

## Classification of Malaria

### DRUG RESISTANT MALARIA

- Literally speaking, drug resistant malaria means malaria caused by a plasmodium resistant to usual antimalarial drugs.
- Although chloroquine resistant strains of *P. vivax* have been described, drug resistance poses a serious clinical problem only with *P. falciparum*, which accounts for over 70% of cases and much of the mortality of human malaria.

### Global Scenario of Drug Resistant Malaria

#### *P. falciparum* resistance

- Chloroquine resistant strains of *P. falciparum* are found now in nearly all areas of chloroquine use including South America, Central America east of the Panama Canal, the Western Pacific, East Asia and many regions of Africa south of the Sahara.
- Resistance to the combination of pyrimethamine and sulfadoxine is prevalent in some areas of Southeast Asia, the Amazon Basin of South America and many foci in sub-Saharan Africa.
- Variable degrees of decreased responsiveness to quinine and quinidine have been reported, though rarely, in Southeast Asia and Oceania and apparently in sub-Saharan Africa

#### *P. vivax* resistance

- Recent reports from Indonesia (Irian Jaya, Sumatra) and Papua New Guinea indicate high levels of *P. vivax* schizonts resistant to chloroquine. Decreased susceptibility may also be appearing in the Solomon Islands, Myanmar, Brazil, Colombia.
- Resistance of *P. vivax* blood schizonts to pyrimethamine and sulfadoxine has been reported in many areas of the world, particularly Southeast Asia.

#### *P. ovale* and *P. malariae* resistance

- *P. ovale* and *P. malariae* forms have not shown resistance to chloroquine

### Indian Scenario of Drug Resistant Malaria

- Of the two plasmodia which cause malaria in India, incidence of drug resistance is more common with *P. falciparum*.
- Occasionally, *P. vivax* may also be drug resistant and this occurs specially as a result of improper treatment and inadequate dosage.
- Originally, both the Plasmodia - *vivax* and *falciparum* - were sensitive to chloroquine, but, in recent years, more and more *P. falciparum* are developing resistance against chloroquine.
- To overcome this problem of chloroquine resistance, Sulfadoxine + Pyrimethamine combination was used. But, very soon, some strains of *falciparum* developed resistance to this combination also.
- *P. falciparum* resistant to traditional drugs like Quinine have also been reported.
- Incidence in India will be difficult to know because in many cases it may not be recorded.
- In India, the first confirmed report of chloroquine resistance in *P. falciparum* was reported in Diphu area of Karbianglong district of Assam in 1973.
- A study carried out by the Clinical Pharmacological and Research Services Unit, in KEM hospital in Mumbai, confirmed the existence of chloroquine resistance in *P. falciparum* cases in Mumbai, incidence being 5% to full dose chloroquine.
- Resurgence of *P. falciparum* resistant to chloroquine has been noticed in several regions of India. Earlier reports indicated chloroquine resistance to *P. falciparum* in North Eastern parts of the country with new foci of drug resistance being added.

**However for all practical purposes, drug resistant malaria in the Indian**

**context means malaria caused by strains of *P. falciparum* which are resistant to chloroquine.**

### **Types of Drug Resistance**

- In defining criteria for resistance to the aminoquinoline antimalarial drugs, the WHO has described three grades of resistance following treatment
- (Low grade) R1 : Recrudescence of infection between 7 and 28 days of completing treatment following initial resolution of symptoms and parasite clearance.
- (High grade) R2 : Reduction of parasitaemia by > 75% at 48 hours but failure to clear parasites within 7 days.
- R3 : Parasitaemia does not fall by >75% within 48 hours.

### **Causes of Drug Resistance**

- Resistance occurs most commonly due to improper treatment and inadequate dosage of antimalarial.
- The possible mechanisms of development of resistance are as follows:
  - i. Parasite does not allow the entry of drug.
  - ii. After entry of drug, the malarial parasite does not retain it and throws it out.
  - iii. May be a combination of both.

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