

BIONOMICS OF MALARIA VECTORS AND MALARIA STATUS IN KAHNOUDJ AREA, SOUTH OF IRAN

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Abstract This descriptive survey studied comparison of malaria cases, epidemiological and entomological serves, insecticides used and mean temperature, relative humidity and amounts of rain fall in a ten year period (1994-2003). The most important species of anopheline vectors include: *Anopheles stephensi*, *An. dhali*, *An. supurpictus* in plain and slope areas, *An. fluviatilis* especially in mountainous area and *An. culicifacies* present in border line of Sistan and Baluchistan province.

This study aimed to analyse different epidemiology aspects of malaria to identify the effective factors in spreading of the diseases.

The south eastern corner of Iran which consists of Sistan and Buluchistan, Hormozgan and Kerman Province (Kahnouj area) with a combined population of approximately 3 million is considered to be a 'refractory malaria region'. API was reported to be 8.74 per 1,000 populations in 1997. In this part of the country, malaria belongs to the oriental type; hence it is more difficult to control than elsewhere in Iran. The inherent problems being the drug resistance of *P. falciparum*, and vector resistance to insecticides with the additional complication of the importation of malaria, mostly *P. falciparum*, from Afghanistan and, to a lesser extent, Pakistan. In other province, in spite of high density and influx of imported cases from Neighboring countries and other province, so far, there is no major problem. The duration of malaria transmission is up to 10 month in costal and 8 month in mountains area, two district peaks of malaria transmission occur in this area is one in April - May and the other in October – November. *Plasmodium vivax* and *P. falciparum* are 2 malaria parasites present in this area. Residual spraying (two rounds per year) was practiced for many years. Anti malaria drugs, particularly chloroquine, has been widely used for a long time. The resistance of *P. falciparum* to chloroquine (CHL) was observed in Iran – Shahr, Sistan and Baluchestan province in 1983 and spread rapidly more or less all over the malaria area in south east of Iran. This is used for the treatment of CHL-resistance falciparum malaria in these areas in sulphadoxine – pyrimethamine (SDX/PYR) combination.

This investigation was carried out in Kahnoudj area between 1994 and 2003. This area with a total population of about 27241 located in southern part of Kerman, where the annual incidence of malaria averages about 1-3 per thousand population. Relative humidity and temperature in mountainous area was lower than in coastal and plain area. This area is an orange-growing region, irrigated by river and deep wells, cement pool are the major sources of mosquito breeding places in this area. The average maximum and minimum temperature in summer are 38.2 and 25.3 and in winter 23.1 and 10.2°C, respectively. The average yearly rainfall is about 150 mm. because of the importance of malaria in that region insecticide applications by lambdacyhalothrin and propoxure were done throughout the whole period of 1994 until 2003. *P. falciparum* rate is lower than *P. vivax*. October/November seems to be the peak for *P. falciparum* transmission, active and passive case detection and mass drug distribution as prevention and treatment malaria

transmission is still going on. An entomological evaluation was carried out by space spray collection, pit shelter collection; animal and human bait catches every 15 day interval in each village. The results subjected to Epi-info computer program, using students-t-test. The anopheline species were collected and classified according to the blood digestion stage (empty, freshly fed, half-gravid, and gravid).

The vectors of this area are *An. stephensi*, *An. fluviatilis*, *An. dthali*, *An. culicifacies* and *An. superpictus*. *An. fluviatilis* has been active through the year with 2 peaks of activity, one in April/May and the other in September/October. Of 514 females *An. fluviatilis* collected by different techniques in that study, 37.3%, 20% and 40.6% were captured by animal and human bait and pit shelter collection respectively whereas 2.7% of the females were captured by pyrethrum space spray collection. The preferred habitats of this species were margins of rivers, streams with or without vegetation. Pit around springs and commonly in slow flowing water with highly dissolved oxygen. *Anopheles fluviatilis* catches in outdoors and indoors such as caves, trunks, of trees, especially palm, artificial pits, wells, cattle sheds, human dwelling. This anopheles was highly exophagic and exophilic while the dominant species in plain area was *Anopheles stephensi* which is endophilic and endophagic. This species has 2 peaks of activity, one in March/April and the other in July/August. Anthropophagic index for *An. fluviatilis* and *An. stephensi* was estimated 2.68% and 0.5% respectively by Elisa method. It seems that malaria transmission in hilly region of this area is much influenced by population rest habits, and has no strong relation to density of *Anopheles* so indoor residual spraying would not assist effectively against diseases control. On the other hand, giving education to people in using mosquito nets, in seasons people rest outdoors, may be considered an effective measure in controlling malaria in the hilly region. On the basis of entomological activities in the future, a careful systematic checking of the susceptibility level of *An. fluviatilis* to pyrethroid insecticides is recommended.