



Epidemiological Profile and Risk Factors of Preterm Births in two Referral Hospitals of Butembo, Eastern Democratic Republic of the Congo

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Authors' contributions

This work was carried out in collaboration between all authors. Authors AKS and FKM designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript.

Author AKM managed the analyses of the study. Author AAM managed the literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JAMMR/2018/40395

Editor(s):

(1) Dr. Elvira Bormusov, The Lloyd Rigler Sleep Apnea Research Laboratory, Unit of Anatomy and Cell Biology, Israel.

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Complete Peer review History: <http://www.sciencedomain.org/review-history/24467>

Original Research Article

Received 13th February 2018

Accepted 23rd April 2018

Published 5th May 2018

ABSTRACT

Background: Preterm is defined as babies born alive before 37 weeks of pregnancy are completed. We distinguish three categories of preterm babies: extremely preterm (less than 28 weeks), very preterm (28 to 32 weeks) and moderate to late preterm (32 to less than 37 weeks). Preterm births constitute a real public health problem that currently needs the attention of pediatricians with their

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colleagues obstetricians, for it constitutes a leading cause of deaths in children under 5. This study aimed to determine the frequency of preterm birth and linked risk factors, in the two general referral hospitals of Butembo.

Method: it was about a cross-sectional study, carried out in the two referral hospital of Butembo, in the DRC, from January 1st, 2015 to December 31st, 2016. It was observed a sample of 6,253 newborns of two referral hospitals: Katwa and Kitatumba, located in Butembo-DRC, from January 1st 2015 to December 31st, 2016.

Results: The frequency of preterm births was 3.53% in Katwa and Kitatumba referral hospitals. Almost 67% of the preterm births occurred at 32-36 weeks of gestation, and most of preterm newborns weighted between 1000-1499g. There is no significant difference in the distribution of preterm births according to infant sex. Women under 18 and ≥ 35 years old, primiparous and grand multiparous, single, attending to less than 4 antenatal care sessions, and those with a low level of education status were the most concerned with preterm births. Premature rupture of membranes, genital and Urinary tract infections, pre-eclampsia, eclampsia, and hypertension during pregnancy were retained as principal causes associated to the occurrence of preterm births, as well as those multiple-fetus pregnancies.

Conclusion: The prevention of principal causes of prematurity, and the early management of pregnant women at risk of having a premature delivery will lead to the decrease of preterm birth frequency and therefore to the decrease in infant mortality.

Keywords: Epidemiological profile; risk factor; preterm births; frequency; Butembo city.

1. INTRODUCTION

Preterm birth is defined by the World Health Organization (WHO) as all births before 37 completed weeks of gestation, or fewer than 259 days since the first day of a woman's last menstrual period [1].

There are sub-categories of preterm birth, based on gestational age: extremely preterm (when the gestational age is less than 28 weeks), very preterm births (are those which occur at 28 to less than 32 weeks of gestation) and moderate to late preterm (32 to less than 37 weeks of gestation) [1-3].

According to the World Health Organization estimates, 15 million babies are born before 37 weeks of gestation every year. This represents more than 1 in 10 babies [3].

The occurrence of preterm births concerns developed countries as well as developing one so that this is said to be a global problem. In the developed country, on average, 9% of babies are born too early. In low-income countries, the frequency of preterm birth is estimated at 12%. [3].

Africa and South Asia are the most concerned regions of the world, for more than 60% of preterm births occur in the two regions [3].

The Democratic Republic of the Congo is one of 10 countries with the greatest number of preterm births [3].

Preterm births are associated with some severe complications, so that these complications constitute the leading cause of death among children under five, responsible for around 1 million of deaths in 2015 [3,4].

In Butembo, in the Eastern Democratic Republic of the Congo, it has been shown that prematurity is the second leading cause of infant mortality after infections [5].

Apart from deaths, preterm births are associated with some long term impacts on their survivors: visual impairment, hearing impairment, chronic lung disease of prematurity, long-term cardiovascular ill-health and non-communicable disease, mild disorders of executive functioning, moderate to severe global developmental delay, psychiatric/ behavioral sequelae, and other family, economic and societal effects [3].

Risk factors for preterm births have been largely documented in developed countries [1]. But findings showed that they depend from one country to another [3]. Thus, the aim of this study was to determine the epidemiological profile of preterm births and their risk factors in the two referral hospitals of Butembo City, in the Eastern Democratic Republic of the Congo.

2. METHODOLOGY

This was a cross-sectional study carried out from January 2015 to December 2016 in the two general referral hospitals of Butembo (Katwa and Kitatumba). The two hospitals are located in Butembo, Eastern Democratic Republic of the Congo.

Our survey's sample included all newborns in the two hospitals mentioned above, whose health files were found and well completed. Thus, a total of 6,253 live newborns were concerned with the study.

The following variables were analysed: individual characteristics of the newborn (including the sex, the weight and gestational age at the birth), past medical history (mainly the antenatal history) and individual characteristics of the mother (age, marital status, number of pregnancies, number of antenatal care sessions attended, education status) and lastly, causes of registered preterm births.

We called primiparous, any woman who gave birth for the first time; pauciparous the one who has given birth 2 or 3 times; multiparous, the one who has given birth 4 to 5 times and grand multiparous, the one who has given birth more than 5 times.

Data were processed and analysed using the Epi-Info software, version 3.5.4. The Risk Ratio (RR) test was used. We concluded to a positive association between the risk factor and the occurrence of preterm births when the RR was more than 1. The confidence interval at 95% (95%CI) which did not contain 1 was considered significant. Only crude values were considered.

3. RESULTS

During our study on preterm births in the two referral hospitals of Butembo, the following findings have been observed: 6253 newborns have been registered during our study period and among them, 221 were born before 37 weeks of gestational age. This represents a frequency of 3.53%. (Table 1). Almost 66.97% of premature infants were born between 32 and 36 weeks of gestation. This represents the moderate preterm rate and 37.56% of premature infants had a birth weight ranged between 1000-1499 grams. (Table 2). There is no significant difference in the distribution of preterm births according to the sex (Table 3). Pregnant women of ≤ 18 years(9.35%)

and those ≥ 35 (5.19%) years old, single(4.72%), Primiparous(6.57%), illiterate(8.12%), living out of Butembo health zone(4.92%) and attending less than 4 antenatal care sessions(2.41%) were the most concerned with preterm births. (Table 4). Premature rupture of membranes was the first leading cause of preterm births (5.20%), followed by genital and urinary tract infections (5.12%); and almost 12.60% of multiple fetus pregnancies ended in preterm births (Table 5).

Table 1. Total of live births, number and frequency (%) of preterm births. Butembo, Democratic Republic of Congo, 2015-2016

Year	Total live births	Cases of preterm births	Percentage (%)
2015	3427	103	3.01
2016	2826	118	4.18
Total	6253	221	3.53

4. DISCUSSION

From Table 1, it appears that out of 6253 newborns during our study period, 221 preterm births were registered, a proportion of 3.5%. According to the WHO estimates, the preterm birth rate in DRC in 2010 was varying from 10 to less than 15% [1]. In Butembo, we found a low rate; this shows that there is an unequal distribution of cases of preterm births in the country. The findings of Butembo are similar to the findings of Ma liu and colleagues in China (4.5%) [6]. Alberto and colleagues found a prevalence of 6.2% [4].

From Table 2, it appears that the great majority of premature infants were born between 32 and 36 weeks of gestation, that is to say 66.97%. This represents the moderate preterm rate. The very preterm represented 27.60% and the extremely preterm births (5.43%). Nagalo et al. [7] also found the predominance of moderate preterm newborns (73.5%), while very preterm and extremely preterm newborns represented successively 24.9 and 1.6%.

While analyzing the same table, we found that 37.56% of premature infants had a birth weight ranged between 1000 and 1499g. Ugochukwa et al, in Nigeria, found that 46.6% of premature infants were born with a weight that ranged from 1500 to 1999g [8].

From Table 3, it appears that the majority of premature infants were female: 125 out of 221 cases of preterm births. This represents 56.56% of all cases of preterm births. But this distribution

is not significant because the CI at 95% contains 1. Goswami and Sahai found in India that a great number of preterm neonates were males i.e. 61.07%, but the deference was not statistically significant [9]. Tietche et al, in 1994, found 50.7% of female and 49.3% of male, [10]. From all these findings, we can conclude by saying that the distribution of cases of preterm births according to sex varies from one study to another, but there is no statistical significant deference in it.

From Table 4, it appears that for a pregnant under 18 years and than or equal to 35, the risk of giving birth to a premature infant is significantly multiplied successively by 2.93 and 1.65. These results are supported by many authors. Moore noticed that young adolescents were significantly more concerned with preterm births [11]. The young maternal age is a risk factor for preterm births probably because, at this age, women are not well informed on the management of pregnancies during antenatal care sessions.

From the same table, it appears that single women run 1.52 times the risk of having a preterm birth and this finding is statistically significant. Etuk et al. [12] arrived to the same conclusion by noticing that unmarried women have a significant higher tendency to have preterm births than married one. The reason for this is that women living alone are not often able to meet all their needs because of low incomes, compared to women cohabiting or

married. In fact, men support financially and psychologically their spouses during pregnancy.

In the same table, it appears that the primiparity and the grand multiparity, multiplies successively 2.29 and 1.36 times the risks of a preterm births. These risks are significant for the CI at 95% does not contain 1. Shah found that only primiparity was associated with preterm births. But grand as well as great grand multiplicities were not associated with preterm births. [13]. In fact, as noticed by Nagalo et al. [7] the first pregnancy was closely associated with young maternal age and influenced preterm birth.

It is also clear from the same table that a pregnant woman who attended to less than 4 Antenatal care sessions have a risk, 2-fold higher to have a premature delivery. Prazuck et al. [14] noticed in Burkinafaso that an insufficient ANC attendance increases the risk of preterm delivery by >9-fold. These findings are similar to the one of Nagalo et al. [7] who discovered that 58% of women in their study had attended to less than 4 antenatal care sessions, and were more concerned with preterm births. It is known that during the antenatal care sessions, women undergo some clinical examinations and laboratory test, for an early diagnosis of pregnancy associated diseases. Thus, the antenatal care sessions help in prevention and early treatment of diseases during pregnancy, which could induce a premature delivery.

Table 2. Preterm births distribution according to gestational age and newborn weight. Butembo, Democratic Republic of the Congo, 2015-2016

Variables	Modalities	Preterm births	%
Gestational age(in weeks of gestation)	32-<37	148	66.97
	28-31	61	27.60
	<28	12	5.43
	Total	221	100.00
Weight at birth(in grams)	500-999	48	21.72
	1000-1499	83	37.56
	1500-1999	55	24.89
	2000-2499	35	15.84
	Total	221	100.00

Table 3. Number of live births and Preterm births (%) according to newborn sex. Butembo, Democratic Republic of Congo, 2015-2016

Sex	Total live births	Cases of preterm births	%	R.R	95% CI	P
M	2627	96	3.65	1.06	0.82 1.38	0.66
F	3626	125	3.45	0.94	0.73 1.22	0.66
Total	6253	221	3.53			

Table 4. Number of live births and Preterm births (%) according to individual characteristics of women. Butembo, Democratic Republic of Congo, 2015-2016

Variables	Modalities	Total live births	Cases of preterm births	%	RR	95% CI		P
Age (in years)	≤18	353	33	9.35	2.93	2.06	4.18	0.00
	19-34	4724	127	2.69	0.44	0.34	0.57	0.00
	≥35	1176	61	5.19	1.65	1.23	2.20	0.00
	Total	6253	221	3.53				
Marital status	Single	1653	78	4.72	1.52	1.16	1.99	0.00
	Married	4600	143	3.11	0.66	0.50	0.86	0.00
	Total	6253	221	3.53				
Parity	Primiparous	1127	74	6.57	2.32	1.74	3.00	0.00
	Pauciparous	1732	45	2.60	0.67	0.48	0.92	0.01
	Multiparous	1945	38	2.06	0.46	0.33	0.65	0.00
	Grand multiparous	1445	64	4.43	1.36	1.02	1.80	0.04
Number of antenatal care sessions attended	Total	6253	221	3.53				
	Less than 4	2221	124	6.58	2.32	1.79	3.01	0.00
	≥ 4	4032	97	2.41	0.43	0.33	0.56	0.00
Education status	Total	6253	221	3.53				
	Illiterate	800	65	8.12	2.84	2.15	3.76	0.00
	Primary	3007	88	3.03	0.71	0.55	0.93	0.01
	Secondary	2367	67	2.93	0.71	0.54	0.95	
	Bachelor	79	1	1.06	0.36	0.05	2.50	0.22
Origin	Total	6253	221	3.53				
	Health zone	4897	157	3.20	0.68	0.51	0.90	0.01
	Out of area	1356	54	4.92	1.17	0.86	1.58	0.31

Table 5. Number of live births and Preterm births (%) according to causes. Butembo, Democratic Republic of Congo, 2015-2016

Variables	Modalities	Total live births	Cases of preterm births	%	RR	95% CI		P
Pathologies of the mother during pregnancy	Premature rupture of membranes	870	45	5.20	1.58	1.15	2.18	0.00
	Genital and urinary tracts infections	1087	51	5.12	1.43	1.05	1.94	0.02
	Preeclampsia, Eclampsia and Hypertension	1395	65	4.70	1.45	1.09	1.93	0.01
	Diabetes	1229	28	2.31	0.59	0.40	0.88	0.01
	Other	1672	32	2.01	0.46	0.32	0.67	0.00
	Total	6253	221	3.53				
Number of fetuses per pregnancy	Singleton	6021	192	3.21	0.26	0.18	0.37	0.00
	Multiple	232	29	12.60	3.92	2.71	5.66	0.00
	Total	6253	221	3.53				

It appears from this table that illiterate woman runs 2.84 times the risk of giving birth to a premature baby. The same observation was done by Balaka B et al in Lomé in Togo [2]. The high risk of having preterm newborns in illiterate women can be justified by the lack of information on the importance of the prevention and early treatment of pregnancy associated diseases in this population.

From the same table, it appears that pregnant women living out of Butembo Health Zone run 1.17 times the risk of having a preterm birth. This was statistically significant. This risk can be explained by the fact that most of women out of the Health Zone live in villages where hospitals work in poor setting conditions. Therefore, the prevention and management of preterm births are not well done.

The Table 5 shows that the risk of occurrence of preterm birth is respectively 1.58 and 1.43 fold higher in pregnant women with premature rupture of membranes and those with urogenital infections. Pre-eclampsia, eclampsia and hypertension during pregnancy also increased the risk of preterm births by 1.45 times. Ndiaye et al., found Malaria as the most important cause of preterm birth in Sénégal [15]. Infections: Urinary tract infection, malaria, HIV, Syphilis and bacterial vaginosis are listed among risk factors of preterm births in the world [1].

From this same table, we notice that a pregnancy with multiple fetuses, multiplies by 3.92 times the risk of a premature delivery. According to WHO findings, multiple fetuses' pregnancy is one of leading causes of preterm births [1].

5. CONCLUSION

The frequency of preterm births is 3.53% in the two referral hospitals of Butembo. Almost 66.97% of premature infants were born between 32 and 36 weeks of gestation. Most of preterm infants had a birth weight ranged between 1000-1499 grams. The following risk factors have been found associated with preterm births: women age of ≤ 18 years and ≥ 35 years old, single marital status, Primiparity, illiteracy, living out of Butembo health zone and attendance to less than 4 antenatal care sessions. Premature rupture of membranes was the first leading cause of preterm births, followed by genital and urinary tract infections; most of the multiple fetus pregnancies ended in preterm births.

The prevention of principal causes of prematurity and the early management of pregnant women at risk of having a premature delivery will lead to the decrease of preterm birth frequency and therefore to the decrease in the infant mortality.

CONSENT

It is not applicable.

ETHICAL APPROVAL

As per international standard or university standard written ethical permission has been collected and preserved by the authors.

FUNDING

The author A.A. Mitamo was funded by the Else-Kröner-Fresenius-Stiftung through the BEBUC Scholarship System (www.foerdereverein-unikinshasa.de).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:

The peer review history for this paper can be accessed here:
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