

Burden of Malaria in rural area Jhansi- A clinico-epidemiological study

Vimal Arya^{*1}, Kumar Gunjan² and Nitin Tiwari³

¹Assistant Professor, MLB Medical College, Jhansi (U.P.), India

²Assistant Professor, Venkateshwara Institute of Medical Science, Gajraula, Hapur (U.P.), India

³Post Graduate, MLB Medical College, Jhansi (U.P.), India

QR Code



*Correspondence Info:

Dr. Vimal Arya
Assistant Professor,
MLB Medical College,
Jhansi (U.P.), India

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Abstract

Introduction: Malaria is a protozoan disease transmitted by the bite of infected Anopheles mosquitoes. WHO estimates that there were 216 million cases of malaria in 2016 resulting in 445,000 deaths. According to world malaria report 2012, India alone has an estimated 24 million cases per year. It is preventable and curable.

Aims and objectives: To assess the burden of malaria in a rural area, and evaluate the clinico-epidemiological factors among malaria positive cases.

Material and Methods: The study was conducted among 300 adult patients of malaria (Pf, Pv, Pf+ Pv) in the rural field practice area, by the Department of Community Medicine at MLB Medical College from March 2017 to October 2017. All the patients presenting fever with the suspicion of malaria were examined. Only peripheral smear / quantitative buffy coat positive patient was included.

Results: Out of total 300 patients of malaria 147 (49%) patients were of *P. falciparum*, 110 (36.67%) were of *P. vivax* and 43(14.33%) were of mixed infection. There was no predilection observed in this study towards any sex. Fever was the most common manifestation followed by Chills and rigors. While altered sensorium was seen in 71 (23.67%).

Conclusion: Use of multipronged strategies to combat the disease transmission and control with an integration of multi-sectoral collaboration is needed in a rural area.

Keywords: Malaria, *P. falciparum*, *P. vivax*.

1. Introduction

Malaria is a protozoan disease transmitted by the bite of infected Anopheles mosquitoes. Six species of the genus Plasmodium cause nearly all malarial infections in humans. These are *P. falciparum*, *P. vivax*, two morphologically identical sympatric species *P. ovale*, *P. malariae*, and *P. knowlesi*. While most of the deaths are caused by *falciparum malaria*, *P. knowlesi* and *P. Vivax* can also cause severe illness. [1]

Based on documented cases, the WHO estimates that there were 216 million cases of malaria in 2016 resulting in 445,000 deaths. According to world malaria report 2012 India alone has an estimated 24 million cases per year. [2]

It usually presents as fever, chills with rigor malaise, headache, myalgia, anorexia vomiting, jaundice, and anemia. Clinically, it may present with hepatosplenomegaly, acute renal failure, gastrointestinal symptoms, dehydration, shock, cerebral malaria and backwater fever. In 2016, nearly half of the world's population was at risk of malaria. [3]

Some population groups are at considerably higher risk of contracting malaria, and developing the severe disease, than others. This includes infants, children under the age of 5 years of age, pregnant women and patients with HIV/AIDS, as well as non-immune migrants, mobile populations, and travelers. National malaria control programmes need to take special measures to protect these

population groups from malaria infection, taking into consideration their specific circumstances. [4]

This is logical because the majority of cases with malaria occur in rural settings and in developing countries like India, where resources are limited with a scarcity of health services, stronger malaria surveillance systems are urgently needed to enable a timely and effective malaria response, to prevent outbreaks and resurgences. An objective of the study is to assess the burden of malaria in the rural area and to evaluate the clinico-epidemiological factors among malaria positive cases.

2. Material and Methods:

The study was conducted among 300 adult patients of malaria (Pf, Pv, Pf+ Pv) in the rural field practice area, by the Department of Community Medicine at MLB Medical College from March 2017 to October 2017.

All the patients presenting fever with the suspicion of malaria were examined. Peripheral thick/thin smear and quantitative buffy coat examination were done. Modified quantitative buffy coat (QBC) method is less expensive than routine QBC and the sample is easier to prepare than microscopy. The time required for the routine

QBC™ technique in detecting malarial parasites is 8–15 minutes which is a definite advantage over PBS microscopy which requires more than 60 minutes of sample examination. Only peripheral smear / quantitative buffy coat positive patients, age more than 14 years and who gave consent were included in a study. These patients were examined in detail and their various clinical manifestations were noted. The data was collected and analyzed using Epi-info 7.2.0.1 Software package and expressed as percentages, proportions, and descriptive tables.

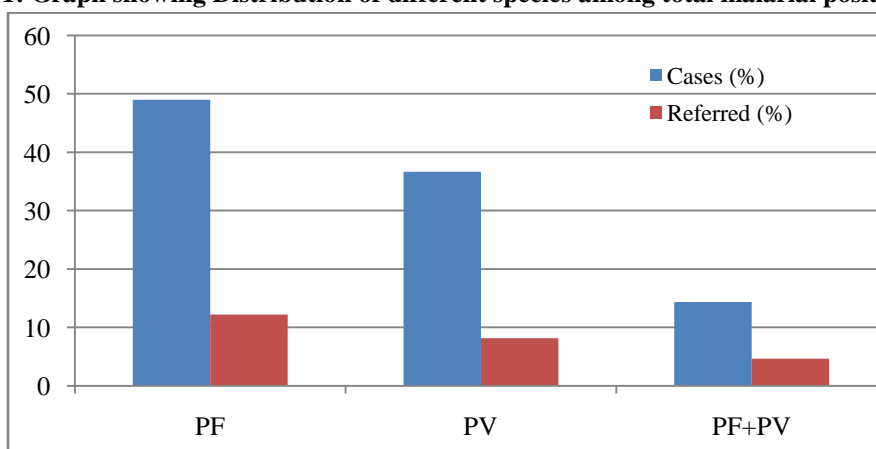
3. Results

Patients with fever who tested positive for the malaria parasite by peripheral smear or buffy coat preparation were included in our study. Out of 339 patients, 39 patients were lost to follow up thus 300 patients were finally included in our study. Patients were examined at the time of visit clinically and by laboratory investigations center. Out of the total 300 patients of malaria, 147 (49%) patients were of *P. falciparum*, 110 (36.67%) were of *P. vivax* and 43(14.33%) were of mixed infection. [Table 1, Figure 1]

Table 1: Distribution of different plasmodium species among total malarial positive cases

Species	No. of cases (n=300)	Percentage (%)	Mortality (%)
<i>P. falciparum</i> (PF)	147	49%	18(12.24%)
<i>P. vivax</i> (PV)	110	36.67%	09(8.18%)
PF+PV	43	14.33%	02(4.65%)
Total	300	100%	29(9.67%)

Figure 1: Graph showing Distribution of different species among total malarial positive cases



Out of the total 300 patients with malaria, 168(56%) patients were male, out of which 77(45.83%) were *p. falciparum* positive, 65 (38.69%) patients were *p. vivax* positive, and 25(14.88%) were positive for both i.e. mixed infection. A total of 132(44%) patients in this study

were females, out of which 70(53.03%) were *p. falciparum* positive, 45(34.09) patients were *p. vivax* positive, and 18(13.64) were positive for both i.e. mixed infection. There was no predilection observed in this study towards any sex. [Table 2]

Table 2: Distribution of total malarial positive cases with Gender among different species types

Sex	Total No. of cases	<i>P. falciparum</i>	<i>P. vivax</i>	Mixed
Male	168(56%)	77(45.83%)	65(38.69%)	25(14.88%)
Female	132(44%)	70(53.03%)	45(34.09%)	18(13.64%)
Total	300	147	110	43

Fever was the most common manifestation. It was present in 282 (94%) of the total patients. Chills and rigors were present in 264 (88%) of the patients. Nausea and vomiting were one of the most frequent symptoms after fever and chills. It was seen in 159 (53%) of the cases.

Headache was a presenting complaint in 121(40.33%) of the patients. Altered sensorium was seen in 71 (23.67%) of the patients. Diarrhea was observed in 41(13.67%) of the total cases. [Table 3]

Table 3: Distribution of symptoms among malarial positive cases among different species types

Symptoms	Total no of patients (%)	<i>P.falciparum</i>	<i>P. vivax</i>	Mixed
Fever	282(94%)	140(49.64%)	99(35.10%)	43(15.25%)
Chills and rigors	264(88%)	138(52.27%)	84(31.82%)	42(15.91%)
Headache	121(40.33%)	76(62.81%)	38(31.41%)	07(5.79%)
Nausea/vomiting	159(53%)	71(44.65%)	82(51.57%)	06(3.77%)
Diarrhoea	41(13.67%)	18(43.90%)	21(51.22%)	02(4.88%)
Altered sensorium	71(23.67%)	45(63.38%)	23(32.39%)	03(6.67%)

Pallor was noted in 179(59.67%) of the total cases. Icterus was the most frequent physical sign in the present study. Icterus was noted in 194(64.67%) patients. Out of 300 patients in the study, 149(49.67%) patients had

splenomegaly. Hepatomegaly was present in 51(17%) patients. Hypotension was present in 78(26%) patients. Cerebral malaria was present in 71(23.67%) patients. [Table 4]

Table 4: Distribution of signs among malarial positive cases among different species types

Signs	Total no of patients (%)	<i>p. falciparum</i>	<i>P. vivax</i>	Mixed
Pallor	179(59.67%)	86(48.04%)	71(39.67%)	22(12.29%)
Icterus	194(64.67%)	99(51.03%)	73(37.63%)	22(11.34%)
Splenomegaly	149(49.67%)	85(57.05%)	46(30.87%)	18(12.08%)
Hepatomegaly	51(17%)	26(50.98%)	14(27.45%)	11(21.57%)
Altered sensorium	71(23.67%)	45(63.38%)	23(32.39%)	03(6.67%)
Hypotension	78(26%)	43(55.13%)	21(26.92%)	14(17.95%)

4. Discussion

According to the World Malaria Report 2014, 22% (275.5million) of India's population lives in high transmission (> 1 case per 1000 population) areas, 67% (838.9million) lives in low transmission (0–1 cases per 1000 population) areas and 11% (137.7million) lives in malaria-free (0 cases) areas. In 2013, 0.88 million cases have been recorded, with 128 million tests being conducted on the suspected cases, with *P. falciparum* causing 53% and *P. vivax* causing 47% of the infections. The incidence of malaria in India accounted for 58% of cases in the South East Asia Region of WHO. Various attempts have been made in the past to study the factors responsible for morbidity and mortality in severe malaria and also to prognosticate the patients with malaria. [2,4]

In our study, males were affected more than females, which may possibly be due to an increased outdoor activity of male children than females. Findings in our study consisted of the discoveries of Kochar *et al* who reported an increased prevalence of malaria among females but only 33%, whereas in our study it was found to be [IJBAR \(2018\) 09 \(03\)](#)

41.2%. Our findings were on par with the discoveries of Gomber and Kabilan who reported the prevalence of malaria as 42% among females. [5,6]

Fever was the most common presenting feature symptoms met in our study as mentioned by many studies globally. Low level of parasitemia in *P.vivax* infections can even produce high fever due to its recognized low fever thresholds (100 infected RBCs/ μ l). Pallor was noticed maximally in cases of *P. falciparum* and Mixed infections than vivax malaria. Pallor caused by severe anemia is seen most commonly in the falciparum malaria as mentioned in many studies. Anemia may be due to hemolysis of infected RBCs and decreased the production of RBC from bone marrow which is observed mostly in falciparum than vivax. In endemic areas, associated factors like malnutrition and intestinal parasitic infections worsen this condition. [7,8]

We studied clinical and biochemical prognostic markers in malaria which will allow us to find out the probability of mortality among malarial cases and according to the severity of malaria, as there is a large number of cases of malaria and scarcity of health services

in third world countries including India. In 2015, 91 countries and areas had ongoing malaria transmission. Between 2010 and 2015, malaria incidence among populations at risk (the rate of new cases) fell by 21% globally. In that same period, malaria mortality rates among populations at risk fell by 29% globally among all age groups and by 35% among children under 5. In 2014, 97 countries and territories had ongoing malaria transmission.

5. Conclusions

This study has evidenced the abundance of microscopic infections in adults from the study area. Out of the total study subjects, about half cases of Pf (49%) followed by cases of PV (36.67%) and 43(14.33%) cases of mixed infection i.e. (PF+PV). Fever was the most common symptom cases, followed by chills and rigors. Icterus was the most common sign cases followed by pallor and splenomegaly. A more sensitive definition of malaria in adults should be formulated, considering other symptoms such as diarrhea, shivering and headache, combined with the presence of parasitemia.

Reporting of the maximum number of confirmed cases of malaria PV in age group >14 yrs and the majority of male cases is consistent with the previous studies. Reporting of the confirmed cases of malaria in the months of March to October in the district, when a national strategy for malaria elimination has been envisaged, is an alarming signal. The strengthening, the preventive and control measures for malaria elimination should be taken into consideration, keeping in view the epidemiological situation. Use of multipronged strategies to combat the disease transmission and control with integration of multi-sectoral collaboration is need of hour in rural area

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