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# Ayurvedic perspective with therapeutic role of classical medicines in malaria

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**Abstract**
The Malaria is caused by *Plasmodium falciparum, P. vivax, P.ovale* and *P. malariae*. It is transmitted by the bite of female anopheline mosquitoes. The prevalence occur throughout the tropics and subtropics below 1500 metres. As per WHO reported in 2024, more than 282 million cases of reported worldwide, which is increase of 9 million from previous year, 2023. In Ayurveda, Concept of *Jwara* is different what is known in modern medicine, raised body temperature. In *Chraka samhita* it is mentioned that *Santap* of *Deha* (body), *Indriya* (sense organs) and *Mana* (mind) is called as *Jwara*. It is condition in which body, sense organs and mind suffer because of raised body temperature. In Ancient science *Ayurveda* on the basis of similarities in sign and symptoms malaria correlated with *Vishama Jawara*, which indicates irregular fever. Malaria incubation period varies as per Malarial Parasite, from 8-25 days in all four Plasmodium. Symptoms developed in Malaria like malaise, vomiting, headache which often mistaken for influenza. Cough with mild diarrhoea are also common. Jaundice is also common due to haemolysis and hepatic dysfunction. In Ayurveda there are medicines which are know to be used against Plasmodium. This study is an attempt to review etiology, distribution, malarial cell cycle, Ayurvedic interpretation, clinical features, treatment along with ayurvedic medicine review.

**Keywords:** Vishama jwara, plasmodium, female anopheline, malaria

## Introduction
Malaria is deadly infectious disease specially prevalent in the part of Africa and India. Every year at around 250 million cases recorded with one million deaths. As per World Malaria Report which came in 2015 [1], Indicated 70% total malaria cases recorded in South East Asia region with 80% of total P. vivax cases reported in America, India and Africa. In India 46% of the total cases who are at risk of developing malaria found [2]. Malaria is found to be endemic which covers 44 million km, contributes one third of earth land [3]. Malaria is caused by Plasmodium genus, Plasmodium Vivax is known to be the leading among all four plasmodium to potentially affect large number of people.

## Distribution of Malaria Globally [4]
As per WHO, in 2024, around 282 million cases of malaria reported along, with 610000 deaths in around 80 countries throughout the world [4]. It is reported by WHO, in 2024 that 95% cases of malaria around 265 million along with 95%, which is 579000 deaths alone reported in the African Region. 75% of all malaria induced deaths were happened in under 5 years of age children [4]. Distribute of malaria depicted in Fig.1.

**Fig 1:** Distribution of Malaria (Courtesy- Davidson's Principles & Practice of Medicine, 20th edition, Page no-344)

**Distribution of Malaria in India**

As per recent WHO data, In India 50% of total malaria cases of South east asia region found, 2 million of malaria cases found in 2023 [5]. But over the past 2 decades, there have been seen decrease in annual malaria cases in India. Significant malaria Malaria cases are noted in the states of Orrisa, Jharkhand, Chhattisgarh, Madhya Pardesh along with Rajasthan, Karanataka, delhi etc. In India highest number of deaths in malaria reported in Orrisa [6] becuase of rainfall throughout the year creating favourable environment for malaria.

**Malarial Parasities Life Cycle [7]**

Female anophaline mosquito becomes infected when it feeds on human blood conatining gametocytes, the sexual forms of the malarial parasite development in the mosquito takes from 7-20 days. Sporozoites inoculated by an infected mosquito dispappear from human blood within half an hour and enter the liver, after some days merozoites, leave the liver and invade red blood cells, where further asexual cycles of multiplication take place, producing schizonts. Rupture of the schizont releases more merozoites into the blood and causes fever, the periodicity of which depends on the species of parasite.

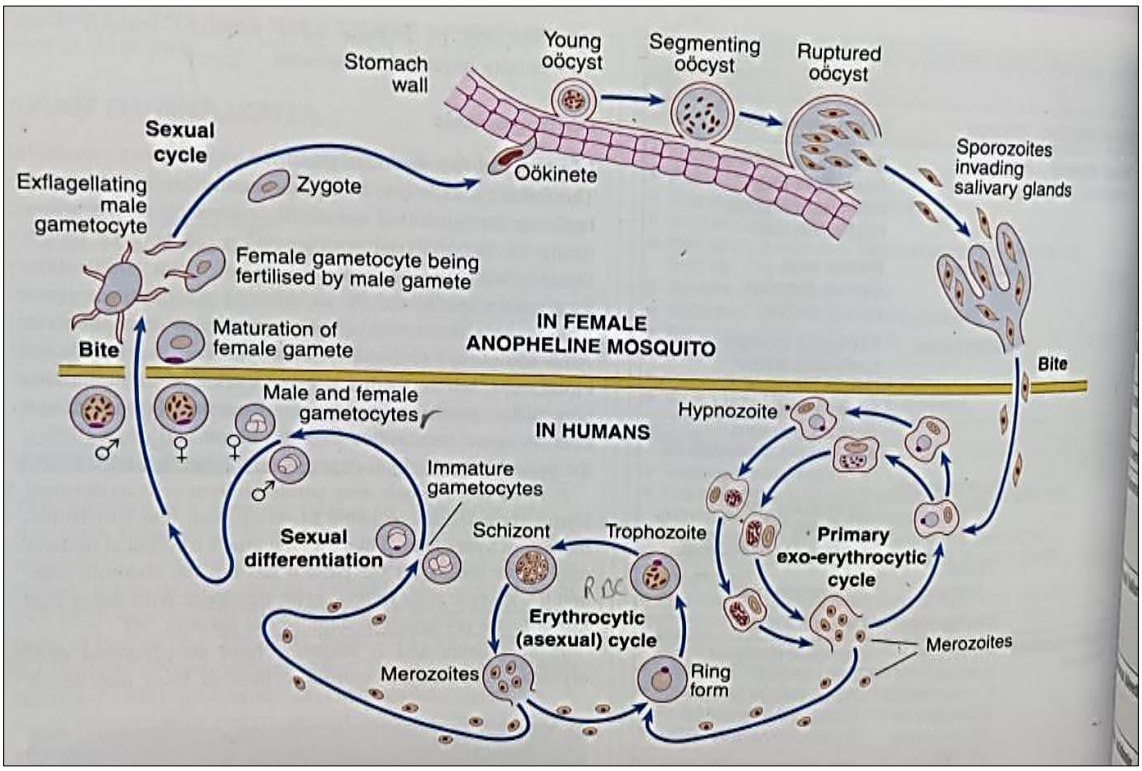


**Fig 2:** Malarial Parasities : Life cycle (Courtesy- Davidson's Principles & Practice of Medicine, 20th edition, Page no-344)

P. vivax and P. ovale may persist may persist in liver cells as dormant forms, hypnozoites, capabale of developing into merozoites month or years later. Thus the first attack of clinical malaria may occur long after the patient has left the endemic after, and the disease may relapse after treatment with drugs that kill only the erythrocyte atage of the parasite.

P.falciparum and P. malariae have no persistent exo-erythrocyte phase but recrudenscences of fever may may result from multiplication of parasites, in the red cells which have not been eliminated by treatment and immune processes (Table1.)

**Table 1:** Relationship between life cylcle of Parasite andc clinical feactures of malaria (7)

| Features | P.Falciparum | P.vivax, P.ovale | P. malariae |
|---|---|---|---|
| Pre-patent period (minimum incubation) | 8-25 days | 8-25 days | 15-30 days |
| Periodicity of fever | Aperiodic | Quartan | Quartan |
| Exo-erythrocytic cylce | Pre-erythrocytic only | Persistent as hypnozoites | Pre-erythrocytic only |
| Asexual cycle | <48 hrs | 48 hrs | 72 hrs |
| Delayed onset | Rare | Common | Rare |
| Relapses | Recrudescence utpo 1 year | Common upto 2 years | Recurdescence upto 1 year |

**Investigations [7, 8]**

For the diagnosis of malaria laboratory investigation like microscopic examination of thick & thin blood smears is reliable to confirm the malaria. In the thick film erythrocytes are lysed, releasing all blood stages of the parasite. This, as well as the fact that more blood is used in thick films, facilitates the diagnosis of low level parasitaemias. A thin film is essential to confirm to identify the species of parasite, in *P. falciparum* infections. PCR is also proved to be the reliable tool for confirmation of malaria. There are some other antigen dtection tests like dipstick is also used for the confirmation of Malaria (4).

**Ayurvedic Interpretation of Malaria**

On the basis of similarties of symptoms malaria can be correlated with *Vishama jwara* and its description found in almost all ayurvedic texts. *Jwara* is known to be caused due to anger of *Rudra* as per Hindy mythology, Rudra is known as god of Destruction [9]. As its name suggests *Vishama Jwara* is manifested as irregular onset (Visama arambha), *Visama kala* (irregular period) of *Jwara* [10]. In *Sushruta Samhita* etiology of *Vishama jwara* is *Agantuka karana* and *Parahetu* (external factors), which is called by *Dalhana* as *Bhutabhisanga* [11]. Which can be corrrelated with malarial parasite. In Upanishad *Atharva veda, Vishama Jwara* is mentioned as *Takman*. It is described that *Jwara* characterised by *Dahana* and *Shoshana* [12]. *Acharya Charaka* has mentioned *Vishama jwara* as *Tridoshaja vyadhi* whereas *Sushruta* mentioned it as *Vata* predominant *Tridoshaja Vyadhi* he also considered *Agantuka hetu* (external factors) as the etiology of *Vishama Jwara* [13]. In Harita samhita 5 types of *Vishama Jwara* are mentioned as *Vataja, Ekaikaja Jwara, Dwaheika Jwara, Triahika Jwara, Chaturthak jwara*. *Madhavkara* explained role of *Bhuta* in *Vishama Jwara* [14].

**Dengue Management by Allopathic Medicines [15]**

P. falciparum is now resistant to chloroquinine almost worldwide. So quinine is drug of choice. Quinine 600 mg (10 mg/kg) 8 hourly by month. If quinine toxicity developed, regimen should be followed by single dose of sulfadoxine 1.5 g combined with pyrimethamine 75 mg.

**Prevention [15]**

Every person going to malarious area should receive anti-malaria advice. This comprises avoiding bites and taking appropriated chemoprophylaxis.

**Avoiding Mosquito Bites**

Long sleeves and trousers should be worn outside the house, especially at night when the anopheline mosquitoes bite. Repellant creams and sprays can be used. Screened windows, the use of a mosquito net and burning repellant coils or tablets also reduce the risk. Impregnation of bed nets with permethrin also reduces mosqquito biting.

**Malaria Control in Endemic Areas**

There are major initiatives under way to reduce malaria in endemic areas. The provision of permethrin impregneted bed nets has been shown to reduce mortality in African children. The WHO now has a 'Roll back malaria' programme. New Combination drug such as artemether-Lumafatrine and pyronaridine are being assests in trials. In developing new drugs known targets can be better exploited by new 4-aminoquinolones.

**Ayurvedic Herbs Used in the Treatment of Dengue Fever**

As malaria is proved to be fatal disease and major reason of mortality in African countries, Many anti-malarial herbs identified are undergoing pre-clinical researches like *Azadirachta indica* [16, 17, 18], *Argemone mexicana* [19, 20] *Asparagus africanus* [21], *Gossypium* [22] etc. Herbs which have shown anti-malarial properties are depicted in Table.2

**Table 2:** Herbs Showing Anti-malarial properties

| Botanical name | Family | Parts used | Mode of Administration | Route |
|---|---|---|---|---|
| *Alstonia scholaris (L.) (Saptaparni)* | *Apocyanaceae* | Stem bark | Decoction | Oral [25] |
| *Andrographis paniculata (Burm.f.) Wall. ex Nees (Kalmegh)* | *Acanthaceae* | Leaves, Roots, Whole plant | Decoction, Powder, | Oral [23, 24, 25] |
| *Azadirachta indica A.Juss (Neem)* | *Meliaceae* | Bark, Leaves | Juice, Paste | Oral [25, 27] |
| *Celastrus paniculatus Willd (Jyotishmati)* | *Celastraceae* | Root bark | Powder | [27] |
| *Eclipta alba (L.) Hassk (Bhringraj)* | *Asteraceae* | - | - | [23] |
| *Gloriosa superba L (Langali)* | *Liliaceae* | Rhizomes | Paste | Oral [26] |
| *Ocimum sanctum L (Tulsi)* | *Lamiaceae* | Leaves | Paste | Oral [23, 25] |
| *Terminalia arjuna (Roxb. ex DC.) (Arjuna)* | *Combretaceae* | Stem bark | Decoction | oral [28] |

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