A Family with Glucose-6-Phosphate Dehydrogenase deficiency Chatam mutation and malaria infection: A case report

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Abstract

Deficiency of glucose-6-phosphate dehydrogenase (G6PD) enzyme is the most common enzymopathy worldwide. Epidemiological and in vitro studies showed individuals with this deficiency have selection advantage during Plasmodium falciparum infection. In this report, the G6PD deficient gene was analysed in a Malay family with malaria infection to investigate its possible effect and its association with malaria infection and haemolysis. We report a Malay family with malaria infection with G6PD deficiency with the G6PD Chatham mutation. A 23-year old Malay man was admitted to our hospital for malaria infection with severe haemolysis. Screening for G6PD was done using fluorescent Beutler and Mitchell modified technique. Enzyme activity was measured using Sigma kit. Mutation screening by multiplex PCR using multiple tandem primers (MPTP) to screen for mutations in the G6PD gene and direct sequencing using PE ABI Prism was performed. Subsequently his three other younger brothers were also admitted for malaria infection at our hospital and investigations were done as with the proband. On analysis for G6PD deficiency, the four brothers were G6PD deficient on screening and molecular basis by PCR-based methods showed they have G6PD Chatham mutation. The brothers were infected with two types of malaria species P. falciparum and Plasmodium vivax (P.vivax) with varied clinical manifestations. The mother of the siblings was also investigated, and she is a female heterozygote for G6PD Chatham. Although some studies have demonstrated a protective effect of all G6PD-deficient genotypes, a large study concluded that protection only occurred in heterozygous females while others failed to find any protection from P. falciparum among young G6PD-deficient boys who were in fact more commonly infected with P. vivax than non-deficient individuals. It seems that the protection of G6PD deficiency against malaria is relative rather than absolute since having G6PD in the mother is protective whereas the second son is not. In summary, we have shown that the affected subjects had varied clinical manifestations in terms of severity of malaria infection and species of the malaria parasite even though at the molecular level, they have the same G6PD Chatham mutation.

Keywords: Glucose-6-Phosphate Dehydrogenase deficiency, Chatam mutation, malaria infection

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