Pediatrics reserves the term severe asphyxia for patients who meet the following criteria: metabolic or deep mixed acidosis (pH <7.0) in umbilical cord blood; Apgar score of 0-3 for more than 5 minutes; neonatal neurological manifestations (convulsions, coma or hypotonia);

multisystemic organ dysfunction: cardiovascular, gastrointestinal, hematological, pulmonary or renal systems ⁷. For the American College of Obstetricians and Gynecologists, an Apgar less than 5 in the fifth and tenth minutes of life clearly increases the relative risk of cerebral palsy. The degree of Apgar abnormality in the fifth and tenth minutes correlates with the risk of cerebral palsy ⁸.

Asphyxia is known to be the most important cause of cerebral palsy, an irreversible sequel characterized by a lesion of focal origin that occurs in the developing brain. Although the sequelae are more often neurological, it is necessary to emphasize that in perinatal asphyxia, the involvement is multi-organ ⁷. In addition, the degree of perinatal asphyxia reflects the quality of care provided to pregnant women in the prenatal period and during delivery, as well as the immediate care of the newborn ⁹.

Therefore, the objective of this study is to determine the prevalence of neonatal anoxia in a public maternity of reference in Goiânia, Goiás.

METHODOLOGY

Cross-sectional and retrospective observational study. The research was developed at Hospital e Maternidade Dona Iris (HMDI), Goiânia-GO, from May to November 2018. The hospital in question is part of the municipal health network in Goiânia and specializes in humanized care in gynecology, obstetrics and low, medium and high risk neonatology, with the

1. Hospital e Maternidade Dona Iris
2. Universidade Federal de Goiás



ADDRESS

PATRÍCIA GONÇALVES EVANGELISTA
Alameda Emílio Póvoa, 165 - Vila Redenção,
Goiânia - GO, 74845-250
E-mail: centrodeestudosdmi@gmail.com

objective of developing health care for women and children, on an outpatient or hospital basis, to users of the Unified Health System (SUS). It also acts as a teaching, research and extension hospital. The research was approved by the Research Ethics Committee CAEE 99642918.9.0000.8058.7210.

The sample consisted of newborns assisted at the institution of choice, from January 2017 to October 2018, chosen for convenience through the Apgar scores.

Inclusion criteria: Newborns between January 2017 to October 2018 with Apgar scores from 0 to 5 for more than 5 minutes.

Exclusion criteria: Newborns with an Apgar score greater than 5 in the 5th minute of life, newborns with gestational age less than 22 weeks and/or 500 grams, newborns with medical records and inconsistent data.

Tabela de cálculo			
Pontos	0	1	2
Frequência cardíaca	Ausente	< 100/min	> 100/min
Respiração	Ausente	Irregular/bradipneia	Forte choro
Tônus muscular	Flácido	Flexão de pernas e braços	Movimento ativo/boa flexão
Prontidão reflexa	Ausente	Alguns movimentos/careta	Expíritos/choros
Cor da pele	Cianose central/palidez	Cianose de extremidades	Rosado

The medical records of newborns were analyzed and the following variables were collected:

Variables in relation to newborns

- Gestational age
- Gender
- Birth weight

Variables in relation to mothers

- Prenatal care
- Congenital infections (STORCH)
- Drug use
- Pathological history

Variables in relation to childbirth

- Amniotic fluid
- Intercurrences (bleeding, placental abruption, prolonged expulsive period, difficult extraction, use of forceps, others)

RESULTS

In this period, there were 7126 deliveries (adding the cesarean deliveries to the normal deliveries), among which 36 newborns were found who met the inclusion criteria.

NBs variables	Normal		Cesarean	
	Less than 37 weeks	More than 37 weeks	Less than 37 weeks	More than 37 weeks
Gestational age	26,7%	73,3%	71,5%	28,5%
Gender	Female 40%	Male 60%	Female 43%	Male 57%
Weight	Less than 2500g 33,3%	More than 2500g 66,7%	Less than 2500g 62%	More than 2500g 38%

Table 1: Distribution of variables of newborns born at HMDI, Goiânia, 2018.

Variables	Normal	Cesarean
Prenatal		
Had prenatal care	80%	85,7%
Had no prenatal care	6,7%	9,5%
No information	13,3%	4,8%
Congenital infections		
Did not have STORCH	73,3%	95,2%
Syphilis	6,7%	-
No information	20%	4,8%
Use of alcohol and legal or illegal drugs		
Yes	-	9,5%
No	93,3%	90,5%
No information	6,7%	-
Pathological history		
UTI at some point during pregnancy	33,3%	38%
SAH/SHGD	6,7%	28,5%
PROM	13,3%	-
Fever before labour	6,7%	-
Cerclage	6,7%	4,8%
No disease	33,3%	28,5%
GDM	-	9,5%
Leukocytosis before delivery	-	4,8%
Hypothyroidism	-	4,8%
Placenta previa	-	4,8%

Tabela 2: Distribuição das variáveis maternas no HMDI, Goiânia, 2018.

Variables	Normal	Cesarean
Characteristics of amniotic fluid		
Clear amniotic fluid	33,3%	47,6%
Meconium amniotic fluid	33,3%	9,5%
Purulent amniotic fluid	6,8%	4,8%
Smelly amniotic fluid	6,8%	-
Bloody amniotic fluid	-	9,5%
No information	20%	28,5%
Complications		
Extended expulsive period	20%	-
Difficult extraction	20%	4,8%
Tight nuchal Cord	20%	-
Pelvic NB	13,3%	4,8%
Labor over 12 hours	6,8%	-
Shoulder Dystocia	6,8%	-
Fetal bradycardia	6,8%	-
Limb prolapsed	6,8%	-
No complications	26,6%	23,8
Use of forceps	-	4,8%
PPA	-	19%
Fetal bradycardia	-	14,2%
Transverse NB	-	4,8%
Fetal centralization	-	4,8%
Bleeding	-	4,8%
No information	-	4,8%

Table 3: Distribution of delivery variables at HMDI, Goiânia, 2018.

DISCUSSION

The prevalence found in the research unit is 0.5% of newborns with this condition. Souza¹⁰ found that the prevalence of neonatal asphyxia in Brazil was between 1.4% to 6.2% among the states of the federation. In other countries, the prevalence varied between 1 and 1.5%, being directly related to gestational age and birth weight³. Herrmann¹¹ concluded that neonatal anoxia affects 2 to 4 newborns per 1,000 live births. Of the affected newborns, 20% to 50% may have hypoxic-ischemic encephalopathy and, among the survivors, 25% evolve with permanent neurological sequelae, with or without mental retardation, learning disorders, seizure disorders and cerebral palsy.

Regarding the type of delivery, 41.7% of newborns with neonatal anoxia were born by normal delivery and 58.3% by cesarean delivery. This result is in agreement with studies by Bailit et al¹², in which the practice of cesarean section, in contrast to being protective of the low Apgar score, was considered a risk factor when the number of cesareans exceeded the predicted number of cesareans. This view, however, has a bias, since most cesarean sections already have fetal impairment or premature delivery, possibly iatrogenic, in the presence of fetal distress that requires early delivery, that is, asphyxia is prior to the cesarean section and not determined by it. Therefore, the operation is done as a way of treating asphyxia.

Regarding gestational age, this study demonstrated a relationship between prematurity and anoxia in newborns delivered by cesarean section, totaling 71.4%. It was not possible to establish a relationship between prematurity and anoxia in newborns with normal birth. Currently, gestational age less than 37 weeks is considered one of the main risk factors for neonatal asphyxia. In Souza¹⁰ it was observed that as the gestational age and weight increase, the risk of suffocation is reduced. Other studies such as Santa Helena et al¹³ corroborate that prematurity is a risk factor for neonatal mortality, with a risk 27 times higher for mortality in the neonatal period than newborns with gestational age above 37 weeks.

Male gender was associated with the occurrence of neonatal anoxia, with 60% of newborns delivered by normal delivery and 57% of newborns delivered by cesarean section being male. These data is corroborated by the study by Bekedam et al¹⁴ and Cunha et al¹⁵, in which there was a strong association between males and the increased risk of fetal distress and consequent asphyxia, with females being a protective factor. Other studies such as Sutton et al¹⁶ and Heinonen and Saarikoski¹⁷ also indicate male gender as a risk factor for neonatal anoxia.

Regarding birth weight, there was a relationship with neonatal asphyxia, totaling 62% of newborns delivered by cesarean section. It was not possible to establish a relationship between birth weight and neonatal asphyxia among newborns with normal birth. There is a consensus among the authors that low birth weight (<2500g) is a factor that contributes to neonatal asphyxia. The World Health Organi-

zation has established birth weight as an isolated factor of the greatest importance for child survival. It is known that deaths in newborns with adequate weight are considered preventable by simple and low-cost interventions during childbirth^{18,19}. Such measures include good neonatal care, making it possible to reduce neonatal mortality from asphyxia in up to 45% of cases.

Regarding prenatal care, this study showed no relationship with neonatal asphyxia. However, there is a bias, since it was not counted how many consultations performed by each pregnant woman and, mainly, the quality of care provided during prenatal care. Prenatal care is an important intervention tool during pregnancy, ensuring health and satisfactory care throughout pregnancy. The number of prenatal visits is a variable that is directly related to the risk of perinatal asphyxia^{15,20}.

It was not possible to associate neonatal asphyxia and congenital infections in the present study, despite the well-known repercussions of toxoplasmosis, rubella, cytomegalovirus, herpes and syphilis described in the literature. There was also no association between the use of alcohol, tobacco and drugs during pregnancy and neonatal asphyxia, although there is consensus among previous studies that the use of alcoholic beverages during pregnancy brings harm to the fetus, such as abnormalities and changes in the central nervous system, being dose-dependent²¹ and that perinatal and neonatal outcomes are unfavorable in pregnant women using legal or illegal drugs^{22,23}.

In the present study, urinary tract infection (UTI) was considered the biggest complication in the gestational period, affecting 33.3% of pregnant women who evolved to normal delivery and 38% of pregnant women who had a cesarean delivery. It is known that the frequency of maternal disorders can trigger perinatal complications such as asphyxia, contributing to neonatal mortality in 10 to 20% of cases²⁴. Still on perinatal complications, studies by Mazor-Dray et al²⁵, highlighted cerebral palsy/mental retardation and perinatal death as consequences of urinary tract infection in pregnancy. Hypertension and specific hypertensive gestation syndrome (SHGS) were also factors associated with perinatal asphyxia, present in 6.7% of pregnant women who progressed to normal delivery and 28.5% of pregnant women who had cesarean delivery, corroborated by previous studies on the subject^{26,27}.

Regarding amniotic fluid, in this study there was an association between meconium amniotic fluid and neonatal asphyxia, being present in 33.3% of normal deliveries and 9.5% of cesarean deliveries. Milsom²⁸, Souza¹⁰ and Batista²⁹ concluded that meconium fluid is related to perinatal asphyxia. Meconium fluid is considered an indicator of fetal distress, especially in the presence of hypoxia or acidosis. According to Beligere & Rao³⁰, preterm infants with meconium amniotic fluid at the time of delivery have a greater risk of neurological disorders in the future when compared to term newborns. Approximately 40% of newborns who are born amid meconium amniotic fluid had cerebral palsy compared to 10% of the

same group with clear fluid.

Prolonged labor was related to neonatal asphyxia in this study, having occurred in 20% of normal births. Although the influence of prolonged labor on fetal well-being is considered controversial, some studies consider that attention to conducting labor can reduce perinatal mortality by reducing asphyxia^{31,32}. Intrapartum asphyxia can be prevented by standard procedure (fetal auscultation every 30 minutes during the first period and every 5 minutes during the expulsion period).

CONCLUSIONS

The prevalence of anoxia in this health unit is 0.5% of newborns.

The profile of the NBs found for normal delivery was of gestational age greater than 37 weeks, male and weighing more than 2500g. The profile of newborns born surgically was of gestational age less than 37 weeks, male and weighing less than 2500g.

The maternal profile found for normal delivery was that of mothers who had UTI at some point during pregnancy, performed prenatal care, denied use of alcohol or licit/illicit drugs and had no infections (STORCH). In surgical delivery, UTI was also considered a risk factor, as well as SAH / SHGS.

It was possible to associate prematurity, male gender and low birth weight with neonatal anoxia among newborn variables, just as it was possible to associate neonatal anoxia with urinary tract infection and SAH/SHGS among maternal variables. Regarding obstetric variables, there was an association between meconium amniotic fluid and prolonged labor with neonatal asphyxia.

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