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(إِنَّ اللَّهَ لَا يَسْتَحِي أَنْ يَضْرِبَ مَثَلًا مَا بَعُوضَةً فَمَا فَوْقَهَا)



"Malaria"



## Cases

228 million malaria cases worldwide in 2018

WHO

## Deaths

405 000 malaria deaths worldwide in 2018

WHO

Is a vector-borne infectious disease caused by protozoan parasites.

It is widespread in tropical and subtropical regions, including parts

of the Americas, Asia, and Africa. Malaria is one of the most common infectious diseases, its vector-borne disease, caused by protozoan parasites of the genus Plasmodium. Four types of the plasmodium parasite can infect humans; the most serious forms of the disease are caused by Plasmodium falciparum and Plasmodium vivax(benign tertian malaria), but other related species (Plasmodium ovale, Plasmodium malariae) can also affect humans. P. falciparum(malignant tertian malaria) is the most common cause of infection, responsible for about 80 % of all malaria cases. P. Knowlesi infect nonhuman primates.

### **Reservoir: Humans**

Incubation period: P. falciparum 9-14 days, P. vivax and P.vale12-18 days, P.malariae 18-40 days.

### **In IRAQ 4 types of species of Anopheles:**

- 1- Anopheles stephensi : south, central region of IRAQ
- 2- Anopheles sacharoui: foot of mountains
- 3- Anopheles superpictus: hilly districts
- 4- Anopheles pulchorimus: in any area of the country

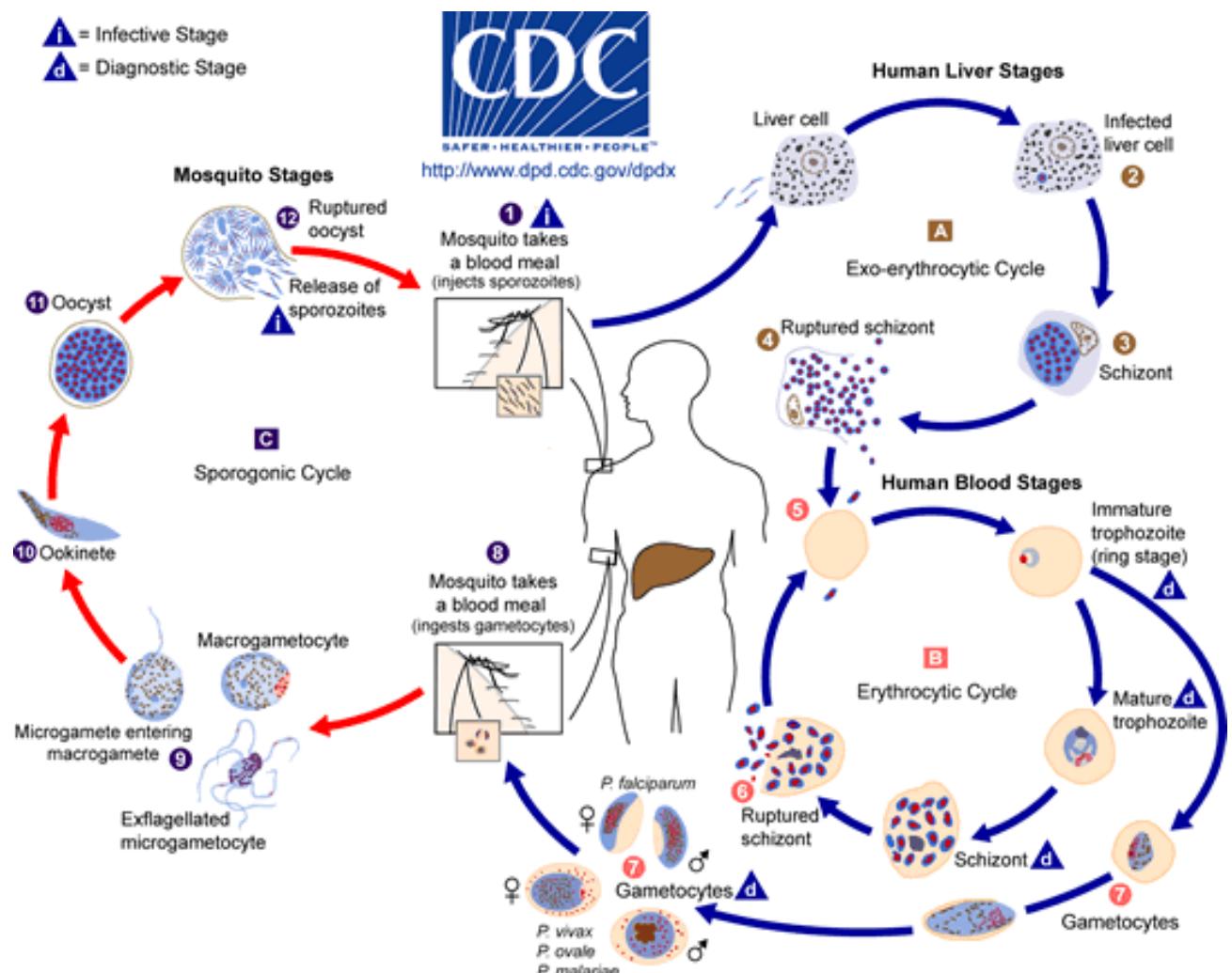
### **Symptoms**

sudden cold, rigor followed by chills, and then fever and sweating lasting 7 days, then occurring every 48 hours bouts of fever in P. vivax and P. ovale infections, while every third day for P. malariae. And P. falciparum can have recurrent fever and almost continuous fever without particular pattern.

Headache, muscle ache, weakness, cough, vomiting, diarrhea, abdominal pain. P.falciparum include; coma, convulsion, pulmonary edema, respiratory distress, kidney failure, jaundice and coagulation, anemia, thrombocytopenia, tender liver, hepatosplenomegaly, abortion, IUGR.

In Ovale and Vivax, frequent relapses happen in the 1<sup>st</sup> 2 years after infection due to latent merozoites present in liver.

In malarie, mild symptoms, chronic malarie can happens with glomulonephritis and Nephrotic syndrom.



## Life cycle of plasmodium parasite in human

### Diagnosis

-Gimesa – stained thick and thin films blood films. Microscopy

- Rapid diagnostic test
- Immunochromatographic test: for malaria antigen (OptiMal) detect plasmodium lactate dehydrogenase.
- PCR –DNA determine recurrence of type of species.
- Serological tests

**Factors that determine the epidemiology of malaria are:  
environmental, vectorial, parasite and host factors.**

Environmental factors

- Temperature (16-20C), humidity, rainfall, and attitude all affect the transmission of malaria.
- construction of dooms
- irrigation system (rice plantation)
- transmission start at March and November

Vectorial factors

These are behavioral factors and susceptibility to infection.

Some species are anthropophilic, others zoophilic(prefer animal blood); some prefer to bite indoor, others outdoors (endophagy, exophagy) some prefer to rest during the day indoors, others outdoors(endophily, exophily). Malaria vectors bite between dusk

and dawn and generally choose well-oxygenated water rather than stagnant polluted pools to lay their eggs.

### Parasite factors

The prepatency period – time from infection to appearance of parasitaemia- is shortest in *p.falciparum*, 6-25 days, and longest in *p.malariae*, 18-59days.

The duration of infection is usually 1year for *p.falciparum*, 5years for *p.vivax/p.ovale* and 2 weeks to 50 days for *p.malariae* (quartan malaria).

*p.vivax* and *p.ovale* relapse because of the presence of intrahepatic parasites.

### Host factors

#### 1- Immunity and susceptibility

a- Immunity may last few years after cure.

b- Permanent immunity its rare, small numbers of plasmodium may continue to survive in the immune host.

c- infants during the first few week of life resist infection from mother

#### 2- Genetic factors:

-Negros is naturally resistance to plasmodium vivax

-Certain genetic abnormalities Hb(SHb, sickle cell) interferes with the severity of disease or give some protection (Glucose-6 phosph-dehydrogenase) for plasmodium falciparum and thalassaima major for p.vivax.

### 3- Occupation:

Outdoors, increase the risk of infection.

e.g drivers, fishers, hunters. troops so male more than female.

## **Preventive measures:**

- 1- Sanitary improvement, such as fining and draining areas of improved water.
- 2- Larvicides and biological control with gambusia fish.
- 3- Application of residual insecticides on the inside wall of dwellings and other places were the anophiline rest.
- 4- Night spraying of screened living and sleeping quarters with areosal preparation of pyrithrium
- 5- In endemic areas install screens and use bed nets.
- 6- Insect repellents applied to the uncovered skin of persons exposed to bites of vector anopheline.
- 7- Long sleeves and trousers should be worn outside the house.
- 8- blood donors should be questioned for the history of malaria or possible exposure to malaria

## 9- Chemoprophylaxis in malaria's area.

### **Control of patient, contacts**

- 1- Report to local health authorities.
- 2- Isolation: for hospitalized patients, blood
- 3- Investigation of contacts, history of previous infection or exposure, all donors' blood should examine for antimalarial antibodies, investigate for persons who shared one needle with malarial patient.
- 4- Specific treatment of patients: chloroquine, amodiaguin, primaquine, quinine.

### **Vector control in IRAQ:**

- Residual spraying (chemical control).
- Biological control: gambusia fish
- Engineering control: elimination all water collection.

### **Chemotherapy in IRAQ:**

Chloroquine: schizonticidal and gametocidal except for plasmodium falciparum it will resist the drug.

Primaquine: eradicate parasite from hepatic cycle and it's also gametocidal

Pyrimethamine(Daraprim): eradicate parasite from hepatic cycle and its sporozoitcidal.

Fansider: use in malignant malaria and resistance to other drugs.

## **MALARIA CONTROL PROGRAMM( ACTION WORK):**

### **1- PREPARATORY PHASE: ( 6-12 months)**

The main activities:

- a- Initiated survey to collect information about the incidence and prevalence, distribution and seasonal variation of the disease, planning.
- b- Training of personnel and pilot operation of the plan (6-12 months).

### **2-ATTACK PHASE: ((3-4 years)**

- a- indoor residual spraying of insecticides usually twice yearly one in march and April and second in July and august.
- b- Chemotherapy: reducing the parasite reservoir by active detection house to house visit.
- c- When fever cases started, blood slides should be done at least 1% of the population monthly during transmission.

### **3-CONSOLIDATION PHASE**

The main activity in this phase is continue screening of all fever cases for

- a- Case detection- active and passive(the patient come to health center) case detection.
- b- Radical treatment of positive cases.
- c- Epidemiological investigation of foci to determine their origin and extent.

When surveillance has shown no endogenous case for 3 consecutive years, the area is ready to pass to maintaince phase.

#### 4-MAINTAINCE PHASE

This phase will last as long as malaria is present in the world and its main activity is to prevent re-establish of endemicity through imported cases.

#### Types of therapy:

1- **Radical treatment:** given to all proven malaria except malignant tertian malaria (p.falciparum, resistance to chloroquine).

chloroquine tab(150 mg)- 1<sup>st</sup> day: 4tab. Than 2tab after 6hr.

2<sup>nd</sup>, 3<sup>rd</sup> day: 2tab. Daily for 2 days.

4<sup>th</sup> day: primaquine tab.(15mg) 2tab.daily for 2weeks.

If after the 3<sup>rd</sup> day fever persist so this mean its chloroquine resistance

In case of p.falciparum(most imported cases are resistance) so treated by:

Fansidar tab. 1<sup>st</sup> day 3tab. In one single dose

Primaquine tab. 2<sup>nd</sup> day 3tab in one single dose.

Rimate: 4 tablests (0,8,24,36,48 and 60 hours).

Quinine salts 600mg + clindamycin or doxycycline (3 times daily for 1 week)

**2- Chemoprophylaxis:** given to all people visiting an endemic area.

2weeks before arrival to endemic area, continue treatment during staying, than 4weeks after return.

Chloroquine 2tab. + primaquine 1tab. Single dose weekly.

Mass treatment: used in difficult areas to cover by spraying and continue during the transmission season.

**3- Antirelapse treatment:** benign tertian malaria (p.vivax) have tendency to relapse after 3 years so we should give all +ve cases : primaquine 1tab. For 1 week just before the transmission season- means just before march.