

Impact of Noncommunicable Diseases on Severity of *Plasmodium falciparum* Malaria

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Background

Noncommunicable diseases and obesity increase globally, also in populations at risk of malaria. We aimed to investigate if comorbidities affect the severity of malaria as well as potential pathogenesis.

Methods

We performed an observational study in adults diagnosed with *Plasmodium falciparum* malaria in Sweden 1995-2015. Cases were identified through the surveillance database at the Public Health Agency of Sweden and clinical data reviewed retrospectively. Multivariable logistic regression assessed associations between comorbidities and severe malaria. We thereafter collected blood from non-infected type 1 and type 2 diabetics and healthy controls and compared *P. falciparum* growth and rosetting rate *ex vivo*.

Results

Among 937 adults (median age 37 years; 67% male, 58% Sub-Saharan Africa origin), patients with severe malaria had higher prevalence of chronic diseases (30%) compared to non-severe cases (18%) ($P=0.004$). In multivariable analysis, diabetes and obesity (Body Mass Index ≥ 30) were independently associated with severe malaria (adjOR 2.98, 95% CI 1.25-7.09 and adjOR 5.58, 95% CI 2.03-15.36, respectively).

Subsequently, *P. falciparum* parasites were cultured in blood from 25 diabetics and 25 healthy controls (mean age 43, 38% male). Preliminary results indicate that blood-glucose and triglyceride levels correlate with parasite growth, and that erythrocytes from type 2 diabetics are more prone to form rosettes.

Conclusions

Obesity and diabetes are risk factors for severe malaria in adults. Properties of the erythrocytes in diabetics as well as nutrient levels in serum appear to contribute to the pathogenesis. The findings are important in a global health as well as travel medicine perspective.