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Anaemia in Critically Ill Children- A Case Study from Nigeria

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Case Study

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ABSTRACT

Background and Aim: Anaemia is a common cause of morbidity and mortality in the tropics. World Health Organization estimated that anaemia affects one-quarter of the world's population and is concentrated within preschool age children and in resource-poor countries like ours. The aim of this study was to evaluate the prevalence and severity of anaemia in critically ill children presenting at the Children Emergency Ward of the University of Port Harcourt Teaching Hospital (UPTH), Nigeria.

Materials and Methods: This was a retrospective study of anaemic children (1 month to 16 years) admitted into the Children Emergency Ward of the UPTH from January to December 2010. Medical case notes of the patients were reviewed. Information obtained included age, gender, presenting complaints, diagnosis, packed cell volume (PCV), blood transfusion and outcome. The PCV was determined by microhaemtocrit method. Data generated were analysed using SPSS for widow, version 12.0 (SPSS Inc, Chicago Illinois, USA). Descriptive statistics in the form of the frequency and percentage were used.

Results: There were a total of 1581 children admitted into the Children Emergency Ward of the UPTH during the period of study. Four hundred and twenty three were confirmed to have anaemia of varying degree giving a prevalence of 26.8%. Most 295(69.7%) of the mothers were poorly educated and live in the urban slums. There were more males 418(67.1%) than females 205(32.9%). Fever, vomiting and weakness were the main presenting features. Ninety two patients (6.3%) had mild anaemia, 102 patients (6.5%) had moderate anaemia and 229 patients (14.5%) had severe anaemia. Two hundred and twelve of the critically ill children (50.1%) were transfused on account of severe anaemia. Malaria and septicaemia were the commonest associated morbid conditions. Twenty five deaths were recorded. Severe anaemia accounted for 13(52.0%) of the total deaths.

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Conclusion: Anaemia is prevalent among Nigerian children in critical condition. Severe anemia is common and associated with increased risk of clinically relevant outcomes such as hospitalization and mortality.

Keywords: Anaemia; Critically ill children; Nigeria.

1. INTRODUCTION

Anaemia is a widespread public health problem with major consequences for human health as well as social and economic development (DeMaeyer and Adiels-Tegman, 1985; Benoist et al., 2008). Estimates of the prevalence of anaemia vary widely and accurate data are often lacking, it can be assumed that in resource-poor areas significant proportions of young children and women of childbearing age are anemic (Irwin and Kirchner, 2001). For instance, in African more than 100 million children are thought to be anaemic (Brabin et al., 2001). In severe cases it is associated with an increased risk of death (Brabin et al., 2001). The subtle nature of its presentation means, however, that mild-to-moderate degree of anaemia frequently remain undetected and untreated by health care workers (Phillips-Howard et al., 2003; Schellenberg et al., 2003).

The cause of anaemia is frequently multifactorial, Infectious diseases – in particular malaria, helminth infections and other infections such as tuberculosis and HIV/AIDS – are important factors contributing to the high prevalence of anaemia in many populations (May et al., 2000; Nussenblatt and Semba, 2002). For example, *Plasmodium falciparum* malaria-related anaemia contributes significantly to childhood mortality and thus preventing and treating anaemia in children is of major importance (Nussenblatt and Semba, 2002). Helminth infections, in particular hookworm infections and schistosomiasis, cause blood loss and thus also contribute to the etiology of anaemia (Torlesse and Hodges, 2001). HIV/AIDS is an increasing cause of anaemia and anaemia is recognized as an independent risk factor for early death among HIV/AIDS-infected individuals (Van Eijk et al., 2002). Other nutritional deficiencies besides iron, such as vitamin B12, folate and vitamin A can also cause anaemia although the magnitude of their contribution is unclear (Semba and Bloem, 2002). Furthermore, the impact of haemoglobinopathies on anaemia prevalence needs to be considered among some populations such as ours (George and Tabansi, 2010).

Only by recognizing the complexity of anaemia can effective strategies be established and progress made. Consequently, an integrated – multifactorial and multisectorial – approach is required to combat this public health problem. The aim of the study is to determine the prevalence and severity of anaemia in children admitted into the Children Emergency Ward of the University of Port Harcourt Teaching Hospital, Nigeria.

2. Materials and Methods

This was a retrospective study of anaemic children (1 month to 16 years) admitted into the Children Emergency Ward of the University of Port Harcourt Teaching Hospital, Nigeria from January to December 2010. Medical case notes of the patients were reviewed. Information obtained included age, gender, presenting complaints, diagnosis, haemoglobin levels, blood transfusion and outcome. The packed cell volume (PCV) was determined by

microhaematocrit method (Chernecky and Berger, 2001). This method was the only available means of evaluating anaemia in our hospital at the time of this review. Three different degrees of anaemia were defined as follows: mild anaemia was defined as PCV below 30%, moderate anaemia as PCV \geq 27%; severe anaemia as PCV < 21% (DeMaeyer, 1989). The main diagnosis was based on the presenting clinical features, with or without the results of laboratory tests. For instance, the diagnosis of malaria was supported by the presence of malaria parasites in the blood film. Patients with bronchopneumonia were diagnosed based either clinically or by chest radiographs or both. HIV/AIDS was based on positive Elisa test on a patient with features of the WHO clinical case definition of HIV/AIDS in Africa, which was confirmed by Western blot test. Diagnosis of malignancies were based on clinical features, ultrasound report and biopsy results. The cause of death as documented after weekly mortality reviews was considered as the final cause of death. Socio-economic status was determined by parents' level of education and place of abode.

Data generated were analysed using SPSS for widow, version 12.0 (SPSS Inc, Chicago Illinois, USA). Descriptive statistics in the form of the frequency and percentage were used.

3. RESULTS

There were a total of 1581 children admitted into the Children Emergency Ward of the UPTH during the period of study. Majority of these children 929 (58.8%) were below 5 years and fever 1243 (78.6%), stooling 438(27.7%), fast breathing 432 (27.3%) and convulsions 217(13.7%) were the main reasons for admission. Four hundred and twenty three were confirmed to have anaemia of varying degree giving a prevalence of 26.8%. Socio-demographic of the children showed that most 295(69.7%) of the mothers were poorly educated and live in the urban slums. The age distribution of the patients showed that most 239(56.5%) of the children were less than 5 years as shown in Table 1. There were more males 418(67.1%) than females 205(32.9%). The presenting features of the children are depicted in Table 2.

Table 1. Age distribution of the children with anaemia (n=423)

Age(years)	Number of children	Percentage
<5	239	56.5
5-<10	132	31.2
10-16	72	12.3

Table 2. Presenting features of the critically ill children with anaemia (n=423)

Symptoms	Frequency	Percentage
Fever	402	95.0
Vomiting	293	69.3
Weakness	167	39.5
Jaundice	142	33.6
Cough	140	33.1
Fast breathing	135	31.9
Stooling	127	30.0
Convulsion	97	22.9
Coma	80	18.9
Coke- coloured urine	23	5.4

Ninety two patients (6.3%) had mild anaemia, 102 patients (6.5%) had moderate anaemia and 229 patients (14.5%) had severe anaemia. Two hundred and twelve of the critically ill children (50.1%) were transfused on account of severe anaemia. Malaria is the predominant associated morbid conditions are as shown in table 3. A total of 78 deaths were recorded. Of these, 25 (females= 14; males= 11) deaths were found among those with anaemia where severe anaemia accounted for more than half 13(52.0%) of the deaths. Most 8(n=13) of the deaths were within 6 hours due to late presentation and delay in blood transfusion.

Table 3. Associated morbidities among the critically ill children with anaemia (n=423)

Morbidities	Frequency	Percentage
Malaria	260	61.5
Septicaemia	111	26.2
Pneumonia	62	14.7
Sickle cell anaemia	52	12.3
Malignancy	48	11.3
Retro viral disease	45	10.6
Tonsillitis	32	7.6
Diarrhoea	25	5.9
Malnutrition	24	5.7
Acute glomerulonephritis	13	3.1
G6PD deficiency	3	0.7
Osteomyelitis	2	0.5
Peptic Ulcer Disease	1	0.2

4. DISCUSSION

Anaemia is the most common haematologic abnormality in critically ill children (George and Tabansi, 2010). We found out that 28.6% of our critically ill children were affected with various grades of anaemia (6.3% being mild, 6.5% moderate and 14.5% being severe). Some studies (Soh et al., 2004; Nguyen et al., 2006; Ngnie-Teta et al., 2007) in other countries have recorded higher prevalences. For instance, in New Zealand, the prevalence of anaemia was found to be 49% among children aged 6 to 11 months and 22% among children aged 12 to 24 months (Soh et al., 2004). In Vietnam, 45.1% of the children under the age of five years were found to present anemia (Nguyen et al., 2006). In sub-Saharan African countries, prevalence of 82% in Benin and 83% in Mali were found (Ngnie-Teta et al., 2007).

Severe anaemia of 14.5% in this study is comparable with some African studies (Zucker et al., 1997; Sherry et al., 1997). The significance of blood transfusion in the management of childhood severe anemia is supported by the finding of increased fatality among untransfused children our study. However, those who died without transfusion, died within six hours of presentation. This supports the contention of Lackritz et al., (1995) that these children were very ill and their deaths may not have been prevented by blood transfusion. With the risk of transmission of the human immunodeficiency virus type-I (HIV-I), the use of blood transfusion in the management of severe pediatric anemia has become an important clinical decision problem in Africa (Obonyo et al., 1998).

Malaria is the predominant associated morbid condition leading to anaemia in our study. This is consistent with previous Nigerian study (Ernest, 2005; Muoneke et al., 2011). Malaria causes anemia through hemolysis and increased splenic clearance of infected and

uninfected red blood cells and cytokine-induced dyserythropoiesis (Ernest, 2005). A single overwhelming episode of malaria, or repeated episodes due to reinfection or failure to adequately clear parasitemia as a result of antimalarial drug resistance may result in life-threatening anemia, metabolic acidosis, and, if untreated, death (Bjorkman, 2002). Severe anemia probably accounts for more than half of all childhood deaths from malaria in Africa (Murphy and Breman, 2001), with case fatality rates in hospitals between 8% and 18% (Marsh et al., 1995).

5. CONCLUSIONS

Success in combating anemia depends on understanding its associated factors. Strategies should be built into the primary health care system and existing programmes such as maternal and child health, integrated management of childhood illness, adolescent health, roll-back malaria, deworming (including routine anthelmintic control measures) and stop-tuberculosis. Furthermore, strategies should be evidence based tailored to local conditions and take into account the specific etiology and prevalence of anaemia in a given setting and population group. Also, attention must be paid to increasing awareness and knowledge among health care providers and the general public concerning the health risks associated with anaemia. Also needed is an operational surveillance system with reliable, affordable and user-friendly methods for assessing and monitoring anaemia prevalence and the effectiveness of interventions.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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