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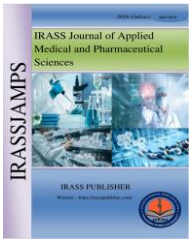


# INTEREST OF THE NATURAL FOOD SUPPLEMENT MALIZANE (CASSAVA LEAF AND LEMON JUICE), TO CORRECT IRON DEFICIENCY ANEMIA IN CHILDREN IN MANIEMA

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**Abstract:** The aim of this experimental study is to assess the effectiveness of natural dietary supplement ''MALIZANE'' and show interest in relation to other management strategies of iron deficiency anemia in children economically (low cost financial), continuous availability, with less risk for anemic children. The results show a significant improvement in serum iron and other hematological parameters evaluated (GR,Hb, Hct) after one month of treatment as wel as therapeutic martial (Amifer).

The new support strategy for iron-deficiency and by malizane may be considered as a food supplement for infants 7 to 12 months in our environments unfavorable socioeconomic conditions. However, other studies are needed to better adventage ot the composition of this natural supplement made of cassava leaf and lemon juice.

**Keywords:** Iron deficiency anemia child interest malizane, Maniema.

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## Introduction

Iron deficiency and iron deficiency anemia remain a current problem in the world and particularly in developing countries. According to the WHO, approximately 25-30% of the world's population suffers from anemia; Half of iron deficient subjects will develop anemia (11, 29, 36), particularly women and young children. Infants and adolescents have a high iron requirement due to their rapid growth.

Iron, although present in very small quantities in the body (0.05% of body weight), plays an essential role in erythropoiesis and in many cellular and molecular functions. The consequences of such a deficiency are multiple in the child on the one hand, and on the other hand its excess increases the activity of free radicals harmful to the body; Thus its metabolism is done in a closed environment ( ).

The risks of iron deficiency anemia can be reduced by breastfeeding, especially when the latter is associated with iron-enriched food supplements (CA-F) such as cereals or iron-enriched milk formulas. Natural food supplements (CA-N) present less risk for the body compared to iron-enriched food supplements, because thanks to a regulatory mechanism, the intensity of iron absorption by the intestine can be largely adapted according to needs (3,7); In addition, CA-N have other advantages (low financial cost, permanent availability, etc.).

While many studies on the effectiveness of daily drug treatment with iron to correct iron deficiency with or without anemia have been published, very few have focused on natural food supplements.

The natural food supplement that is the subject of our study consists of cassava leaf juice and lemon (FMCI), respectively rich in iron and vitamin C. Ascorbic acid or vitamin C by its participation in certain redox reactions facilitates the absorption of iron by promoting the reduction of ferric ion (Fe+++) to ferrous ion (Fe++),

$$(Fe^{+++} \longrightarrow Fe^{++})$$

In other words, ascorbic acid plays the role of cofactor to facilitate the absorption of non-heme iron of plant origin via the Divalent Metal Transporter (DMT1) at the apical pole of the antherocyte, thus increasing its absorption by 30% (24).

This prospective study aims to assess the effectiveness of the FMCI solution and show its interest compared to other strategies for managing iron deficiency anemia in children in Maniema.

***Patients and methods***

This is an experimental study with a control sample, conducted at HGR-Kindu, in the urban-rural health zone of Kindu, Maniema Province, for a period of one month. The selection of children was carried out on the basis of the following criteria: infants aged 7-12 months, not completely weaned, all suffering from iron deficiency anemia (low ferric iron <37ug/dl; MCV<74ft and Hb<11g/dl); Infants with severe anemia (Hb<6g/dl), severe

acute malnutrition (SAM) and those with chronic infection were excluded from this study.

The beneficiaries of the experimental group (group A n = 50), receive, during the study, the FMCI diet, while the sample of the control group (group B n = 50) is subjected to antianemic drugs based on iron in syrup (Amifer). Preparation of FMCI solution: The mixture of cassava leaf juice with that of lemon was made in appropriate proportions giving FMCI solution of reddish appearance, comparable to the color of blood, of pleasant taste ready to correct iron deficiency anemia in children: real scientific curiosity.


Its analysis was carried out at the laboratory for the analysis of foodstuffs, medicines, water and toxic substances of the National University of Rwanda on May 22, 2012.

***Table : Physico- chemical analysis : Résultats***

| Nber of sample | Parameter to be analyzed | Method | Resultats |
|---|---|---|---|
| 1 | $Ca^{2+}$ | Calorimetric | 50mg/l |
| | Fe2+ | Calorimetric | 13.05mg/ |
| | Ascorbic Acid | Volumetric | 29.87mg/100g |

The rate of administration: To be consumed twice a day after meals.

Staple foods: Breast milk, a porridge adapted to this age, the family meal.

The evaluation measures were essentially biological; In this regard, we collected the serum iron level (ug/dl), the hemoglobin level (g/dl), and hematocrit (%) as well as the number of red blood cells (millions/mm3).

The statistical analysis of our results was done by Epi info software.

The serum iron level was considered in our study as the primary criterion for selecting subjects. The secondary criteria are hemoglobin, red blood cells, and hematocrit. The comparison of these biological parameters before (D=0) and after treatment (D=30) was done by paired analysis (t test) for a sample greater than 30. Thus, we used the software …and calculation of Z…

## Results

Table I: Evolution of biological parameters after 30 days of treatment for Group A

| Variables | Jrs 0 | Jrs 30 |
|---|---|---|
| **FER** | 27 | 82 |
| **GR** | 2 | 4 |
| **Hb** | 8 | 12 |
| **Hct** | 21 | 37 |

The results of this table 1 in relation to the evolution of biological parameters in the infants tested (group A), show a significant improvement in the serum iron level after one month of administration of the FMCI solution (82, vs. 27; Z < -1, 96); the same was true for the other parameters: GR (4, vs. 2; Z < - 1, 96); Hb (12, vs. 8; Z < - 1.96); Hct (37, vs. 21; Z < - 1.96).

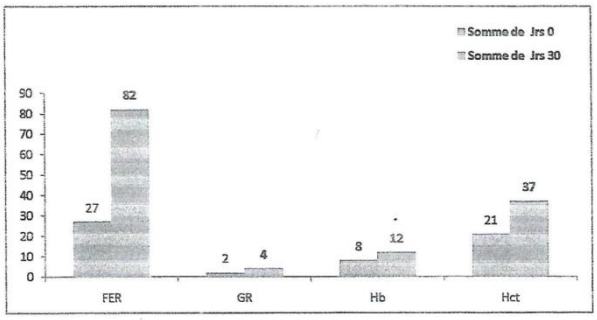


Figure 1: Comparison of the means observed in group A after 30 days of treatment shows a significant statistical difference, i.e. (Z < - 1.96)

**Table II: Evolution of biological parameters after 30 days of treatment for group B**

| Variables | Jrs 0 | Jrs 30 |
|---|---|---|
| **FER** | 28 | 81 |
| **GR** | 3 | 4 |
| **Hb** | 9 | 12 |
| **Hct** | 22 | 31 |

The results of this table show a significant improvement in serum iron levels after one month of iron treatment in syrup (81, vs. 28; Z < - 1.96);

Other parameters were also significantly improved: GR (4, vs. 3; Z < - 1.96); Hb (12,vs,9; Z< - 1,96); Hct (31,vs,22; Z< - 1,96)

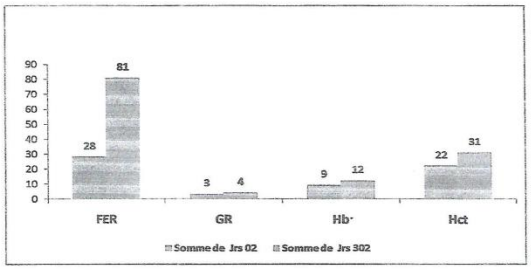


**Figure 2: The comparison of the means observed in group B after 30 days of treatment shows a significant statistical difference, i.e. (Z < - 1.96).**

## Discussion

Iron deficiency with anemia is common in our environments in infants aged 7-12 months, as shown by the results of an epidemiological survey conducted in a hospital environment by TSHOSO (2011), mainly due to poor diversification of food at this age.

The clinical consequences are multiple in children. Iron deficiency is associated with an increased risk of serious morbidity.

According to experiments conducted in animals and humans, it affects motor, cognitive and emotional development by disrupting myelination and modifying the function of neurotransmitter receptors (in particular dopaminergic receptors) and neuronal metabolism.

Therefore, the iron balance must be sufficient for hematopoiesis, neurological development and immune function (Allen et all, 2008). Thus, the American Academy of Pediatrics recommends early screening for infants aged 7-12 months compared to those aged 15-18 months (Maja Beck Popovic et al, 2006).

The magnitude of the consequences of iron deficiency with anemia observed in Maniema, in more than 38% of infants aged 7-24 months (TSHOSO, 2011) justifies the implementation of iron therapy in syrup, because it allows to rapidly increase iron status and reduce the prevalence of iron deficiency anemia in children in Maniema.

Iron-enriched food supplements (CA-F), iron-enriched milk formulas, are not commonly used in our settings because of their high cost. In our series, no infant benefited from the iron-enriched food supplement. An alternative to drugs and iron-enriched food supplement (CA-F), is the natural food supplement (CA-N), made of cassava leaf juice and lemon (FMCI); Ascorbic acid or vitamin C, contained in lemon juice, improves the bioavailability of non-heme iron from cassava leaf juice. It is also known from the literature that a dose of 75 mg of vitamin C during a meal increases iron absorption by up to 12%; For example, the combination of toasted bread with peanut butter and orange juice improves the absorption of non-heme iron from bread and peanut butter (Desjardins I, 1999).

The results obtained in our experimental study, conducted in infants aged 7 - 12 months, all suffering from iron deficiency anemia, show that the FMCI solution administered for one month significantly improves the serum iron level of infants with iron deficiency anemia; It also significantly improves other biological parameters evaluated in this study (Hb, Hcte, GR) in the same way as martial therapy.

However, few studies are published for natural food supplements (CA-N).

The avocado-lemon solution is a natural solution recommended by Professor Ibrahim Saracoglu, herbalist, consists of taking an avocado and 1-1.5 tablespoons of lemon juice; Spread a piece of bread with this preparation, eat every day for 1 month, and repeat as needed (22).

## CONCLUSIONS

This study confirms the effectiveness after one month of treatment with the FMCI solution to correct iron deficiency anemia in infants. This is a new strategy for treating children suffering from iron deficiency anemia in our environments. It would be interesting to conduct further studies to further improve the composition of the FMCI solution called malizane in our study.

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