

Epidemiological-Clinical Features of Anemia in Children Aged 6 to 59 Months Hospitalized in the Pediatrics Department of Nianankoro Fomba Hospital in Ségou

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Abstract

According to the WHO, anemia affects 64.6% of children under the age of 5 on the African continent, representing more than 90 million children. In Mali, 82% of children aged 6 to 59 months have anemia. Objective: This work aimed to study anemia in children aged 6 to 59 months hospitalized in the pediatrics department of the Nianankoro FOMBA hospital in Ségou. **Materials and Method:** This was a descriptive cross-sectional study in children aged 6 to 59 months from January 1 to December 31, 2019 at the pediatrics department of the Nianankoro Fomba Hospital in Ségou. **Results:** We collected a sample of 316 cases of anemia out of a total of 1,316 hospitalized children, an overall frequency of 24%. The most affected age group was 25-59 months with an average age of 32 months. The sex ratio was 1.2. Farming fathers and out-of-school mothers were the most common at 72.5% and 97.5%, respectively. Most cases of anemia occurred during the winter period with a peak in October of 35.12%. The most talked about reason for consultation was fever. Severe anemia was the most common at 74% with 81% hypochrome anemia. The use of transfusion was 90.8%. The mortality rate was 11.4% with a cure rate of 85.4%. Deaths were strongly related to severe anemia. **Conclusion:** Anemia has multifactorial cause. Strong parental involvement in integrated activities to combat malaria, malnutrition and parasitosis will help reverse the trend.

Keywords: Anemia, Pediatrics, Ségou.

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INTRODUCTION

According to the World Health Organisation (WHO), anaemia is defined as a decrease in haemoglobin concentration below the age, sex and physiological status of the individual. In children aged 6 months to 5 years, a haemoglobin level below 11g/dl indicates anaemia, which is mild up to 10g/dl, moderate between 7 and 10 and severe below 7g/dl [1]. It is a public health problem with major consequences on health as well as on socio-economic development. It

affected more than 47% of children under 5 years of age worldwide [1].

This rate is about 40% in South America, 17% in Europe and reaches 64.6% in Africa, which represents more than 90 million children. The most serious consequence on health, widely demonstrated elsewhere, is the increased risk of maternal and infant mortality observed in severe forms. Other concerns include adverse effects on child development and work productivity when anaemia is due to iron deficiency, and increased risk of post-operative mortality in

anaemic patients [1]. In children under 5 years of age, anaemia is observed in nearly 70% of cases in certain rural African regions, and malaria, malnutrition, haemoglobinopathies and digestive parasitosis are the conditions most often incriminated [2, 3]. 66% of anaemia cases in children fewer than 5 years of age in Cameroon were related to malaria [2, 4]. In Mali, according to the DHS V, 82% of children aged between 6 and 59 months suffer from anemia: 21% in the mild form, 52% in the moderate form and 9% in the severe form. The proportions of anemic children are high whatever the socio-demographic and economic characteristics considered. Anemia affects children in rural areas more than those in urban areas (85% compared to 68%). It should be noted that 55% of children in rural areas have moderate anemia and 11% have severe anemia. In the regions, the prevalence varies from 89% in Mopti to 79% in Kayes and a minimum of 68% in Bamako [5]. However, little documented data has been available on anemia in children in Segou pediatrics. Thus, our study proposes to study the epidemiological and clinical characteristics of anaemia in children aged 6 months to 5 years at the Nianankoro Fomba Hospital in Segou. The objective was to study anemia in children aged 6 months to 59 months hospitalized in the pediatric department of the Nianankoro Fomba Hospital in Segou.

MATERIALS AND METHOD

This was a descriptive cross-sectional study from January to December 2017 in children aged 6 months to 59 months hospitalized in the pediatric department of Nianankoro Fomba Hospital in Segou with a hemoglobin level ≤ 11 g/dl. All children aged 6 months to 59 months hospitalized with a haemoglobin level less than or equal to 11g/dl were included in our study. Not included in the study were all children aged 6 months to 59 months with hemoglobin less than or equal to 11g/dl who were not hospitalized and children under 6 months and over 59 months with hemoglobin less than or equal to 11g/dl. Data were collected on an individual survey form after informed consent of the parents. The variables studied were age, sex, origin, mode and reason for consultation, psychomotor development, anthropometric data, elements of the physical examination, clinical and biological elements, the diagnosis retained, the results of complementary examinations and the immediate future. The data were entered in Microsoft Office world and the graphs in

Microsoft Office Excel. The analysis and processing of the data was carried out using SPSS version 20 software and the Pearson Chi-square statistical test was used to compare our results, with a probability of $p < 0.05$ considered significant. Ethically, inclusions were made after informed consent from parents or carers.

RESULTS

During the study period, 316 cases of anemia were recorded out of 1316 hospitalized children, representing an overall frequency of 24%. The 25-59 age group was the most represented with a frequency of 63.3%, the average age of the study population was 32 months; boys were in the majority with a frequency of 56% and a sex ratio of 1.25; children from the commune of Ségou were in the majority with a frequency of 76.6%; referred children were in the majority with 54.4%. The most common reason for consultation was fever (18.9%), followed by convulsions and pallor (18.3% and 16.4% respectively). Children of farmers' fathers were in the majority with 72.5%, followed by those of workers' and traders' fathers with 18.3% and 4.7% respectively. Children of mothers who had not attended school were in the majority with 97.5%. Malaria was the most common diagnosis with 87.6% (Table II). The peak of admissions was in October with 35.12% (Figure 1). Thick blood cell count was positive in 99.7% of patients, electrophoresis was positive in 1% of our patients and severe anemia was the majority with 74%, microcytic anemia represented 87.6% and 69.6% of patients had hypochromic anemia. It appears from our study that more than half of the study population presented with hypochromic microcytic anaemia, i.e. 60.4% (Table II). Children who received transfusions accounted for 73.7%. Cured children accounted for 85.4% of cases and the death rate was 11.4% (Table III). Of the referred children 88.4% had severe anemia (hemoglobin level < 7 g/dl) and of the non-referred children severe anemia accounted for 46.5%. Of all the patients, severe malaria predominated with a frequency of 87.3%, followed by severe acute malnutrition (8.5%) and acute lung disease (3.1%). Severe anemia was prevalent in severe malaria with 84% of cases, followed by complicated acute malnutrition with 11% of cases, bronchopneumonia with 3.4% and sickle cell disease with 0.8%. The mortality rate was 11%; this mortality was predominant in the 25-59 month age group.

Table I: Distribution of the study population by diagnosis

Diagnosis	Number	Frequency (%)
Severe malaria	277	87,6
Broncho-pneumonia	10	3,2
Sickle cell disease	3	1
Severe acute malnutrition	277	8,2
Total	316	100

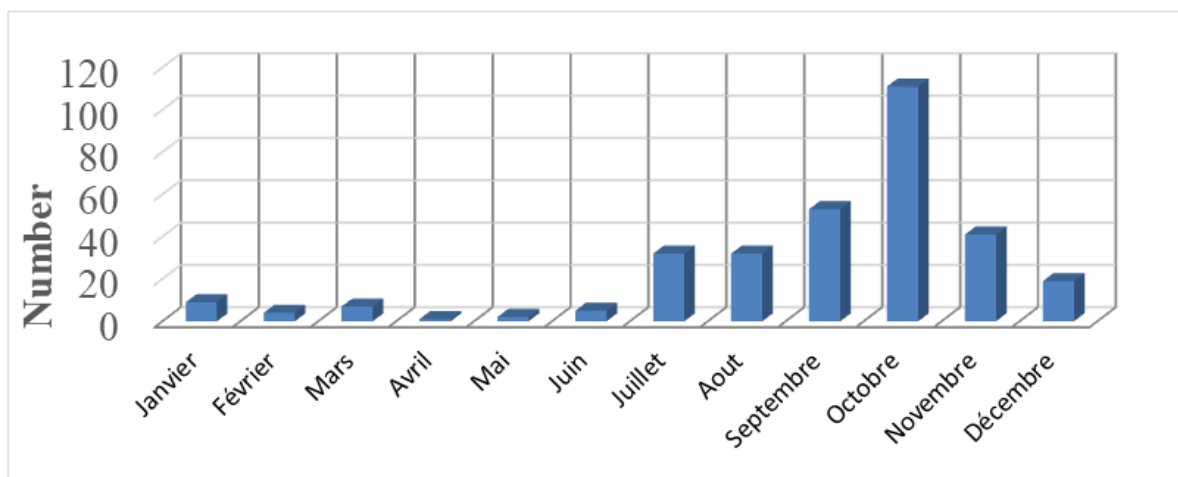


Figure 1: Distribution of the study population by month of consultation

Table II: General classification according to mean corpuscular volume (MCV) and mean corpuscular haemoglobin concentration (MCHC)

Type of anemia	Frequency	Percentage
Hypochromic microcytic anemia	191	60,4
Normochromic microcytic anemia	57	18,1
Hypochromic normocytic anemia	35	11,1
Normocytic normochromic anemia	33	10,4
Macrocytic anemia	0	0
Total	316	100

Table III: Distribution of the study population by fate

Become	Frequency	Percentage
Healing	270	85,4
Abandonment/Evasion	8	2,5
Transferred/referred	2	0,6
Deceased	36	11,4
Total	316	100

DISCUSSION

In our study we worked on a sample of 316 cases of anemia out of a total of 1316 children hospitalized during 12 months, i.e. an overall frequency of 24%. This rate can be explained by the fact that in our study only hospitalized children who had a blood count from 6 months to 5 years of age were taken into account. The prevalence of anemia is generally very high in Mali and in Africa. DANIELE K *et al.*, found a prevalence of 88.5% in children hospitalized in Cameroon [6], in Senegal it was 71% [7], the age group 25-59 months was the most represented, i.e. 63.3%, the average age was 32 months with extremes ranging from 6-59 months. A study carried out in Tunisia showed that the prevalence of anemia reaches its maximum and exceeds 50% between 25-59 months [10]. Several studies carried out in Guinea [11], DANIEL K from Cameroon in 2009 [6] had found respectively 79% in children aged 6-59 months, 80.8% in children under 5 years. In our study the male sex was the most represented with 56%. The sex ratio was 1.2 for males. This male predominance is reported by other studies in Africa [8, 9]. The majority of the children resided in the

commune of Ségou (77%). This can be explained by the geographical location of the hospital, which is in the centre of the town. Our study shows that farmer fathers and mothers who did not attend school were the most frequent with 72.5% and 97.5% respectively. The low level of education plays a role in the occurrence of anemia even when the information is communicated; but it is not understood in its full dimension because of the low level of education of the population in particular (mothers of children). Moreover, when the information is assimilated, the lack of financial means remains the crucial problem. In our study, most cases of anemia occurred during the winter period, with a peak in the month of October (35.12%). This could be explained by the recrudescence of certain pathologies during the rainy period such as malaria. In our study, fever was the most frequently mentioned reason with 19.3% followed by convulsions, pallor and prostration with 18.3%, 16.4, and 15.5% respectively. In 2012, in Cameroon, DANIELE K and colleagues found fever as the first reason for consultation [6]. Plasmodium falciparum malaria was the most frequent etiology (87.6%). Other pathologies were: bronchopneumonia,

malnutrition, gastroenteritis, sickle cell disease etc [7]. Malaria is a major public health problem in Mali despite the efforts of the state and its partners. Children under five years of age pay the heaviest price for this disease. It is still the number one disease and represents 42% of the reasons for seeking care in health facilities in the general population [13]. In addition, the Segou region is a rice-growing area with numerous irrigation systems and the largest dam in the country (Markala Dam). This predisposition of the region and the endemic character could explain the high frequency of this pathology. Several studies have found similar results: NGUEFACK N and colleagues found 89% malaria in anemic children in Cameroon in 2012 [14]. OUEDRAGO HZ and colleagues in Burkina found 52.6% of malaria in Pf in 2008 [15].

In our study 74% of children had severe anemia. Microcytic anemia was the most frequent with 87.6%. Several studies carried out in Pointe Noire, Dakar and Abidjan report cases of microcytic anemia [18, 7, 19]. Hypochromic anemia represented 71.5% against 28.5% of normochromic anemia [18, 7, 19]. A study carried out in Coccody, Côte d'Ivoire, found a normochromic anemia rate of 78.6% against 21.38% for hypochromic anemia [18]. [In our study, more than half of the patients presented a hypochromic microcytic anemia, i.e. 60.4%. This can be explained by the fact that the reserves built up by the child during pregnancy only provide a limited autonomy, not exceeding 6 months in full term children and 2 months in premature babies [20] and that at 1 year of age, 30% of the iron required for erythropoiesis comes from food sources [21] which are lacking or insufficient for most of our patients. Malaria was the most common cause of death in 87% of cases, and 84% of the children presented with severe anemia. The same case was reported in Cameroon in 2008 where 85% of children suffered from malaria and 81% of children had severe anemia [12]. In a study in Senegal, malaria due to *Plasmodium falciparum* had a high incidence in children less than 5 years of age, this incidence is 63.8% in Uganda, 87.2% in Ghana and 45.4% in Nigeria [7]. In our study, the majority of our patients resided in the commune of Segou (54.4%) and 88.4% of the children referred presented with severe anemia. Although transfusion involves many risks, the recourse to transfusion was 73.7%. The determinants of transfusion were the hemoglobin level and signs of clinical intolerance such as dyspnoea, tachycardia, murmur, shock etc. In Cameroon, NGUEFACK F and colleagues used transfusion in almost all cases of severe anemia (89%) [14].

In our study, the evolution was favorable in 85.4% with 2.5% of cases of abandonment, and a death rate of 11.4%. This mortality was largely related to cases of severe anemia. This death rate can be explained by the delay in diagnosis and treatment; there is also a

lack of resources. In Cameroon, DANIELE K and colleagues had 5.9% of deaths in their study [6].

CONCLUSION

Anemia has a multifactorial cause. The management of severe anemia due to severe malaria is still difficult, especially because of the lack of access to blood. A strong involvement of parents associated with integrated activities to fight against malaria, malnutrition and parasitosis will help to reverse this trend.

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REFERENCES

1. Organisation Mondiale de la Sante (OMS). (2011). Concentrations en hémoglobine permettant de diagnostiquer l'anémie et d'en évaluer la sévérité, Système d'informations nutritionnelles sur les vitamines et les minéraux. Genève organisation mondiale de la santé. VMNIS. P: 1-6.
2. Tietche, F., Njiki, D., & Tetanye, E. (1993). Facteurs épidémiologiques associés aux anémies sévères de l'enfant consultant en urgence à l'hôpital Central de Yaoundé (Cameroun). *Bull filiais doc oceac*, 26, 50-59.
3. Korenromp, E. L., Armstrong-Schellenberg, J. R., Williams, B. G., Nahlen, B. L., & Snow, R. W. (2004). Impact of malaria control on childhood anaemia in Africa—a quantitative review. *Tropical medicine & international health*, 9(10), 1050-1065.
4. Mbanya, D. N. S., Monny, L. M., Mboka, C., & Tetanye, E. (2002). Severe anemia in children aged 6 months to 5 years in a malaria endemic region: experience from a pediatric unit in Yaoundé, Cameroon. *Bull Filiais Doc OCEAC*, 35, 23-27.
5. EDSMV (Enquête démographique et de santé Mali, 2012-2013, p: 31-32.
6. Koum, D. K., Tsakeu, E. N. D., Sack, F. N., Ngalagou, P. T. M., Kamanyi, A., & Mandengue, S. H. (2014). Aspects cliniques et biologiques des anémies pédiatriques dans un hôpital de District urbain au Cameroun. *Pan African Medical Journal*, 16(1), 91.
7. EDS-C (Enquête Démographique et de santé continue Sénégal 2012-2013 rapport final), P: 78-101.

8. El Jalia, A. T. I., Sadok, G., Chiraz, B., Samira, H., Samia, C., & Amina, F. (2005). Prevalence et typologie des anémies chez les enfants de moins de 5 ans: Etude épidémiologique dans le grand tunis et le sud ouest. *Tunisie médicale*, 83(9), 511-518.
9. Aboussaleh, Y., Ahami, A. O. T., Alaoui, L., & Delisle, H. (2004). Prévalence de l'anémie chez les préadolescents scolaires dans la province de Kénitra au Maroc. *Âge*, 302(12), 98.
10. Ministère De La Santé Publique De La Tunisie. (2002). Institut national de nutrition et technologie alimentaire. Anémie en Tunisie causes et mesures d'intervention, P 4.
11. Ngnie-Teta, I., Receveur, O., & Kuate-Defo, B. (2007). Risk factors for moderate to severe anemia among children in Benin and Mali: insights from a multilevel analysis. *Food and Nutrition Bulletin*, 28(1), 76-89.
12. Djomo, J. (2009). L'anémie sévère de l'enfant à l'hôpital Saint Jean de Malte de Njombé: Aspects épidémiologiques, cliniques, étiologiques et prise en charge. Thèse Med. Yaoundé, n° 302.
13. Bangoura, A. (2013). Epidémiologie du paludisme en saison sèche à kalifabougou, cercle de Kati, mali. Thèse FMOS, Bamako, n°47, 100p.
14. Chelo, D., Dongmo, R., Guemkam, G., Koki Ndombo, P. O., Mbassi Awa, H. D., Nguefack, F., ... & Vougmo Njua, C. (2012). Fréquence des anémies sévères chez les enfants âgés de 2 mois à 15 ans au Centre Mère et Enfant de la Fondation Chantal Biya; Yaounde; Cameroun. *Pan Afr. med. j.*, 1-11.
15. Ouedraogo, H. Z., Nikiema, L., Some, I., Sakande, J., Dramaix-Wilmet, M., & Donnen, P. (2008). Home-based practices of complementary foods improvement are associated with better height-for-age Z score in 12-23 months-old children from a rural district of Burkina Faso. *African journal of food, agriculture, nutrition and development*, 8(2), 204-218.
16. Konate, D. S. (2008). Relation entre les affections parasitaires et l'anémie par carence martiale chez les femmes en âge de procréer et les enfants de moins de 5 ans dans trois zones; thèse Med, Bamako.
17. Measuredhs. (2004). Enquête Démographique et de Santé 2003- 2004 (EDS-BF III). Washington DC, ORC Macro Int, 2004.
18. Atanda, H, Bon, J, Force, B, Porte, J., & Rodier, J. (1999). Contribution à l'étude de la prévalence de l'anémie chez l'enfant en milieu tropical. *Médecine d'Afrique noire*, 45(1), 43.
19. Abissey, A., Mignonsin, D., Vilasco, B., & Bondurand, A. (1991). Apport de l'hémogramme dans la classification des anémies *Médecine d'Afrique Noire*, 38(11).
20. El-Hazmi, M. A. F., & Warsy, A. S. (1999). The pattern for common anaemia among Saudi children. *Journal of tropical pediatrics*, 45(4), 221-225.
21. Dommergues, J. P., & Bader-Meunier, B. (1989). Les anémies nutritionnelles de l'enfant. *La Revue du praticien (Paris)*, 39(24), 2117-2121.