Research Paper

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A Retrospective Study of Malaria Prevalence at Bilaspur District (Chhattisgarh), India

Medical Science

KEYWORDS : TPC-Total Positive Cases of Malaria, PF- Plasmodium falciparum , SFP-Slide Plasmodium falciparum, TSE- Total Slide Examined, OR-Odds ratio

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ABSTRACT

Background:-A retrospective study on malaria was carried out from 2004 to 2009 in an area of unstable malaria in the Bilaspur district in Chhattisgarh state of India. It is a district of tribal block as Marwahi, Pendra,Gaurilla in the district.These blocks have of this district P. falciparum was prevalent; however, the risk of P. falciparum malaria was 58.7 % (average of six years from 2004-2009) and.(95% confidence interval [CI] = 57.4–61.6%), An increasing trend was recorded in malaria prevalence from 48.0% in 2004 to 63.2% in 2009 (odds ratio [OR] = 3.0, 95% CI = 1.6–3.5) that increased to 57.3% in 2005 (OR = 1.6, 95% Confidence Interval(CI) = 1.2–2.1) of the district. Bilaspur. This increase was statistically significant (2 = 120.5, degrees of freedom = 2, P < 0.001).The correlation between Toal positive cases of malaria and P.Falciperum was obtained(r=0.793,p<0.004)which is highly significant.

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 immunity[5] 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 (Chhattisgarh) 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 region. Scientists at the National Institute of Malaria Research Field Station at Raipur are conducting a 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%).[6] However, in Bilaspur District, which is approximately 120 km from Raipur, malaria was not a problem until recently.[7] A focal outbreak of malaria including deaths was recorded in Bilaspur district in May–June 2003 in a labor population who went to forests of Bilaspur District approximately 190 km from Raipur for collection of forest produce.[8] At the same time, however, there were increasing reports of focal outbreaks of malaria in Bilaspur. The outbreak provided an opportunity for a case study on mosquito and malaria prevalence. The main objective was to determine the pattern of malaria in an area of unstable malaria caused by each species of Plasmodium encountered because effective measures to reduce the burden of malaria in unstable transmission settings would differ from those recommended for high-transmission areas.

MATERIALS AND METHODS

Study site. Bilaspur District (area = 7,135 km^2) consists of ten blocks (administrative units) with a total population of 20 million (15% ethnic tribes). A Longitudinal study was carried out in Bilaspur district of Chhattisgarh In survey. Bilaspur district has ten blocks these are Belha,Pathariya, Mungeli, Takhatpur, Lormi, Kota, Gourella, Pendra, Marwahi, Masturi .Marwahi .These blocks contain 200 villages (population = 175,267). There is eight primary health center (PHC) in Marwahi blockand only one CHC(community Health Centere).This is responsible for providing health facility to all 200 villages spread over 1,218 km^2. Marwahi PHC is close to the forest where migrants came for collection of forest produce from various districts in March–April 2004. The rain in Marwahi PHC is 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 thatch 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 retrospective study was carried out from January 2004 to December 2009.We have collocted data from ten Blocks of this district. The maximum no. of cases of Malaria have accountable in a tribal belt blocks Marwahi,Pendra and Gaurilla which are 90 Km from the city of Bilaspur. The data were analyzed by SPSS11.5 version.

Table1:-Blockwise distribution in Bilaspur district of total cases in total six years

BLOCKWISE	total slide examined	TPC	%TPC	%SFP	PF	%PF
BILASPUR CITY	147894	96	0.1	53.1	51	0.03
MASTURI	204997	1123	0.5	38.9	437	0.21
BILHA	168368	1177	0.7	52.2	614	0.36
TAKHATPUR	184660	311	0.2	20.6	64	0.03
PATHARIYA	58057	124	0.2	9.7	12	0.02
MUNGALI	157305	900	0.6	25.9	233	0.15
LORMI	134554	781	0.6	40.7	318	0.24
KOTA	139044	9000	6.5	29.8	2685	1.93
PENDRA	62661	3544	5.7	83.4	2957	4.72
GOURELLA	90497	5682	6.3	88.7	5039	5.57
MARWAHI	86248	2759	3.2	92.8	2561	2.97
TOTAL	1434285	25497	1.8	58.7	14971	1.04

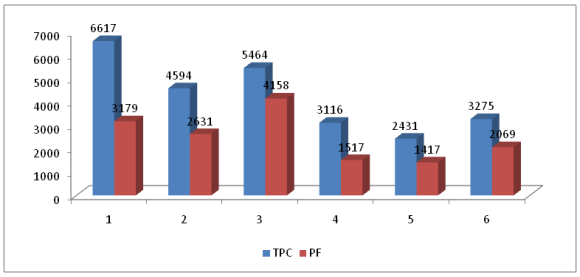

Figure1:- Total positive cases and *Plasmodium falciparum* from year 2004-2009

Table2:-Trends of total cases of malaria from year 2004 to 2009

year	total examined	TPC	%TPC	sfp%	PositiveF	%PF
2004	238627	6617	2.8	48.0	3179	1.3
2005	276721	4594	1.7	57.3	2631	1.0
2006	265891	5464	2.05	76.1	4158	1.6
2007	227733	3116	1.4	48.7	1517	0.7
2008	208325	2431	1.2	58.3	1417	0.7
2009	216988	3275	1.5	63.2	2069	1.0
TOTAL	1434285	25497	1.8	58.7	14971	1.04

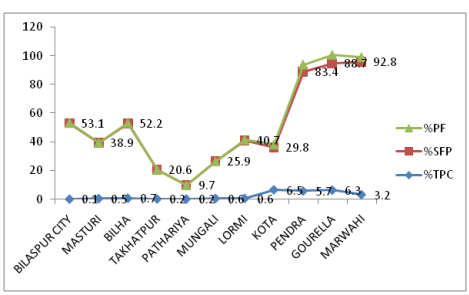

Figure2:- Line diagram amomg all blocks with %TPC,%SFPand%PF

RESULTS

The only two Plasmodium species encountered were P. falciparum and P. vivax . Ten deaths in children and three in adults caused by P. falciparum were also observed among subjects in the cross-sectional surveys. The differences in prevalence of gametocyte carriage between age groups were statistically significant ($X2 = 14.1$, 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 ($X2 = 21.1$, df = 4, $P < 0.001$). Mixed infections of P. vivax and P. falciparum were recorded in all age groups except infants. In Kota block of the district Bilaspur has maximum recorded 6.5% of total malaria positive cases. It indicates it is sensitive area of this district.(Table1) But in Marwahi Block of this district has maximum percentage of slide P. falciparum 92% of the toal slide examined. It means that Marwahi is more sensitive for P. falciparum .If we look at Gaurella Block of this district We have obtained the maximum % FP 5.5.%. These observation according to th year 2004-2009 . .(Table1)In the year 2004 , Percentage of total positive cases has maximum 2.5% of total slide examined.Also no of total positive malaria cses has 2.05% of total slide examined in this district.In the year 2006 no of positive falciperum have record maximum .approximately 76.1% of out of total slide examined in the district.Similarly % P. falciparum P. falciparum 1.3% of out of total slide examined in the year 2006 of the district. (Table2).If we look at figure1 we found ,The cases of P. falciparum are increasing with respect to Total Positive cases of Malaria in years from 2004- 2009.If we look at Figure 2 we found the line digram of % PF and % SFP are similar. The Odds ratios have been obtained by SPSS 11.5 version with confidence intervals.

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.[11] 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.[1]

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 subjects 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 used 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 PQ[14] or by anti-vector intervention

Recommendations

Understanding the dynamics of Geoghraphical variationof this disease 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 year of study period and it's a matter of concern in some Blocks Like Kota, Marwahi , Gaurella which are Tribal belt of this district.

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