



## PREVALENCE OF MALARIA IN A TERTIARY CARE HOSPITAL IN SOLAPUR DISTRICT, MAHARASHTRA.

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### ABSTRACT

Malaria is preventable as well as treatable disease still a major public health problem in India.

The present study was aimed to assess the prevalence of malaria infections among patients with acute undifferentiated fever, presenting to tertiary care center Solapur, Maharashtra from January 2013 to December 2016. Total 4631 samples were tested with the RDT ACCUCARE one step malaria Pf/Pv antigen test (LAB-CARE diagnostic PVT. LTD. India) at Microbiology laboratory following manufacturer's instructions.

Out of 4631 samples, 295 (6.37%) were positive for malaria. *Plasmodium vivax* was predominant (60.67%) followed by *Plasmodium falciparum* (30.17%) and mixed infection by *Plasmodium vivax* and *Plasmodium falciparum* (9.16%). Maximum number of cases were reported in month of July to November. Males were affected more as compared to female. Finding in present study will be helpful for formation of different policy for prevention and control of malaria which will in turn reduce morbidity and mortality associated with it.

**KEYWORDS :** Malaria, P.vivax, P.falciparum, Rapid diagnostic test.

### Introduction:

The World Health Organization (WHO) estimated 214 million malaria cases and 438,000 malaria deaths globally in 2015.<sup>1</sup> Among them 80% cases were found in African countries and 13 % in South East Asia Region (SEAR) countries. India contributes to 61% of malaria cases and 41% of malaria deaths in SEAR countries.<sup>2</sup> Malaria is preventable as well as treatable disease still a major public health problem in India. In 2015, total 1,102,205 malaria cases and 561 deaths were reported in India based on microscopy and rapid diagnostic tests (RDT). Less than two malaria cases per thousand individuals per year (Annual Parasite Index (API)) is reported in most parts of India, lowest in South-, North- and West, and highest in Central-, East- and North-East region.<sup>3</sup> However, data from malaria surveillance are uncertain since a majority of the population live in poverty in rural areas and has limited access to diagnostic services. According to recently published studies, the burden of malaria appears to be much higher than there previously reported figures.<sup>4</sup>

Malaria imposes great socio-economic burden with six other infectious diseases i.e. diarrhea, HIV/AIDS, tuberculosis, measles, hepatitis B, and pneumonia, accounts for 85% of global infectious disease burden.<sup>5</sup> 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. Malaria is commonly influenced by external forces like climate, season, temperature and socioeconomic status.<sup>6</sup> Notable epidemiological feature of malaria in India include the increasing proportion of *Plasmodium falciparum* from 10% in the 1970s to around 50% in 2010, because of emerging chloroquine resistance, complications due to *Plasmodium vivax*, and emergence of a fifth species *P.knowlesi* from nearby countries like Malasiya & Europe.<sup>7</sup> 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.

There are various, techniques for the diagnosis, peripheral blood smear (PBS) of thick and thin smear, qualitative buffy coat test (QBC), rapid diagnostic techniques based on histidine rich protein-2 (HRp-2) and plasmodium lactate dehydrogenase (pLDH), PCR, specific complementary biotinylated probes.<sup>8</sup> The present study was aimed to assess the prevalence of malaria infections among patients with acute undifferentiated fever, presenting to tertiary care center Solapur.

### Material and Method

This retrospective study was carried out at Department of Microbiology, Dr. V.M. government medical college, over a period of January 2013 to December 2016. A total of 4631 samples from clinically suspected cases of malaria from various OPD and IPD at tertiary care hospital were included in the study. Ethical clearance was taken before starting the project from institutional ethical committee. Three to five millilitre blood specimens were collected in EDTA containing vial from cubital vein of all patients by taking aseptic precaution.

**Exclusion criteria:** patients with other positive laboratory test results i.e. for typhoid fever and dengue fever.

### Rapid diagnostic test (RDT):

All samples were tested with the RDT ACCUCARE one step malaria Pf/Pv antigen test (LAB-CARE diagnostic PVT.LTD. India) at Microbiology laboratory following manufacturer's instructions. It detects *P. falciparum* specific Histidine-Rich-Protein II and Lactate dehydrogenase antigen of pan-malaria species (*P. falciparum*, *P. malariae*, *P. vivax*, and *P. ovale*). The test card has two regions, 'Pf' and 'Pan'. A red band in the 'Pf' region alone indicates that the sample is reactive for *P. falciparum*. Red bands in both 'Pf' and 'Pan' region indicate either single infection by *P. falciparum* or a mixed infection of *P.falciparum* with *P. vivax*. Appearance of a red band in the 'Pan' region alone indicates that the sample is reactive for infection by a *P.vivax*, as *P. vivax* is more common compare to *P. ovale* or *P. malariae* in our region. The RDT kits were quality checked using known positive and negative controls.

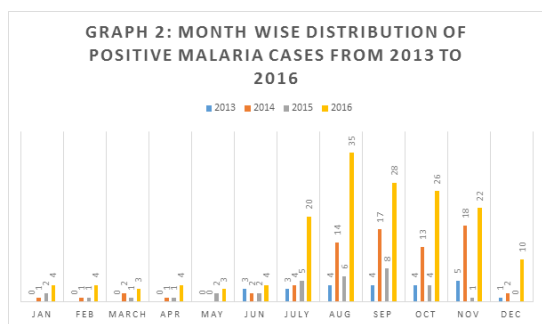
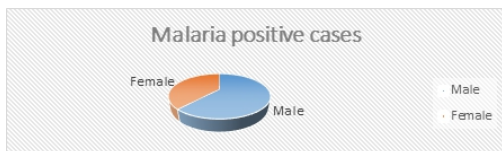
### Result:

Total 4631 clinically suspected cases were studied during the period of 4 years. Among them 295 cases were positive for malaria. The prevalence rate was 6.37%. Prevalence of malaria was more in males (61.35%) as compared to females (38.65%).

Among the 295 cases of malaria positive cases, *Plasmodium vivax* was predominant (60.67%) followed by *Plasmodium falciparum* (30.17%) and mixed infection by *Plasmodium vivax* and *Plasmodium falciparum* (9.16%). Month wise distribution of positive cases shows that maximum number were seen during period of July to November month. (Graph 2) When we compiled data of 4 years, it showed that there was no specific pattern of progression or fall in number of positive malaria cases over a years.

**Table 1: Numbers of positive malaria patients from year 2013 to 2016.**

Year	Total Sample	Total positive (n=4631)	<i>Plasmodium vivax</i> infection positive(Pv) (n=295)	<i>Plasmodium falciparum</i> infection positive(Pf) (n=295)	Mixed infection (Pf +Pv) positive (n=295)
2013	602	24	20	2	2
2014	991	75	44	24	7
2015	888	33	24	7	2
2016	2150	163	91	56	16
	4631	295 (6.37%)	179(60.67%)	89 (30.17%)	27(9.16%)

**Graph.1 Gender wise distribution of Malaria infection****Discussion:**

India's geographic position and climatic condition have been for long, favourable to the transmission of malaria. Positive cases of malaria are reported throughout the year as a right combination of average temperature, rainfall and precipitation conditions persists across the country over all the seasons in some part or the other.<sup>6</sup> Prevalence of malarial infection in present study was 6.37% which is comparable to result of other studies by Karlekar SR et al<sup>9</sup> (4.28%) and Jivabhai HT et al<sup>10</sup> (2.10%) but in contrast to result observed by Pandey S et al<sup>11</sup> (24.74%) and Singh G et al<sup>12</sup> (16.58%). 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.<sup>13</sup>

In present study, Month wise distribution of malaria cases shows that number of cases start increasing from June every year and remain high till November, thereafter it tends to fall gradually. Similar findings were also reported by Singh G et al<sup>12</sup> and Prajapati B et al.<sup>14</sup> The high prevalence of malaria in this period could be due to collection of water in rainy season which favours mosquito breeding till November, relative humidity of 60% and temperature between 20° and 30°C.

Prevalence of *Plasmodium vivax* was 60.67%, *Plasmodium falciparum* 30.17% and mixed infection was 9.15% in our study. Similar findings were reported by Kumar S. et al<sup>15</sup> and Kevadiya SM et al<sup>6</sup> but in contrast Karlekar SR et al<sup>9</sup> had reported *Plasmodium vivax* 33.8% and *Plasmodium falciparum* 66.6%. 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. In present study, Prevalence of malaria was more in male (61.35%) compared to female (38.65%). Similar findings were reported by Kumar S et al<sup>15</sup> and Karlekar SR et al.<sup>9</sup> The difference in M:F ratio may be due to more outdoor activities of males compared to female so more chances of mosquito bites.

According to Prajapati B et al<sup>14</sup> and Kumar S et al<sup>15</sup>, they had recorded decrease in number of malaria positive cases as year progresses. This may be due to increase in awareness of malaria; increase in proper precautionary steps conducted by government against malaria. In contrast to this in present study from compiled data of 4 years we found

that there was not any specific pattern of progression or fall in number of positive malaria cases over a year as majority of patients coming to our hospital from periphery were illiterate and not aware about malaria.

**Conclusion:**

There is high prevalence of *P. vivax* as compared to *P.falciparum* infections. The maximum number of cases were reported in month of July to November which concludes that malaria has its peak incidence during rainy season. Incidence was more common in male compared to female. These observations will be helpful for formation of different policy for prevention and control of malaria like impart health education to population at risk regarding radical treatments, optimum approach to spraying of insecticides, promotion of insecticidal treated bed nets and introduction of blister packs of medication.

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