

Factors of Low Birth Weight Risk in the Department of Gynecology-Obstetrics of the Ignace Deen National University Teaching Hospital in Conakry, Guinea

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Abstract

Introduction: The underweight at birth is recognized as a major cause of morbidity and mortality in childhood. **Objective:** To identify maternal and obstetric sociodemographic factors associated with low birth weight. **Patients and Methods:** This is a retrospective study of analytical type that examined the records of women who gave birth in the Obstetrics and Gynecology department of Ignace Deen National University Teaching Hospital from 1st December 2016 to 30th April 2017. The analysis was made with the R version 3.3.1 software. We did a univariate and multivariate analysis. **Outcomes:** Out of the 1633 live births of single pregnancies that occurred during the study period, 109 children were born with a low weight (<2500 g) corresponding to a rate of 6.7%. In univariate analysis, we found a significant association between low birth weight and maternal single status ($p = 0.019$), maternal weight less than 60 kg ($p = 0.038$), primary parity ($p = 0.018$), maternal history of abortion ($p = 0.001$), history of preterm birth ($p < 0.001$), arterial hypertension ($p < 0.001$), anemia ($p < 0.001$) and malaria ($p < 0.001$). In multivariate analysis, the variables associated with low birth weight were: history of preterm delivery with OR of 8.5 [1.8 - 40.1], history of abortion (OR = 4.4 [1.4 - 13.9]), malaria (OR = 23.8 [6.1 - 92.5]), anemia (OR = 11.8 [3.7 - 38.2]) and high blood pressure (OR = 5.4 [1.6 - 17.9]). **Conclusion:** The decrease in frequency of low birth weight in Guinea will be done by improving the quality of prenatal care with an emphasis on screening, prevention and treatment

of malaria, anemia and high blood pressure during pregnancy, prevention of abortion and premature birth.

Keywords

Risk Factors, Low Birth Weight, Ignace Deen, Newborn to Term

1. Introduction

Low birth weight is defined by the World Health Organization (WHO) as a birth weight at term less than 2500 g [1]. The underweight at birth is recognized as a major cause of morbidity and mortality in infancy [2] [3]. It can affect the health of the child's growth, development and learning ability [3]. The newborns of low birth weight have an increased risk of death before the age of one year [4]. The risks of morbidity are both prenatal (anoxic-ischemia) and postnatal (hypothermia and hypoglycemia) [2]. These children have a higher risk of minor cognitive deficits, symptoms of hyperactivity, delayed neurodevelopment at 5 years and school problems at 8 years. They are more likely to develop in adulthood cardiovascular disease, high blood pressure, carbohydrate intolerance, diabetes, dyslipidemia and obesity [5]. They are at risk of death two to four times higher than normal weight children [2] [6].

In Guinea, the incidence of low birth weight varies from one administrative area to another. Urban regions of Labé and Conakry have the highest rate with 10% and 11% respectively of low birth weight corresponding to one newborn over 10 [3] [7].

The high incidence of low birth weight in Conakry, its negative impact on the health of children and lack of previous research on the subject in the service motivated the realization of this study aimed at identifying maternal sociodemographic and obstetric factors associated with low birth weight.

2. Material and Method

This is a retrospective study of analytical type that covered the records of women who gave birth in Obstetrics and Gynecology department of the Ignace Deen National University Teaching (CHU) of Conakry between 1st December 2016 and 30th April, 2017 corresponding to 5 months.

The records of all women who gave birth in this department during this period were included. Incomplete applications and those of the women who gave birth to a stillborn, premature, or malformed newborn infant, twins or triplets were excluded. All the women were assigned to one of the following two groups:

Group 1: composed of women who delivered to term a living infant whose birth weight was less than 2500 g;

Group 2: composed of mothers whose living newborns to term had a birth weight greater than or equal to 2500 g.

In a case of birth weight < 2500 g, two cases of birth weight \geq 2500 g were randomly recruited for comparison. As for the 60 cases of low birth weight, we recruited 120 cases of birth weight \geq 2500 g and after increase of 8.5% we got 130 cases.

The following parameters were compared in both groups,

1) Maternal socio-demographic data: age and weight at birth, educational level, marital status.

2) Obstetric data: parity, history of abortion, premature delivery and antenatal care.

3) Maternal conditions diagnosed during pregnancy: malaria, anemia and high blood pressure.

All data were collected using a pre-survey form based on the objectives of the study. The parameters were analyzed using the R software version 3.3.1. Initially, an unvaried analysis was performed. To compare the different proportions when all theoretical numbers are greater than 5, the Pearson χ^2 test was used. When at least one of the theoretical numbers is less than 5 but greater than 2.5, the corrected χ^2 Yates was applied and when at least one of the theoretical numbers is less than 2.5, the exact Fisher test was used.

Then, a multivariate analysis was determined by logistic regression as a variable to explain the low birth weight is a dichotomous categorical variable as explanatory variables and parameters significantly associated with low birth weight. For the selection of these variables to be introduced in the regression model, the process of stepping down has been applied. The results are given in p-value, crude odds ratio (ORb) and adjusted (ORa) and 95% confidence intervals for each explanatory variable. The association was considered significant when p was less than 5% or if the confidence interval of OR b and ORa excludes the value 1.

3. Results

Out of the 1633 term live births in single pregnancies that occurred during the study period, 109 children were born with low birth weight (<2500 g), corresponding to a rate of 6.7%. But 49 files were incomplete and do not have to be considered. So 60 cases were assigned to group 1 (PN < 2500 g) and 130 cases in group 2 (PN \geq 2500 g) (**Table 1**).

A significant association between low birth weight and the following factors were found: the unmarried status of the mother (p = 0.019), which increases the risk of low birth weight by 2 times (OR = 2.1 [1.1 - 3.9]) and maternal weight < 60 kg (p = 0.038) with an increased risk of 50% (OR = 1.5 [1.2 - 2.0]) (**Table 2**).

A significant association between low birth weight and the following factors was found: the parity < 4 (p = 0.018) with a risk of low birth weight nearly 3 times greater (OR = 2.5 [1.2 - 4.9]), the antecedent abortion (p = 0.001) which multiplies by 3 the risk of low birth weight (OR = 2.7 [1.5 - 5.1]) and the antecedent of preterm delivery (p < 0.001), which increases the risk to almost 5 times (OR = 4.6 [2.0 - 10.2]) (**Table 3**).

A highly significant association with maternal conditions during pregnancy was found: high blood pressure ($p < 0.001$), anemia ($p < 0.001$) and malaria ($p < 0.001$). The risk of low birth weight is multiplied by 6 on the occurrence of hypertension during pregnancy (OR = 5.6 [2.9 - 10.9]), with 14 cases of malaria (OR 14.3 [6.0 - 34.0]) and 18 in case of anemia (OR = 18.3 [8.5 - 39.4]) (Table 4).

Table 1. A woman has given birth to a newborn under 2500 g as compared to a woman who gave birth to a newborn of 2500 g or more according to their sociodemographic characteristics.

Maternal socio-demographic characteristics	Birth weight				p-value	OR gross	IC (95%)
	<2500 g		≥2500 g				
	n = 60	%	n = 130	%			
Married mothers							
Yes	29	25.2	86	74.8	0.019	2.1	[1.1 - 3.9]
No	31	41.3	44	58.7			
Educated mothers							
Yes	49	29.9	115	70.1	0.205	0.6	[0.2 - 1.4]
No	11	42.3	15	57.7			
Maternal age (years)							
<35	60	100	125	96.2	0.125	1.9	[0.9 - 1.92]
≥35	0.0	0.0	5	3.8			
Maternal weight (kg)							
<60	40	35.7	72	64.3	0.038	1.5	[1.2 - 2.0]
≥60	20	25.6	58	44.6			

Table 2. A woman who gave birth to an infant less than 2500 g as compared to woman who gave birth to a newborn of 2500 g or more as obstetric settings.

Obstetric settings	Birth weight				p-value	OR gross	IC (95%)
	<2500 g		≥2500 g				
	n = 60	%	n = 130	%			
Multiparous							
Yes	16	21.6	58	78.4	0.018	2.5	[1.2 - 4.9]
No	44	37.9	72	62.1			
History of abortion							
Yes	36	43.9	46	56.1	0.001	2.7	[1.5 - 5.1]
No	24	22.2	84	77.8			
Antenatal care							
Yes	23	25.8	66	74.2	0.110	0.6	[0.3 - 1.1]
No	37	36.6	64	63.4			
History of premature labor							
Yes	41	25.8	118	74.2	<0.001	4.6	[2.0 - 10.2]
No	19	25.6	12	74.4			

Table 3. A woman who gave birth to an infant less than 2500 g as compared to a woman who gave birth to a newborn of 2500 g or more according to the disease diagnosed during pregnancy.

Pathologies diagnosed during pregnancy	Birth weight				p-value	OR gross	IC (95%)
	<2500 g		≥2500 g				
	n = 60	%	n = 130	%			
Hypertension during pregnancy							
Yes	37	56.1	29	43.9	<0.001	5.6	[2.9 - 10.9]
No	23	18.5	101	81.5			
Malaria in Pregnancy							
Yes	53	54.1	45	45.9	<0.001	14.3	[6.0 - 34.0]
No	7	7.6	85	92.4			
Anemia during pregnancy							
Yes	45	71.4	18	28.6	<0.001	18.3	[8.5 - 39.4]
No	15	11.8	112	88.2			

Table 4. A woman who gave birth to an infant less than 2500 g as compared to a woman who gave birth to a newborn of 2500 g or more according to the married mothers, Hypertension, Malaria and Anemia during pregnancy, History of abortion and premature labor.

Variables	adjusted OR	IC 95%	p-value
Married mothers	1.5	[0.5 - 4.5]	0.488
Hypertension during pregnancy	5.4	[1.6 - 17.9]	0.006
Malaria during Pregnancy	23.8	[6.1 - 92.5]	<0.001
Anemia during pregnancy	11.8	[3.7 - 38.2]	<0.001
History of abortion	4.4	[1.4 - 13.9]	0.012
History of premature labor	8.5	[1.8 - 40.1]	0.007

After taking into account the interaction between the various factors, a mother who developed malaria during pregnancy has a risk 24 times greater of delivering a newborn less than 2500 g. For a mother in whom anemia was diagnosed during pregnancy, the risk of delivering an infant of less than 2500 g is over 12 times higher and in the one that has developed a blood pressure, risk is increased 11 times. The premature birth and abortion history respectively multiplied by about 9 and 4, respectively, the risk of delivering an infant with low birth weight. The maternal weight below 60 kg rose to 4.46 times the risk of low birth weight.

4. Discussion

The risk factors for low birth weight demonstrated in this study tally with several studies conducted in Cameroon [8], Senegal [9], Congo Brazzaville [10], Tunisia

[11] and Burkina Faso [12] [13]. These studies show a significant association between low birth weight and blood pressure, history of abortion, primiparity, low level of education, malaria, and low maternal weight. In contrast, Ndiaye *et al.* [14] did not find a significant relationship between the weight of the mother and the newborn. The link with high blood pressure which is also highlighted by Hastoy *et al.* [15] is explained by the fact that in the maternal blood pressure, there is a decrease in uteroplacental perfusion led to a reduction of intake of nutrients and oxygen to the fetus which results in an intrauterine growth retardation and ultimately a low birth weight. This decrease in uteroplacental perfusion is favored by the late detection of high blood pressure which is often discovered during a maternal and/or fetal complication. The link between low maternal weight and low birth weight can be explained one hand by genetic factors, because it is intuitive that a mother of a little weight might give birth to a newborn of small birth weight. On the other hand by maternal malnutrition, which not only reduces the weight of the mother but also the fetus. As for malaria, through its impact on maternal condition and placental infection, it causes an intrauterine growth restriction and thus the birth of a newborn of low birth weight. The link with anemia is explained by the fact that in maternal anemia nutritional intake and oxygen to the fetus is decreased and therefore the weight of the fetus as well. The occurrence of anemia is favored especially by intestinal parasites, malaria and malnutrition. The history of abortion and premature birth was significantly associated with low birth weight due to the fact that some risk factors of abortion and premature delivery are also risk factors for low birth weight [16]. Regarding parity, we found a decrease in low birth weight as parity increases. This same observation was made by Letaief [11] which speaks of a low weight birth rate higher in primiparous and Kangulu IB [17] who reports in his study in the Democratic Republic of Congo that the risk of low birth weight passes in primiparous 2.48 to 1.07 in multiparous and explains this by the competition for nutrients between the teenager growing and the developing fetus as well as the low efficiency of placental function at this age. The same situation was reported by Mabilia-Bibela JR who found that primiparity and high parity favor the occurrence of low birth weight [10]. Contrary to some published data [8] [10] [12] [17]. It was not found, as studies conducted in Senegal [18] and Morocco [19] a significant link between the number of antenatal care and low birth weight. A recent study in several developing countries has shown that inadequate prenatal care was among the least significant risk factors for the most important birth [20]. It should be noted that prenatal care is very bad in the Guinean population studied. Over 53% of women included in this study had no antenatal care and 38% had only 1 to 2 prenatal visits, so far from the minimum of 4 consultations requested by WHO. Among women who had four consultations recommended many have not taken regularly iron/folate tablets and sulfadoxine/pyrimethamine offered free to all pregnant women during antenatal care. The nets distributed during antenatal care to protect pregnant women against

mosquito bites as malaria vectors are often used for other purposes (such as fishing nets or to protect gardens against certain insect pests). The lack of significant association between low birth weight and prenatal care in this study also indicates the poor quality of antenatal care in our context since during prenatal consultations, most risk factors reported by this study should be screened for, and a curative or preventive treatment initiated. The positive impact of intermittent preventive treatment with sulfadoxine/pyrimethamine during pregnancy is confirmed by the literature [21]. Marital status after consideration of third factor is no longer significantly associated with low birth weight. This finding is different from that reported by Traoré *et al.* [22]. The lack of connection with maternal age reported in this study is confirmed by the study in Senegal [9] but is contrary to the result of a study at Brazzaville [10] and one made in the Democratic Republic of Congo reported that mothers under 18 years are 7.62 times more likely to give birth a newborn with low birth weight and the risk becomes 2.04 in mothers over 35 years [17]. Letaiefin Tunis found that the rate of low birth weight is higher among mothers aged under 18 years [11]. Advanced maternal age has been shown in many countries as a risk factor for low birth weight [20] [23]. This was also confirmed by Mabilia Bibela JR-Brazzaville who found that maternal age is often linked to low birth weight with higher risk in adolescents and in women aged over 35 years [10]. The reason why this factor is not identified as a factor associated would be the fact that only 3.8% of women included in this study had an age beyond 35 years threshold shown in other studies.

Limitations of the Study

During this study, 49 files were removed for incomplete information. Furthermore, this did not take into account the nutritional status of the mother, the maternal size, the use of tobacco and alcohol by the mother who may have a relationship with the low weight at birth. It was not taken into account the prematurity, neither.

5. Conclusions

Significantly associated risk factors for low birth weight demonstrated in this study are: maternal weight below 60 kg, malaria, anemia, high blood pressure during pregnancy and abortion history and premature delivery.

The decrease in the frequency of low birth weight will go through improving the quality of prenatal care with an emphasis on screening, prevention and treatment of malaria, anemia and high blood pressure during pregnancy, improving the nutritional status of women of childbearing age, prevention of abortion and premature birth.

Conflicts of Interest

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

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