

Studies of malaria incidence (*Plasmodium vivax*, *plasmodium falciparum*) in Aurangabad Taluka, Aurangabad District ,(Maharashtra), India.

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ABSTRACT:

This study aimed to determine the prevalence of malaria infections among the patients attending, Aurangabad Taluka of Maharashtra, between January to December 2019, A total number of (1539) blood samples of suspected malaria cases were examined out during. This year from which positive cases of *Plasmodium vivax* and *Plasmodium falciparum* were examined and according to the data percentage of positive cases of both the species were calculated in each month during the month of June and July increased in the number of positive cases i.e. (1.01 %) and (1.40%) respectively for both *P. vivax* and *P. falciparum*. The prevalence of malarial infection exhibited seasonal patterns with many cases in the month of June and July had the greatest risk. These findings compared with other findings of malaria-endemic populations in India that a hospital-based diagnosis and surveillance for malaria reflects seasonal malaria transmission due to seasonal variation as these months are rainy seasons so the host multiplies rapidly.

Keywords: Malaria parasite, *Plasmodium vivax*, *Plasmodium falciparum*, Aurangabad Taluka.

1. Introduction

Malaria is a deadly infection caused by protozoan parasites in the *Plasmodium* genus. Infection is transmitted by the bite of an infected female, Anopheles sp. mosquito, resulting in erythrocyte infection and destruction (1). Although once widespread, the disease is not mostly limited to the tropics and subtropics worldwide, including many poor nations with limited resources and health care infrastructure.

Malaria is a major cause of morbidity and mortality in the tropics. The disease is of global importance, results in 300-500 million cases yearly and 1.5-2.7 million deaths annually. Approximately 2.48

million malaria cases are reported annually from South Asia, of which 75% cases are from India alone (2).

Malaria continues to be one of the important public health problems in India. As per the World Health Organization (WHO) report 2015, the Southeast Asian (SEA) region bears the second largest burden of malaria (10%), only being next to the African region (88%). Malaria caused 214 million infections and 438000 deaths worldwide, most of them occurred in the Africa region (90%) followed by the SEA region (7%). Among the SEA region, India shares two-third of the burden (66%). Five species of the plasmodium such as *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium ovale*, *Plasmodium malariae*, and *Plasmodium knowlesi* cause malaria in humans. Infection is initiated when sporozoites from the salivary glands of a female anopheles' mosquito are inoculated during a blood meal into the human bloodstream (3,4). The common clinical manifestation is fever with chills and rigors, headache, vomiting, jaundice and common sign being splenomegaly, pallor, and icterus. Hematological abnormality which is most commonly seen in malaria is thrombocytopenia followed by anemia (5-7).

Clinical pictures, outcome, prognostic factors, and changing clinical pattern of malaria due to individual species infection have been studied extensively (8). The high mortality rate from *P. falciparum* is due to its ability to induce severe malaria, and in some cases, multiple organ failure. Malaria transmission depends on two primary factors: 1) location of mosquito breeding sites 2) clustering of human habitations where people serve as reservoirs of parasites for mosquito infection. 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 (9).

The hematological abnormality which is most commonly seen in malaria is thrombocytopenia followed by anemia in patients suffering from malaria (10).

The literature survey revealed that, though there are some reports of study related to malaria from India and the rest of the world, systematic study of malarial incidents from the Aurangabad Taluka-Maharashtra region is not reported.

2. Materials and methods

2.1. Study area

Aurangabad Taluka is a city in the Indian state of Maharashtra. It is the administrative headquarters of Aurangabad district and is the largest city in the Marathwada region, located on a hilly upland terrain in the Deccan Traps, Aurangabad is the fourth-most populous urban area in Maharashtra with a population of 1,175,116. The city is known as a major production center of cotton textile and artistic

silk fabrics. Several prominent educational institutions, including Dr. Babasaheb Ambedkar Marathwada University, are located in the city. The city is also a popular tourism hub, with tourist destinations like the Ajanta and Ellora caves lying on its outskirts, both of which have been designated as UNESCO World Heritage Sites since 1983. Other tourist attractions include the Aurangabad Caves, Daulatabad Fort, Grishneshwar Temple, Jama Mosque, Himayat Bagh, Panchakki, and Salim Ali Lake. Historically, there were 52 Gates in Aurangabad, some of them extant, because of which Aurangabad is nicknamed as the "City of Gates" Aurangabad features a semiarid climate under the Köppen climate classification.

Annual mean temperatures range from 17 to 33°C, with the most comfortable time to visit in the winter – October to February. The highest maximum temperature ever recorded was 46°C (114°F) on 25 May 1905. The lowest recorded temperature was 2°C (36°F) on 2 February 1911. In the cold season, the district is sometimes affected by cold waves in association with the eastward passage of western disturbances across north India, when the minimum temperature may drop down to about 2°C to 4°C (35.6°F to 39.2°F).

Most of the rainfall occurs in the monsoon season from June to September. Thunderstorms occur between November to April. The average annual rainfall is 710 mm. The city is often cloudy during the monsoon season and the cloud cover may remain together for days. The daily maximum temperature in the city often drops to around 22 °C due to the cloud cover and heavy rains.

According to the 2011 Indian Census, Aurangabad has a population of 1,175,116, of which 609,206 are males and 565,910 are females.

2.2. Study design

The study was conducted to determine in the period January to December 2019, slide positive rate of malaria in this study.

2.3. Tools used for the survey

The tools used to test patients with suspected *P.vivax* and *P. falciparum* such as Clean Glassware, Slides, Forceps, Cotton, Racks, Syringes Lancets, Plaster, and Test Tubes, Gloves, Beakers, Pester Pipette, and Needles were sterilized previously. All chemicals used to diagnose *P.Vivax* and *P. falciparum* were of anlar degree wherever distilled water was required. The main tool used for diagnosing *P. vivax* and *P. falciparum* was Microscope.

During this investigation, all tools used were sterilized properly used to test patients with suspected *P.Vivax* and *P. falciparum* such as Clean Glassware, Slides, Forceps, Cotton, Racks, Syringes Lancets,

Plaster and Test Tubes, Gloves, Beakers, Pester Pipette and Needles

All chemicals used to diagnose *P. vivax* and *P. falciparum* were of anlar degree wherever distilled water was required. The main tool used for diagnosing *P. vivax* and *P. falciparum* was microscope.



Fig. 1: Some of tools used during experimental.

2.4. Data collection

2.4.1. Source of data

The blood samples were collected from the patient's records in the District of Malaria Office and different places in Aurangabad Taluka. District Aurangabad. India. The total number of monthly samples of malaria cases 1539 from January to December 2019.

2.4.2. Collection and preparation of samples

The blood samples were collected from patient's records in the District of Malaria Office, and different places in Aurangabad Taluka. district Aurangabad. India.

During this investigation all glassware used was sterilized properly, all the chemicals were of analytical grade, bloodstream distilled water is used for the preparation of the solution.

The blood samples of patients from Aurangabad Taluka collected from January to December 2019.

These patients were suspected of malaria, suffering from fever advised for blood testing. The method used for the determination is given below (3,12).

Methods

The work methods were carried out on patients infected with malaria parasite as described by earlier research Ali *et al.*, (12).

3. Result and discussion

This study was carried out at Aurangabad city to find the prevalence of malarial infection, total numbers of suspected cases about 1539 were studied and the percentage was calculated based on positive cases of *Plasmodium vivax* and *Plasmodium falciparum*.

From the table (1) was studied in 1593 cases. From 1539 cases specimens infected by malaria parasites were found (12) cases infected with malaria parasites, (10) cases *P. vivax*, and (2) cases *P. falciparum*. figure (2).

Also, the results show that infection with *P. vivax* was heights infected percentage in July. While infection by *P. falciparum* was in the period from July and September. figure (3). This study agrees with the report Kamble *et al.*, (13) who stated that prevalence malaria parasites including *P. vivax* in Aurangabad city.

The *Plasmodium falciparum* is concenter responsible for more fever diseases in the world, especially in African (14).

Also, the table (1) showed the infection by malaria parasites was an incidence in the period June to July. This may be due to the rainy season of this period. This study agrees with Odongo-Aginya *et al.*, (14) who stated that the relationship between malaria transmission and monthly rainfall were increased malaria parasites according to monthly rainfall pattern.

Months	Blood samples Collected	Blood samples examined	p.v(+ve)	% p.v	pf (+) ve	%pf	Total (+)v e	Total %
JAN	155	155	1	0.65	0	0.00	1	0.65
FEB	150	150	0	0.00	0	0.00	0	0.00
MAR	162	162	1	0.62	0	0.00	1	0.62

APR	150	150	1	0.67	0	0.00	1	0.67
MAY	107	107	1	0.93	0	0.00	1	0.93
JUN	198	198	2	1.01	0	0.00	2	1.01
JUL	214	214	2	0.93	1	0.47	3	1.40
AUG	198	198	1	0.51	0	0.00	1	0.51
SEP	158	158	0	0.00	1	0.63	1	0.63
OCT	169	169	1	0.59	0	0.00	1	0.59
NOV	130	130	0	0.00	0	0.00	0	0.00
DEC	160	160	0	0.00	0	0.00	0	0.00
TOTAL	1539	1539	10	0.65	2	0.12	12	0.77

Table 1: The positive cases of *P. vivax* and *P. falciparum* during the month Jan to Dec 2019.

P.v= *Plasmodium vivax*, *P.f*= *Plasmodium falciparum*

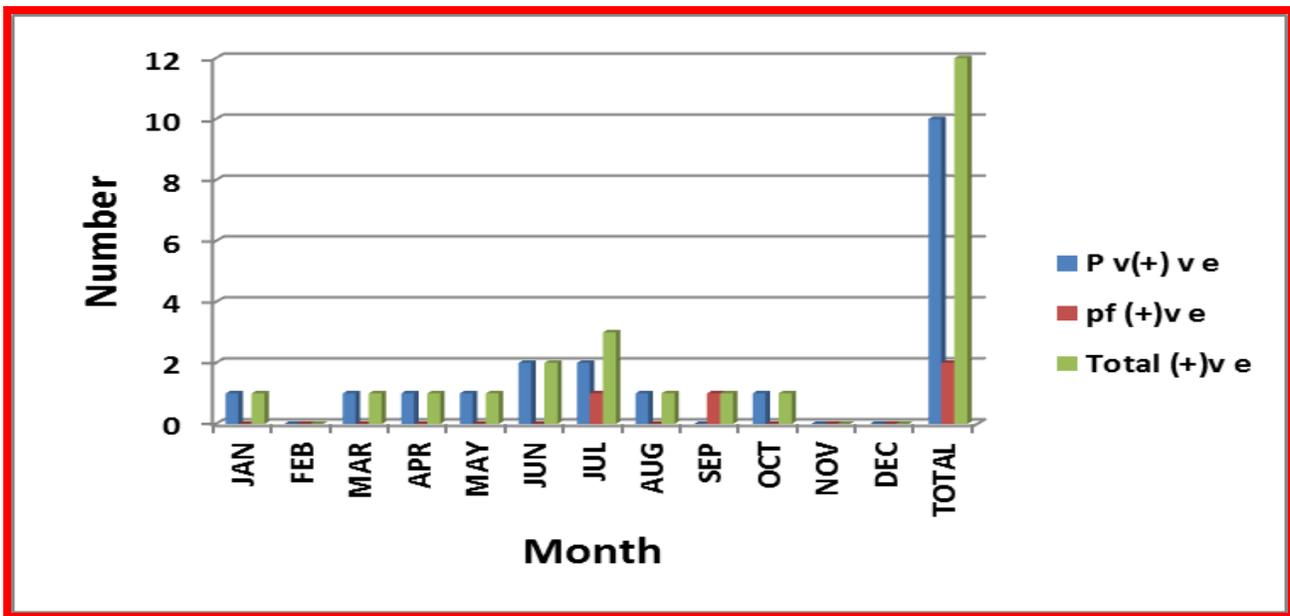


Fig. 2: Prevalence of *P. vivax* and *P. falciparum* during the year 2019

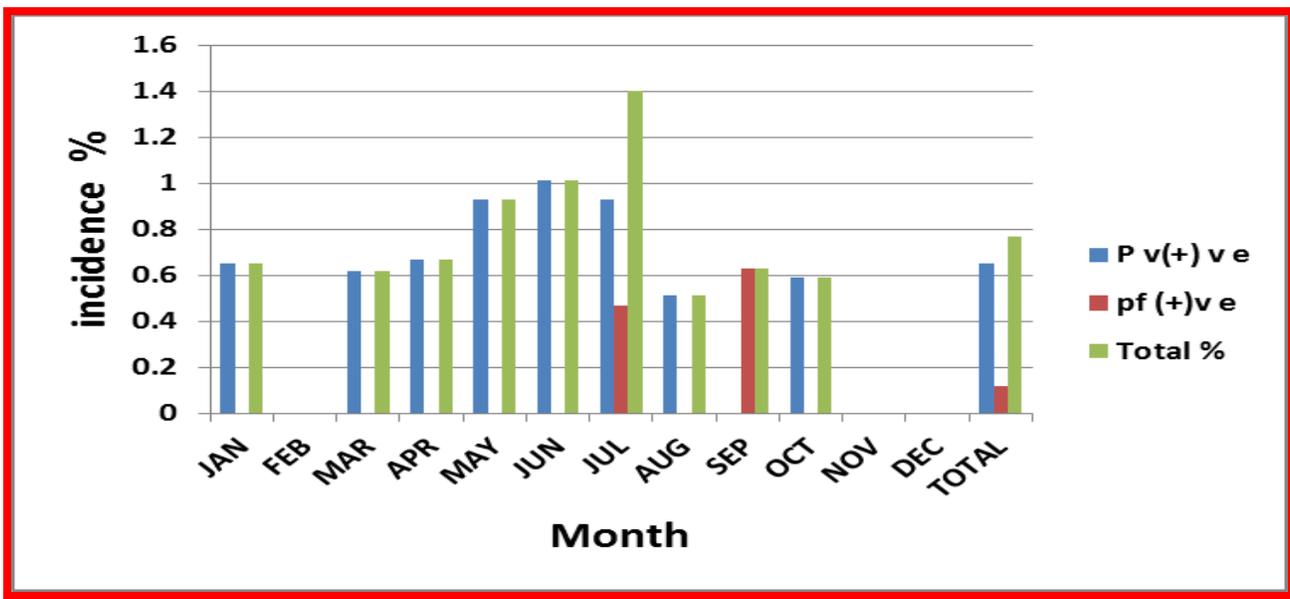


Fig. 3: Percentage incidence of malarial parasites during year 2019

4. Conclusion

In the present study, there is a gradual decrease in the number of positive malaria cases during the year 2019. There is a significant prevalence of malaria in monsoons as compared to other seasons. Most cases were recorded during June and July it indicates that malaria is a seasonal disease. The result of the study will be useful for government agencies to plan preventive measures to control malaria. Aurangabad Taluka is still endemic for malaria. Health education is a vital component that lacks an improvement in the condition, and is justified by a higher rate of illiterate and working class than

others. Using mosquito nets is not enough in which it requires a more aggressive health education to improve the situation.

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References

1. Bourtzis, K., Dobson, S. L., Xi, Z., Rasgon, J. L., Calvitti, M., Moreira, L. A., ... & Mavingui, P. (2014). Harnessing mosquito–Wolbachia symbiosis for vector and disease control. *Acta tropica*, 132, S150-S163.
2. Mohapatra, M. K., Dash, L. K., Bariha, P. K., & Karua, P. C. (2012). Profile of mixed species (*Plasmodium vivax* and *falciparum*) malaria in adults. *J Assoc Physicians India*, 60, 20-24.
3. Ali, A. M., Quadri, S. A., Mehdi, M. A. H., & Al-Arabi, F. Y. (2020). Incidence of Malaria Caused by *Plasmodium vivax* and *Plasmodium falciparum* at Aurangabad City (MS) India. *Purakala with ISSN 0971-2143 is an UGC CARE Journal*, 31(33), 74-78.
4. White NJ, Breman JG. (2012). *Harrison's Principles of Internal Medicine*. 18th ed. Vol. I. US: The McGrawHill Companies, Inc. 1688.
5. Oh, M. D., Shin, H., Shin, D., Kim, U., Lee, S., Kim, N., & Choe, K. (2001). Clinical features of *vivax* malaria. *The American journal of tropical medicine and hygiene*, 65(2), 143-146.
6. Devineni, S. B., Suneetha, O., & Harshavardhan, N. (2015). Study of platelet count in malaria patients and the correlation between the presence and severity of platelet count with type of malaria. *Journal of Evolution of Medical and Dental Sciences*, 4(67), 11734-11746.
7. Muddaiah, M., & Prakash, P. S. (2006). A study of clinical profile of malaria in a tertiary referral centre in South Canara. *Journal of vector borne diseases*, 43(1), 29.
8. White NJ, Breman JG. *Harrison's Principles of Internal Medicine*. 18th ed. Vol. I. US: The McGrawHill Companies, Inc; 2012. p. 1688.
9. Karlekar, S. R., Deshpande, M. M., & Andrew, R. J. (2012). Prevalence of asymptomatic *Plasmodium vivax* and *Plasmodium falciparum* infections in tribal population of a village in Gadchiroli district of Maharashtra state, India. *An Int J*, 4(1), 42-4.

10. Estacio, R. H., Edwin, E. R., Cresswell, S., Coronel, R. F., & Alora, A. T. (1993). The Quantitative Buffy Coat technique (QBC) in early diagnosis of malaria: The Santo tomas University Hospital experience. *Phil J Microbiol Infect Dis*, 22(2), 56-9.
11. Ali, A. M., Quadri, S. A., Mehdi, M. A. H., & Al-Arabi, F. Y. (2020). Prevalence of Malaria Parasite in GangapurTaluka, Aurangabad District.(Maharashtra), India. *Purakala* with ISSN 0971-2143 is an UGC CARE Journal, 31(33), 68-73.
12. Kamble, Y., Ragade, V., & Pradhan, V. (2015). Prevalence of plasmodium vivax and plasmodium falciparum in the city Aurangabad (MS) India: A case study. *European Journal of Experimental Biology*, 5(6), 29-33.
13. O'Brien, D., Tobin, S., Brown, G. V., & Torresi, J. (2001). Fever in returned travelers: review of hospital admissions for a 3-year period. *Clinical infectious diseases*, 33(5), 603-609.
14. Odongo-Aginya, E., Ssegwanyi, G., Kategere, P., & Vuzi, P. C. (2005). Relationship between malaria infection intensity and rainfall pattern in Entebbe peninsula, Uganda. *African health sciences*, 5(3), 238-245.