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Research Article

Low Birth Weight Newborns from HIV-Infected Mothers in Togo

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Abstract

Introduction: Low birth weight (LBW) is a real public health problem. The aim of the study was to describe the epidemiological, clinical and evolutionary aspects of low birth weight infants born to HIV-infected mothers.

Patients and Methods: This was a descriptive and analytical retrospective study from January 1st 2013 to December 31st 2016. The collection of the data took place between 1st of November to 15th of November 2017. Sociodemographic, gynecological and obstetric history, PMTCT measures were collected and analyzed.

Results: Of 766 newborns of HIV-positive mothers, 123 (16.05%) were LBW. The LBW included in the study were 90. The 25-to-35 age group was the most represented in mothers (30.00%). The very low birth weights were 4 (4.44%) and the low birth weights were 86 (95.56%). There was a statistically significant difference by weight for maternal age (p = 0.0458). Prematurity was found in 49 neonates (54.44%) and intra-uterine growth retardation in 41 neonates (45.56%).

Conclusion: The incidence of low birth weight remains relatively high among HIV-positive women. It is essential to federate actions to reduce this impact in order to avoid the consequences linked to it.

Keywords: *Low Birth Weight; PMTCT; Togo*

Introduction

Worldwide, nearly three million neonates die each year, 98% of these deaths occurring in Asia and Africa. Neonatal deaths represent more than 40% of deaths in children under five years and the lack of a reduction in this figure has impacted on the millennium goal objectives with regard to infant mortality [1,2]. Neonatal infections (estimated 30%), low birth weight (LBW, estimated 30%) and perinatal asphyxia (estimated 25%) together constitute the three leading causes of neonatal deaths [2,3].

In low resource countries, notably in Africa, HIV is one of the principle causes of premature births and small for gestational age. Among other frequent associations, HIV may also cause growth delay in children and infants [4,5]. Low birth weight, the most concerning finding in developing countries, has two principal causes: prematurity and intra-uterine growth restriction (IUGR). In Africa, between 1998 and 2015, the prevalence of LBW was between 7 - 17%, depending on region and study periods [4,6].

In Togo, infant-child mortality had been 89% and the neonatal mortality 27%, representing nearly a third of infant-child mortality [7]. In Togo, many hospital and national studies are focussing upon the prevention of mother to child transmission (PMTCT) but none of these are focussing upon the issue of Low Birth Weight among the neonates born of seropositive mothers [8,9]. We have therefore undertaken this study to the end of better understanding the situation of LBW neonates of HIV positive mothers, contained in a protocol of PMTCT.

Objective of the Study

The objective of the study being to describe the epidemiological aspects, clinical findings and outcomes of the Low Birth Weight neonates born of mothers infected by HIV1.

Patients and Methods

Type and scope of the study

This was a retrospective, qualitative study, analysing from the 1st of January 2013 to the 31st of December 2016 the medical dossiers of children under the care of Sylvanus Olympio University Hospital Centre (UHC). The collection of the data took place between 1st of November to 15th of November 2017.

Study population

The study was based on 90 of 123 children born to HIV1 seropositive mothers on antiretroviral treatment started before pregnancy or in the first trimester. We included all neonates with birth weight < 2500g born to HIV1-infected mothers under regular follow-up of a program of prevention of transmission from mother to child (PTMTC) on antiretroviral treatment (ART) and having given birth at Sylvanus Olympio UHC. We used the definitions of Preterm (< 37 gestational weeks), Very Preterm (< 32 gestational weeks), Low Birth Weight (LBW, < 2500g) and Very Low Birth Weight (VLBW, < 1500g).

B+ Option of the protocol of PMTCT

The national directive used for PMTCT is sourced from the recommendations of the WHO and relates to the option B+; antiretroviral therapy given to all pregnant women infected by HIV regardless of CD4 count. For the neonate, this includes the daily use of Nevirapine (NVP) from birth up to the age of 4 to 6 weeks regardless of feeding method [10].

Study parameters

The principal parameters were the socio-economic characteristics of the mothers, the past obstetric history and the PMTCT measures (ART). For the neonates, the studied parameters were the birth details, the HIV status, the physical measurements and the clinical assessments (at birth, 6 weeks, 10 weeks, 6 months, 9 months and 12 months).

Collection and analysis of the data

The weight and measurements were taken according to the WHO recommendations by the regular staff of the service. These parameters had been measured by a nurse for each infant before they had received a medical assessment. The infants had been weighed naked with an electronic scale for weighing babies with a precision of 100g. The length of the infants was measured by two people using an infant scale, with a precision of 1 mm. The collection of these data was achieved with the help of a study sheet forming part of the national PMTCT program medical dossier of the mother and child.

The collected variables and analyses were: the age, length and weight, which permitted us to calculate for each infant the anthropometric values for the indices of: Weight-for-Age, Weight-for-Length, Length-for-Age and the BMI-for-Age, and to compare these indices to the WHO 2015 normal values, in terms of standard deviation to the median of the reference.

The Weight-for-Age index enabled us to determine the percentage of underweight infants (Weight-for-Age score of <-2 SD) and of severely underweight infants (Weight-for-Age <-3 SD). The index of Length-for-Age enabled us to determine the percentage of growth delayed (stunted) infants (Length-for-Age <-2 SD) and of severe growth delay (Length-for-Age <-3 SD).

The indices of Weight-for-Length and of Weight-for-Age were used to determine the percentage of malnourished infants (Weight-for-Length <-2 SD or Weight-for-Age <-2 SD) and specifically, of severely malnourished infants (Weight-for-Length or Weight-for-Age <-3 SD). We concluded that the infants that had normal values in all three indices were well nourished.

Data analysis methods

The data were collected and classified correctly and the programs, Epidata 3.1 and R studio 3.4.2 were used to process the data. The statistical analysis comprised of a descriptive analysis of the population and a comparative analysis according to the category of low birth weight. At the descriptive level, the results were expressed as a total and a percentage for the qualitative variables, and for the quantitative variables, with median and of the interquartile interval values. At the level of the comparative analysis, the statistical tests used were Pearson's Chi-Squared Test or Fisher's Exact Test for the qualitative variables and the Student's Test for the quantitative variables. The threshold of significance was fixed at 0.05.

Results

Global prevalence of low birth weight

During our study period, 766 children born from HIV seropositive mothers were admitted to the service, of which 123 were having a weight less than 2500g. This gave a global prevalence of 16.05%. The prevalence of low birth weight was 16.81% [95% CI: 12.36 - 22.39] in 2013 than 16.89% [95% CI: 12.31 - 22.67] in 2014 and 13.93% [95% CI: 8.56 - 21.65] in 2016. Divided by sex, the prevalence was 18.11% [95% CI: 12.05 - 26.15] in 2013 for female subjects and 15.24% [95% CI: 9.23 - 23.87] for male subjects (Table 1). Among the 123 mothers, 90 medical dossiers were able to be made use of.

Year	Number of neonates	Number of Low Birth Weight neonates	Total number of each sex of the total number of neonates		Total number of each sex among the neonates with Low Birth Weight	
	N	N	M	F	M	F
2013	232	39	105	127	16	23
2014	219	37	109	110	17	20
2015	193	30	108	85	15	15
2016	122	17	60	62	8	9

Table 1: *Classification of infants per year according to sex and birth weight.*

Characteristics of the mothers

The majority of the mothers had an age between 25 and 34 years old in 58.89% of the cases and 25.56% of the cases were aged 35 years and older. Non-educated mothers and those who had not received primary education represented 51.11% of the total of the mothers.

Regarding obstetric and gynaecological history among the mothers, 53.34% of the mothers were pauciparous and 54.44% paucigestational. Twenty mothers (22.22%) had a history of a deceased child, ten mothers (11.11%) of two children deceased and one mother (1.1%) had a history of four deceased children.

At the birth, 41 mothers (45.56%) had reached a gestational age (GA) between 32 and 36 weeks; 41 mothers (45.56%) had reached a GA > 37 and 8 (8.89%) had a GA between 28 and 32. Vaginal deliveries were noted for 58 (64.44%) of the mothers (Table 2).

	Total	Weight < 2500g		Weight < 2000g		Weight < 1500g		P value
	N	n	%	n	%	n	%	
Parity								
Primiparous		7	12.96	11	36.67	3	50.00	
Pauciparous		34	62.96	12	40.00	2	33.33	
Multiparous		13	24.08	7	23.33	1	16.67	
Gravida	90							0.0809+
Primigravida		5	9.26	10	33.33	1	16,67	
Paucigravida		32	59.26	13	43.33	4	66.67	
Multigravida		17	31.48	7	23.34	1	16.66	
Normal Pregnancy	90							0.0077+
Yes		50	92.59	20	66.67	5	83.33	
No		4	7.41	10	33.33	1	16.67	
Mode of Delivery	90							0.4581+
Vaginal		36	66.67	17	56.67	5	83.33	
Caesarean		18	33.33	13	43.33	1	16.67	
Prematurity/IUGR	90							0.0004+
Prematurity		20	37.04	23	76.67	5	83.33	
IUGR		34	62.96	7	23.33	1	16.67	
Number of antenatal consultation (ANC)	90							
≥ 4		34	62,96	18	60.00	1	16.67	

Table 2: *Classification of infants according to obstetric and perinatal factors.*

Characteristics of the children

The male children amounted to 27 and the female 63, making a male to female ration of 0.43. The median birth weight of the children was 2.10kg [IQI 1.89 - 2.30 kg]. The median weight of males was 2.1kg [IQI 1.92 - 2.20] and of females, 2.2 kg [IQI 1.89 - 2.30 kg].

The number of cases of Very Low Birth Weight was 4 (4.44%) and of Low Birth Weight, 86 (95.56%). There was a statistically significant difference of the birth weight with relation to the age of the mother (p = 0.0458).

There were 49 premature neonates (54.44%) and intra-uterine growth restriction at term gestation in 41 neonates (45.56%). Regarding the type of feeding, 49 neonates (54.44%) had opted for exclusive breastfeeding up to the age of 6 months. At birth, 39 (43.33%) of the children had a Weight-for-length index of <-3 SD. At 14 weeks of life, 8 children had a Weight-for-length lower than -3 SD and only 2 children at 12 months had a Weight-for-length index. It was practically the same for the other anthropometric measures (Table 3).

	At Birth			At 14 weeks		
	Sex		P value	Sex		P value
	M	F		M	F	
Index of Weight/Length			0.4915++			0.4031+
Normal	8 (29.63)	20 (31.75)		21 (77.78)	51 (80.95)	
Between-3SD-2SD	5 (18.52)	18 (28.57)		2 (7.41)	8 (12.70)	
<-3 SD	14 (51.85)	25 (39.68)		4 (14.81)	4 (6.35)	
Index of Weight/Age			0.3384+			0.2158++
Normal	2 (7.41)	12 (19.05)		12 (44.44)	40 (63.49)	
Between-3SD-2SD	12 (44.44)	28 (44.44)		6 (22.22)	11 (17.46)	
< -3 SD	13 (48.15)	23 (36.51)		9 (33.34)	12 (19.05)	
Index of Height/Age			0.5203+			0.1455++
Normal	11 (40.74)	32 (50.79)		11 (40.74)	38 (60.32)	
Between-3SD-2SD	6 (22.22)	15 (23.81)		6 (22.22)	13 (20.64)	
<-3DS	10 (37.04)	16 (25.40)		10 (37.04)	12 (19.04)	

***Table 3**: Classification of infants by sex according to the anthropometric parameters at birth and at 14 weeks (n = 90).*

+: Fisher's Exact Test; ++: Chi-Squared Test; M: Male; F: Female.

During the whole time of the tracking we had a good regaining of weight and of the length of the children, more so under the diet of exclusive breastfeeding than for those children fed formula milk (Table 4). The 90 children benefitted from a HIV serology at 12 months with no child positive for HIV.

	At Birth			At 14 weeks		
	Type of feeding		P value	Type of feeding		P value
	M	A		M	A	
Index Weight/Height			0.1380++			0.3332+
Normal	16 (32.65)	12 (29.27)		42 (85.71)	30 (73.17)	
Between-3SD-2SD	16 (32.65)	7 (17.07)		4 (8.16)	6 (14.63)	
<-3DS	17 (34.70)	22 (53.66)		3 (6.13)	5 (12.20)	
Index Weight/Age			0.4621++			0.4380++
Normal	9 (18.37)	5 (12.20)		31 (63.26)	21 (51.22)	
Between-3SD-2SD	19 (38.78)	21 (51.22)		9 (18.37)	8 (19.51)	
<-3DS	21 (42.85)	15 (36.58)		9 (18.37)	12 (29.27)	
Index Height/Age			0.3677++			0.6058++
Normal	23 (46.94)	20 (48.78)		29 (59.18)	20 (48.78)	
Between-3SD-2SD	14 (28.57)	7 (17.07)		9 (18.37)	10 (24.39)	
<-3DS	12 (24.49)	14 (34.15)		11 (22.45)	11 (26.83)	

***Table 4:** Classification of infants by anthropometric data according to the type of feeding at birth and at 14 weeks of life (n = 90).*

+: Fisher's Exact Test; ++: Chi-Squared Test; M: Maternal Breastfeeding (Exclusive); A: Artificial Milk.

Discussion

The global prevalence of Low Birth Weight in the study was 16%. The percentage of infants with Very Low Birth Weight was 6.7% and of Low Birth Weight, 93.3%. Prematurity was found in 54.4% of the neonates. During the tracking, the catch-up by male children and children fed artificially was poor, among the different parameters.

The main limitation of the study was the small size which does not permit generalisations to be made. Nevertheless, the study brings valuable data on Low Birth Weight neonates born to HIV infected mothers on antiretroviral treatment, followed in a hospital service.

In this work, LBW made up 16% of the neonates born to HIV seropositive mothers from 2011 to 2016, with a reduction in the incidence during this time. The incidence of 17.5% [95% CI: 13.18 - 22.84] in 2011 was later 16.89% [95% CI: 12.31 - 22.67] in 2014 and 13.9% [95% CI: 8.56 - 21.65] in 2016. In the Onah series [11], Low Birth Weight was at a rate of 14.1%. In Benin in 2014, in a study on HIV seroprevalence and the associated status of children born to HIV seropositive mothers in the zones of prevention of Cotonou found that 15.8% of neonates born to HIV seropositive mothers were of Low Birth Weight [12]. Our prevalence was lower than the 20.9% reported from the Gabriel Touré Hospital in Mali in 2009 [13] and the 30% reported in Douala [14]. The reducing rate of Low Birth Weight could be explained by the development of the options in the Prevention of Mother to Child Transmission (PMTCT) guidance issued by the WHO up to 2012, putting options A, B and B+ in place in Togo in 2015 [10].

One study performed among the population of non-HIV-infected mothers of Togo found a rate of growth retardation of 7.1% in 2014 [15]. This prevalence is clearly lower than that of the neonates born to HIV-infected mothers. According to the study, 'PEDIACAM', which followed 4104 mother-child couples in two functional arms (infected or non-infected with HIV) found growth delay occurring more frequently among the infants infected by HIV, and less frequently among infants not infected by HIV, but more specifically, less frequently than those non-infected but HIV-exposed infants [16]. According to one meta-analysis, maternal HIV infection was significantly associated with a Low Birth Weight, moreover in developing countries and the use of antiretroviral was not significantly influencing the outcome of Low Birth Weight [17].

During the study, the recovery of children with regard to various parameters of interest was weaker among the children of male sex than among children of female sex but this was not a statistically significant difference. The growth differential associated with the male sex has also been described by other authors who have worked among African populations, in Benin [18], Burkina Faso [19], Uganda [20], Ghana [21], Nigeria [22] and was confirmed by a meta-analysis in 16 Sub-Saharan African countries [23]. The reasons explaining why boys are growing less well than girls are not clear. Some authors have put forward the strong prevalence of anaemia observed among boys in their study population to justify their poor growth [24]. Others too have evoked an hypothesis that genetic factors could explain the relative vulnerability of boys in relation to girls [25]. Certain genetic polymorphisms have been found to be associated with some growth disorders found in adulthood or adolescence [26].

It has been noted during the study that the recovery of children with regard to our different followed parameters was weaker among children who received artificial milk. This same finding has been found in another hospital in Togo [27] and in Benin [18].

Conclusion

This work has permitted us finding an unexpected elevated incidence of Low Birth Weight among mothers infected by HIV. In this population of seropositive women, the unexpected probability of LBW is linked to certain socioeconomic data such as maternal age, the socioeconomic level and the obstetric history such as the length of pregnancy. We have also noted a difference, but without statistical significance, that HIV seropositive women who were having poor antenatal follow-up were more often having infants with LBW than those

who were having the minimum number of antenatal care visits, according to the WHO. The association of HIV and LBW being common among seropositive pregnant patients must be made the object of a special study by medical staff in order to limit the occurrence of many infections and of diminishing the frequency of LBW.

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