Pattern and outcome of Anaemia in Children Managed at the Federal Medical Centre, Azare.

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Background: Anaemia remains a common presenting clinical problem in children in developing countries of the world. It is a manifestation of some diseases and it is often multifactoral in origin.

Objectives: This retrospective study was to determine the prevalence, aetiology, presentation, severity and outcome of anaemia among children admitted into the Paediatric ward of the Federal Medical Centre (FMC), Azare, Nigeria over a 5-year period.

Method: The admission records of children with anaemia over a 5-year period (1st January 2002 to 31st December 2007) were reviewed. Information extracted for the study included: age, gender, symptoms and signs at presentation, primary diagnosis (cause of anaemia), complication(s) of anaemia, PCV before and after transfusion, haemoglobin electrophoretic pattern and outcome of admission.

Results: The records of 2,766 children admitted during the period under study were analysed out of which 152 of them had anaemia due to various conditions; giving a prevalence of 5.5%. Of those with anaemia, 98 (64.5%) were males and 54 (35.5%) females; giving a M:F ratio of 1.8:1. The mean age of the children with anaemia was 4.0±0.51 years. (Range, 0.33-13 years), with 102 (67%) under 5 years of age. The main symptom at presentation was fever in 132 (86.8%) patients, while pallor was the most frequent physical sign in all the patients. Malaria was the leading cause of anaemia with asexual form of *Plasmodium falciparum* being present in 93 (61.2%) of the patients, 68 (44.7%) had sickle cell disease. Other identified causes include PEM in 13 (8.6%) sepsis in 8 (5.3%) and G-6-PD deficiency in 3 (2%). Anaemic heart failure in 52 (34.2%), altered sensorium in 34 (22.4%) and convulsion in 21 (13.8%); were the complications in the patients. Sixteen of the children with PCV less than 10% at admission, including 3 with PCV less than 5%, died giving a case fatality of 10.5%.

Conclusions: Anaemia still remains a major problem in childhood. Emphasis should be given to efforts that would prevent severe anaemia, such as prompt and appropriate treatment of malaria with artemisinin-based combination therapies and provision of good nutrition. Regional blood transfusion centres that would guaranty effective and safe blood at an affordable cost should be established.

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INTRODUCTION

Severe anaemia is defined as haemoglobin (Hb) concentration of <5g/dL or packed cell volume (PCV) of <15%.[1,,2] Anaemia is often multifactoral in origin [1,3,4] and it is one of the major presenting clinical problems worldwide, particularly in the developing countries.[5,6] A reduction in the amount of circulating haemoglobin (Hb) decreases the oxygen carrying capacity of blood. When Hb level falls below 7g/dL pallor becomes evident in the skin and mucous membranes.[6] Physiologic adjustment to anaemia include increase cardiac output, a ' shift of oxygen dissociation curve to the right ' as a result of increased concentration of 2,3- diphosphoglycerate (2,3-DPG) in red blood cells (RBCs) thereby reducing the affinity of Hb for oxygen and thus enhancing more complete transfer of oxygen to the tissues. In addition there is increased production of erythropoietin.[6] These may compensate for mild to moderate anaemia.

Although with the advent of recombinant erythropoietin in the late 1980s, it has become possible to treat anaemia without transfusion, blood transfusion still remains the standard treatment for severe anaemia and it could be life saving despite the risks of transmission related infections especially the Human Immunodeficiency virus (HIV) and Hepatitis B virus (HBV). [6] Moderate to severe anemia may present with weakness, tachypnoea, shortness of breath on exertion and tachycardia. Further reduction in the PCV is associated with decompensation and signs of anaemic heart failure like S 3 gallop rhythm, tender hepatomegaly, altered sensorium or convulsion and death; particularly in acutely developing anaemia.[6,7] This study thus aim at determining the prevalence, aetiology, presentation, severity and outcome of anaemia among children admitted into the Paediatric ward of the Federal Medical Centre (FMC), Azare, Nigeria

PATIENTS AND METHODS Approval was obtained from the ethical committee of the medical centre, following which the admission records of all children admitted with a diagnosis of anaemia into the Paediatric ward of the FMC, Azare, Nigeria over a 5-year period (1 st January 2002 to 31 st December 2007) were reviewed. Information extracted from the admission records were: age, gender, outcome of admission, symptoms and signs at presentation, presumptive diagnosis (cause of anaemia), final diagnosis, complications(s) of anaemia, PCV before and after transfusion, haemoglobin electrophoresis pattern, presence or absence of malaria parasite on blood film at admission and

outcome of admission. One hundred and thirty nine (89.5%) of the patients were transfused with packed red blood cells screened for HIV and HBV. The transfusions were either as a single 15mls/Kilogram body weight or multiple aliquots in those with very low PCV on admission. Data were analyzed using Chi-squares test and Student t-test where applicable; P value<0.05 was considered significant.

RESULTS

A total of 2,766 patients were admitted into the Paediatric ward on account of various medical conditions over the 5-year period. One hundred and fifty two had anaemia due to various morbidities, giving a prevalence of 5.5%. There were 98 (64.5%) males and 54 (35.5%) females with a M: F ratio of 1:8:1 and a significant male preponderance (P<0.05) (Table I). The mean age of the 152 children was 4.0±0.5years. (Range, 0.33-13 years), with 102 (67%) under 5 years of age. The main symptom at presentation was fever146 (86.8%), while pallor 132 (96%) was the most frequent physical sign (Fig I). Fifty one (33.6%) out of the 152 children with anaemia had pre-transfusion packed cell volume (PCV_0) ?5- 10% , 93 children (61.2%) had PCV_0 of 11-19% ,while 8 children had PCV_0 of 20-29% respectively.The post-transfusion packed cell volumes (PCV_1) was in the range of 21- 35% for 119 (85.6%) of the 139 children transfused.

Table 1: Age and gender distribution of children with anaemia

Age (years)	Gender		Total (percent)
	Male	Female	
05	70	32	102 (67)
5-9	20	18	38 (25)
10-14	8	4	12 (8)
Total	98	54	152 (100)

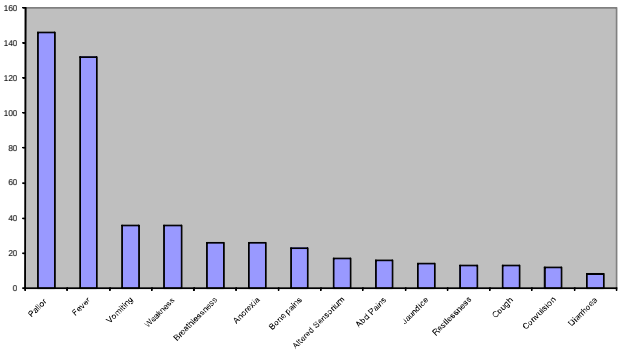

Figure 1: Symptoms & Signs in children with anaemia

Malaria was the leading cause of anaemia with asexual form of *Plasmodium falciparum* being present in 93 (61.2%) patients, 13 of these also had sickle cell anaemia. Twelve (7.9%) patients had retrospective diagnosis of severe malaria on account of their presenting with fever and having favourable response to antimalaria despite absence of malaria parasitaemia.

Haemoglobin electrophoresis pattern revealed that 64 (42.1%) patients had AA genotype, 42(27.6%) SS, 16(10.5%) AS and 10 (6.6%) AC, while the electrophoresis pattern of 20 (13.2%) children were not documented (Table II).

Other identified causes include protein energy malnutrition in 13 (8.5%), septicaemia in 8 (5.3%), suspected glucose-6-phosphate dehydrogenase (G-6-PD) deficiency in 3 (2%), megaloblastic anaemia in 2 (1.3%), while 14 (9.2%) had no specified diagnosis. Anaemic heart failure 52 (34.2%), altered sensorium 34 (22.4%) and convulsion 21 (13.8%) were the complications of severe anaemia in the patients.

One hundred and twenty three (80.9%) patients were discharged home for follow-up at the Paediatric outpatient clinic, 6 (3.9%) went home against medical advice; 4 of whom refused transfusion and 2 left after transfusion but before definite diagnosis were established. Sixteen died giving a case fatality of 10.5%. Of the 16 that died, 9 (56%) died before transfusion including the 3 with PCV less than 5% while the remaining 7 (44%) had blood transfusion before death. The 3 patients with suspected G-6-PD deficiency and 4 others with suspected leukaemia were referred to Aminu Kano University Teaching Hospital for further management (Table II).

Table 2: Haemoglobin (Hb) electrophoretic pattern and outcome among children with anaemia

(Hb) electrophoretic pattern	No (%)
AA	64 (42.1)
AS	16 (10.5)
SS	42 (27.6)
AC	10 (6.6)
Unknown	20 (13.2)
Total	152 (100)
Admission outcome	
Discharged	123 (80.9)
DAMA*	6 (3.9)
Died	16 (10.5)
Referred	7 (4.6)
Total	152 (100)

*Discharged against medical advice

DISCUSSION

The prevalence of severe anaemia of 5.5% is lower than those reported in other centers in Nigeria [6-10] where PCV of =20% was used to define severe anaemia, but compared favourably with the report of Jiya et al, [11] who noted a prevalence of 2.7%. They used PCV cut off of =15% to define severe anaemia. A significant male preponderance is observed in this study, a trend that is similar to that noted in the reports from Sokoto [11] and Ilorin.[9] Majority of the children were under 5 years of age, and this is in keeping with the age group most affected by malaria in sub-Saharan Africa (where about 80% of cases occur in children less than 5 years of age).[3,12-15] This observation is corroborated by the presence of *Plasmodium falciparum* parasitaemia in 93 (61.2%) patients in this series.

Moderate to severe anaemia contributes significantly to the morbidity and mortality in severe malaria.[16,17] .It is therefore not surprising that the leading cause of severe anaemia in this study is malaria; a finding that is similar to those reported in other series. [8-10, 18] This is followed by SCD in 42 (27.6%) patients; (20 of whom had their preadmission Hb status known). This

frequency of SCD is comparable to the 25% noted in Ilorin [9], as against the 37.8% noted in Sokoto[11] , and 14.4% in Abakaliki. [8]

Diagnosis of G-6-PD could not be confirmed in the 3 suspected cases because of non-availability of facility for enzyme assay; however the set up for haemolysis was established clinically. Fourteen (9.2%) patients had no specified diagnosis; this is also due to limitation in diagnostic facilities at our Centre.

Blood transfusion still remains the standard treatment for severe anaemia, hence most of the patients (89.5%) in this study (as well as other comparable studies [8,9]) received urgent blood transfusion, despite the attendant risks of transmission- related infections. About 81% of the patients were discharged home for follow up at the Paediatric Outpatient Clinic.The findings are comparable with those contained in earlier reports from other centres.[8] Only 6 (3.9%) went home against medical advice in contrast to the higher figure of noted in the Abakaliki [8] , Ilorin [9] and Sokoto [11] studies. This is perhap explained on the premise of the different emergency blood transfusion regimen in the various centres. All the 16 patients that died had PCV less than 10% at admission, including the 3 with PCV less than 5% that died before transfusion. It could be concluded that at such low haematocrit the ensuring metabolic derangement, the attendant cardiovascular decompensation and severe hypoxic-ischaemic-encephalopathy had become irreversible.

CONCLUSION

In conclusion, severe anaemia still remains a major problem in childhood with malaria being the leading cause in spite of government's effort with Roll Back Malaria. Blood transfusion, although a standard treatment for severe anaemia, is not without the risks of transmission-related infections and immune modulation, especially with high transfusion rate. Emphasis should be given to efforts that would prevent severe anaemia, prompt and appropriate treatment of malaria. High cost and shortages of blood products for transfusions further complicate these issues. Government should establish regional blood transfusion centre that would guaranty effective and safe blood at affordable cost.

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