Chloroquine-resistant *Plasmodium vivax* in Pakistan: an emerging threat

Pakistan has a population of 194 million people, of which approximately 182 million live in malaria-endemic regions. In Pakistan there are 500,000 new cases of malaria and 50,000 deaths caused by malaria each year. *Plasmodium vivax* is the culprit in 88% of malaria admissions, although *Plasmodium falciparum* often takes the spotlight, given its more severe course. Chloroquine has long been the drug offered to patients with unconfirmed malaria and those diagnosed with *P vivax* infection. Given the rise of drug resistance in many infectious agents due to poorly regulated drug use, it is no surprise that resistance has occurred in the organism that so frequently infects us. The time has come to recognise the threat of chloroquine-resistant *P vivax* in Pakistan, an entity that has been largely ignored.

Data on chloroquine resistance from Pakistan is scarce, even in the most recent global analysis. Nevertheless, in 2013, the emergence of the F1076L mutant of the *pmdr1* gene—the mutation responsible for chloroquine resistance—in *P vivax* in Pakistan highlights the imminent threat of resistant *Plasmodium*. In 2015, the first case of resistance was identified in a pregnant woman, and it was cured after switching to a combination of artemether and lumefantrine.

Implementation of the Roll Back Malaria initiative by Pakistan’s Directorate of Malaria Control is the latest government attempt to eradicate malaria. It includes key elements of malaria control and prevention, but there is no mention of facilitating research on the *Plasmodium* gene polymorphisms in our population. We have reached an age of resistance, in which monotherapies and simple prevention are insufficient to combat the new generation of genetically diverse microorganisms armed with mutations that we have not prepared for. Our national malaria policy addresses chloroquine-resistant *P falciparum*, first identified 30 years ago, but has no mention of resistant *P vivax* or management guidelines for resistant *P vivax* infections. Given the bleak future in the presence of a malaria parasite that is resistant to the most common drug, relevant government-funded research is necessary to understand the burden of resistant malaria in Pakistan, and old guidelines have to be revised before an epidemic takes control.

We declare no competing interests.

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