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# Epidemiological, Diagnostic, Therapeutic and Evolutionary Profile of the Newborn Macrosome at the University Teaching Hospital of Bouaké (Côte D'ivoire)

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## Abstract

***Objective:*** *To describe the main epidemiological, diagnostic, therapeutic and evolutionary aspects of the newborn macrosome in neonatology at Bouaké University teaching Hospital.*

***Methods:*** *This was a prospective, descriptive and analytical study carried out in the neonatology unit of the Bouaké CHU from January to November 2019. Included were all newborns with a birth weight ≥ 4000g after parental consent. The variables studied were sociodemographic, diagnostic, therapeutic and evolutionary.*

***Results:*** *A total of 1557 newborns were registered including 130 macrosomes (87 boys and 43 girls) or 8.3%. The age of the mother was ≥30ans in 53.8% of the cases. She had a history of large fetus (46.2%), maternal and/or familial obesity/overweight (71.5%), gestational diabetes (10.4%) and pre-existing diabetes (3.9%). The main physical signs at admission were general (34.2%), respiratory (27.7%) and neurological (22.3%). Hypoglycemia (36.4%), perinatal asphyxia (15.2%) and obstetrical trauma (15.2%) were the main pathologies associated with macrosomia. The evolution was marked by recovery (92.3%), death (6.9%) and discharge against medical advice (0.8%). The significant factors associated with death were resuscitation in the delivery room [P<0.001 - OR 5.55 (1.1-25.62)] and age at admission greater than or equal to 24 hours [p=0.001- OR 9.16 (1.17-418.22)].*

***Conclusion:*** *Macrosomia is frequent at the Bouaké University teaching Hospital. It often concerns a newborn boy of a diabetic, obese or overweight mother. Lethality is still high. Improvement of the prognosis requires correct follow-up of pregnancies and early management of the newborn. This implies a perfect collaboration between the gynecologist-obstetrician, the midwife and the pediatrician.*

**Keywords:** newborn, macrosome, etiology, prognosis, Côte d'Ivoire

## Introduction

The newborn macrosome refers to any newborn whose birth weight is ≥ 4000 grams or greater than the 90th percentile of the reference curves in relation to gestational age [1-3]. Its prevalence varies between countries due to the variety of contributing factors studied in different studies [4]. Globally, macrosomia affects 3-15% of all births [5]. In developed countries its prevalence varies between 5 and 20% [6] For example, it was 9% of births between 2010 and 2015 in the United States [7]. The causes are varied and may be genetic or environmental. Being born large, it carries risks for both the mother and the newborn. For the mother, fetal macrosomia increases the risk of caesarean section, hemorrhage of the delivery in case of vaginal delivery, postpartum infections and maternal

death. For the newborn, macrosomia increases the risk of perinatal asphyxia, obstetric trauma, metabolic disorders, especially hypoglycemia, and death [8-10]. In addition to its medical complications, fetal macrosomia has socioeconomic repercussions. It leads to a longer period of hospitalization and therefore more expensive for the parents. For these evoked consequences, the newborn macrosome should, like low birth weight, be the subject of particular attention and numerous publications. But in practice, works on macrosomia are rare in Côte d'Ivoire. The last work carried out in Abidjan dates back about ten years. At the time, this study revealed a prevalence of 3.43% [10] but insufficiently described the other aspects of this clinical condition. To our knowledge, no study has been conducted on newborn macrosomes in Bouaké, the second largest city in Côte d'Ivoire after Abidjan, the economic capital. The objective of this work was to describe the diagnostic, therapeutic and evolutionary epidemiological profile of the newborn macrosome for the improvement of prognosis and professional practice.

## Methods

This was a cross-sectional descriptive and analytical study conducted in the neonatology unit of the Bouaké University Hospital from January to November 2019. The neonatology unit is the only tertiary level unit located about 350 km from Abidjan, the economic capital to the south. This unit has a health area that covers about 60% of the national territory. The unit has three cradles, eight incubators, three radiant tables, two phototherapy devices, a vacuum cleaner, four oxygen bottles each equipped with a manometer, three oxygen concentrators, a pulse oximeter and two nursing chairs. The medical and paramedical team of this unit includes a pediatrician assistant head of clinic, four doctors registered in the Pediatrics Special Studies Diploma, one hospital intern, two doctoral students, medical students, fourteen midwives, five orderlies and two hospital officers. Newborns were received and visited daily by two physicians and two PhD students, assisted by two midwives, two nurses' aides and a hospital services officer. Two physicians, medical students, two midwives, a nurse's aide and a hospital services officer also provided duty and on-call care. The study population is all newborns admitted to the neonatal unit during the study period. Included in the study were all newborn macrosomes of consenting parents regardless of sex and reason for admission. Macrosomia was defined as a birth weight greater than or equal to 4000 grams. All macrosome infants without medical records or unexploitable medical records were not included in the study. The study sample was drawn as admissions were made to the unit of newborn macrosomes meeting the inclusion criteria. The sample size was calculated using the formula N=(Z)2p(1-p)/d2 (*n = sample size, Z = 1.96 at 95% confidence level, p = estimated proportion of home births, d = 5% margin of error*). In the absence of the national prevalence of newborn macrosome, the prevalence of newborn macrosome used for the calculation is the 8% rate used at the global level. The calculation performed gave: N = (1.96x1.96) x 0.08(1-0.08) / (0.05x 0.05), i.e. 113, which we rounded to 130 to increase the power of the study. Newborns meeting the inclusion criteria were given a thorough clinical examination after stabilization of major vital functions. The anamnesis was based on the course of the pregnancy and the circumstances of birth. The physical examination assessed the general condition, hemodynamic constants and looked for an infectious focus or abnormality in all devices. The minimal paraclinical exploration included a blood glucose level, blood count, ABO/Rhesus blood groups. Depending on the etiologic orientation, the assessment was completed by a blood culture, a CRP, and imaging (chest X-ray, transfontanel ultrasound). At the end of the exploration, the diagnosis was retained and the symptomatic and etiological treatment instituted. In the present study, hypoglycemia was defined as venous blood glucose measured during the first 48 hours of life < 2.5 mmol/L) in asymptomatic term newborns, < 2.2 mmol/L) in symptomatic term newborns and < 1.7 mmol/L) in premature newborns [11, 12]. Monitoring of treatment was clinical and paraclinical. All information about the child and family, care provided and progress under treatment was recorded in the medical record. A standardized, anonymous and structured survey form was developed for data collection. It provided information on epidemiological, diagnostic, therapeutic and evolutionary characteristics. The study variables were for: i) epidemiological characteristics of the newborn (age at admission, sex, place of residence), of the mother (age, activities, history (macrosome, stillbirth, abortion, pathologies, gestations, parity); ii) diagnostic characteristics (type of macrosomia,

clinical signs, associated pathologies); iii) therapeutic and evolutionary characteristics (treatments instituted, discharge modalities, length of stay, factors associated with death). With respect to ethical considerations, prior authorization for a preliminary investigation was obtained from the Medical Scientific Department of the University Hospital Center with amplification to the Head of the Pediatrics Department. The information collected was made anonymous by a coding system. The data were entered and then analyzed with the Epi-Info 7 computer software. Quantitative variables were expressed as means with standard deviation. Qualitative variables were expressed as proportions

## Results

### Epidemiological Aspects

During the period of the study, 1557 newborns were admitted to the neonatology unit, 130 of them for macrosomia, i.e. a prevalence of 8.3%. The newborn macrosome was male in 87 cases and female in 43 cases, i.e. a sex ratio of 2. The mother had a low level of education and was a housewife or a tradeswoman in 90.8% (118/130). She resided in the city of Bouaké in 83.1% of cases and was at least 30 years old in 53.9% of cases. In 40.8% of cases, the mother's age was between 35 and 39. The median age of the mothers was 30 years (extreme 18 and 45 years). The mother was multigester and large multigester in 60.8% of cases and had given birth at least 4 times in 51.5% of cases. She had a history of obesity/overweight (71.5%), familial diabetes (12.3%), diabetes (3.9%) and macrosome delivery in 46.2%. The mother's history and birth circumstances are summarized in Table I.

**Table1.** *Maternal history*

| Variables | Effectifs n/N | Percentage |
|---|---|---|
| **Gestited** | | |
| • Primigeste (1) | 6/130 | 4.6 |
| • Paucigeste (2-3) | 45/130 | 34.6 |
| • Multigeste (4-5) | 46/130 | 35.4 |
| • Large multigeste (≥6) | 33/130 | 25.4 |
| **Parity** | | |
| • Primigpare (1) | 16/130 | 12.3 |
| • Paucipare (2-3) | 47/130 | 36.2 |
| • Multipare (4-5) | 42/130 | 32.3 |
| • Large multipare(≥6) | 25/130 | 19.2 |
| **Pathologies** | | |
| • · Obesity/ Overweight | 93/130 | 71.5 |
| • · Family Diabetes | 16/130 | 12.3 |
| • · Known diabetes | 5/130 | 3.9 |
| **Gynaecological-obstetrical** | | |
| • Macrosome delivery | 60/130 | 46.2 |
| • ·Spontaneous abortion | 18/130 | 13.9 |
| • ·Stillbirth/Death in utero delivery | 15/130 | 11.5 |

The mother had made at least 4 prenatal visits in 78.5% of cases. Maternal and fetal anomalies identified during prenatal consultations are shown in Table II.

**Table2.** *Maternal and fetal anomalies identified during prenatal consultations*

| Pathologies | Effectifs n/N | Percentage |
|---|---|---|
| **At the mother's level** | | |
| · excessive uterine height | 95/130 | 73.1 |
| · anemia | 23/45 | 51.1 |
| · hemoglobinopathies | 6/38 | 15.8 |

| | | |
|---|---|---|
| · excessive weight gain | 18/130 | 13.8 |
| · diabetes (gestational) | 5/48 | 10.4 |
| · HIV positive serology | 6/114 | 5.3 |
| · rubella-positive serology (IGM) | 7/31 | 22.6 |
| · Positive toxoplasmosis serology (IGM) | 5/27 | 18.5 |
| · uncomplicated malaria | 4/130 | 3.1 |
| · myoma | 3/93 | 3.2 |
| · utero-pyelohydronephrosis | 1/93 | 1.1 |
| · syphilis serology negative | 26/26 | 100 |
| **At the level of the fetus** | | |
| ● · Hydramnios | 1/93 | 1,1 |

The pregnancy was full term in all cases. The presentation was cephalic (96.2%), transverse (2.3%) and breech (1.5%). Delivery was vaginal in 50% of cases and caesarean section in 50% of cases. He was resuscitated in the delivery room in 12.3% of cases. The resuscitation procedures undertaken were wiping (100%), warmth in skin-to-skin contact on the mother's belly and wearing a cap on the newborn (100%), mouth clearance (100%), mask ventilation (12.3%) and external cardiac massage (11.5%). The APGAR score at 5 minutes of life was greater than or equal to 7 in 95.3% and between 4 and 6 in 4.7% of cases. All newborn macrosomes benefited from prophylactic care in the delivery room (*Vitamin K1 1 mg intramuscularly, antiseptic eye drops, chlorhexidine umbilical dressing*).

## Diagnostic Aspects

The birth weight was between 4000 and 4499 grams (g) in 85%, 4500 and 4999g in 13% and greater or equal to 5000g in 2.3%. The median weight was 4112.5 g (extremes 4000g and 5340g). The birth head circumference was between 31 and 33 centimetres (cm) in 35.4%, 34 and 35 cm in 52.3% and greater or equal to 36 cm in 12.3%. The median cranial perimeter was 34 cm (extremes 31 and 37 cm). The birth height was between 45 and 52 centimetres (cm) in 63.1%, 53 and 55 cm in 34.6% and greater or equal to 56 cm in 2.3%. The median height was 52 cm (extremes 45 cm and 57 cm). The newborn macrosome admitted to neonatology came from the maternity ward of Bouaké University Hospital in 81.5% of cases, referred from a peripheral maternity ward in 14.6%, and brought by the parents in 3.9% of cases. The newborn macrosome was admitted at an age less than or equal to 24 hours in 121 cases (93%), between 25 and 48 hours in 2 cases (1.5%) and more than 48 hours in 7 cases (5.5%). The median age was 2 hours (extreme 0 and 600 hours). Reasons for admission and physical signs of examination are presented in Table III.

**Table3.** *Reasons for admission and physical signs of examination*

| Reasons for admission and physical signs* | Effectifs n/N | Percentage |
|---|---|---|
| **Reasons for admission** | | |
| · Macrosomia | 106/130 | 81.5 |
| · Neonatal Suffering | 18/130 | 13.8 |
| · Elderly mother | 9/130 | 6.9 |
| · Obstetrical trauma | 6/130 | 4.6 |
| · Term overrun | 6/130 | 4.6 |
| · Respiratory distress | 6/130 | 4.6 |
| · Prevention of mother-to-child transmission of HIV | 6/130 | 4.6 |
| · Malformation | 2/130 | 1.5 |
| · Fever | 2/130 | 1.5 |
| · Chorioamniotite in the mother | 1/130 | 0.8 |
| · Cord bleeding | 1/130 | 0.8 |
| · Cold | 1/130 | 0.8 |
| · Suspicion of a strangulated hernia | 1/130 | 0.8 |

| | | |
|---|---|---|
| · Diabetic mother | 1/130 | 0.8 |
| · Vomiting | 1/130 | 0.8 |
| **Physical signs **** | 63/130 | 48.5 |
| · General | 51/130 | 39.2 |
| · Respiratory | 41/130 | 31.5 |
| · Neurological | 16/130 | 12.3 |
| · Locomotives | 9/130 | 6.9 |
| · Cutanéomucous | 4/130 | 3.1 |

** a newborn could have several associated patterns and physical signs*

*** Physical signs:*

- *General signs: Hypothermia (37 cases), General poor condition (17 cases), Fever (5 cases), Malformation (4 cases).*
- *Respiratory signs: Respiratory distress (21 cases), Polypnea (14 cases), Bradypnea (8 cases), Bronchial rales/sensitizers (8 cases).*
- *Neurological signs: cerebral distress (26 cases including 10 grade I, 7 grade II and 9 grade III cases), hypotonia (9 cases), hypertonia (1 case), abnormal movements (3 cases), convulsion (2 cases).*
- *Locomotor signs: brachial plexus elongation (11 cases), clavicle fracture (2 cases), sero-blood bump (1 case), cephal-hematoma (1 case), dislocation, (1 case).*
- *Cutaneous mucosal signs: pallor (3 cases), cyanosis (3 cases), jaundice (2 cases), ecchymosis (1 case).*
- *Cardiovascular signs: skin recoloration time less than 3 seconds (1 case), tachycardia (1 case), bradycardia (1 case), irregular heartbeat (1 case).*

The capillary blood glucose test performed in all newborns revealed normo-glycemia in 91 cases (70%), hypoglycemia in 36 cases (27.7%), hyperglycemia in 3 cases (2.3%). The blood count in 43 children was normal in 40 cases (93%) and abnormal in 3 cases (2 cases of anemia and 1 case of hyperleukocytosis). The C-reactive protein assay performed on 40 macrosomes was negative in 26 cases (65%) and positive in 14 cases (35%). The thick drop and Plasmodium blood smear performed on 43 macrosomes were negative in all cases. Chest X-ray of 13 newborn macrosomes was normal in 10 cases (77%) and abnormal in 4 cases (clavicle fracture 2 cases, shoulder dislocation 1 case). Hypoglycemia (27.7%), perinatal asphyxia (11.5%), obstetric trauma (11.5%) and infection (10.8%) accounted for 61.5% of the morbid conditions associated with macrosomia (Table IV).

**Table4.** *Morbid conditions associated with macrosomia*

| Morbid conditions * | Effectifs n/N | Percentage |
|---|---|---|
| Hypoglycemia | 36/130 | 27.7 |
| Perinatal asphyxia | 15/130 | 11.5 |
| Obstetrical trauma | 15/130 | 11.5 |
| Infection | 14/130 | 10.8 |
| Post maturity | 11/130 | 8.5 |
| Malformation | 4/130 | 3.1 |
| Inhalation of amniotic fluid | 2/130 | 1.5 |
| Anemia | 2/130 | 1.5 |

** a newborn could have an association of morbid conditions*

### Therapeutic and Evolutionary Aspects

Macrosomes were put under observation for 24 hours for monitoring in 66% of cases. Those hospitalized for an associated morbid condition accounted for 34%. The non-specific and specific treatments administered are shown in Table V.

**Table5.** *Non-specific and specific treatments administered to newborn macrosomes*

| Treatments | Effectif n/N | Percentage |
|---|---|---|
| **Non-specific** | | |
| · Early enteral feeding | 115/130 | 88.5 |
| · Solute Perfusion (SG5%+SG10%) | 38/130 | 33.8 |
| · Intravenous bolus of serum glucose 10%. | 37/130 | 28.5 |
| · Oxygen therapy | 17/130 | 13.1 |
| · Food stop | 15/130 | 11.5 |
| · Valium | 4/130 | 3.1 |
| **Specific **** | | |
| · Bi-antibiotherapy | 24/130 | 18.5 |
| · Niverapine | 6/130 | 4.6 |
| · Lasilix | 1 | 0.8 |
| · Ezomeprazole | 1 | 0.8 |
| · Blood transfusion | 1 | 0.8 |

The evolution under treatment was marked by recovery 120 cases (92.2%), discharge against medical advice 1 case (0.8%) and death 9 cases (6.9%). Pathologies associated with death were 4 cases of perinatal asphyxia, 2 cases of malformations (ruptured omphalocele grade II and 1 case, cervical malformation 1 case), 2 cases of infection and 1 case of neuro hypoglycemia. Significant factors associated with death are presented in Table VI.

**Table6.** *Factors associated with death of the newborn macrosome*

| Variables | Living | Deceased | OD ratio | P |
|---|---|---|---|---|
| **Resuscitation in the delivery room** | | | | |
| · No | 111 | 3 | 5.55 (1.1- 25.62) | <0.001 |
| · Yes | 10 | 6 | | |
| **Age at admission** | | | | |
| · < 24 hours | 65 | 1 | 9.16 (1.17- 418.22) | 0.016 |
| · ≥ 24 hours | 56 | 8 | | |

The duration of hospitalization was less than or equal to 24 hours in 98 cases (75.4%), between 25 and 72 hours in 16 cases (12.3%) and more than 72 hours in 16 cases (12.3%). The median length of hospitalization was 6 hours (extremes 1 and 288 hours). For the 120 macrosomes in which the evolution was favourable, the neuro somatic examination performed 1 month after hospital discharge was normal.

## Discussion

The objective of the study was to describe the main epidemiological, diagnostic, therapeutic and evolutionary aspects of the newborn macrosome in the neonatology unit of Bouaké University Teaching Hospital. This clinical condition is often associated with various pathologies. Management is mainly limited to prophylactic care and early enteral feeding with a favorable evolution in the majority of cases. These results must be qualified because the study is hospital-based and mono-centric and cannot be extrapolated to all health centers in the Gbêkê region. In addition, communication difficulties secondary to the language barrier and the absence of the mother on admission made it difficult to obtain certain information and to verify its veracity. The low socio-economic level of the parents made it difficult to carry out certain paraclinical examinations. For example, paraclinical check-ups were very rarely carried out. In spite of the methodological limitations, these results raise points of discussion at the epidemiological, diagnostic, therapeutic and evolutionary levels.

## On the Epidemiological Level

This work shows that the prevalence of macrosomia is 8.3% in neonatology at Bouaké University Teaching Hospital. This result is comparable to that reported by Kayode-Adedeji and *al.* in Nigeria in 2018 with a prevalence of 8% [13]. Yao and *al.* [14] in France in 2017 reported 7.95%. Moreover, the results of the present study are lower than those reported in Algeria (10.9%) [15], Lithuania (24.4%) [16] and Mexico (18.6%) [17]. Other authors found lower prevalence. Indeed, Saïd and *al.* [18] in Tanzania in 2016 reported a prevalence of 2.3%. Macrosomia prevalence was also low in 14 provinces in China (7.3%) [19], South-South Nigeria (7.4%) [20], Tigray in northern Ethiopia (6.68%) [21] and Hong Kong, China (2.89%) [22]. This variability from one study to another could be explained by differences in the socio-demographic characteristics of respondents, study design, data collection procedure and type of study participants. Despite these differences, these studies have the merit of showing that macrosomia is a frequent reason for admission to neonatology. In the study, the newborn macrosome is a boy in the majority of cases with a sex ratio of 2. Merger and *al.* [12] also found a male predominance with a proportion of 66.68%. Similarly, Akin et al. in Turkey in 2010 [23], Elouazzani and *al.* [24] in Morocco in 2012, LI et al. in China in 2014 [19], Manel and *al.* [25] in Tunisia in 2017, Usta and *al.* [26] in Turkey in 2017 and Biratu and *al.* [27] in 2018 in Ethiopia reported male predominance but in different proportions. Various hypotheses have been proposed to explain why girls are born lighter than boys. Wilkin and *al.* [28] suggested that sex-specific genes affecting insulin sensitivity are responsible for the difference in birth weight between the sexes. They suggest that the female fetus is genetically more resistant to insulin and less sensitive to the trophic effects of insulin and is therefore smaller [28]. The study shows that 3.9% of the macrosome mothers had long-standing diabetes and 10.4% of the mothers had gestational diabetes. These results are higher than those reported by Luhete and *al.* [29] in 2016 in Lumbubashi (Democratic Republic of Congo). In their study the incidence of maternal diabetes was 1.2%. For Saïd and *al.* [18] in Tanzania in 2016 mothers were diabetic in 5.8%. Manel and *al.* [25] in Tunisia in 2017 reported a 9.3% frequency of maternal diabetes. The link between fetal macrosomia and maternal diabetes has been widely demonstrated in the literature. According to Carlotti and *al.* [30] and Ballard and *al.* [31], diabetes, whether gestational or pre-pregnancy, is a known risk factor for fetal macrosomia. Moreover, its frequency varies from 45% in a population of women with diabetes to 8% in a control population of women without diabetes. The occurrence of macrosomia in diabetic mothers has been attributed to poor glycemic control [32]. Thus, the proportions reported in the study would not reflect reality. The low level of screening in our secondary context of low socioeconomic status and sometimes insufficient demand for paraclinical biology check-ups by health workers, constitutes a selection bias. It appears from the present study that the history of family and/or maternal obesity/overweight appears at a frequency of 71.5%. The notion of maternal obesity in the context of fetal macrosomia is found in several studies but at variable frequencies [23, 29, 33, 34]. Two mechanisms have been proposed to explain the link between maternal obesity and fetal macrosomia. The first is increased maternal resistance to insulin leading to higher fetal blood glucose levels, and the second is a level of insulin and placental lipases that metabolize triglycerides in maternal blood, leading to the transfer of free fatty acids to the fetus [35-37].

## Diagnostic Aspects

The study showed that the vaginal route and Caesarean section each account for 50% of the routes of delivery. These results are comparable to those reported by Saïd and *al.* [18] in Tanzania in 2016. In their studies, the newborn macrosome was born by cesarean section in 55.3% and by vaginal delivery in 44.7% of cases. Tolosa and *al.* [7] in the United States in 2017 reported a C-section rate of 70%. However, these results differ from those reported by most authors. The majority of the research has returned to a predominance of vaginal delivery. Biratu and *al.* [27] in Ethiopia in 2018 and Luhete and *al.* [29] in 2016 in Lumbubashi (Democratic Republic of Congo) reported a vaginal delivery rate of 74.2% and 84.4%, respectively, compared with 25.8% and 15.6% by Caesarean section. Ezegwui and al. [32] in Nigeria in 2011, Yao and *al.* [14] France in 2017 found a frequency of vaginal delivery of 72.7% and 75% respectively, compared to 27.3% and 25% by Caesarean section. The vaginal route remains the most frequent mode of delivery. According to the CNGOF and the HAS, the entire obstetrical team (midwife, obstetrician, anesthesiologist and pediatrician) must

be present at delivery. This clearly shows the need for proximity between the gynecology and pediatrics departments in our reference hospitals, which is not often the case. The present study shows that hypoglycemia (36.4%), anoxo-ischemic cerebral pain (15.2%), obstetrical trauma (15.2% with 11 out of 15 cases of brachial plexus paralysis, i.e. 73.3% of obstetrical trauma) and infection (14.1%) are the main pathologies associated with macrosomia. The same neonatal pathologies with a few differences have been observed in some studies. For Saïd and *al.* [18] in Tanzania in 2016 neonatal morbidity was dominated by hypoglycaemia (27.2%), respiratory distress (16.5%) and perinatal asphyxia (14.4%). Oral and *al.* [38] in Turkey in 2001 found, in addition to these morbidities, 17 cases of brachial plexus paralysis (2.4%), 16 cases of clavicular fracture (2.3%). Yao and *al.* [14] in France in 2017 found that neonatal morbidity was dominated by hypoglycemia (4.25%) and respiratory distress (3.54%). These differences in results could be explained by methodological reasons (location of the studies and the different objectives set). Indeed, as this study took place in a neonatology department, shoulder dystocia could not be found in the results. However, the high rate of hypoglycemia encountered in this work could be explained by the under-diagnosis of maternal diabetes. Also, a delay in transfer to neonatology (favouring the delay of early oral feeding when possible) could be incriminated because the majority of macrosomes are admitted to the service in the first 24 hours of life with a median age at admission of 2 hours.

### Therapeutic and Evolutionary Aspects

In the study, the majority of macrosomes were apparently healthy with 66.2% of newborns under observation versus 33.8% hospitalized. Macrosome management is thus summarized in non-specific care (early oral feeding, umbilical cord care with dakin, ocular antiseptic eye drops and vitamin K1). It appears from this study that the evolution of the newborn macrosome is favorable without sequelae in 92.3% of cases with a lethality of 6.9%. The deceased neonate had anoxo-ischemic cerebral suffering in 4 cases, malformation in 2 cases, infection in 2 cases and hypoglycemia in 1 case. This result is comparable to that found by Hanane [39] in Morocco in 2010, which was 7.19% lethal. In contrast, Mallouli and *al*. [25] in Tunisia in 2017 reported a lower value of 0.85%. For Yao and *al.* [14] in France in 2017 no deaths were observed during the study. This high lethality in the present study could be explained by several factors. First, the insufficient follow-up of pregnancies by the mothers (21.5% of the mothers had an irregularly followed pregnancy and only 28% performed more than 3 ultrasounds during the pregnancy). We can also point out the transfer delay in neonatology. In fact, it appears from the present study that newborn macrosomes admitted after 24 hours of life present 9 times more risk of death than those admitted before 24 hours (p=0.001- OR 9.16 (1.17-418.22)). This delay in consultation could be due to difficulties in transporting these newborns from the maternity ward to the neonatal ward (use of cab, lack of transport incubator). In addition, the macrosome resuscitated in the delivery room, has 5 times more risk of dying than the one that was not resuscitated (P<0.001 - OR 5.55 (1.1-25.62)). This fact could be explained by the insufficiency of the technical platform in the management of the delivery room but also in the neonatology unit of the Bouaké University Teaching Hospital.

## Conclusion

Macrosomia is common in neonatology at the Bouaké UniversityTeaching Hospital. It mainly concerns male newborns born to diabetic, obese or overweight mothers. Although favorable in the majority of cases, lethality is still high. In order to improve the prognosis of macrosomia, it is necessary to codify management, strengthen staff capacities, reinforce the technical platform and raise parents' awareness of the importance of pregnancy monitoring in the context of macrosomia. This necessarily requires close collaboration between the pediatrician, the midwife and the gynecologist-obstetrician.

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