

Original Article

MALARIA PATTERN IN A DISTRICT OF CENTRAL INDIA

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ABSTRACT

Introduction: Malaria has been a major public health problem in India especially in the areas rich in forests and water resources e.g. Chhattisgarh. The study was carried out to determine the pattern of malaria and to assess the prevalence of malaria in a district of the region.**Methodology:** A longitudinal study on malaria was carried out from 2004 to 2013 in the Bilaspur district which has been an area of unstable malaria in central India for long duration.**Results:** Out of total 2380570 examined persons only 42320 (1.9%) were positive i.e. Total Positive Cases (TPC) for malaria parasite (C.G.) and out these only 24849 (59.1%) were Plasmodium falciparum (PF). Thus the Plasmodium falciparum was highly prevalent in the study area; however, the risk of P. falciparum malaria was 59.1 % (average often years i.e. from 2004 to 2013 was taken), (95% confidence interval [CI] = 58.4-62.6%), An increasing trend was recorded in malaria prevalence from 48.0% in 2004 to 63.1% in 2013 (odds ratio [OR] = 3.0, 95% CI = 1.6-3.5) that increased to 57.3% in 2005 (OR = 1.6, 95% CI = 1.2-2.1).**Conclusions:** Because no declining trends were observed during the whole study duration of 10 years therefore malaria especially falciparum malaria is a matter of concern for the authorities responsible for management of Malaria at various levels of public health sector i.e. primary, secondary and tertiary level in the study area.**Key Words:** Malaria, Plasmodia Falciparum, Central India, Slide Positivity

INTRODUCTION

Malaria is a major public health problem in India and its dynamics vary from place to place.¹ In areas where malaria is highly endemic (high transmission), severe malaria most commonly occurs in young children.² Where malaria transmission is low or unstable (sporadic or periodic) as has been described in southeast Asia, natural immunity is slow to develop, all age groups are affected, and incidence often increases with age.^{3,4} Plasmodium falciparum malaria is a life-threatening disease for individuals with low immunity⁵ and although only a small proportion of patients with malaria develop severe manifestations, these patients require the most urgent and intensive care. Although the burden of malaria in stable areas is well-documented, data from unstable transmission areas are scarce because too few subjects are affected to be able to conduct systematic surveys during non-epidemic years. Furthermore, in areas of stable transmission, the pattern of transmission remains relatively unchanged from year to year, whereas areas with unstable malaria are characterized by considerable variation in the intensity of transmission between years.

Malaria in central India i.e. Chhattisgarh State is complex because of the vast tracts of forest with tribal settlement. Furthermore, socioeconomic status, cultural characteristic, health care infrastructure, and degree of mobility of population also differ between locations and populations, and contribute to the diversity of malaria characteristics in the region⁶. Scientists at the National Institute of Malaria Research Field Station at Bilaspur are conducting multidisciplinary study for the last two decades on malaria in a tribal forested belt of Bilaspur District, which has the highest number of malaria cases in the state (25%).⁷ However, in Bilaspur City, which is approximately 120 km from Raipur (Capital of Chhattisgarh), malaria was not a problem until recently.⁸ A focal outbreak of malaria including deaths was recorded in Bilaspur district in Sept-Oct 2013 in a labour population who went to forests of Bilaspur District approximately 190 km from Raipur for collection of forest produce.⁹ At the same time, however, there were increasing reports of focal outbreaks of malaria in Bilaspur. These outbreaks provided an opportunity for the case study on mosquito and malaria prevalence. The study was carried out in the district of Bilaspur with the following objectives because in an area of unstable malaria caused by each

species of Plasmodium encountered as the effective measures to reduce the burden of malaria in unstable transmission settings would differ from those recommended for high-transmission areas.

The stud objectives were to determine the pattern of malaria in the study areas; and to find out the prevalence of malaria in the study areas.

MATERIALS AND METHODS

A Longitudinal study was carried out in Bilaspur district of Chhattisgarh. The district (area = 7,135 km²) consists of ten blocks (administrative units) with a total population of 20 million (15% ethnic tribes). The names of these blocks are Belha, Pathariya, Mungeli, Takhatpur, Lormi, Kota, Gourella, Pendra, Marwahi, Masturi Marwahi. All these blocks, each block has 200 villages (population = 175,267). There is only one primary health centre (PHC) in Marwahi, Kota, Pendra, Gourella blocks and this is responsible for providing health facility to all 200 villages spread over 1,218 km². Marwahi, Kota, Pendra, Gourella PHCs are very close to the forest where migrants came for collection of forest produce from various districts in March-April. The terrain in Marwahi Kota, Gourella PHCs are highly undulating and hilly (mean altitude = 492.9–700.0 meters above sea level) and 57% area is under forest cover. The forest is tropical deciduous. The houses are made of mud and that each and are often located near a stream or its tributary in the forest. Houses are dark and damp, even during summer. Windows are seldom provided. These villages were not sprayed since 1997 with indoor residual insecticide. This study was carried out from January 2004 to December 2013 as decades.

RESULTS

The only two Plasmodium species encountered were P. Falciparum and P. vivax. Analysis of age-specific

data on malaria prevalence from study villages showed that the slide P. Falciparum rate increased from 12.6% to 26.9% in children ≤1 year of age (infants) to 35.6% in those > 1–4 years of age to 39.4% in those > 4–8 years of age, and then decreased to 31.3% in those > 14 years of age ($\chi^2 = 32.2$, degrees of freedom [df] = 4, $P < 0.0001$). Ten deaths in children and three in adults caused by P. falciparum were also observed among subjects in the cross-sectional surveys. Gametocytes of P. Falciparum were detected in 2.7%, 7.1%, 9.1%, 12.7%, and 7.6% of subjects ≤1, > 1–4, > 4–8, > 8–14, and >14 years of age. The differences in prevalence of gametocyte carriage between age groups were statistically significant ($\chi^2 = 14.1$, df = 4, $P \leq 0.005$). However, slide P. vivax rate increased from 9% in the youngest subjects to 12.6% in those > 1–4 years of age and then showed a steady decrease to 10.4% in those > 4–8 years of age to 9.5% in those > 8–14 years of age to 5.6% in those > 14 years of age ($\chi^2 = 21.1$, df = 4, $P < 0.001$). Mixed infections of P. vivax and P. Falciparum were recorded in all age groups except infants.

Table 1 shows block-wise and year-wise trends of percentage of Total Positive Cases of Malaria (TPC), Slide Plasmodium falciparum (SFP), Plasmodium falciparum (PF) are 1.9%, 59.1%, 1.12% were obtained. Not only maximum of %TPC,%SFP,%PF are 6.3% in Gaurella block, 92.8% in Marwahi block, 5.57% in Gaurella but also Min of % TPC,SFP,PF are 0.07% in Bilaspur city, 9.7% in Pathariya block, 0.03% in Bilaspur City were recorded. One more thing is common if we have max as well as min percentage of total positive cases of malaria in those blocks similar we have obtained percentage P. Falciparum in those blocks. If we look at year wise analysis, Not only maximum of %TPC,%SFP,%PF are 0.28 % in 2004, 76.1% in 2006 year, 0.17% in 2006 but also minimum of %TPC, %SFP, %PF as 0.1% in 2008 year, 42.28% in 2010 year, 0.10 % in 2012 year recorded.

Table1: Block-wise distribution in Bilaspur district of Total Cases of Malaria from Year 2004 to 2013

Block	Examined	TPC	%TPC	%SFP	PF	%PF
Bilaspur City	245468	160	0.07	53.1	85	0.03
Masturi	340246	1864	0.55	38.9	725	0.21
Bilha	279451	1954	0.7	52.2	1019	0.36
Takhatpur	306491	516	0.17	20.6	106	0.03
Pathariya	96360	206	0.21	9.7	20	0.02
Mungali	261089	1494	0.57	25.9	387	0.15
Lormi	223328	1296	0.58	40.8	528	0.24
Kota	230780	14938	6.5	29.8	4457	1.93
Pendra	104002	5882	5.7	83.4	4908	4.72
Gourella	150204	9431	6.3	88.7	8364	5.57
Marwahi	143151	4579	3.2	92.8	4250	2.97
Total	2380570	42320	1.9	59.1	24849	1.12

Figure-1 is showing percentages total Positive Cases of Malaria, P. Falciparum and slide falciparum positive according years from 2004-20013 i.e. ten year . If we look at Both TPC and PF are following same trends as both are increasing simultaneously as well as decreasing.

Table 1 shows Percentage Total Positive Cases of Malaria and Percentage of P. Falciparum according to their Blocks. Kota, Gourella, Marwahi have high trends of %TPC and %PF. So these blocks are very sensitive for Malaria because API ≥2.0 scores more

than two of this Disease. Figure-2 is showing Percentage Total Positive Cases of Malaria and Percentage of P. Falciparum according to their year 2004-2013. If we

look at from year 2004 to 2007 line trends are fluctuated after that line is consistently remain. In the year 2006 both %TPC and % PF are high.

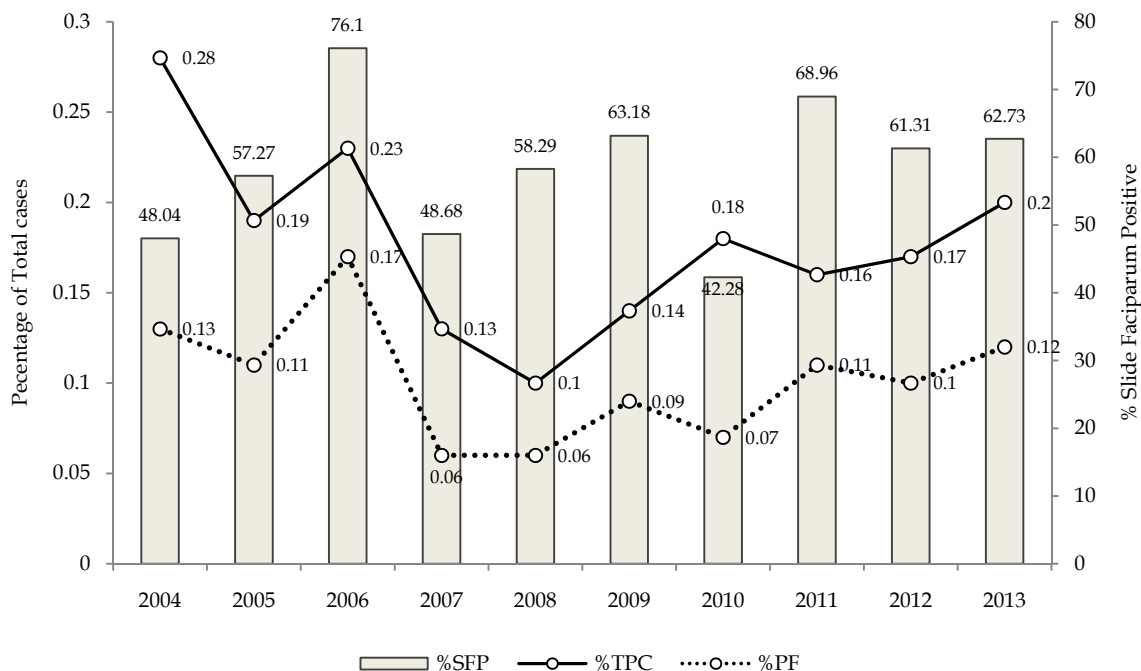


Figure1: Line diagram among percentage of Total Positive Cases, percentage of Plasmodium Falciparum and percentage of Slide Falciparum Positive according years 2004 to 2013

DISCUSSION

The epidemiology of malaria is the product of complex interaction between host, vector, and parasite factors that are specific to each location in which malaria occurs.¹⁰ Age-specific analysis of the data indicated that all age groups showed a high positivity for malaria, particularly for P. falciparum infection. Furthermore, all age groups had gametocytes, including infants as previously reported.¹¹

Under the current strategy of the National Vector Borne Disease Control Program, much emphasis is given to early detection and prompt treatment (EDPT) of fever cases. Consequently, malaria workers were posted for EDPT in affected villages. In addition, two rounds of Malathion were sprayed in 2004, but this spraying was discontinued in 2005. However, malaria particularly that caused by P. falciparum, showed a steady increasing trend. The problem is compounded by a moderate level of resistance to CQ.

Although there are limitations in the interpretation of our results because of the small sample size, it is possible that we may have underestimated the true incidence of CQ-resistant malaria in the population. However, these results provide information that may be relevant for future studies. The epidemiologic consequence of CQ resistance can be assessed because during the hot dry season when the prevalence of P. falciparum infection would-be expected to be low,¹² it was the predominant infection (68%) and 3.8% of the sub-

jects had gametocytes. This is an impressive burden despite intensified surveillance and treatment because transmission of malarial parasites from humans to mosquitoes depends on the availability of mature infectious gametocytes in peripheral blood.¹³ Therefore gametocyte carriage can be caused as an estimate of transmission potential of malaria parasites from human to mosquitoes. Malaria transmission may be reduced either by the removal of gametocytes from the circulation or by reducing the infectivity of mosquitoes. Such a reduction can be achieved by the use of PQ¹⁴ or by anti-vector intervention.

RECOMMENDATIONS

Understanding the dynamics of seasonal variation is important not only in controlling the disease in the community but also enables us to plan before hand to cope with the challenges of management of Malaria at primary, secondary and tertiary level. And as the observations are very alarming and calls for immediate attention by the concern authority because no declining trends were observed during the whole years of study period and it's a matter of concern.

It is a very alarming situation in tribal belts of this district like as Merwahi, Kota and Gaurella Blocks. Here deaths due to Malaria are also recorded in recent year. At these centre API score of Malaria have greater than two. Therefore Malaria is very sensitive at those

blocks. We should to improve Malaria Control Programme in these Blocks of this District.

REFERENCES

- Pattanayak S, Sharma VP, Kalra NL, Orlov VS, Sharma RS, 1994. Malaria paradigms in India and control strategies. *Indian J Malariol*31: 141-199.[Medline]
- Molineaux L, Gramiccia G, 1980. *The Garki Project, Research on the Epidemiology and Control of Malaria in the Sudan Savanna of West Africa*. Geneva: World Health Organization.
- Theander TG, 1998. Unstable malaria in Sudan. The influence of the dry season. *Trans R Soc Trop Med Hyg*92: 589-592.[Web of Science][Medline]
- Luxemburger C, Thwai KL, White NJ, Webster HK, Kyle DE, Maelankirn L, Chongsuphajaisiddhi T, Nosten F, 1996. The epidemiology of malaria in a Karen population on the western border of Thailand. *Trans R Soc Trop Med Hyg*90: 105-111.[Web of Science][Medline]
- Worrall E, Rietveld A, Delacollett C, 2004. The burden of malaria epidemics and cost-effectiveness of interventions in epidemic situations in Africa. *Am J Trop Med Hyg*71: 136-140.[Abstract/Free Full Text]
- Singh N., Chand S. K., Mishra A. K., Bharti P. K., Singh M. P., Ahluwalia T. P., Dash A. P. Epidemiology of malaria in an area of low transmission in Central India. *Am. J. Trop. Med. Hyg.*, 75(5), 2006, pp. 812-816. <http://www.ajtmh.org/content/75/5/812.full.pdf>
- Singh N, Nagpal AC, Saxena A, Singh MP, 2004. Changing scenario of malaria in central India, the replacement of *Plasmodium vivax* by *Plasmodium falciparum* (1986-2000). *Trop Med Int Health*9: 364-371.[Web of Science][Medline]
- Singh N, Saxena A, 2003. Usefulness of a rapid on site *Plasmodium falciparum* diagnosis (Paracheck® Pf) in forest migrants and among the indigenous population at the site of their occupational activities in central India. *Am J Trop Med Hyg*72: 26-29.
- Singh N, Chand SK, Mishra AK, Nagpal AC, 2004. Migration malaria associated with forest economy in central India. *Curr-Sci*87: 1696-1699.
- Singh J, Bhattacharji LM, 1944. Rapid staining of malaria parasites by a water soluble stain. *Indian Med Gaz*79: 102-104.
- World Health Organization, 1975. *Manual on Practical Entomology in Malaria. Part II*. Geneva; World Health Organization. Offset publication 13.
- Bruce-Chwatt LJ, 1987. Malaria and its control: present situation and future prospects. *Annu Rev Public Health*8: 75-110.[Web of Science][Medline]
- Singh N, Mishra SS, Singh MP, Sharma VP, 2000. Seasonality of *Plasmodium vivax* and *P. falciparum* in tribal villages in central India (1987-1995). *Ann Trop Med Parasitol*94: 101-112.[Web of Science][Medline]
- Akim NI, Drakeley C, Kingo T, Simon B, Senkoro K, Sauerwein RW, 2000. Dynamics of *P. falciparum* gametocytemia in symptomatic patients in an area of intense perennial transmission in Tanzania. *Am J Trop Med Hyg*63: 199-203.