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PERINATAL ASPHYXIA: Epidemiological, Clinical, Aetiological and Prognostic Aspects at Ziguinchor Regional Hospital (ZRH)/Senegal

François Niokhor Diouf[1]*, Ndongo Pn[1], Amadou Sow[2], Toure Fk[1], Senghor S[1]

Abstract

Introduction: Birth asphyxia is one of the leading cause of neonatal deaths in developing countries like Senegal. Our objective was to study the socio demographic, clinical, aetiological and prognostic aspects of birth asphyxia at Ziguinchor regional hospital.

Material and methods: This was a descriptive analytical retrospective study of newborns medical records admitted at Ziguinchor regional hospital's neonatology department from January 1, 2020 to December 31, 2021.

Results: A total of 211 files of birth asphyxia were studied. Prevalence of asphyxia was 12, 8% of neonatal hospitalisations and 3, 6% of maternity births. The mothers' average age was 32 years old, 75.94% were married and 75% unemployed. 51% of them came from rural areas, 31% illiterate, 44,8% primigravida and 46,92% primiparous. Midwives followed 94,78% of mothers who gave birth vaginally in 68,8% of cases. 47,87% had dystocia. 50% of mothers had hypertension.78,4% of asphyxiated babies were in born. 63,4% of cases had yellow tinted amniotic fluid, 86,26% a cephalic presentation. The sex ratio was 2.05. Newborn average weight was 2760 g. Average hospitalisation time was 5,2 days. Digestive (60,66%) and respiratory distress (34,60%) were the main complications. 24,3% of asphyxiated newborns had developmental delay of which 5.93 % died with cerebral palsy before 2 years old.

Conclusion: More efforts and interventions should be made to reduce morbidity and mortality of birth asphyxia at Ziguinchor regional hospital.

Keywords: Asphyxia; Perinatal; Epidemiology; Aetiology

Introduction

Asphyxia is defined by the failure to establish breathing at birth [1]. According WHO, asphyxia is one of the primary causes of early neonatal mortality in developing countries of which 2/3 of these deaths can be prevented by providing simple and adequate interventions. Various studies done in Senegal on birth asphyxia reported a prevalence range of 7,46 to 8,99% [2-4]. In the southern Senegal, a preliminary study done at the Peace Hospital revealed a prevalence of 20.6% [5], making this pathology one of the main cause of hospitalization and death in the city of Ziguinchor. Thus, we aimed to study the socio demographic clinical aetiological and prognostic aspect of perinatal asphyxia in the neonatology unit of the Ziguinchor regional hospital.

Affiliation:

[1]Department of Pediatrics, Cheikh Anta Diop University, Abass Ndao Hospital Center, Dakar, Senegal

[2]Pediatrics Abass Ndao Hospital, Avenue Cheikh Anta Diop Dakar fann gueule tapée, Senegal

***Corresponding author:**

François Niokhor Diouf, Department of Pediatrics, Cheikh Anta Diop University, Abass Ndao Hospital Center, Dakar, Senegal.

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Material and Methods

Setting and type of study

This study took place in the neonatology unit of the Ziguinchor regional hospital which is classified as level II according to the Senegal health pyramid. The hospital is located in Ziguinchor, a town situated in the Southern Senegal which shares its borders with Gambia (north), Guinea Bissau (south), Guinea Conakry (east) and the Atlantic Ocean (west). The neonatology unit accommodates children aged 0 to 1 month with a capacity of 30 beds including 8 closed incubators, 8 open incubators. Its health workers consist of 1 paediatrician, 7 state-registered nurses, 7 nursing assistants, 2 nurse aides and 4 cleaners.

We conducted a single-center descriptive analytical retrospective study of new-born's medical records admitted to the neonatology unit of the Ziguinchor hospital from January 1, 2020 to December 31, 2021.

Study population

As part of this work, all patients' files with the diagnosis of birth asphyxia were included. We excluded files where the diagnosis of perinatal asphyxia was not clearly specified.

Data collection

For each neonate medical file, we used a data collection form that recorded the following parameters which were analysed:

- Socio-demographic information of mothers: age, education level, marital status, professional activity, residence, ethnicity, gestational age and parity
- Pregnancy and childbirth: age of pregnancy, prenatal care provider , number of prenatal visits, type of pregnancy, medical maternal pathology during pregnancy, pregnancy complications, mode of birth delivery, type of presentation, place of birth(in born or out born), amniotic fluid colour , mode of newborns transfer.
- Neonatal and hospitalization: sex, birth weight, type of hospitalization, complication during hospitalization and outcome

Definition of Study parameters

We defined perinatal asphyxia as any viable newborn who did not cry at birth and had an Apgar score less than or equal to 4 in the first minute of life.

Dystocia was either mechanical (osseous or funicular) or dynamic (related to uterine contractions). Child's prognosis was defined as short term (during hospitalization), medium (one week at his appointment following discharge) and long term (following months to years after birth). Patients distance follow up was performed via check-up appointment, telephone or video call.

Sarnat classification was used for hypoxic-ischemic encephalopathy.

Developmental milestones mainly posture and language was assessed from birth until data analysis. We were did not assessed sensory disorders (deafness, blindness).

Data analysis

The data were analysed using Epi info 3 statistical software then exported to Excel 2013. Results were expressed as mean absolute value and percentage. proportions were compared using Pearson Chi² or Fisher's exact test depending on validity conditions with a P value <0.05 considered as statistically significant.

Results

In this study the prevalence of birth asphyxia in hospitalized newborns was 12,08% (211/1746 newborns hospitalized). The prevalence of in born (maternity birth) asphyxiated newborns was 3,68% (149/4076 births).

Socio-demographic and epidemiological data

Mother's average age was 32 years with the main age group of 18-25 years (42,6%). 75, 9% were married, 31% unschooled and 75% unemployed. The average gestational age and parity were respectively 6,5 and 6. Half of them came from an urban area (51%).

Pregnancy and childbirth data

More than half (55,7%) of the mothers had a gestational age of 37 to 41 weeks + 6 days. Those less than 37 weeks were 28, 24%. 53,7% of mothers did 4 to 7 prenatal visits and were followed up in 97,8 % of cases by a midwife .Almost all cases (94,79%) were single pregnancy. In more than half of cases (52,13%) dystocia didn't occurred. 78,4% were in born cases. In 50 percent of cases hypertension was the main pathological disease during pregnancy (Table 1).

Table 1: Distribution of maternal pathologies during pregnancy.

Pathologies	Workforce	Percentage
Sickle cell disease	1	7,14%
Hepatitis B	3	21,43%
HIV	3	21,43%
HTN	7	0.5
TOTAL	14	1

41, 30% of mothers had threatened preterm labor as main pregnancy complication (Table 2).

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Table 2: Distribution of pregnancy complications.

Complications	Workforce	Percentage
Threatened preterm labour	19	41,30%
Eclampsia/Preeclampsia	9	19,57%
Placenta Previa	5	10,87%
Placenta abruptio	4	8,70%
Gestational Diabetes	3	6,52%
Urinary tract infections	3	6,52%
Anemia	1	2,17%
Severe malaria	1	2,17%
Scarred uterus	1	2,17%
Total	46	100

Table 3: Distribution of newborns according to mode of delivery, presentation, color of amniotic fluid, sex and birth weight.

		Workforce	Percentage
Delivery mode	Spontaneous VB	135	63,98%
	Induced VB	73	34,60%
	LSCS	3	1,42%
	TOTAL	211	1
Presentation	Cephalic	183	86,26%
	Breech	26	12,32%
	Face	2	0,95%
	Transverse	1	0,47%
	TOTAL	211	1
Appearance of amniotic fluid	Clear	60	28,44%
	Yellow Tinted	101	47,87%
	Meconium	33	15,64%
	Bloody stained	17	8,06%
	TOTAL	211	1
Sex	Male	142	32,70%
	Female	69	67,30%
	TOTAL	211	1
Weight	Below 1000g	3	1,46%
	Between1000 and 1500g	10	4,88%
	Between1501 and 2499g	31	15,12%
	Between 2500 and 4000g	152	74,15 %
	Up to 4000g	9	4,39%
	TOTAL	205	1
Birth	Inborn	149	78,84%
	Out terminal	40	21,16%
	TOTAL	189	1
Transfer	Yes	40	21,16%
	No	149	78,84%
	TOTAL	189	1

Newborn and hospitalization data

Neonatal data were recorded in Table 3.

The average hospitalization time was 5.2 days. 68,7% of newborns were classified Sarnat 1. Digestive disorders were the main complications during hospitalization (Table 4).

Table 4: Distribution of complications during hospitalization

Complications	Workforce	Percentage
Digestives GERD/NEC	128/9	64,93%
Respiratory distress	73	34,60%
Neurological/Convulsion	22	10,42%
Metabolic/Hypoglycemia	40	18,96%
Infectious/Neonatal infection	30	14,22%
Cardiac/Hemodynamic instability	12	5,69%
Jaundice	4	1,90%
Nosocomial infection	2	0,95%

The mortality rate was 18,9% during hospitalization mainly due to respiratory distress. Of the 111 newborns monitored, 24,3% had developmental delay of which 44, 4% had posture disorders, 37% cerebral palsy and 18% language disorders.

Discussion

In our study, the prevalence of birth asphyxia was 12,08%. This finding was similar to those reported in 2022 by Ndiaye [6] (10, 92%) in Dakar. Much lower rate (0.1%) were reported in developed countries [7]. This rather high prevalence particularly in regions could be explained by precarious working conditions, shortage of qualified midwives, unskilled health workers on neonatal resuscitation and poor intrapartum transfer. Mother's average's age was 32 years between 14 to 50 years. This was much higher than mothers average's age found by Djuidjie Tala [8] in Dakar in 2012, Kamaye et al. [9] in Niamey in 2022 and Sidibé et al. [10] in Bamako in 2019 who reported respectively 25, 24 and 28 years [8-10]. Contraception failure in our areas could be the reason why women give birth after the age of 35.

Nearly half (40.52%) of our mothers went to secondary school. however only 31 % were unschooled .This finding was similar to Boko [15] and Diouf [16] who reported respectively 33.3% and 45.7% of unschooled mothers. In this study, 75% of mothers were housewives without income-generating activities. Boko found a similar rate (67%). More than half (51%) of mothers came from an urban area. On the other hand, Gueye and Faye found respectively 63,90% [17] and 76% [3] of mothers from rural areas. Nearly half of the mothers were primigravidas (44,08%) and primiparous

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(46,92 %.). There is a substantial overlap between this finding and those reported in Senegal and sub-region [8,11-14]. Indeed, primigravidas primiparous women are more likely to be inexperienced in monitoring pregnancy and labor.

The main gestational age range (55,17%) was 37 to 40 weeks + 6 days. Thiam L et al. [5] found nearly (53,3%) the same gestational age in his study. In more than half of the cases, (53,7%), mothers attended 4 to 7 antenatal care visits. WHO recommends at least 8 contacts to reduce perinatal mortality and improve women's experience of care [18].

In our study, 94,79% of antenatal care provider was a midwife. Likewise this was also reported by Boko [15] at 83.20%. Genuinely, the objective of WHO is to achieve a 100 percent pregnancy follow up by a midwife or gynecologist. 50 % of mothers had hypertension during pregnancy. In addition threatened preterm labour and preeclampsia /eclampsia were the main complications with respectively 41.3% and 19.57%. On the other hand, some authors found premature ruptured of membranes, maternal infections and preeclampsia as the main complications [2,14,19]. Birth asphyxia is influenced by many factors. 78,84% of cases were In born deliveries as mostly reported by various authors [4,15]. Actually, the maternity ward of Ziguinchor regional hospital serves not only the city but also the entire sub region. 86,26% of newborns had cephalic presentation, 68.98 % were delivered through vaginal birth. This same trend was found by other authors [2,10]. On the other hand, Thiam [5] found more deliveries by cesarean section. In our study, the high incidence of birth asphyxia following vaginal delivery could be explained by the shortage of health personnel (only 1 gynecologist available in the structure during the study period) but also unskilled staff to newborn resuscitation. The amniotic fluid was yellow tinted or meconium stained in more than half of the cases (63.51%). A similar finding is highlighted in literature [8,19,20,] and attests of fetal hypoxia. According to Gebreheat [21], neonates born with meconium stained amniotic fluid are 8,55 times more likely to develop perinatal asphyxia than those with clear amniotic fluid . The sex ratio was 2.05 favoring male sex likewise findings of other authors [8,21,22]. As a matter of fact, lung biochemical maturation is regulated by a multi dimension endocrine control in which androgens play a slowing role.

In this study birth average weight was 2760g. A much higher birth average weight (3202.4g) was reported in a study done in Brazzaville Teaching University hospital. Gebreheat [21] argued that newborns under 2.5 kg are 12.75 times more likely to suffer from perinatal asphyxia than newborns between 2.5 and 4 kg. Intrauterine growth retardation is a risk factor for perinatal asphyxia, due to poorer uterine contractions tolerance (risk of hypoxic ischemic encephalopathy and meconium aspiration syndrome [22].

The average hospitalization stay in this work was 5.2 days fluctuating between 1 to 38 days. Much higher values were found by Ndiaye A (8.2 days) and Thiam L. (10 days) with a range of 1 to 32 days. Most of our newborns were classified Sarnat 1 and had a good clinical evolution. This was probably the reason why hospitalization stay in our study was relatively short. Digestive disorders (60.6%), respiratory distress (34.6%), neonatal infections (18.96%) and hypoglycemia (14.2%) were the main complications. In literature, respiratory complications are most common [23,36,48,54]. Crying at birth reduce pulmonary resistance, lung fluids drains, inflate and ensure adequate respiratory function. In case of asphyxia we see the opposite.

In medium and long term prognosis, 75,68% of asphyxiated newborns reached their developmental milestones. Ndiaye A found the same results [36]. In this study, most of children were classified Sarnat 1 for hypoxic ischemic encephalopathy and recovered well. Only 24,3% had developmental delay of which 37,04% had cerebral palsy, 18,52% language disorders and 44,44% only posture disorders.5, 93 % of children with cerebral palsy died before 2 years old

Conclusion

Birth asphyxia remains a public health concern in developing countries particularly in Senegal. It is relatively common at the Ziguinchor regional hospital with a high mortality rate. Salvation can be achieved through better decision-makers policy, sharpened coordination between mother and child care centers and accessibility of qualified human resources and materials.

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