



Prevalence of Asymptomatic *Plasmodium vivax* and *Plasmodium falciparum* Infections in Tribal Population of a Village in Gadchiroli District of Maharashtra State, India

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(Received 15 April, 2012, Accepted 4 May 2012)

ABSTRACT : The present investigation was undertaken to study the prevalence of asymptomatic malaria in the tribal village Khobramendha of Gadchiroli district in Maharashtra state. Out of a total of 210 samples collected, nine tested positive (4.28%) for asymptomatic malaria. Six were positive for *P. falciparum* (66.6%) and three for *P. vivax* (33.3%). Not a single case of mixed infection was detected. The male/female ratio was 2/1 for both *P. vivax* and *P. falciparum*. The average age of the positive individual was found to be 24.8 years. As far as asymptomatic malaria cases of Khobramendh village is concerned, it is female biased upto the age of 60, but later on it is dominantly male biased (67%).

Keywords : Asymptomatic malaria, *Plasmodium falciparum*, *vivax*, Khobramendha, Gadchiroli, Maharashtra.

INTRODUCTION

The last two decades have seen an increasing level of international attention directed towards malaria. In 2000, the Millennium Development Goals called for a reversal in the incidence of this disease by 2015. Malaria affects 36% of the world population in 107 countries and territories situated in the tropical and subtropical regions. Of the 2.5 million reported cases in south East Asia, India alone contributes about 70%. Currently 80.5% of the Indian population lives in Malaria risk areas (Dash *et al.*, 2008) and around 85% of the total malaria cases are reported from the forested areas occupied by ethnic tribes of the country (Kumar *et al.*, 2007).

Malaria transmission depends on two primary factors. These are location of mosquito breeding sites and clustering of human habitations where people serving as reservoirs of parasites for mosquito infection live. Previous successes in malaria control for example in India and Sri Lanka were primarily attributed to the effects of residual insecticide spraying which severely reduced anopheline population (Vinetz and Gilman, 2002).

Asymptomatic *Plasmodium* species infections are frequently found in hyper endemic region of the world (Owusu-Agyei, *et al.*, 2001; Eke *et al.*, 2006). There is a growing interest in ascertaining the role of asymptomatic *Plasmodium* spp. Infection (Bottins *et al.*, 1996) and studies have confirmed that asymptomatic parasitaemia occurs in the absence of intense transmission (Cucunuba, *et al.*, 2008) and it persist inter-seasonally in places with seasonal transmission (Babiker, 1998). Alves, *et al.*, (2002) found that asymptomatic parasitaemia in these patients are likely to represent a major mechanism of over seasoning of malaria parasite, for both *Plasmodium falciparum* and *Plasmodium vivax* (Vinetz and Gilman, 2002).

Studies in malaria endemic areas of the world have shown high prevalence rate of asymptomatic malaria which provides ready reservoirs of infection making control programme difficult to accomplish. Asymptomatic carriers do not seek treatment for their infection and therefore constitute a ready reservoir available for transmission by mosquitoes. There is a period when mosquito populations are at minimum and asymptomatic infections likely to become a refuge for the parasite population and the source of new infections when mosquito populations expand. A well planned strategy is needed to study and provide evidence based information on the aspect of asymptomatic malaria as it has a direct bearing on malaria treatment, transmission dynamics and management to prevent mortality (Dash *et al.*, 2008). Treatment of patient with asymptomatic parasitaemia is critical for the control of malaria endemic region, as history has shown that after vector control efforts have stopped, persist asymptomatic parasitaemia individual served to infect the newly expanding anophelin population (Tikasingh, *et al.*, 1980).

In recent years, the incidence of malaria in most of the districts of Maharashtra state has reduced but for the district of Gadchiroli. Dhiman *et al.*, (2005) studied the persistence of malaria transmission at Gadchiroli and found that compliance to fever radical treatment was not satisfactory and the quality of spray to control vector was unsatisfactory. Their findings emphasized the importance of health education to community and their involvement in malaria control for achieving positive results. The Gadchiroli district is mainly hilly forested area inhabited by the Gond tribal population. Since not much information on the burden of clinical asymptomatic malaria is available for India, the present survey was undertaken to study the prevalence of asymptomatic malaria in the tribal village Khobramendha of Gadchiroli District in Maharashtra State.

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among community. Do you mind giving your blood sample for this study ?

MATERIAL AND METHODS

Study Area : The study was carried out during the months of November- December, 2011 at the tribal village Khobramendha of Gadchiroli District in Maharashtra State. This village is situated in the north-east of the district. The total population of this village is around 510. This region experiences highly seasonal transmission of *Plasmodium falciparum*, with peak transmission occur from August to December. The main vector species in this area are *Anopheles culicifacies* and *Anopheles fluviatilis* while *Anopheles annularis* being the secondary vector (NVBDCP). The village is situated in hilly area amongst dense forest adjoining Chhattisgad State. The occupation of villagers is mainly forest based work and farming. The paddy farming is totally rain dependant as there are neither irrigation facilities nor lake or river in this region.

Study Design : The study was carried out in three phases- Village survey, Blood sampling and Laboratory work.

Village Survey : A census of whole village was performed and a verbal questionnaire regarding the malaria symptoms as :

1. Are you suffering from fever, headache, body ache, nausea since last fortnight?
2. Did you suffer from malaria within last one month?
3. Are you undergoing any kind of medical treatment?
4. This is a study regarding asymptomatic malaria cases

24.8 years. The age group of blood sample examined and found positive is given in Table. 1.

Table 1: Age group wise positive cases of asymptomatic malaria cases found at Khobramendha village of Gadchiroli District in Maharashtra State (#- *P. vivax*; §- *P. falciparum*; M- Male, F- Female).

Age	0-10		10-20		20-30		30-40		40-50		50-60		> 60		Total	
Sex	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Individuals screened	19	11	23	25	19	32	17	13	13	16	06	07	03	06	100	110
Positive cases	1 #	1§	0	1§	0	1#	0	0	0	2§	0	1#	2§	0	1#	2#
Percent-age	5	9	0	4	0	3	0	0	0	12	0	14	66	0	2	5.4

DISCUSSION

Dhiman *et al.*, (2005) while concluding the study on the persistence of malaria transmission at Gadchiroli district of Maharashtra state concluded that there is a need to impart health education to tribal communities regarding radical treatments, optimum approach to spraying of insecticides, promotion of insecticidal treated bet nets and introduction of blister packs of medication. They also advocated the need to monitor drug resistance in *P.*

When we found the answer “No” for all the four questions, we selected the person for blood sampling.

Blood Sampling : Thick and thin blood samples of 210 peoples of different age, sex and economic conditions were collected from 20/11/11 to 23/11/11.

Laboratory work : Collected blood samples were stained according to the guideline of NVBDCP by procedure of dehaemoglobinisation on same day of collection, stained by JSB-I and JSB- II stain on 24th November 2011 and were examined for the detection of the malaria parasite. The positive samples were cross checked to confirm the results.

Ethics : The study was carried out with the consent of the people of Khobramenda village by informing them about the malaria detection. The detected positive cases of the study were informed to the Government Health Worker of the same village for follow-up and treatment.

RESULTS

Out of a total of 210 samples collected, nine tested positive for asymptomatic malaria. Six were positive for *P. falciparum* (66.6%) and three for *P. vivax* (33.3%). Not a single case of mixed infection was detected. The male/female ratio was 2/1 for both *P. vivax* and *P. falciparum*. The average age of the positive individual was found to be

falciparum to chloroquine but did not consider the aspect of asymptomatic malarial infection which is known to exist despite of various interventions directed at restricting transmission through mosquito control and treatment of symptomatic cases. Martcheva and Hoppensteadt (2010) reported that the current control measures undertaken in India may not be able to eliminate malaria if the factor of asymptomatic malaria is not included in their managerial programme.

The present study reveals the presence of asymptomatic, *Plasmodium* spp. Infection in the village of Khobramendha in Gadchiroli district of Maharashtra state. According to Holdridges life zones, with prevalence of *Plasmodium* spp. infection in asymptomatic peoples ranges between 2.4 to 49.5% in different population (Alves, *et al.*, 2002; Marcano *et al.*, 2004; Cucunuba, *et al.*, 2008). In the present study, 4.28% (9/210) positive cases of asymptomatic malaria were detected at the Khobramendha village of Gadchiroli district which is much higher than those reported from Tamilnadu (2.9%) by Rajendran *et al.*, (2001). Further, in Tamil nadu, 88% and 12% asymptomatic cases belonged to *P. vivax* and *P. falciparum*, respectively, whereas in Khobramendha 33.3% and 66.7% asymptomatic cases belonged to *P. vivax* and *P. falciparum*, respectively.

At Khobramendha asymptomatic *Plasmodium* spp. infection was found more in female than in male with a ratio of 2 : 1 (Female : Male) for both the *Plasmodium* species. Surprisingly no case of mixed infection was found although low percentage of mixed asymptomatic infection in commonly found in malaria endemic regions (Cucunuba, *et al.*, 2008). Previous records exhibit that mortality due to malaria is male biased in all age groups. This gap widens after the age of 25 years. The overall death ratio is 1 : 0.56 (male: female) and most of the mortality (56.1%) was found between the age group of 15.54 years. In Jharkhand state, 45.55% of pregnant women are asymptomatic (Hamer *et al.*, 2009). As far as asymptomatic malaria cases of Khobramendha village is concerned, it is female biased upto the age of 60, but later on it is dominantly male biased (67%).

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