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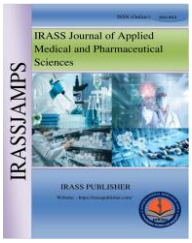

ASSESSMENT OF THE IRON STATUS OF MOTHER-CHILD COUPLES AT DELIVERY IN THE TOWN OF KINDU

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Abstract: A study iron status assessment in mother-infant pairs in chidbirth was performed in different maternity hospitals of the city of Kindu (DRC). 392 mother-infant pairs were the subject of this study. The incidence of iron deficiency is very high in the mothers (82%) compared to that of newborns deficient (16%), all from deficient mothers (serum iron 37-100ug/dl). No cases of anemia with iron deficiency was not observed either in the mother or in the newborn (serum iron <37ug/dl).Multiparity and low birth weight (LBW) are considered important risk factors for iron deficiency in the NN. The prevalence of pregrancy anemia of 34.2% observed in our study had no influence on iron deficiency in the newborn.

Keywords: Iron status, mother-child pairs, risk factors, city of Kindu, DRC.

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Introduction

Anemia and iron deficiency are quite common during pregnancy. According to the WHO, pregnancy anemia is defined by a hemoglobin level below 11 gldl in the first and third trimesters of pregnancy and below 10.5 gldl in the second trimester (John W. Feighter, 1990; T. Harvet, 2011); However, with the phenomenon of hemodilution, approximately 30% of pregnant women may experience lower Hb levels. at 10g/dl (1.13).

The prevalence of anemia among pregnant women in developing countries such as Togo and Guinea is close to 60 (BOUDJERRA N, 2005). Around 8% to 40% of pregnant women in Western countries are considered to have anemia (Alexander et al, 2009). In France, 22.7% of women of childbearing age have an iron deficiency (serum ferritin below 12 mg/l) and 4.4% have iron deficiency anemia (Catherine A et al, 2009)/

Iron deficiency can not only disrupt the normal development of the fetus during pregnancy, but also compromise the survival of the child in the neonatal period if it is not adequately and rigorously managed.

Most studies show that women who have iron deficiency are not more likely to give birth to newborns with the same deficiency than women whose iron stores are sufficient (John W. Feighter, 1994). It is therefore important to know in our environments the risk factors linked to iron deficiency with or without anemia in children at birth.

To better approach our study, we asked ourselves the following questions:

- What would be the importance of iron deficiency in the mother and child at the time of delivery?
- Would the prevalence of anemia of pregnancy be high and detrimental to giving birth to iron-deficient newborns?
- What would be the main risk factors and complications linked to iron deficiency in the mother and/or child during childbirth?

As a hypothesis,

The prevalence of pregnancy-related anemia in Kindu town is high and detrimental to giving birth to iron-deficient newborns;

- Multiparity and close pregnancy are often associated with iron deficiency in the child at birth;
- FPN are considered both an important risk factor and complication linked to iron deficiency in children.

Our work has the following objectives:

- Evaluate the iron status of mothers and their newborns at delivery in order to know the incidence of iron deficiency in the latter;
- Identify the main risk factors and complications linked to iron deficiency in children.

Patients and methods

The present study is prospective and consists of evaluating the iron status in the mother-child couple at birth. 4 maternity hospitals were targeted given their large reception capacity and their geographical location. These are the HGR-K, HGR-A, MSR and the BDOM maternity ward. This is a cross-sectional and multicenter study carried out during the period from January 1 to December 2010. Venous blood samples (ml) from the mother from a superficial vein in the elbow crease and from the newborn via the umbilical vein; the blood samples thus collected are sent to the large HGR-K laboratory for their analysis (serum iron level and routine hematological examinations: GR, Hb, Hte, GE, VGM). A total number of 392 mother-child pairs were the subject of this study.

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The parameters below were retained and the statistical analysis of the related data was carried out by the Epi info version 6.1 software.

- Overall incidence of iron deficiency in the mother-child couple;
- Prevalence of pregnancy-related anemia;
- Risk factors for iron deficiency in newborns at birth

Results

Overall impact

Table 1: Overall incidence of iron deficiency among mother-child couples at delivery.

Mother Child	without deficiency	with deficiency	Total	%
Without deficiency	71	258	329	84
With deficiency	0	63	63	16
Total	**71 (18%)**	**321 (82%)**	**392**	**100**

The results observed in this table 1; shows that out of the total number of 392 mother-child pairs, 321 mothers presented an iron deficiency (82%). The 63 deficient newborns observed in our series all came from deficient mothers, they represent an incidence of 16%.

Note that no case of iron deficiency with anemia has been observed either in the mother or in the newborn at birth.

Risk factors for iron deficiency in newborns at birth

Anemia of pregnancy

Table 2: Hemoglobin level of mothers and iron status of newborns

Iron Status	NN deficient		NN non-deficient	
Hb of mothers	**N**	**%**	**N**	**%**
Greater than 11gr/dl	36	9,2	222	57
Less than 11gr/dl	27	6,8	107	27
Total	**63**	**16**	**329**	**84**

We note in this table 2 that out of the total number of mothers (392), 134 of them presented anemia (Hb<11g/dl), i.e. a prevalence of pregnancy anemia of 34.2%; 27 deficient NNs came from mothers with anemia of pregnancy, anemia of pregnancy compared to 9.2% of deficient NNs from mothers without anemia.

The difference observed on a statistical level is not significant (p>0.05).

Chi square = 2.51; p = 0.11

Parity

Table 3: Parity and martial status of newborns

Iron Status	NN deficient		NN non-deficient			
Parity	**N**	**%**	**N**	**%**	**Total**	**%**
Oligoparous	12	3	213	54	225	57,4
Miltiparous	18	5	67	17	85	21,6
G/multiparous	33	8	49	13	82	21
Total	**63**	**16**	**329**	**84**	**392**	**100**

The results of this table reveal that the majority of mothers were aligoapres (57.4%) compared to multiparous (21.6%) and grand multiparous (21%) mothers; on the other hand, there are more NN deficiencies from large multiparous mothers (8%) than those from oligoparous mothers (3%). The difference observed on a statistical level is significant (p < 0.05%).

NNs from multi and grand multiparous mothers are more exposed to developing iron deficiency.

Chi square = 47.31 p = 0.000

Natal weight

Table 4: Natal weight and martial status of newborns

Iron Status	NN deficient		NN non-deficient			
PN (gr)	**N**	**%**	**N**	**%**	**Total**	**%**
2500<	22	6	312	80	334	86
>2500	41	10	17	4	59	14
Total	**63**	**16**	**329**	**84**	**392**	**100**

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The results of this table 4 show that out of the total number of 392NN, 59 NN had a low birth weight (BW<2500g) with an incidence of 14% (47 preterm and 12 at term); Among the 63 NN deficiencies, 41 NN presented LBW, i.e. an incidence of 10 compared to 6 of NN with normal birth weight.

The observed difference is statistically significant (p<0.05%)

Chi square 150.55 p = 0.000

Comments

Overall incidence (Tab1)

According to the results of this table, the majority of mothers (82%) had iron deficiency; There were only 16% of newborns with deficiencies, all from deficient mothers. No cases of deficiency with anemia were observed in this table.

According to studies carried out by the WHO (Hafidi Naima, 2003), the prevalence of iron deficiency among pregnant women is quite high and varies depending on the area of residence, higher in rural areas (48%) than in urban areas (42.4%) and nationally (40.5%);

Certain studies carried out in France have highlighted a prevalence of 60% to 80% of pregnant women at the end of pregnancy with iron deficiency and iron deficiency anemia in 9 to 10% of French women in metropolitan France (Flavi 22%) with iron deficiency anemia.

Indeed, it is known from the literature that iron reserves in pregnant women become depleted towards the end of pregnancy (especially during the last two trimesters), following the considerable increase in iron requirements, thus promoting the absorption of dietary iron (Flavien J, 2011). The low income of families as well as the ignorance of mothers linked to their low level of education mean that foods rich in iron are neither available nor consumed regularly in families, and as a result iron deficiency can easily manifest itself in newborns secondary to a maternal deficiency are very rare, because as soon as the mother has a deficiency, the iron absorbed first passes into the child's body. This explains this low incidence of iron deficiency observed in the NN (16%) paradoxically to a very high maternal deficiency in the mother (82%).

As for the almost total absence of cases of iron deficiency with anemia observed in our study, this can be explained by the systematic administration of iron during ANC organized in the various health centers by NGO partners. On this subject, the HAS (2011) advises against this practice of systematically administering iron to pregnant women because they run a lot of risk.

Risk factors

- **Pregnancy anemia (Tab. 2)**

The frequency of pregnancy anemia in our study is 34.2%; It is lower than that observed in Lomé (Togo), 48% and higher than that observed in Tunis 30% and that observed in Western countries 8-30% ( ). In a study carried out in Kinshasa during the period of conflict, more than 50% of pregnant women presented anemia (Okilonda, 2003). The incidence of iron deficiency observed in NNs from mothers with gestational anemia (7%) is slightly lower than that of NNs from mothers without gestational anemia (9%); The difference observed statistically is not significant (p>0.05%). Pregnancy anemia is not considered in our study as a risk factor for iron deficiency in NN. Especially since in our study there were no cases of iron deficiency with anemia neither in the mother nor in the NN. Several factors can explain the fairly high frequency of anemia in pregnant women which were not the subject of this study...

- ***Parity (Tab. 3)***

The results of this table show that the NN deficiencies from grand multiparous mothers (8%) are more numerous than the NN deficiencies from oligoparous mothers (5%); the difference observed on a statistical level is significant (p>0.05%).

In certain African countries such as Togo (Lomé), high parities no longer represent a risk factor for iron deficiency and iron deficiency anemia (Dop, Et Coll, 1992).

Furthermore, a study carried out in Niger by Brunengo et all (1991) revealed a clear influence of parity; Oligoparous women had higher serum ferritin values compared to multiparous women. The difference was significant (p<0.05). Among the factors favoring iron deficiency in NN, multiparity and twin pregnancies occupy the first places (Guy Biron MD, 1974). Indeed, in multiparous women, iron is constantly robbed by needs x 5 to 6; Knowing that each pregnancy costs around 1g of iron (44).

Iron requirements can be met by the availability of iron-rich foods and their bioavailability in households. In other words, iron must be available from the body's reserves or from food. However, nutritional situations are different between populations in industrialized countries and those in developing countries. Women in industrialized countries generally have sufficient food intake while women in developing countries like ours (DRC) often have deficiencies due to insufficient consumption of meat and little fruit (ascorbic acid). Among other contributing factors is ignorance linked to the low level of education of mothers as well as the large size of households ( ).

Natal weight (Tab. 4)

The overall incidence of low birth weight NN in our study is 14%;

NN deficiencies with FPN presented an incidence of 10%, higher compared to NN non-deficiencies (4%).

The study conducted on anemia during childbirth in Lomé (TOGO) showed 10 cases of FPN (8%); In our study, the incidence is higher (14%).

NN to FPN are considered in our study as an important risk factor for iron deficiency in the latter. Indeed, according to the literature, iron reserves in children are built up at the end of pregnancy, when iron needs are considerably increased 4-5X compared to the start of pregnancy.

This increased need for iron constitutes one of the important factors favoring the absorption of iron in the mother and this is conditioned (of course) by the consumption of foods rich in iron available in the family. As NN at term is extremely effective in its iron extraction process...the iron absorbed by the mother passes directly to the fetus. The consequence is that NN who are born at full term with FPN or before are automatically deprived of these iron reserves.

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Iron deficiency in the mother is not the only factor favoring LBW, there are others such as smoking and inadequate diet.

Conclusions and recommendations

- Our study found a very high incidence of iron deficiency in the mother (82%) compared to only 16 in NN, all from keeled mothers; which shows that iron deficiency still constitutes a real public health problem in our environments compared to other African and Western studies.
- Multiparity, FPN and inadequate nutrition are important risk factors observed in our study.
- CPNs which are better organized in place, could be an ideal framework to educate pregnant women, not only to observe the rules of natural family planning, but also to consume foods rich in iron and fruits rich in ascorbic acid, available and inexpensive in our environments.
- Further studies are needed to better understand the risk factors for iron deficiency in NN and other etiologies of anemia in pregnant women.

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