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Fetal Macrosomia in the Maternity Ward of the Community University Hospital: Risk Factors and Maternal-Fetal Prognosis

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Abstract

Introduction: Fetal macrosomia is a birth weight greater than or equal to 4000 grams. The aim of this study is to determine the frequency of macrosomia, to identify the risk factors, and to evaluate the maternal and perinatal prognosis in the obstetrics and gynaecology department of the Community University Hospital Centre (CHUC). **Methodology:** This was a retrospective case-control study over a period of 24 months in the maternity ward of the CHUC. **Results:** The frequency of delivery of macrosomic fetuses was 4.1%, and the average age of women with large fetuses was 29.5 years. In 65.7% of cases, they were not engaged in any income-generating activity. Most of them had at least secondary education (65.7%) and were mainly multiparous (78.8%). The risk factors found were maternal age greater than or equal to 35 years, multiparity, previous large fœtus, gestational diabetes, obesity and male sex. Maternal complications were dominated by uterine atony (52.2%), perineal tear (31.9%), and cervical tear (15.9%). In our series, macrosomic newborns were three times more likely to present with a neonatal complication than normal-weight newborns. Neonatal mortality was 2.1%. **Conclusion:** Reducing macrosomia requires a better understanding of the risk factors, early detection, correct management during vaginal delivery and close monitoring of labour with good control of obstetric manoeuvres.

Keywords

Fetal Macrosomia, Risk Factors, Maternal-Fetal Prognosis, CHUC

1. Introduction

Fetal macrosomia is a situation that obstetricians have been increasingly confronted with in recent years [1]. It is known that the increase in fetal weight can be partly explained by maternal dietary changes with a tendency to increase maternal weight [2] [3]. The rate of macrosomia varies greatly from one country to another, ranging from 2.4% to 28% [4]. It is estimated that it now accounts for about 10% of all deliveries, and as a result, it is not only a permanent concern in the daily practice of obstetricians and neonatologists [4]. Several studies report maternal and perinatal complications associated with macrosomia. Maternal complications are dominated by an increase in caesarean sections, delivery haemorrhages, prolonged labour, cervicovaginal lesions and perineal ruptures in the case of vaginal delivery. Neonatal complications are dominated by shoulder dystocia and its dramatic consequence of brachial plexus elongation, neonatal asphyxia, hypoglycemia, hypocalcemia and fractures during fetal extraction maneuvers. Macrosomia can also be complicated in some cases by neonatal death [5]-[7]. The etiological factors of fetal macrosomia are numerous and often intertwined and their relative influence remains poorly understood [8]. In the Central African Republic, very few studies have been conducted on the delivery of large foetus [9]. Thus, the importance of the phenomenon is still unknown in the gynaecology and obstetrics department of the Community University Hospital, hence the interest of this work, the objectives of which are as follows: To determine the frequency of macrosomia in the department; Identify the associated factors; Determining the maternal and neonatal prognosis of macrosomia delivery in order to contribute to better management of cases of foetal macrosomia in the Gynaecology-Obstetrics department of the CHU Communautaire.

2. Patients and Methods

This was a retrospective case-control study. Ranging from 01 January 2022 to 31 December 2023 at the maternity ward of the Community University Hospital Centre, a period of 24 months. Our study population consisted of patients whose delivery was carried out and registered in the obstetrics and gynaecology department of the Community University Hospital during the study period.

Included:

- **As a case:** all full-term monofetal deliveries with a newborn weight greater than or equal to 4000 grams.
- **As controls:** deliveries of newborns weighing between 2500 g and 3999 g based on a ratio of 1 case to 1 control.

Multiple pregnancies, Pregnancies of fetuses with malformations, and Preterm births were not included.

We conducted an exhaustive census of all birthing cases that met the inclusion criteria. A questionnaire was developed and pre-tested.

The variables studied were: Sociodemographics for women who have recently given birth, variables related to pathologies during pregnancy, and those related

to the course of labour.

The data were captured and then analysed using the Epi info.7 software. The statistical tests used for comparison were Yates' Chi2 and Ficher's test. The difference was significant if $p < 0.05$. The texts and tables were entered using Microsoft Office Word and Excel.

3. Results

We recorded 438 macrosome deliveries out of 10667 deliveries, *i.e.*, a frequency of 4.1%. The average age of women who gave birth was 26.4 years ± 7.15 years, with extremes of 16 and 44 years. For those who gave birth to a macrosome, the average age was 29.5 years ± 6.80 years, with extremes of 19 and 44 years. The majority of women who had given birth had at least attained secondary education and were living in common-law unions.

Among postpartum women who were evacuated, the suspicion of macrosomia during labour was a frequent reference reason, with a statistically significant difference ($p < 0.001$; OR = 6.76). Macrosome delivery was more observed in women who had given birth at least twice (Table 1). Newborns under 30 years of age, as well as pupils and housewives, were the most represented. Maternal age greater than or equal to 35 years, multiparity, living in a union, and high level of education were associated with a higher risk for women to give birth to a macrosome, with a statistically significant difference ($p < 0.001$) (Table 2).

In more than half of the cases, women who gave birth to a macrosome had no history of the large foetus. The proportion of women with a pre-existing medical condition prior to pregnancy was low. The mode of induction of labour was mainly spontaneous. In 25% of cases, the deliveries had taken place by the upper route. Acute foetal distress was the main indication for caesarean section. Complications observed during vaginal delivery were more common in women who gave birth to a macrosome.

A total of 309 male newborns (70.5%) and 129 female newborns (29.5%) with a statistically significant difference of $p < 0.001$ and OR at 2.01. We noted: 378 newborns with a birth weight between 4000 and 4500g or 86.3%, and 60 newborns with a birth weight greater than 4500g or 13.7%; Maternal age greater than or equal to 35 years, multiparity, living in a couple, high level of education, history of large fetus, gestational diabetes and obesity were associated with a higher risk for women to give birth to a macrosome. The decision to proceed with an artificial induction of labour or that of a planned caesarean section was more common in women who gave birth with a macrosome, as was post-term delivery. Women who gave birth to a macrosome had a 4-fold higher risk of undergoing an episiotomy, and a 9-fold higher risk of undergoing instrumental fetal extraction, respectively. The differences are statistically significant ($p < 0.001$). Maternal complications in women who gave birth to a macrosome were represented mainly by uterine atony, followed by perineal tear and cervical tear. Neonatal complications were more common in macrosomal neonates (Table 3). The latter were at a higher risk of

presenting a neonatal complication than those of normal weight, with a statistically significant difference ($p < 0.001$). On the other hand, the APGAR score at the first minute was not influenced by whether or not they were a macrosomal newborn ($p > 0.05$). (Table 3).

Table 1. Distribution of patients according to parity.

Parity	Cases		Controls		Total
	Eff	%	Eff	%	
Primiparous (1 episode)	93	21.2	153	34.9	246
Paucipparous (2 - 3 episodes)	159	36.3	186	42.5	345
Multiparous (≥4 episodes)	186	42.5	99	22.6	285
Total	**438**	**100.0**	**438**	**100.0**	**876**

Table 2. Correlation between sociodemographic characteristics and macrosomia.

Variables	Cases N = 438 (%)	Controls N = 438 (%)	OR	95% CI	p
Age of mothers					
Under 35	315 (45.7)	375 (54.3)	0.43	[0.31 - 0.60]	**0.001**
35 and over	123 (66.1)	63 (33.9)			
Parity					
Primiparous	93 (37.8)	153 (62.2)	0.50	[0.37 - 0.69]	**0.001**
≥2 Births	345 (54.8)	285 (45.2)			
Marital status					
Living as a couple	366 (58.7)	258 (41.3)	3.55	[2.59 - 4.87]	**0.001**
Single	72 (28.6)	180 (71.4)			
Educational level					
Low educational level	153 (42.9)	204 (57.1)	0.62	[0.47 - 0.81]	**0.001**
Middle and higher educational level	285 (54.9)	234 (45.1)			

Table 3. Correlation between fetal prognosis and macrosomia.

Variables	Cases n = 438 (%)	Controls n = 438 (%)	OR	95% CI	p
Neonatal complications					
Yes	57 (70.4)	24 (29.6)	2.58	[1.58 - 4.30]	**<0.001**
No	381 (47.9)	414 (52.1)			
APGAR score					
Good	399 (49.1)	414 (50.9)	0.59	[0.35 - 1.00]	**0.067**
Bad	39 (61.9)	24 (38.1)			

4. Discussion

Fetal macrosomia remains a major concern for obstetricians because it can be responsible for the increase in maternal and fetal morbidity and mortality. In

developing countries, the risk of maternal and neonatal complications remains high, due not only to the inadequacy of community-based care but also to the inadequacy of the technical platform [10]. According to the Canadian Association of Obstetrics and Gynaecology (CAOG), fetal macrosomia is defined as a birth weight greater than 4000 or 4500 g. These thresholds were defined because they are the birth weight associated with the frequent occurrence of mechanical obstetric complications [11]. The frequency of macrosomia in our series was 4.1%. This frequency is close to that observed in the same department nearly fifteen years ago by Wol-wol (4.8%) in 2009 [9]. On the other hand, our results are lower than those of developed countries. In France, according to the 2016 national perinatal survey, the rate of newborns with a birth weight greater than 4000g is 6.9% [12]. For China, a cross-sectional survey in hospitals conducted in 14 provinces reported a total prevalence of macrosomia of 7.3% [13]. In the United States, the report on births registered in 2016 notes a prevalence of macrosomia of 7% [14]. Moreover, for the African series, the frequency of macrosomia is variable, ranging from 2.7% in Mali [15] to 6.87% in Morocco [16] and reaching 8.3% in Cameroon [17] and 10.94% in Tunisia [18]. Pregnancy in women at the extreme ages of reproductive life is considered to be at high risk. The literature reports high rates of complications of childbirth and pregnancy outcomes for older women compared to those in their twenties [19] [20]. The maternal ages most affected by macrosomia in our work were the 25 to 29 age group (29.5%) and the age group greater than or equal to 35 years (28.1%). The mean age of parturients who gave birth to a macrosome was 29.5 ± 6.8 years, with extremes ranging from 19 to 44 years. The average age of our study population was comparable to that found in Gabon, which was 29 years old [21]. It must be said that the incidence of macrosomia is constantly increasing worldwide, probably because of the increasingly advanced maternal age at childbirth, as pointed out by various authors [20] [22] [23]. In our series, 65% of the women who had a macrosome had reached the secondary level of education. This finding is probably related to a selection bias. Indeed, this study was conducted in the city of Bangui, where the literacy rate is significantly high compared to the rest of the country [24]. At the socio-professional level, education level is a factor that is associated with better use of health services by women in sub-Saharan Africa. Indeed, it is recognized that women with low education often have difficulty accessing or understanding information about health problems [25]. In addition, the professional status of women is one of the parameters that contribute to assessing the socio-economic level of households. Compared to the profession of women who have given birth, it appears that most of them did not carry out an income-generating activity (65.7%). According to data from the Ministry of Employment, nearly one in four workers is unemployed [26]. In the Central African Republic, nearly three out of four women are not officially married, according to the Civil Registry [27]. This situation could explain the fact that in our study, 71.9% of parturients who gave birth to a macrosome were living in a common-law union. Similarly, single women accounted for 16.5% of these

women. Knowing the financial vulnerability of this category of women, [28] this situation could be the cause of delays in the decision on medical care, hence the occurrence of obstetric complications during labour. We have highlighted a significant association between certain sociodemographic characteristics and the occurrence of macrosomia. These were: maternal age greater than or equal to 35 years, multiparity, living in a union and high level of education, all of which were associated with a higher risk for women to give birth to a macrosome, with a statistically significant difference ($p < 0.001$). Our results related to high maternal age and multiparity are corroborated by those of the literature. Indeed, Diallo *et al*. in Guinea [10] and Kakudji *et al*. in Lubumbashi [7] made the same observation. In agreement with these authors, we can say that since multiparity is often associated with advanced age, macrosomia in these circumstances is related to the fact that birth weight increases proportionally with maternal age. It is also this fact that could explain why first-time mothers aged 35 and over have a higher risk of giving birth to macrosomes [29]. For other authors, the fact that the mothers of macrosomes are older than those of normal-weighted newborns could be the discreet expression of obesity or diabetes, the risk of which increases with age[30]. The main histories found are those of macrosome delivery with a positive predictive value of 95% [11], followed by gestational diabetes and obesity [31]. This observation is also ours. Indeed, our study showed that women with a history of large fetuses had more than twenty-five times the risk of giving birth to a macrosome, just as those with gestational diabetes and obesity had a 10-fold higher risk of macrosomia with a statistically significant difference ($p < 0.001$). We can thus affirm in agreement with Iloki *et al*. in Congo [29], and Ezegwui *et al*. in Nigeria [32] that the history of macrosomia is a constant factor of fetal macrosomia. Prolonging the term of pregnancy is usually accompanied by a risk of macrosomia. Indeed, this is accompanied by weight gain, and this fetal hypertrophy promotes the prolongation of pregnancy through the feta-pelvic disproportion, disrupting the phenomena of spontaneous induction of labour [33]. In our series, the proportion of macrosomia cases (71.4%) was more associated with post-term exceeding, with a statistically significant difference ($p < 0.001$). We found 97.9% of the newborn macrosomes alive and 2.1% of the stillbirths. In our series, macrosomic newborns were three times more likely to have a neonatal complication than those of normal weight, with a statistically significant difference ($p < 0.001$). These neonatal complications could also be due to obstetric manoeuvres related to the instrumental extraction of the foetus or manoeuvres to correct possible shoulder dystocia. As for neonatal morbidity of macrosomes, it was dominated in descending order by fetal asphyxia (68.4%), shoulder dystocia (15.8%), and death (15.8%). These results are different from other authors who have mainly noted that neonatal morbidity is mainly due to fetal hypoglycaemia and neonatal trauma [34]. Regarding the APGAR score, although we noted a higher proportion of macrosomic newborns with difficulties adjusting to extrauterine life than in the control group (61.9% versus 38.1%), there was no statistically significant difference ($p = 0.067$).

This result is similar to that of a French multicenter survey, which concluded that macrosomia is associated with a greater number of obstetric interventions with marked maternal consequences without any increase in the adaptation of the fetus to extrauterine life, neonatal complications being most often of traumatic origin [35]. In contrast, other authors have noted that neonatal morbidity is mainly due to fetal hypoglycemia first and then neonatal trauma [34] [36]. The condition of newborns at birth is assessed using the APGAR Score at the first minute. In our study, we found 97.9% of the newborn macrosomes alive and 2.1% of the stillbirths. Among the stillbirths, there were 3 fresh stillbirths and 6 macerated stillbirths. As in other studies, macrosomia has been shown to be associated with adverse neonatal outcomes [37] [38]. In our series, macrosomic newborns were three times more likely to have a neonatal complication than those of normal weight, with a statistically significant difference ($p < 0.001$).

5. Conclusion

Macrosomia, therefore, remains a risk situation, worrying because of maternal and neonatal morbidity. Pregnant women should be informed about the risk factors for pregnancy in general and fetal macrosomia in particular in order to allow early detection during prenatal consultations and close monitoring of pregnant women at risk (obese, diabetic, tall, multiparous, with a history of macrosomia); and to balance diabetes during pregnancy. Better knowledge of risk factors and early detection of pregnant women at risk could improve maternal-fetal prognosis.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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