Original Research Article

Low birth weight : Prevalence and associated factors among newborns at hospitals in Kisangani, North-Eastern RD Congo 2024

Abstract :

Background: Low birth weight remains a major public health problem in every country in the world. It is a predictor of early neonatal mortality, morbidity and long-term health. The aim of this study was to determine the prevalence of low birth weight and to identify the associated factors in a hospital setting in Kisangani.

Material and methods: A retrospective case-control study including all live and full-term births was conducted from 1 December 2023 to 31 May 2024 in the maternity wards of Hôpital Général de Référence de Makiso-Kisangani, Hôpital Général de Référence de Mangobo, Hôpital Général de Référence de Tshopo and Centre de Santé Alwaleed. A sample of 646 newborns was selected:86 cases (newborns weighing less than 2500 grams) and 560 controls (newborns weighing2500 grams or more). Factors associated with prehypertension were identified using logistic regression.

Results: The prevalence of low birth weight was 13.4%. Factors associated with low birth weight were maternal age less than 18 years, intergenital interval less than 2 years, maternal infection during pregnancy, high blood pressure, level of primary education and urban residential environment.

Conclusion: This study shows that the prevalence LBW remains a public health issue in Kisangani. This research was carried out in four maternity units in the city and revealed certain factors predictive of LBW, such as maternal age under 18, birth interval under 2 years, maternal infection during pregnancy, hypertension, primary education level, urban residential environment and anemia. Knowledge of these associated factors should be used to reinforce existing preventive strategies, including antenatal consultations, with a view to improving maternal and child healthnationwide.

Key words: Prevalence, associated factors, low birth weight, Kisangani, DRC**(Elaborate)**

INTRODUCTION

Low birth weight(LBW) is defined as a weight of newborns at birth less than 2500 gram by World Health Organization. More than 20 million infants are born with low birth weight in worldwide [1, 2].

LBWcontinues to remain a major public health problem worldwide, especially in the developing countries. The birth weight of an infant is the single most important determinant of its chances of survival, healthy growth, and development [3].There is widespread agreement that having LBW at birth disadvantages the child. LBW accounts for 60 to 80% of all newborn deaths. Along with short- and long-term infant and childhood morbidity, it is a significant cause of perinatal mortality. Infants born with

birthweights of less than 2500 g had a mortality rate that was up to 40 times greater, and they had a significantly increased chance of developing long-term disabilities [4–10].Previous studies in the DRC and other African countries have reported LBW prevalences ranging from 6.3% to 13.6% [11].The risk factors that determine LBW have been investigated in several studies both in Africa and elsewhere.

National measures to enhance mother and child health have been implemented, but the Democratic Republic of the Congo (DRC) still faces a public health crisis related to LBW. For a number of reasons, including the fact that the underlying mechanisms causing LBW remain poorly understood, it is challenging to prevent risk factors.

Very little is known about LBW and its contributing causes in Kisangani. This is the context for our study, the first of its kind in our community, which aims to better target and combine interventions to prevent LBW.

MATERIALS AND METHODS

1. Study design

We conducted a retrospective case-control study.

2. Setting and study period

This study was conducted in the maternity wards of Makiso-Kisangani General Hospital, Mangobo General Hospital, Tshopo General Hospital and Alwaleed Health Centre. These maternity units were chosen because of the high number of births recorded and their easy geographical accessibility. This work was carried out over a period running from 1 December 2023 to 30 April 2024.

3. Study target population

The target population for this study was newborns born live at term in the above-mentioned health facilities during the study period.

4. Sampling and sample size

Non-probability convenience sampling was used. A total of 646 respondents were enumerated for this study.

5. Selection of respondents (inclusion and exclusion criteria)

Live newborns born at term with no known risk factors (i.e. intrauterine growth retardation) for low birth weight were included in the study.

Mothers who gave birth prematurely (before 37 completed weeks of gestation) and newborns from twin pregnancies were excluded from the study.

Mothers who gave birth to newborns weighing less than 2500 grams were cases and newborns ≥2500 grams were controls.

6. Study variables

For the variables studied, cases comprising newborns with LBW were compared with controls, comprising all full-term newborns with a birth weight of between 2500 and 4000g. The dependent

variable was low birth weight. The independent variables were the mother's socio-demographic data (age, profession and socio-economic level), parity and medical history, as well as the course of the last pregnancy (pathologies during pregnancy, follow-up, term, gestational age), the characteristics of the delivery (mode) and the characteristics of the newborn (term, weight, size, sex, malformations and transfer to the neonatology department). Anaemia in pregnant women was defined as an Hb level of less than 10g/dl. Arterial hypertension was defined as a blood pressure greater than 135/85mmHg. Maternal infection was defined as any bacterial, viral, parasitic or mycotic infection occurring during gestation. The nutritional status of the mothers was assessed by calculating the body mass index (BMI) determined by the ratio of body weight (in kilograms)/square of height (in metres). A BMI of between 18.5 and 24.9 kg/m2 corresponded to good nutritional status. Malnutrition was defined as a BMI of less than 18.5 kg/m2.

7. Data collection

Data were collected retrospectively, using a documentary analysis technique. We used women's medical delivery records and registers using a pre-established data collection form containing the study variables.

8. Data processing and analysis

The data were entered and processed using SPSS software (IBM SPSS Statistics 22).

Frequencies, percentages, means and standard deviations were used to describe maternal sociodemographic and obstetric characteristics. Factors associated with prehypertension were identified using logistic regression.

9. Ethical considerations

Before starting the survey, a request for authorisation was sent to the medical-health and administrative authorities of the health facilities concerned. The anonymity of the questionnaires ensured the confidentiality of the data.

RESULTS

1. General characteristics of term newborns in the study sites

The data from this study indicate that the majority of newborns were male, both among those with LBW and those of normal weight. The mean weight of term newborns ranged from 1958±339 g among LBW births to 3329 ±480 g among normal weight births.The above data are presented in Table 1.

2. Socio-demographic data of the study participants

These data show that most of the study participants were aged between 18 and 35, were Christian, had no occupation, were illiterate and lived in urban areas. These data are presented in Table 2.

3. Obstetrical characteristics of study participants

The obstetric data provided the following information :

- the majority of the women surveyed had an intergenital interval of less than 24 months and a normal BMI ;

- Most of them had no history of abortion or stillbirth and had given birth vaginally;
- The majority were multiparous, normotensive and had not contracted any infection during pregnancy;
- Anaemia was found in 53.5% of mothers who had given birth to LBW babies, compared with 25% of those who had given birth to babies of normal weight.These data are given in Table 3.

4. Prevalence of low birth weight in the study sites

Of the 646 full-term newborns in the study sites, 86 were of low birthweight, representing a prevalence of 13.4%.

5. Association between maternal, obstetric and neonatal characteristics and newborn birth weight

Multivariate analysis indicated that maternal age less than 18 years, intergenital interval less than 2 years, maternal infection during pregnancy, arterial hypertension, primary education level, urban residential environment and male sex of the newborn were significant predictors of LBW. These data are presented in Table 4.

DISCUSSION

1. General characteristics of the study population

The aim of this retrospective case-control study was to determine the prevalence of LBW in hospitals in Kisangani and to identify associated factors. Previous studies have matched one case to one control [12, 13], while other authors have matched more than one control to a case. In the present study, we matched 6 controls to one case [14-16].

2. Prevalence of low birth weight

Our study revealed a prevalence of low birth weight of 13.4% of all term newborns registered during the survey period in the four maternity units visited. This prevalence is close to that found in studies conducted in other regions of DR Congo, i.e. 11.6% and 11.8% respectively [17,18].However, it remains high compared with the national rate according to the demographic and health survey, which reported a rate of 7% and 6.3% for Katanga province [19].

High prevalence rates have also been reported in studies carried out in Zimbabwe and Morocco, where they were 19.9% and 22% respectively [20,21]. The differences in prevalence observed in these studies could be explained by the multiplicity of risk factors, in particular malnutrition, inadequate monitoring of pregnancy, malaria and repeated urogenital infections during pregnancy [11].

3. Factors associated with FPN

3.1. Maternal age under 18 years

According to the results of studies carried out in Tunisia and DR Congo, maternal age under 18 years was a factor in the occurrence of LBW [11,14, 22]. Our results concur with these studies, with a statistically significant difference (p=0.003). Several factors could explain this finding, including competition for nutrients between the growing adolescent and the foetus, which appears to be at the root of the problem,

and competition between pregnancy and growth, which has a particularly unfavourable effect on the micronutrient status of adolescent girls [11, 14].

3.2. Intergenital interval of less than 2 years

It appears that an intergenital interval of less than 2 years was associated with low birth weight in the maternity units visited in Kisangani during the present study (p= 0.002). This result is similar to that of Letaief et al and Mamba et al [17, 22].Maternal exhaustion syndrome describes what happens when a woman's body is used without rest and without time to recover. Other factors, such as the energy costs of pregnancy and lactation, particularly in the context of close reproductive cycles with no recovery time for the woman, lead to a cumulative deterioration in maternal nutritional status, which can lead to LBW [14].

3.3. Maternal infection during pregnancy

Our study showed that maternal infection during pregnancy was identified as a predictor of LBW. This result corroborates the observations made by other authors on this subject [16,17,23,24]. However, a study from Benin found no correlation between infection during pregnancy and the birth of a newborn with LBW [24]. The normal course of pregnancy can be disrupted by infections, firstly because of the inflammatory reaction that accompanies any infection and secondly because, during an infection, the woman is weakened and obliged to draw on her own nutritional and energy reserves [25].

3.4. Hypertension

The bivariate and multivariate analyses (OR =0.453 ; 0.277-0.747 ; p= 0.002) performed with our data indicate that there is a correlation between hypertension and LBW.This result is similar to that of Mabiala-Babela et al and Nkwabong E et al [13,26]. High blood pressure is thought to disrupt blood circulation and consequently placental exchanges, leading to a reduction in both oxygen and micronutrient supply from the mother to the foetus during pregnancy [17].

3.5. Level of primary education

According to the results of this study, mothers with a high level of education were less likely to give birth to a low birth weight baby than those with a primary education. This observation is consistent with several studies associating LBW with maternal education [27,28].

3.6. The urban residential environment

In this study, the probability of giving birth to a low birth weight baby was significantly higher among urban women, which is consistent with studies conducted in Ethiopia and Bangladesh [29,30].

According to another study conducted in Zambia, women living in urban areas were unaware of the benefits of starting antenatal care early, and lacked sufficient knowledge about such care and early antenatal attendance [31]. This constatation confirms the observation made in this study (OR 0.523 (0.335- 0.814; p=0.004).

3.7. Anemia

According to this research, it has been shown that there is a relationship between anaemia and LBW. Similar results have been obtained by other researchers [32,33]. Gestational anaemia can lead to a number of complications, one of the most significant of which could be the development of LBW due to poor intrauterine growth associated with disruption of foeto-placental blood flow, resulting in reduced micronutrient and oxygen intake [25].

LIMITATIONS

In this study, the main limitation lies in the data used to carry out the analyses. It was collected primarily for routine healthcare rather than for a specific intervention. It is therefore possible that errors were made when documenting the records. Lastly, this study's analysis of the data only captures the reality of a small number of public health facilities. Consequently, the findings cannot be extrapolated to moms who gave delivery at home or in private healthcare facilities.

CONCLUSION

This study shows that the prevalence LBW remains a public health issue in Kisangani. The research was carried out in four maternity units in the city and revealed certain factors predictive of LBW, such as maternal age under 18, birth interval under 2 years, maternal infection during pregnancy, hypertension, primary education level, urban residential environment and anemia. Knowledge of these associated factors should be used to reinforce existing preventive strategies, including antenatal consultations, with a view to improving maternal and child health on a national scale.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

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Table 1. General characteristics of term newborns in the study sites

General characteristics	Weight	
	< 2500 grams n (86)	≥ 2500 grams n (560)
Sex of newborn		
Male[n (%)]	45 (52,3)	287 (51, 2)
Female [n (%)]	41 (47,7)	273 (48,8)
Newborn weight [mean ± SD]	1958±329 grams	3329±480 grams

Table 2. Socio-demographic data of mothers taking part in the study

Socio-demographic data	N	%
Age (years)		
< 18	29	4,5
18-35	517	80
>35	100	15,5
Residence		
Urban environment	581	90
Rural	65	10
Religion		
Christian	587	90,8
Muslim	32	4,9
Kimbanguist	19	3
Other	8	1,5
Profession		
With profession	529	81,8
No profession	117	18,2
Level of education		
Illiterate	387	58,5
Primary	129	20
Secondary	77	12
University	53	9,5

Table 3. Obstetric characteristics of study participants (N= 646). Bivariate analysis.

Obstetrical characteristics	Case (n= 86)	Control (n= 560)	Pearson Chi-square
Intergenic interval			0.000
< 24 months [n (%)	69 (80,2)	406 (72,5)	
≥ 24 months [n (%)]	17 (19,8)	154 (27,5)	
Hypertension			0.007
Yes [n (%)	4 (4,6)	14 (2,5)	
No [n (%)	82 (95,4)	546 (97,5)	
Anemia			0.002
Yes [n (%)	46 (53,5)	140 (25)	
No [n (%)	40 (46,5)	420 (75)	
Maternal infection during pregnancy			0.000
Yes [n (%)	27 (31,3)	168 (30)	
No [n (%)	59 (68,7)	392 (70)	
BMI			0.453
< 18,5 [n (%)]	9 (10,4)	39 (6,9)	

18,5 - 24,9 [n (%)]	58 (67,4)	392 (70)	
25 - 29,9 [n (%)]	13 (15,1)	95 (17)	
≥ 30 [n (%)]	6 (7,1)	34 (6,1)	
Number of pregnancies			0.089
1 [n (%)]	29 (33,7)	201 (35,8)	
2 [n (%)]	18 (21)	128 (22,8)	
3 [n (%)]	39 (45,3)	231 (41,4)	
History of stillbirth			0.167
Yes [n (%)	3 (3,4)	9 (1,6)	
No [n (%)	83 (96,6)	551 (98,4)	
Route of delivery			0.345
vaginal delivery [n (%)	77 (89,5)	498 (88,9)	
Caesarean section [n (%)	9 (10,5)	62 (11,1)	
History of abortion			0.875
Yes	13 (15)	67 (12)	
No	73 (85)	493 (88)	

Tableau 4. Association entre les caractéristiques maternelles, obstétricales et néonatales et le poids des nouveau-nés à la naissance.

Characteristics	Adjusted OR (95% CI)	p
Maternal age under 18	1.045 (1.013-1.070)	0.003
Intergenital interval less than 2 years	1.810 (1.264-2.602)	0.002
Maternal infection during pregnancy	3.960 (2.718-5.565)	0.000
Hypertension	3.324 (1.697-6.468)	0.000
Primary education level	0.453 (0.279- 0.747)	0.002
Urban residential environment	0.523 (0.334- 0.814)	0.004
Anemia	1,22 (1,07-1,47)	0,002