The Consequences of Malaria Infection in Pregnant Women and their Infants

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Preliminary results are presented from this study which indicate that 84.8% of pregnant women present at first antenatal visit with anemia (Hb 11g/dl) an 8.7% of their infants (n = 230) have a hemoglobin at birth below 14g/dl. There is an association between pregnancy anemia and malaria. A case control study in pregnant women and an infant cohort study to 18 months of age, are employed to study the cause and effects of anemia and malaria on women and their infants health.

Key words: malaria - pregnancy - anemia - epidemiology

Malaria is one of major causes of anemia, especially in pregnancy (Brabin 1991). The study population lives in an area endemic for malaria in the Lower Shire Valley in Malawi, Central Africa. In this area nutritional deficiencies, HIV schistosomiasis and hemoglobinopathies are also considered as important contributors of anemia.

Anemia during pregnancy can cause low birth weight and low birth hemoglobin. This consequently may lead to increased morbidity for the infant.

The main questions in our study is to quantify the contribution of maternal anemia on birthweight and birth hemoglobin and to investigate whether birth hemoglobin relates to clinical risk in infancy. Other investigations will include the assessment of the impact of malnutrition, of hemoglobinopathies and of HIV, infection as factors contributing to anemia.

STUDY DESIGN AND METHODS

The study design has been reported previously (Brabin et. al. 1992) and is outlined in Fig 1. After informed consent pregnant woman and after delivery their infants are recruited into the study. Every low birthweight baby is entered in the study with a control (same week, same hospital). Every baby with a peripheral blood Hb value below 14g/dl (i.e. not cord Hb value) is also recruited. Routine procedures include the completion of questionnaires and collection of blood samples for malaria smears and hematological analyses. Questionnaires haven been designed to collect important information on parity, gestation, anthropometric measurements, age, social status, medical history, and drug intake during pregnancy.

Among the laboratory investigations, malaria is screened microscopically on Giemsa stained thick and thin films, hemoblogin concentration is determined by the cyanmethahemoglobin method while a hematocrit is done using the micro-hematocrit centrifuge. Measurements of free erythrocyte protoporphrin (FEP), serum iron and iron binding capacity are used to screen for iron deficiency anemia. Mean corpuscular volume and red cells counts using the Coulter counter are measured on cord blood samples in order to screen for alpha-thalassemia. In addition thin blood films are examined for morphological abnormalities (e.g. microcytosis and hypochromia) in order to detect iron-deficiency anemia and hemoglobinopathies. A double ELISA technique is used to screen for HIV.

Additional laboratory methods are planned which are aimed at improving the diagnostic accuracy of malaria and alpha-thalassemia. Flow cytometric detection of malaria parasites has been proved to be accurate (Vianen van et al. 1993) and this method will be evaluated as an alternative to

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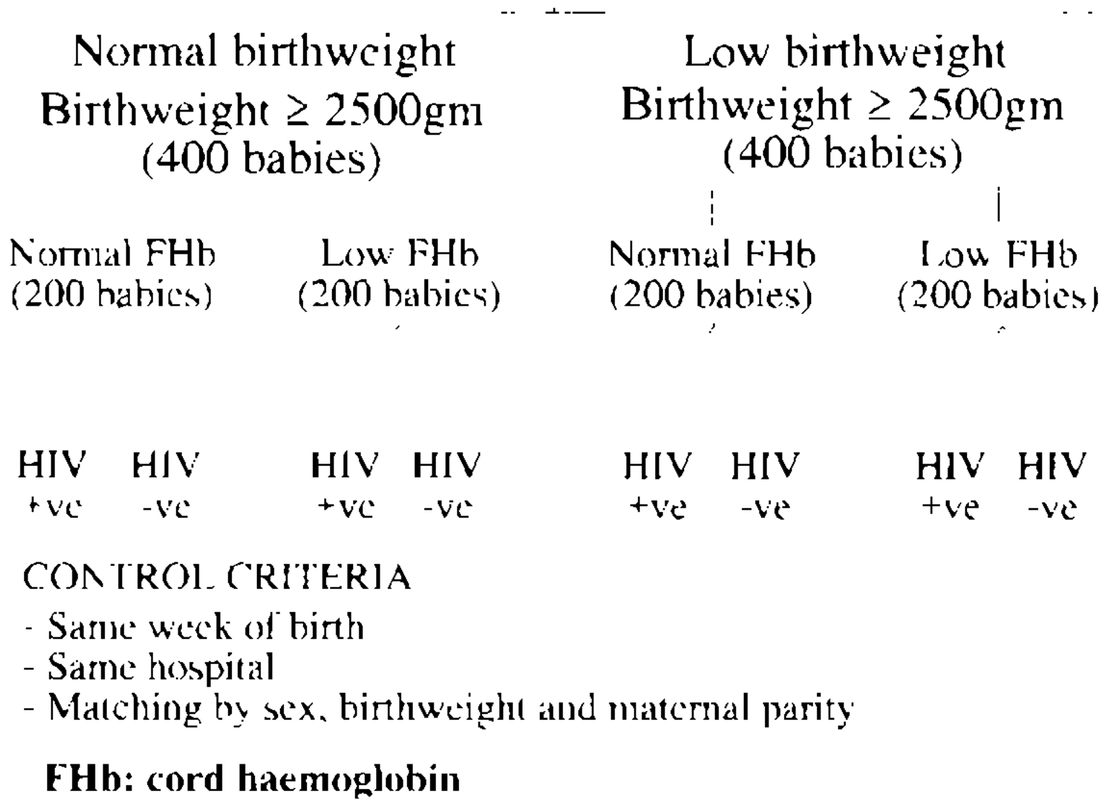

Fig. 1: study design.

microscopy. The polymerase chain reaction (PCR) technique is also to be introduce for detection of alpha-thalassemia which may be missed by other methods above.

PRELIMINARIE RESULTS

At the first visit of pregnant women to the antenatal clinic mean gestational age, assessed by palpation of uterine size, is 22.3 weeks (SD 5.0 n = 1604). Mean hemoglobin is 9.2 g/dl (SD 2.0 n = 1595) with 23.2% severely anemic (Hb 8g/dl). 84.8% of pregnant women were anemic by WHO criteria (Hb 11g/dl).

Many infants were born anemic: 91 out of 190 (47.9%) had a cord hemoglobin below 14 g/dl which is at the lower limit for cord hemoglobin values for healthy european populations (Fig. 2). Malaria

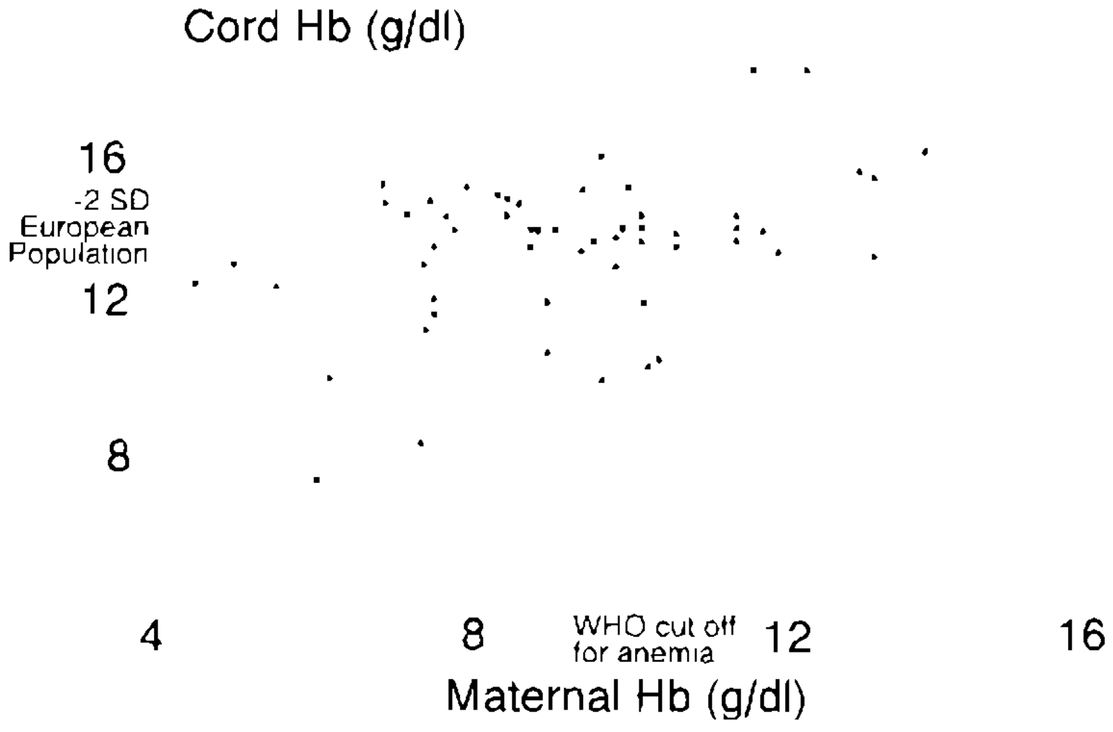

Fig. 2: correlation of cord and maternal hemoglobin values.

prevalence at first antenatal visit in the first six months of the study was 17.6% (n=1010) (Fig. 3) 10.4% of deliveries are preterm (% weeks).

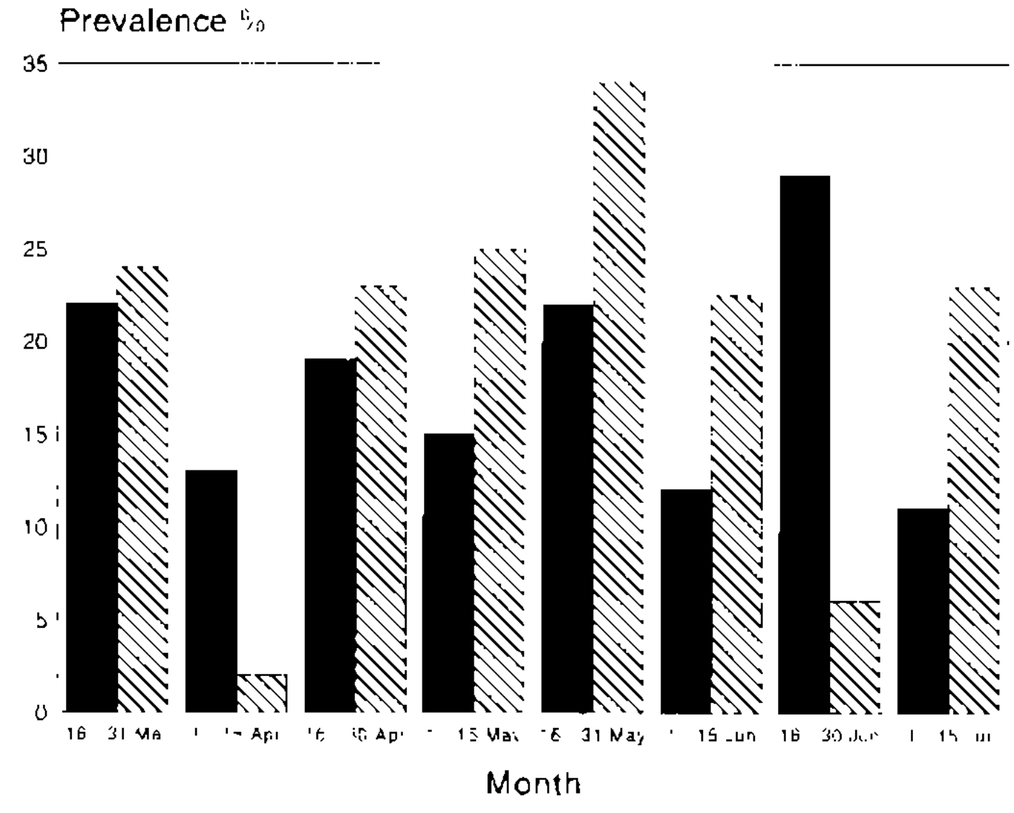

Fig. 3: prevalence of severe anemia and malaria at first visit..

DISCUSSION

Our preliminary findings indicate that a suitable population for studying malaria-associated anaemia has been identified. Malnutrition, HIV infection and possible hemoglobinopathies are common in the study area. The study design should enable us to determine how these conditions affect maternal, foetal and infant anemia and how this anemia relates to maternal and infant malaria.

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