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Determinants of Prematurity at the Centre Hospitalier Universitaire Pédiatrique de Bangui (CHUPB)

C. J. Kiteze Nguinzanémou[1,2*], B. O. Bogning Mejiozem[1,2], S. Ningatoloum Nazita[1,2], F. D. Fiobème[1,2], E. V. Ngatimo[1,2], J. E. Kosh-Komba Palet[1,2], I. M. Wando Kangalé[1,2], E. Kiteze Bandassa[1,2], S.-C.H. Diemer[2], J.-C. Gody[1,2]

[1]Clinique Médicale Infantile Raymond Max Siopathis, Centre Hospitalo-Universitaire Pédiatrique de Bangui CHUPB, Bangui, République Centrafricaine
[2]Faculté des Sciences de la Santé (FACSS), Bangui, République Centrafricaine
Email: *ckiteze@yahoo.fr

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Abstract

Objective: The aim of this work was to identify the risk factors for the occurrence of prematurity at CHUPB. **Materials and Methods:** a case-control study was performed between February and June 2021 at CHUPB. Our study population consisted of premature infants who were matched to full-term newborns on a 1:1 basis. The variables studied were maternal characteristics (age, marital status, education level, and occupation) as well as pregnancy (maternal history, prenatal care), delivery (maternal fever, rupture of membranes), and newborns (gestational age, sex, and weight). The chi^2 test with a significance level of $p < 0.05$ and the adjusted odds ratio were used. **Results:** A total of 609 newborns were hospitalized, 219 of whom were premature (36%), of whom 100 premature infants meeting the inclusion criteria were enrolled. Maternal age < 18 years was noted in 20% of cases (adjusted OR = 2.94 [0.86 - 10.06]) versus 5% of controls. Low educational level was noted in 47% (adjusted OR = 4.33 [1.88 - 9.96]) of cases versus 14% of controls. The risk factors identified were previous preterm delivery (adjusted OR = 0.06 [0.00 - 0.80]), maternal fever before labor (adjusted OR = 0.43 [0.20 - 0.90]), and premature rupture of membrane (RPM), (adjusted OR = 0.32 [0.16 - 0.64]). There was no association between marital status and insufficient prenatal visits (ANC) in relation to the occurrence of prematurity. **Conclusion:** The reduction of preterm births requires improved monitoring of pregnancy, delivery and care of the newborn. But primary prevention lies in improving the living conditions of the population.

Keywords

Prematurity, CHUPB, Risk Factors

1. Introduction

Preterm birth, defined as any birth before 37 completed weeks of amenorrhea, is an important cause of neonatal morbidity and mortality, particularly in Sub-Saharan Africa and South Asia. Worldwide, preterm births are estimated at about 15 million per year, 60% of which occur in third world countries. [1]. Faced with this situation, the "Sustainable Development Goals" (SDGs) have set the goal of reducing deaths of newborns and children under 5 years of age to 12 per 1000 births in all countries [2]. The main causes of neonatal mortality are prematurity, perinatal asphyxia and neonatal infection, making it a major public health problem.

In the Central African Republic, according to the study conducted from 2001 to 2002 at the CHUPB, the main risk factors for prematurity were young maternal age, mothers without a profession, pathological history (malaria, urogenital infections), primiparity and insufficient prenatal consultations [3]. This study, conducted 20 years later in the same department, aimed to contribute to the reduction of prematurity in Bangui.

2. Patients and Methods

This was a case-control study conducted in the neonatology department of the CHUPB, the only national reference center for the management of newborns. The study population consisted of all newborns aged from 0 to 28 days of life, hospitalized from February to June 2022, whose parents were consenting. All preterm newborns from singleton pregnancies were considered cases, and all full-term newborns were considered controls. Preterm infants were defined as as newborns with a gestational age of less than 37 completed weeks of amenorrhea and term newborns as those with a gestational age of more than 37 weeks of amenorrhea. The 2 groups of the study population were matched for sex. We purposely excluded preterm newborns from multiple pregnancies for the simple reason that it has been proven in the literature that multiple pregnancy is a particular cause of spontaneous prematurity, not responding to the same causes as in single pregnancies [4] [5]. The study variables were the socio-demographic variables of the mothers (age, level of education, occupation, marital status), those related to the pregnancy (maternal history, number of prenatal consultations, prenatal check-ups) and to the course of the delivery, as well as the variables related to the newborns (gestational age, sex, weight). The data were analyzed using Epi-info 7.5.1 software. The Pearson Chi^2 test with a significance level of $p < 0.05$ and the adjusted odds ratio were used to determine risk factors and logistic regression (adjusted odds ratio) to remove all confounders.

3. Results

During the study period, the neonatology department of the CHUPB hospitalized 609 newborns, 219 of whom were premature. The 100 preterm infants meeting our inclusion criteria represented 16.4%.

The relationship between the sociodemographic factors of the mothers and prematurity is shown in Table 1.

Maternal antecedent relationships and prematurity are recorded in Table 2.

The Table 3 presents the relationship between pregnancy course and prematurity.

The relationship between the course of delivery and prematurity is reported in Table 4.

Table 1. Maternal sociodemographic factors related to prematurity.

Risk factors	Préma (yes)	Préma (No)	OR IC à 95%	p	OR ajusted	P ajusted
Age						
<18	20	5	4.7 [1.76 - 14.66]	0.001	2.94 [0.86 - 10.06]	0.09
≥18	80	95	1		1	
Marital status						
Living alone	4	8	2.04 [0.36 - 11.34]	0.407		
Married life	96	92	1			
School level						
No level + Primary	47	14	5.45 [2.74 - 10.84]	0.000	4.33 [1.88 - 9.96]	0.00
High school and above	53	86	1		1	
Profession						
No profession	38	31	1.36 [0.75 - 2.44]	0.297		
Other occupation	62	69	1			
Parity						
Primipare	43	33	1.53 [0.86 - 2.72]	0.145		
Paucipare + multipare	57	67	1			

Table 2. Relationship between maternal history and prematurity.

Maternal antecedent	Préma (yes)	Préma (no)	OR IC à 95%	p	OR ajusted	P ajusted
HTA						
Yes	4	3	1.34 [0.29 - 6.18]	0.700		
No	96	97	1			
Premature birth						
Yes	7	1	7.45 [0.89 - 61.73]	0.030	0.06 [0.00 - 0.80]	0.032
No	93	99	1		1	
Abortion						
Yes	23	20	1.19 [0.60 - 2.34]	0.605		
No	77	80	1			
Stillbirths						
Yes	14	11	1.31 [0.56 - 3.06]	0.521		
No	86	89	1			

Table 3. Shows the relationship between pregnancy course and prematurity.

Prenatal check-ups	Préma (yes)	Préma (no)	OR IC à 95%	p	OR adjusted	P adjusted
CPN						
≤3	76	49	3.29 [1.80 - 6.06]	0.000	1.61 [0.73 - 3.58]	0.236
>3	24	51	1		1	
Toxoplasma serology						
Positive + Not achieved	76	29	2.99 [1.67 - 5.37]	0.000	0.99 [0.40 - 2.45]	0.998
Negative	45	71	1		1	
Rubella serology						
Positive + Not achieved	59	30	3.35 [1.87 - 6.02]	0.000	1.40 [0.55 - 3.55]	0.476
Negative	41	70	1		1	
BW serology						
Positive + No achieved	50	17	4.88 [2.54 - 9.37]	0.000	2.17 [0.82 - 5.74]	0.1172
Negative	50	83	1		1	
Hepatitis B serology						
Yes	73	47	3.04 [1.68 - 5.50]	0.000	1.09 [0.46 - 2.56]	0.829
No	27	53	1		1	
VIH serology						
Yes	23	12	2.19 [1.02 - 4.63]	0.040	1.03 [0.38 - 2.80]	0.940
No	77	8	1		1	
Test d'Emmel						
Yes	54	22	4.16 [2.24 - 7.70]	0.000	1.92 [0.85 - 4.33]	0.114
No	46	78	1		1	

Table 4. Relationship between the course of delivery and prematurity.

Risk factors	Prema (yes)	Prema (no)	OR IC à 95%	P	OR ajusted	P ajusted
Maternal fever						
Yes	74	51	2.73 [1.50 - 4.95]	0.000	0.43 [0.20 - 0.90]	0.026
No	26	49	1		1	
RPM						
Yes	75	41	4.31 [2.36 - 7.89]	0.000	0.32 [0.16 - 0.64]	0.001
No	25	59	1		1	
Gender						
Female	47	41	0.78 [0.44 - 1.37]	0.730	0.32 [0.16 - 0.64]	0.001
Male	53	59	1		1	

Regarding the gestational age of the cases, we noted 12 extreme premature babies (6%), 30 very premature babies (15%), 58 late premature babies (29%). The average weight was 2000 gr with extremes from 1000 to 4000 gr. In all cases, the weight < 1000 gr was noted in 16 newborns (8%), between 1000 - 1400 gr in 41

newborns (20.5%), 1500 - 2400 gr in 70 newborns (365%) and more than 2500 gr in 73 newborns (36.5%).

4. Discussion

This study on the determinants of prematurity at the CHUPB reflects the realities of any hospital study. It also shows the inadequacy of maternal data in relation to the imprecision of the date of the last menstrual period, with the corollary of poor assessment of gestational age. Conclusions should be modulated with respect to the general population and comparisons from other studies.

The occurrence of preterm births in mothers with a low level of education is well known and reported in the literature [6] [7] [8] [9]. All these authors have found an association between low maternal education and the occurrence of prematurity.

The young maternal age, especially mothers under 18 years of age, reported by some authors as a risk factor for prematurity, was also noted in our series [3] [9] [10] [11] [12] [13]. This could be explained by the gravity of social factors for these young mothers, namely: high unemployment, low level of education, low socio-economic level, difficult living and working conditions, poor access to health care, ignorance and unwanted pregnancies negatively impacting on the proper monitoring of pregnancy.

The influence of marital status is reported by Chiabi *et al.* for whom marriage is a protective factor as well as Fiawoo *et al.* who identify celibacy as a maternal risk factor [14] [15]. Ouattara *et al.* found a link between single mothers and the occurrence of prematurity [9]. Contrary to these authors, marital status is not associated with the occurrence of prematurity in our study.

In our study, only the history of preterm delivery is associated with the occurrence of prematurity. Our result corroborates those of Ouattara *et al.* in Burkina-Faso ($P \leq 0.001$), Périlleau-Boichut *et al.* in Martinique (OR = 4.1 [1.3 - 13]) and Margarita E *et al.* in Peru [11] [16] [17] [18].

With regard to ANC, no statistically significant relationship was noted between the number of ANC and the occurrence of preterm births. Also a number of ANC lower than 3 is not predictive of preterm birth. On the other hand, many authors in the literature report a quantitative insufficiency of ANC and the occurrence of prematurity [3] [6] [8] [9] [11] [14] [15]. The difference between our study and that of the authors consulted is methodological. Indeed, without using logistic regression, the influence of quantitative insufficiency of ANC in relation to prematurity recorded in our study is in reality only a confounding factor.

In the light of these results, we can deduce that it is not the number of ANC performed that plays a primordial role in pregnancy surveillance but the quality of prenatal care. Maternal fever, already reported by Ouattara *et al.* in Burkina Faso as being associated with the occurrence of preterm birth, is also reported in our study [11]. Similarly, premature rupture of membranes has been reported by some authors [4] [8] [7] [11] [14]. The link between maternal infectious risk

(maternal fever and PMR) and the occurrence of prematurity is no longer in doubt [3] [4] [19] [20] [21]. This can be explained on the one hand by the role of ascending genital infection and on the other hand by individual susceptibility to infection and genetic determinism.

The predominance of late prematurity (85%) in our study versus 10% in case of great prematurity and 5% for extreme prematurity has also been reported by some authors [20] [21].

5. Conclusion

This case-control study highlights the significant role played by the low level of maternal education, young maternal age, maternal fever and premature rupture of membranes in the occurrence of prematurity in Bangui. This suggests the need to emphasize women's schooling and also to strengthen pregnancy monitoring.

Conflicts of Interest

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

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