

Elevated levels of methaemoglobin in Tanzanian children with severe and uncomplicated malaria

[Nicholas M. Anstey](#), [Mushtaq Y. Hassanali](#), [Juliana Mlalasi](#), [Denis Manyenga](#), [Esther D. Mwaikambo](#)

Transactions of The Royal Society of Tropical Medicine and Hygiene, Volume 90, Issue 2, March 1996, Pages 147–151, [https://doi.org/10.1016/S0035-9203\(96\)90118-2](https://doi.org/10.1016/S0035-9203(96)90118-2)

Abstract

Elevated levels of methaemoglobin, the ferric form of haemoglobin incapable of oxygen transport, have been previously found during *Plasmodium vivax* infections and in acidotic infants. We measured methaemoglobin in the following 5 groups of children with *P. falciparum* malaria admitted to Muhimbili Medical Centre, Dar es Salaam, Tanzania, (i) Cerebral malaria (CM) with unrousable coma ($n = 50$), including 32 with complete recovery (CMCR) and 18 with death or neurological sequelae (CMDS); (ii) malaria with severe anaemia but without severe respiratory distress (SA; $n = 6$); (iii) uncomplicated malaria (UM; $n = 37$); (iv) asymptomatic parasitaemia (AP; $n = 5$); and (v) healthy controls (HC; $n = 34$). Mean methaemoglobin levels were elevated in all groups with malaria, forming up to 16.4% of circulating haemoglobin. The degree of methaemoglobinaemia correlated with disease severity and severity of anaemia. Mean methaemoglobin levels in children with AP, UM, SA, CMCR and CMDS were 3.3%, 4.1%, 5.6%, 4.7% and 5.8% respectively; the mean levels in those with clinical disease were significantly higher than those in healthy controls (2.0%). Methaemoglobinaemia >10% was found in 5.4%, 16.7%, 12.5% and 22.2% of those with UM, SA, CMCR and CMDS, respectively. In the presence of parasite sequestration, impaired tissue perfusion, and a reduction in oxygen carrying capacity of blood due to anaemia, a further reduction in oxygen carrying capacity from even a modest concentration of methaemoglobin is likely to exacerbate tissue hypoxia, perhaps critically so in a minority of anaemic and acidotic patients with severe falciparum malaria.

Keyword: [Malaria](#), [Plasmodium falciparum](#), [Methaemoglobinaemia](#)

