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Severe Anemia During Pregnancy: Prevalence, Risk Factors and Maternal-Fetal Prognosis

Lyande LB[*1], Limbaya Ekanga NMJ[2], Amisi BM[1], Lokenye Kabinda A[1], Kumiele PM[1] and Bakulanga P[1]

[1]Higher Institute of Medical Techniques of Yangambi (ISTM – YBI), Democratic Republic of the Congo
[2]Higher Institute of Medical Techniques of Kisangani (ISTM – KIS), Democratic Republic of the Congo

[*]**Correspondence:** Ley Bafeno Lyande, Higher Institute of Medical Techniques of Yangambi (ISTM – YBI), Democratic Republic of the Congo

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Abstract

Anemia is one of the most important public health problems in the world and concerns the World Health Organization (WHO) given its prevalence, its many etiologies but also the consequences for which it is responsible in mothers and young children. In pregnant women, the causes of anemia are multiple and often intertwined: iron deficiency (but also folic acid, vitamin, etc.), intestinal helminthiasis, malaria, other infections (HIV infection, etc.), and hemoglobinopathies are the main causes. But among these etiologies, it has been estimated that 75% of anemias are attributable to iron deficiency and remain a cause of considerable perinatal morbidity and mortality. To avoid this, health services should design and implement strategies to control anemia in pregnant women, including prevention, early diagnosis, and appropriate management. The objective is to contribute to improving the management of anemia during pregnancy in order to reduce maternal and fetal morbidity and mortality linked to anemia in pregnant women.

Keywords: severe anemia; pregnant; risk factors and foeto-maternal prognosis; Yangambi

Introduction

Anemia is one of the most important public health problems in the world and has been of concern to the World Health Organization (WHO) since 1949, taking into account its prevalence, its many etiologies but also the consequences for which it is responsible in the mother and the young child [1].

According to the WHO, anemia is defined during pregnancy by a hemoglobin level below 11 g/dL in the first and third trimester of pregnancy; less than 10.5 g/dL in the second [2].

According to a joint study conducted by the WHO and the CDC on the global prevalence of anemia between 1993 and 2005, Africa is the continent most affected by anemia during pregnancy with an average prevalence of 57%, while in Europe, the average is 25.1%, in Asia 48.2%, and in America 24.1%. On a global scale, this prevalence was 41.8% or 56.4 million pregnant women concerned [3].

A 2007 survey of maternal-fetal health in the DRC revealed that nearly 70% of pregnant women were anemic. The highest rates were reported in Bas-Congo and Maniema, respectively 90.4% and 77.5% [4].

In pregnant women, the causes of anemia are multiple and often intertwined: iron deficiency (but also folic acid, vitamin, etc.), intestinal helminthiasis, malaria, other infections (HIV infection, etc.), and hemoglobinopathies are the main causes. Among these etiologies, it has been estimated that 75% of anemias are attributable to iron deficiency [5]. This high prevalence of iron and other micronutrient deficiency among pregnant women in developing countries is a cause for concern, and maternal anemia still remains a cause of considerable perinatal morbidity and mortality [6, 7].

Presentation of Results

Prevalence of anemia among gestants

- Overall prevalence of anemia during pregnancy

Table 1 shows us that the frequency of anemia during pregnancy is 55.67%.

Pregnant	Number	%
Anemia	167	55.67%
No anemia	133	44.33%
Total	300	100%

Table 1: Overall prevalence of anemia during pregnancy.

- Type of anemia according to hemoglobin level

In the light of Table 2, we note only severe anemia presents 53.29% of cases.

Type of anemia	Number	%
Mild anemia	53	31.74%
Moderate anemia	25	14.97%
Severe anemia	89	53.29%
Total	167	100%

Table 2: Type of anemia according to hemoglobin level.

Factors associated with severe anemia

- Socio-demographic characteristics
  A. Age of patients

Table 3 shows that there is no statistically significant difference between the different age groups with regard to the occurrence of severe anemia during pregnancy.

Age (years)	≤20		21–25		26–30		30–35		30–35	
	n	%	n	%	n	%	n	%	n	%
Mild anemia	0	0%	0	0%	0	0%	0	0%	0	0%
Moderate anemia	2	40%	17	42.5%	29	51.8%	18	42.9%	12	50%
Severe anemia	3	60%	23	57.5%	27	48.2%	24	57.1%	12	50%
Total	5	100%	40	100%	56	100%	42	100%	24	100%

Table 3: The influence of age on the occurrence of anemia during pregnancy; P-value = 0.8597.

B. Marital status

Table 4 shows the influence of marital status on the occurrence of anemia during pregnancy.

	Single		Married	
	n	%	n	%
Moderate anemia	6	50%	72	46.5%
Severe anemia	6	50%	83	53.5%
Total	12	100%	155	100%

Table 4: Influence of marital status on the occurrence of anemia during pregnancy; P-value = 0.8123.

C. Profession

Table 5 shows that there is no statistical difference between the profession of the patients with regard to the occurrence of severe anemia during pregnancy.

Profession	Civil servant		Shopkeeper		Housewife		Pupils/students	
	n	%	n	%	n	%	n	%
Severe anemia	13	46.4%	11	36.7%	50	36.7%	15	68.2%
Moderate anemia	15	53.6%	19	63.3%	37	63.3%	7	31.8%
Total	28	100%	30	100%	87	100%	23	100%

Table 5: Influence of profession on the onset of anemia during pregnancy; P-value = 0. 0924.

D. Level of education

Table 6 shows that the risk of study does not influence the severity of anemia during pregnancy.

	Primary/secondary		University/higher	
	n	%	n	%
Severe anemia	59	53.6%	30	52.6%
Moderate anemia	51	46.4%	27	47.4%
Total	110	100%	57	100%

Table 6: Influence of patient education and the occurrence of severe anemia during pregnancy; P-value = 0.9097.

- Gyneco-obstetric history

A. Parity

It appears from Table 7 that there is no statistical difference between the parities with regard to the occurrence of severe anemia during pregnancy.

Parity	Nulliparous		Primiparous		Pauciparian		Multiparous		Grand multiparous	
	n	%	n	%	n	%	n	%	n	%
Moderate anemia	10	30.3%	20	58.8%	12	46.2%	33	47.2%	3	60%
Severe anemia	23	69.7%	14	41.2%	14	53.8%	36	52.8%	2	40%
Total	33	100%	34	100%	26	100%	69	100%	5	100%

Table 7: Influence of parity on the occurrence of anemia during pregnancy; P-value = 0.2017.

B. Inter-birth interval

Table 8 shows that there is no statistical difference between the inter-birth interval of less than 2 years with severe anemia during pregnancy and those with moderate anemia.

	Less than 2 years		More than 2 years	
	n	%	n	%
Moderate anemia	47	52.2%	21	47.7%
Severe anemia	43	47.8%	23	52.3%
Total	90	100%	44	100%

Table 8: The influence of the inter-birth interval on the occurrence of anemia during pregnancy; P-value = 0.6250.

C. History of postpartum hemorrhage

Table 9 shows that patients who had postpartum hemorrhage during their previous delivery are significantly more likely to have severe anemia, 66.7% against 42.3% in the moderate anemia group.

	Postpartum hemorrhage		No postpartum hemorrhage	
	n	**%**	**n**	**%**
Moderate anemia	13	33.3%	55	57.9%
Severe anemia	26	67.7%	40	42.1%
Total	39	100%	95	100%

Table 9: Influence of history of postpartum hemorrhage; P-value = 0.0098.

Maternal-fetal prognosis

- Maternal prognosis

A. Transfusion

We note that patients with severe anemia during pregnancy are significantly more likely to have been transfused (97.9%), as shown in Table 10.

	Transfusion		No transfusion	
	n	**%**	**n**	**%**
Moderate anemia	1	2.1%	77	64.2%
Severe anemia	46	97.9%	43	35.8%
Total	47	100%	95	100%

Table 10: The impact of transfusion of patients with severe anemia during pregnancy; P-value = 0.0000.

- Fetal prognosis

A. Low birth weight

Table 11 shows that low birth weight newborns from patients with severe anemia during pregnancy (87.5%) are significantly more numerous compared to 51.6% in the group with moderate anemia.

	Low birth weight		Normal birth weight	
	n	**%**	**n**	**%**
Moderate anemia	1	12.5%	77	48.4%
Severe anemia	7	87.5%	82	51.6%
Total	8	100%	159	100%

Table 11: Relationship between anemia during pregnancy and birth weight; P-value = 0.0468.

B. APGAR from newborn to 5th minute

Table 12 shows that the APGAR less than or equal to 6 are significantly more likely to have newborns with a low APGAR score (67.6%) *vs.* 49.8% severe anemia during pregnancy.

	APGAR less than or equal to 6		APGAR greater than 6	
	n	**%**	**n**	**%**
Moderate anemia	12	32.4%	66	50.8%
Severe anemia	25	67.6%	64	49.8%
Total	37	100%	130	100%

Table 12: Relationship between the APGAR of newborns at the 5th minute less than or equal to 6 and the occurrence of severe anemia during pregnancy; P-value = 0.0485.

C. Perinatal mortality

Table 13 shows that there is no statistical difference with regard to perinatal mortality.

	Yes		No	
	n	**%**	**n**	**%**
Moderate anemia	2	20%	76	48.4%
Severe anemia	8	80%	81	51.6%
Total	10	100%	157	100%

Table 13: The influence of perinatal mortality on the occurrence of anemia in pregnancy; P-value = 0.0808.

Discussion

Prevalence of anemia in pregnant women

In our series, we found a prevalence of anemia in pregnancy of 55.7%. Anemia during pregnancy is very common, especially in developing countries, where it affects 50–80% of pregnant women [8, 9]. This figure is close to that found by Esike et al. [10] and Okube et al. [1]; on the other hand, this figure is higher than that found in Gombe in northern Nigeria [11–15] and that found by Alem et al. [16] and is higher than that found by the WHO and CDC [5]. We believe that this result is due to the high incidence of poverty in Democratic Republic of the Congo of 71.3% of the population, which imposes on many families a monotonous diet responsible for nutritional deficiency at the base of certain forms of deficiency anemia and also the situation of Yangambi which is highly endemic for malaria, where malaria is responsible for anemia in pregnant women. Promiscuity exposes to water diseases, ankylostomiasis, and amoebiasis, which are responsible for anemia by blood depletion.

Factors associated with severe anemia

- Maternal age

We noted in our series that there is no statistically significant difference between the different age groups in the occurrence of anemia during pregnancy. Obai et al. [17] made the same observation as us; on the other hand, Ma et al. [18] found that patients aged 45–49 had a risk of severe anemia during pregnancy.

- Marital status

In our series, we noted that there is no statistical difference between married and single women with regard to the occurrence of anemia during pregnancy; the same observation was made by Obai et al. [17] and Lokare et al. [19]. We think that this result would be justified by the poverty which lives in our environment of Yangambi in particular and of DR Congo in general; indeed, single people by the fact that they are abandoned to their sad fate without employment can develop deficiency anemia due to lack of means. The same is true for brides who generally abandon themselves to their spouses to meet their needs because they do not have a profit-making initiative.

- Profession

It appears from our study that there is no statistical difference between the professions of patients in relation to the occurrence of anemia during pregnancy. Lokare et al. [19] made the same observation as us; on the other hand, Obai

et al. [17] found that housewives were exposed to the risk of anemia, justifying this by the fact that they only had as a source of survival their spouses.

- Level of education

We found that there is no statistical difference between levels of education with regard to the occurrence of severe anemia during pregnancy. Obai et al. [17] found that education was a factor that reduced the risk of anemia. They justified their result by the fact that pregnant women with a low level of education understand less well the recommendations made during the prenatal consultation, and they have difficulty observing the recommendations given to them during the health education sessions [20, 21].

- Parity

We found in our series that there is no statistical difference between parity with regard to the occurrence of anemia during pregnancy. Our results agree with those of Ahmad et al. [22]. However, Obai et al. [17] found that compared to nulliparous, pauciparous, or multiparous women increases the risk of the onset of anemia during pregnancy.

- Inter-birth interval

In our series, we found that there is no statistical difference between patients with an inter-birth space of less than 2 years and those with an interval greater than or equal to 2 years with regard to the occurrence of severe anemia during pregnancy. Contrary to our series, Kassa et al. [21] found that a short inter-birth interval doubles the risk of severity of anemia.

According to Labama [23–25], anemia during pregnancy is more linked to close parity because the maternal organism did not have sufficient time to compensate for previous anemia before the new pregnancy.

- History of postpartum hemorrhage

Note that in our series, patients who had postpartum hemorrhage during their previous deliveries were more likely to have severe anemia compared to those in the moderate anemia group. This same observation has been made by other authors. Ma et al. [18] found that significant previous bleeding increases the risk of severe anemia 5-fold. This risk is due to the fact that the maternal organism deficient by a prior nutritional deficit has not had enough time to reconstitute itself when the woman becomes pregnant. The needs of pregnancy will only increase the risk [26, 27].

Maternal-fetal prognosis

- Maternal transfusion

We found during our study that patients with severe anemia during pregnancy were significantly more likely to have been transfused, *i.e.*, 51.7% against 1.9% in the moderate anemia group. Childbirth is a situation that is always accompanied by hemorrhage. The good maternal tolerance to hemorrhage is linked to its state of hypovolemia, the hemoglobin level, and the passage in the general circulation of the blood contained in the uterine muscle during its retraction; this volume can reach up to 500 ml. We are talking about physiological transfusion. The physiological responses to hemorrhage vary according to its severity and the patient's condition: either the hemorrhage occurs on the normal ground or an anemic ground preexisting at delivery.

Patients with severe anemia are, therefore, more likely to decompensate much more easily regardless of the amount of blood lost and therefore benefit from a transfusion, which justifies our results.

- Maternal mortality

We did not record any cases of death during our study series. According to the United Nations, severe anemia, as defined by the WHO (Hb less than 7 g/dL), is responsible for more than half of the cases of maternal death worldwide

[28, 29]. We believe that the results observed in our series of studies could be justified by good management in Yangambi of patients showing signs of anemia decompensation.

- Low birth weight

It emerged from our study that patients with severe anemia during pregnancy were significantly more likely to have low birth weight newborns, *i.e.*, 7.8% *vs.* 1.9% in the moderate anemia group. In 2011, Ndeye [30] listed 30 cases of fetal distress, including 17 in the anemia group. Also, in Nablus, the rate of low birth weight found by the authors in the population of anemic women was 56.6% [31–34].

We believe, like Beucher et al. [35], that the risk of low birth weight and suffering fetus increases with the severity and duration of the anemia as a consequence of nutritional deficiency and lack of oxygen for metabolism.

- Newborn APGAR

We found in our series that patients with severe anemia during pregnancy are significantly more likely to have newborns with a low APGAR score. As said before, we think, like Beucher et al. [35], that the risk of low birth weight and fetal distress increases with the severity and the length of the anemia as a consequence of nutritional deficiency and lack of oxygen for the metabolism.

- Perinatal mortality

We found in our series that the perinatal mortality of newborns from pregnant women who presented severe anemia is 8.9%, while those who presented moderate anemia is 2.6%. The difference is not statistically significant. We believe that these results are due to the fact that at the time of our study, the hospital had a high technical platform in equipment and personnel in neonatology who promptly took care of newborns.

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