Editorial

Microbiology Section

An Overview of Malaria Burden in India and Road-Blocks in Its Control

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ABSTRACT

Malaria continues to be a major public health problem with India alone contributing about 70% of the 2.5 million reported cases in South East Asia. *P. vivax* is a predominant parasite species in the country; however, malaria control programs have been neglecting the species and have garnered all efforts against *P. falciparum*. The parasite resistance to insecticide and antimalarial drugs is growing and the alarming reports of emergence of multi-drug resistance poses a real threat to the impact of most of the malaria control programmes. Intensive monitoring of drug resistance along with the strategies to reduce its future emergence and spread is imperative, especially as there appears to be no near-future promise of antimalarial vaccines being available for clinical use.

Key Words: Malaria, India, Antimalarial drug resistance

Malaria continues to be a major public health problem, afflicting 36% of the world population in 107 tropical and sub-tropical countries. India alone contributes about 70% of the 2.5 million reported cases in the South East Asia [1]. More than two-third of Indian population lives in malaria zones [2], with largest proportion of cases contributed from the states of Orissa, Jharkhand, West Bengal, North Eastern States, Chhattisgarh, and Madhya Pradesh and most of the malaria attributable mortality is reported from Orissa and other forested areas occupied by ethnic tribes in the country [3]. Overall, out of 4.2 million disability adjusted life years lost due to vector borne diseases, malaria alone accounts for estimated 1.85 million years loss per annum in India [3, 4]. The vulnerable groups that have greatest risk of deaths due to malaria are children under five years of age, pregnant women and non-immunes. Although malaria control programmes have been in place for decades, the scale of the true effect of malaria burden in India have been frequently underestimated to be able to establish reliable baselines against which to evaluate the success of control measures. A recent analysis indicates there is a 68% to 98% gap between India's reported malaria cases and the actual incidence of malaria [3] which is primarily due to reporting factors according to WHO report [5]. Gupta et al have also recently reported that many malaria cases treated at private facilities are not included in the official statistics and thereby underestimate the malaria patterns [6].

Malaria transmission dynamics is highly affected by socio-economic and environmental factors. Of the six primary malaria vectors, An. stephensi is responsible for malaria in urban and industrial areas while An. culicifacies is the vector of rural and peri-urban malaria in peninsular India. *An. culicifacies* complex is responsible for 60-70% malaria cases occurring annually in India [7]. Insecticide Vector control in India is primarily based on indoor residual spraying (IRS) of insecticides in rural areas and anti larval operations in urban areas. The emergence of vector resistance to widely used insecticides and parasite resistance to first-line drugs have resulted in a rise in malaria incidence in many endemic areas, resulting in the need to resort to more costly chemotherapeutic agents with greater toxicity [8].

Unlike Sub-Sahara Africa, *Plasmodium vivax* malaria accounts for 50% of total malaria cases. Although vivax malaria is perceived as a benign disease but recent reports indicate increasing incidence of severe disease [9] and chloroquine therapy failures associated with *P. vivax* [10] and economic loss due to the disease is enormous. More people worldwide live at risk from *P. vivax* than *P. falciparum* [11]. *P. vivax* control may become even more difficult in coming years as there is increasing prevalence of clinically defined chloroquine-resistant *P. vivax* [12]. Malaria control programs are majorly focused on elimination of *P. falciparum*, most likely due to greater mortality rates associated with it, and vivax malaria has been neglected even though *P. vivax* is a predominant parasite species in the country [13].

The recent analysis of patterns in falciparum and vivax malaria among patients in a private comprehensive-care, multi-specialty hospital in New Delhi showed that *P. falciparum* was the dominant cause of cases requiring treatment in the facility on an overall basis and a seasonal variation exists between the *Plasmodium* species causing malaria. The proportion of *P. falciparum* malaria cases tends to be greatest during the post-monsoon season, while *P. vivax* malaria cases are largest in the monsoon season [6].

Emergence of multi-drug resistance in the vector is a major cause for concern. Increasing drug resistance in *P. falciparum* is a possible cause for the continued rise in proportion *of P. falciparum* to nearly 50% in recent years in India [14]. Chloroquine is mainstay of treatment of vivax malaria and for *P. falciparum* in low risk and chloroquine sensitive areas. However, the drug is not gametocytocidal for *P. falciparum* and thus cannot block transmission and cannot prevent relapses in *P. vivax*. Quinine is reserved for complicated malaria as well as during pregnancy and only sporadic reports of its resistance are available from Southeast Asia [15]. Resistance to all classes of antimalarials has emerged and there is at present no alternative therapy available. In the present scenario, Artemesinin

derivatives provide the most rapid therapeutic response among all anti-malarials. ACT, combination of artesunate-sulphadoxine pyrimethamine, has been therefore introduced in high burden states for treatment of *P. falciparum* to allow both rapid parasite clearance and reduce selection pressure. However, alarming clinical observations of failure of ACT for falciparum malaria have been reported from Thai-Cambodian border [16].

In conclusion, anti-malarial drug resistance poses a real threat to the impact of most of the malaria control programmes. Intensive monitoring of drug resistance along with the strategies to reduce its future emergence and spread is imperative especially as there appears to be no near-future promise of anti-malarial vaccines being available for clinical use.

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