

PREVALENCE OF MALARIA AT TRIBAL DISTRICT GONDIA

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Malaria has remained a greatest health and socioeconomic burden in the tropical and subtropical regions of the world. Malaria is an endemic disease in India. India has the highest malaria burden in South East Asia Region. In India, malaria is a major public health problem in states having predominantly tribal population. In our study, total 4,95,286 peripheral smears were studied in 2016, out of which 920 cases were positive for malaria with prevalence rate of 0.186 %. In the year 2017, out of 4,47,468 peripheral smears, 679 cases were positive for malaria. Prevalence rate of malaria was 0.152 %. In 2016, cases with *Plasmodium vivax* (47.17%) were more whereas in 2017, Cases of *Plasmodium falciparum* (56.41%) were more. Prevalence of malaria was more in males than females, most of the cases occurred in the age group 21-50 years with peak at 31-40 years.

INTRODUCTION

Malaria has remained a greatest health and socioeconomic burden in the tropical and subtropical regions of the world. According to World Health Organization, approximately, 4,29,000 deaths with 212 million cases were reported from malaria in the world (World Health Organization, 2016.¹ "Lancet Infectious Diseases" reported Nationwide malaria elimination efforts and challenges in India and bordering countries as India contributes a substantial burden of malaria outside sub-Saharan Africa, with the third highest *Plasmodium vivax* prevalence in the world.²

The causative agents in humans are *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium ovale* and *Plasmodium malariae*. From these four protozoa *P. vivax* and *P. falciparum* contributes most of cases of malaria in India.³ There are reports of emergence of a fifth species *P. knowlesi* from nearby countries like Malasia & Europe.⁴

Malaria is commonly influenced by external forces like climate, season, temperature and socioeconomic status.³ Since the symptoms are nonspecific for malaria like fever, headache; control and eradication of malaria has been very challenging issues and require prompt treatment, to save patient's life therefore a rapid and accurate diagnosis is necessary.⁵

At present, malaria diagnosis at the primary health care level in India is conducted by either microscopy or rapid diagnostic test (RDT).⁶

Malaria is an endemic disease in India. India has the highest malaria burden in South East Asia Region with an estimated 24 million cases per year as per world malaria report 2012. The mortality in malaria is due to *plasmodium falciparum*. India contributes to 61 per cent of malaria cases and 41 per cent of malaria deaths in SEAR countries.⁷ In India, approximately 539 million people reside in high transmission areas, i.e. defined as more than one case per 1000 population.⁸ In India, 60-65% of the malaria infections are reported due to *P. vivax*, while 30-35% due to *P. falciparum*. India is one of the major contributors to malarial morbidity and mortality in the world.⁹

Tribal population in India is mostly residing in areas which are remote and difficult to reach due to typical geographical situations usually due to forest, hills, valleys and perennial streams. The presence of various malaria parasites and vector species, climatic diversity favouring growth and proliferation of the parasite and vector as well as a highly susceptible human population have resulted in high malaria transmission in tribal areas. In India, malaria is a major public health problem in states having predominantly tribal population.⁸

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A recent report submitted by JP Nadda, union minister for health and family welfare department has stated that malaria cases in Maharashtra have declined by 24%-from 23,983 cases in 2016 to 18,133 in 2017.¹⁰ The objective of this analysis was to find out the prevalence of malaria in tribal population of Gondia district.

AIM AND OBJECTIVES

To study the epidemiological trend of malaria cases reported in 2016 and 2017 in Gondia district.

MATERIAL AND METHODS

Malaria control program comes under NVBDCP. Department of Microbiology, GMC Gondia does not have NVBDCP laboratory so we collected data from district malaria office of Gondia. All smears were examined by microscopy. Two years data of 2016 and 2017 was collected and analyzed to see the prevalence of malaria in tribal district Gondia.

RESULTS

In the present study, total numbers of 4,95,286 peripheral smears were studied in 2016. Out of which 920 cases were positive for malaria. Prevalence rate of malaria in this year was 0.186 %. In the year 2017, total 4,47,468 peripheral smears were examined , out of which 679 cases were positive for malaria. Prevalence rate of malaria in 2017 was 0.152 %. Overall prevalence of malaria in Gondia district was 0.169%.

Table 1 Showing prevalence of malarial parasites in males and females in 2016, n=920

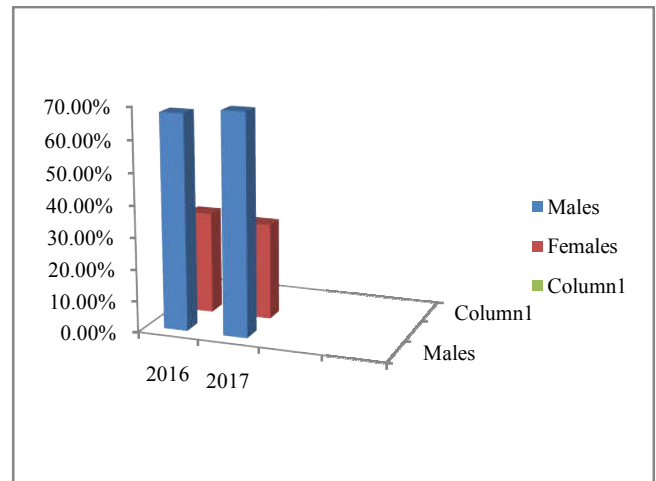
Sex	<i>Plasmodium falciparum</i>	<i>Plasmodium vivax</i>	Mixed	Total
Male	244	323	56	623 (67.72%)
Female	148	111	38	297 (32.28%)
Total	392 (42.61%)	434 (47.17%)	94 (10.22%)	920 (100%)

Among 920 malarial parasites positive cases in 2016, *Plasmodium vivax* was predominant (47.17%), followed by *Plasmodium falciparum* (42.61%) and mixed species (*Plasmodium vivax* and *Plasmodium falciparum*) were 10.22% (Table 1).

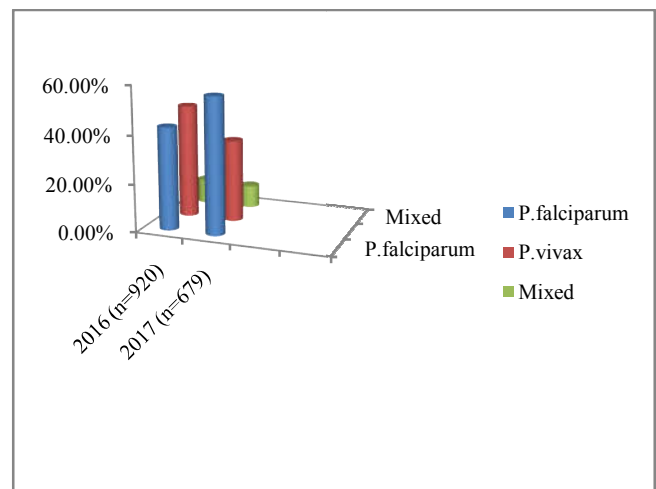
Table 2 Showing prevalence of malarial parasites in males and females in 2017, n=679

Sex	<i>Plasmodium falciparum</i>	<i>Plasmodium vivax</i>	Mixed	Total
Male	262	158	52	472(69.51%)
Female	121	74	12	207 (30.49%)
Total	383 (56.41%)	232 (34.17%)	64 (9.42%)	679 (100%)

Among 679 malarial parasites positive cases in 2017, *Plasmodium falciparum* (56.41%) was predominant followed by *Plasmodium vivax* (34.17%), and mixed species (*Plasmodium vivax* and *Plasmodium falciparum*) were 9.42% (Table 2).



Graph 1 Shows overall prevalence of malaria in males and females



Graph 2 Shows distribution of malaria species in 2016 and 2017

Prevalence of malaria was more in males (67.72%) as compared to female (32.28%) in 2016. Similar findings were seen in 2017, prevalence in males (69.51%) was more as compared to female (30.49%). (Graph 1)

Table 3 Shows age and sex wise distribution of *Plasmodium* species in 2016 (n=920)

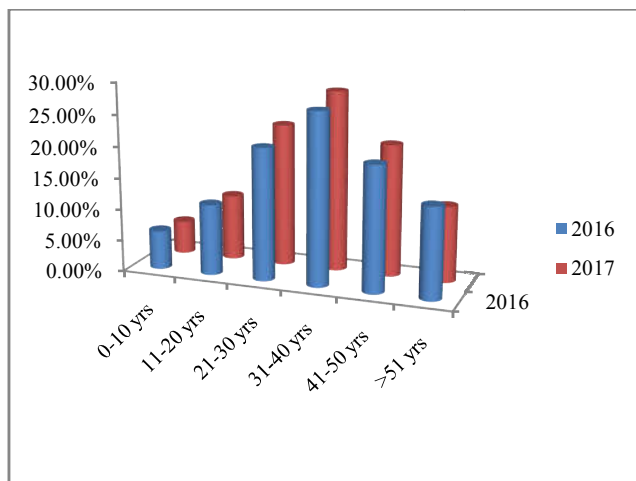
Age group (in years)	<i>Plasmodium falciparum</i>		<i>Plasmodium vivax</i>		Mixed		Total
	Male	Female	Male	Female	Male	Female	
0-10	18	9	19	6	3	2	57 (6.19%)
11-20	28	13	45	11	4	3	104 (11.30%)
21-30	56	37	57	21	13	9	193 (20.98%)
31-40	62	48	82	31	15	12	250 (27.18%)
41-50	47	24	69	24	12	7	183 (19.89%)
>51	33	17	51	18	9	5	133 (14.46%)
Total	244	148	323	111	56	38	920 (100%)

With regard to difference in age group in *Plasmodium vivax*, *Plasmodium falciparum* and mixed species, most of the cases occurred in the age group 21-50 years with peak at 31-40 years, 27.18% in 2016. (Table 3)

Table 4 Shows age and sex wise distribution of *Plasmodium* species in 2017, n=679

Age group (in years)	<i>Plasmodium falciparum</i>		<i>Plasmodium vivax</i>		Mixed		Total
	Male	Female	Male	Female	Male	Female	
0-10	11	8	7	5	4	1	36 (5.30%)
11-20	27	14	13	7	8	2	71 (10.46%)
21-30	68	22	31	21	11	1	154 (22.68%)
31-40	73	38	47	19	13	4	194 (28.57%)
41-50	52	27	37	14	9	3	142 (20.91%)
>51	31	12	23	8	7	1	82 (12.08%)
Total	262	121	158	74	52	12	679 (100%)

In the year 2017, most of the cases occurred in the age group 21-50 years with peak at 31-40 years and 28.57% in 2017.(Table 4)



Graph 3 Showing overall age wise distribution of malaria cases.

DISCUSSION

Malaria continues to be a heavy social and public health problem.⁷ Understanding the multifaceted determinants of tribal malaria is important as many factors play a role in malaria transmission directly or indirectly. The tribal villages are intersected by numerous hill streams and their tributaries which support mosquito breeding throughout the year.^{8, 11, 12, 13} Prevalence of malarial parasitic infection in our study was found to be 0.186 % in 2016 and 0.152 % in 2017. Overall prevalence in our study was 0.169%. Prevalence of malarial parasitic infection in study at Navi Mumbai, by Singh G *et al.* was found to be 16.58%.¹⁴ Pandey *et al.* of Bilaspur showed prevalence rate 24.74%.¹⁵ However Hadiya *et al.*¹⁶ from Gujarat and Karlekar *et al.*¹⁷ from Gadchiroli (Maharashtra) reported much less prevalence of 2.10% and 4.28% respectively. Prevalence of malarial infection in study by Ingole KV was 6.37%.⁵ This wide variation of prevalence of malarial infection in India may be due to differences in geographical and climatic condition which affect mosquito breeding, socio-economic conditions of patients, knowledge about healthcare and public health practices.¹⁸

In our study, among 920 malarial parasites positive cases in 2016, *Plasmodium vivax* was predominant 47.17%, *Plasmodium falciparum* 42.61% and mixed species (*Plasmodium vivax* and *Plasmodium falciparum*) were 10.22%.

In a study by Ingole KV *et al.* at Solapur, *Plasmodium vivax* was predominant 60.67% followed by *Plasmodium falciparum* 30.17% and mixed infection by *Plasmodium vivax* and *Plasmodium falciparum* 9.16%.⁵ In study at Aligarh by Umm-e Asma *et al.* 64% belonged to *P. vivax*, 34% to *P. falciparum*, and 2% were the cases of mixed infection.⁹ It is similar to an earlier study conducted in Karnataka where *P. falciparum* and *P. vivax* were 53% and 34%, and mixed infections were 14%.¹⁹ In study by Dayanand *et al.* the prevalence of *P. vivax*, *P. falciparum* and mixed infections was, 81.7%, 14.9% and 3.3%, respectively.²⁰ In our study, among 679 malarial parasites positive cases in 2017, *Plasmodium falciparum* 56.41% was predominant *Plasmodium vivax* 34.17%, and mixed species were 9.42%. Similar findings were reported by Karlekar *et al.*¹⁷ who reported *Plasmodium falciparum* 66.6% and

Plasmodium vivax 33.8%. The difference in prevalence of *P. vivax* and *P. falciparum* in different areas can be due to presence of endemicity of particular type and higher relapses in *vivax* type.⁵

In our study, Prevalence of malaria was more in males 67.72% as compared to female 32.28% in 2016. Similarly, in 2017 prevalence of malaria was more in males 69.51% as compared to female 30.49%. Male to female ratio in our study was 2:1, which is similar to Karlekar SR *et al.*¹⁷ from Gadchiroli. In a study at Solapur by Kishor Ingole, Prevalence of malaria was more in males (61.35%) as compared to females (38.65%).⁵ Infection was more common among males 329 (73.3%) than females 120 (26.7%), in study by Dayanand *et al.*²⁰ The difference in M:F ratio could be due to various reasons like body odour, which may attract mosquitoes, movement of males in wider areas, more chances of mosquito bites and some unknown inherent susceptibility.¹⁴

In our study, with regard to difference in age group in *Plasmodium vivax*, *Plasmodium falciparum* and mixed species, most of the cases occurred in the age group 21-50 years with peak at 31-40 years 27.18% in 2016 and 28.57% in 2017. In a study by Singh G *et al* most of the cases occurred in the age group 11-50 years with peak at 21-30 years.¹⁴ In study at Aligarh by Umm-e Asma, maximum numbers of malaria patients were recorded from the age group of 21-30 years, followed by 10-20 years.⁹

CONCLUSION

Overall prevalence of malaria in our study was 0.169%. Malaria prevalence is more in urban than rural area. In rural areas, prevalence of malaria is again low in tribal areas as Gadchiroli and Gondia.

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