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Recrudescent *Plasmodium falciparum* infections in children in an endemic area following artemisinin–based combination treatments: Implications for disease control

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Abstract

Objective

To evaluate the features and risk factors associated with recrudescence of primary *Plasmodium falciparum* infections that arose following artemisinin-based combination drug treatment of the primary infections.

Methods

The clinical features and risk factors associated with subsequent recrudescence of primary *Plasmodium falciparum* infections were evaluated in 37 of 877 children following artesunate or artemisinin-based combination treatments (ACTs). Recrudescence was determined by polymerase chain reaction.

Results

Compared to children with sensitive infections, children with recrudescence had significantly higher gametocytaemia and proportion with parasitaemia $>50\,000/\mu\text{L}$. Compared with primary infections, recrudescence was accompanied by significantly fewer symptoms, lower body temperatures and asexual parasitaemias. In age- and gender-matched children with and without recrudescence, declines in parasitaemias following treatment were monoexponential but elimination

half-life of parasitaemia was significantly longer in children with recrudescence. In a multiple regression model, at enrolment, 3 factors were independent risk factors for subsequent recrudescence of primary infections: parasitaemia $\geq 50\,000/\mu\text{L}$ [adjusted odds ratio (AOR)=2.63, 95% confidence interval (CI): 1.17-5.90, $P=0.018$], parasite clearance time ≥ 2 days (AOR=2.47, 95% CI: 1.24-4.90, $P=0.04$) and treatment with artesunate compared with ACTs (AOR=2.35, 95% CI: 1.08-5.12, $P=0.03$).

Conclusions

Recrudescence infections following artesunate or ACTs differ significantly from the primary infections from which they arose and have implications for malaria control efforts in Sub-Saharan Africa where ACTs are now first-line treatments.

Keywords

- Malaria;
- Recrudescence;
- Children;
- Risk factors;
- Nigeria; o

- *Plasmodium falciparum*;
- Artesunate;
- ACTs;
- Parasitaemia;
- Parasite

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