

RESEARCH ARTICLE

A RETROSPECTIVE CLINICAL BASED STUDY OF MALARIA IN A UNIVERSITY TEACHING HOSPITAL***Juno J. Joel¹, Joshy P¹, Sreedharan Nair², Shastry C.S¹**¹Dept. of Pharmacy Practice, NGSM Institute of Pharmaceutical Sciences, Mangalore, India²Dept. of Pharmacy Practice, MCOPS, Manipal, India*Corresponding author's e-mail: junojoel@nitte.edu.in**ABSTRACT**

The study was a retrospective prescription analysis of evaluation of prescription patterns on patients admitted with malaria. The study was conducted for a one year period from June 2010 to May 2011. The study aimed to compare the prescriptions with the existing treatment guidelines. Evaluation of data was done for various parameters which include patient demographics, presenting signs and symptoms, previous exposure to malaria, co-morbidities, initial laboratory results, parasitological examinations during hospitalization and drug treatment regimens. A total of 117 prescriptions were analyzed. Among the various anti-malarial drugs given alone, Primaquine was the most prescribed anti-malarial drug (20.4%), followed by Chloroquine (7.2%), Artesunate (3.8%), and Arteether (1.3%), irrespective of the type of therapy. Chloroquine with Doxycycline (10%), Artesunate with Doxycycline (8.2%), Artesunate with Sulphadoxine/Pyrimethamine (12%) were considered to be appropriate rational combination regimens. It was found that 78.7% of these cases have been treated in accordance with the WHO norms and 21.3% of cases not in accordance with the norms. Inappropriate combinations which accounts of (20.7%) and an inappropriate choice of anti-malarial of (0.6%) were observed in the study. The study concluded that there is a need of individual treatment protocol for malaria caused by different parasites and regular training programs for the prescribers for the better patient care as the study site is observed as malaria zone.

Key words: Malaria, Anti-malarials, prescribing pattern.**INTRODUCTION**

Malaria should be considered as a serious disease since it accounts for the death of around 3 million people every year. This disease remains as a major public health issue in our country due to slow progress in its control. Malaria is a disease caused by the parasites called '*Plasmodia*' that lives part of its life in humans and part in mosquitoes.¹

Around 1.5 million cases of malaria are being reported annually by the National Vector Borne Disease Control Programme (NVBDCP), of which 50% are due to *P.falciparum*.²

Dakshina Kannada, a coastal district located on the western coast of Karnataka state was relatively free from malaria until early 1990 with only few cases. But since 1990, various industrial projects and other construction activities began with poor little care on hygienic aspects on due course there was an outbreak of malaria. It has been identified that the incidence of malaria increases with the onset of monsoon (June to October), as the water logging favors mosquito breeding and thus end up in transmission of the disease³.

Many states inhabited by ethnic tribes mainly in the forest ecosystems, malaria exist with the preponderance of *P.falciparum*.⁴

The greatest task is with the resistance of drug occurring with *P.falciparum*. It is necessary to take the guidance of the principles of clinical management of malaria which include early recognition of infection due to *P.falciparum* and rapid management procedures. This in turn helps the physicians in easy overcome on complicated situations.

The main objective of the study was to understand the prescribing patterns and to compare it with the existing national guidelines for the management of malaria

MATERIALS AND METHODS

The study was conducted at K.S Hegde Charitable Hospital. It is a 750-bedded private tertiary care hospital centrally located in Dakshina Kannada, Mangalore.

It is a retrospective cross-sectional study in which subjects admitted with a primary diagnosis of malaria during the one year period from June 2010 to May 2011 to study the clinical symptoms and the prescribing pattern of anti-malarial drugs.

All patients above 15 years of age diagnosed to have malaria (after doing a peripheral blood smear) were included in the study. The study protocol was approved by the institutional human ethics committee.

The collected data includes

- Patient demographic details
- Presenting signs and symptoms
- Clinical diagnosis and co-morbidities
- Previous exposure to malaria
- Laboratory tests and Parasitological examinations
- Drug treatment regimens

RESULTS AND DISCUSSION**Demographics**

In our study we have analyzed, 117 cases of confirmed malaria, admitted and treated in the hospital. Out of these,

there were 95 (81.2%) males and 22 (18.8%) female patients. The age of the patients ranged from 15 years to 73 years. Majority of the people n=88 (75.2%) belong to the age group of 25-45 years. Though the ages of the subjects were different, malaria parasitaemia did not vary significantly between different age groups.

Seasonal variation

The cases of malaria admitted and treated during different seasonal variations in a calendar year, were studied and are mentioned in Table 1. The highest frequency of cases was observed during the months of November and December (24%), and with the lowest rate of infection during the month of January (2.6%). A study conducted by Bonnlander *et al* at Central Haiti's Schweitzer hospital reported to have the peak case incidence occurred during November to January, a few months after the rainy season.⁵

Table 1: Seasonal variation of malaria cases per month

Month	No. of Malaria cases	Percentage
June	12	10.3
July	11	9.4
August	13	11.1
September	5	4.3
October	9	7.7
November	16	13.7
December	12	10.3
January	3	2.6
February	9	7.7
March	7	6.0
April	9	7.7
May	11	9.4

Distribution of Plasmodium Species

A detailed distribution on the type of Plasmodium species among the diseased individuals is mentioned in Table 2. There were 83 (70.9%) cases of *P.vivax* infection, 18 (15.4%) cases of *P.falciparum* and 16 (13.7%) cases of mixed infection (*P.vivax* plus *P.falciparum*). In a retrospective analysis conducted by Muddaiah *et al* in south canara found that *P.vivax* was the major parasite type (52.54%), followed by *P.falciparum* (33.75%)⁶. Highest number of *P.vivax* infections recorded in the present study shows their higher transmission rate in this region. An epidemiological study conducted in Qatar also revealed that *P.vivax* is the most common cause of imported malaria, with the majority acquired from the Indian subcontinent⁷.

Table 2: Types of malaria parasites

Parameter	Frequency	Percentage
<i>P. falciparum</i>	18	15.4
<i>P. vivax</i>	83	70.9
Mixed infections	16	13.7
Total	117	100

Past medical history

Only 16 patients had the past medical history of malaria. Three of the patients showed relapse because of discontinuing treatment.

Clinical symptoms of malaria

The initial clinical features and other findings are summarized in Table 3. Fever was the most commonly presented symptom by the patients and it accounted for all the cases (100%). This was followed by other major symptoms such as chills (89.7%), headache (57.3%), vomiting (49.6%), abdominal pain (23.1%), myalgia (21.4%), sweats (5.1%).

Table 3: Symptoms presented at the hospital by the patient

Clinical presentation	Frequency	Percentage
Fever	117	100
Chills	105	89.7
Headache	67	57.3
Vomiting	58	49.6
Abdominal pain	28	23.9
Myalgia	25	21.4
Splenomegaly	11	9.4
Hepatomegaly	9	7.7
Sweats	6	5.1

Comparison of symptoms according to plasmodia species

We have compared the presenting symptoms and clinical findings according to the parasite species. Abdominal symptoms including abdominal pain - 9 (50%); vomiting - 13 (72.2%); hepatomegaly - 4 (22.2%) dominated in *P.falciparum* infection. The 'p' value on comparison with *P.vivax* for abdominal pain, vomiting and hepatomegaly in *P.falciparum* infection was 0.0242, 0.0487 and 0.0236 respectively and found the statistically significant difference. The details are depicted in Table 4. A study based on the clinical features of malaria in Pakistan revealed that vomiting and abdominal pain occurred more frequently in patients infected with *P.falciparum* than any other parasites⁸.

Frequency of anti-malarial usage in various plasmodium species

Comparisons of drugs used among patients with malaria according to Plasmodium species was mentioned in Table 5. In case of *P.falciparum*, the most commonly prescribed antimalarial was Artesunate 16 (88.9%), followed by Chloroquine 8 (44.4%) and Primaquine 8 (44.4%). For *P.vivax*, the most commonly administered drug was Chloroquine 61 (73.5%) followed by Primaquine 56 (67.5%) and Artesunate 19 (22.9%), and in case of mixed infections, the most commonly prescribed drug was Artesunate 13 (81.3) followed by Primaquine 10 (62.5%) and Chloroquine 8 (50.0%).

Table 4: Comparison of presenting signs and symptoms among cases of malaria according to Plasmodium species

Clinical Presentation	<i>P.falciparum</i> (N=18) %	<i>P.vivax</i> (N=83) %	OR	95% CI	P Value
Fever	100.0	100.0	0.22	0.004 – 11.53	0.4548
Headache	55.6	56.6	0.96	0.34 – 2.67	0.9338
Abdominal Pain	50.0	22.9	3.37	1.97 – 9.69	0.0242*
Chills	94.4	92.8	1.32	0.15 – 11.73	0.8005
Sweats	5.6	3.6	1.57	0.15 – 16.01	0.7041
Myalgia	27.8	21.7	1.39	0.44 – 4.41	0.5775
Vomiting	72.2	45.8	3.10	1.01 – 9.42	0.0487*
Hepatomegaly	22.2	4.8	5.64	1.27 – 25.24	0.0236*
Splenomegaly	11.1	7.2	1.60	0.31 – 8.68	0.5833

P<0.05*

Table 5: Frequency of use of different anti-malarials in various species of malaria infection

Drugs	Species		
	<i>P.falciparum</i> n (%)	<i>P.vivax</i> n (%)	Mixed infection n (%)
Chloroquine	8 (44.4)	61 (73.5)	8 (50.0)
Artesunate	16 (88.9)	19 (22.9)	13 (81.3)
Sulphadoxine/Pyrimethaine	4 (22.2)	14 (16.9)	4 (25.0)
Primaquine	8 (44.4)	56 (67.5)	10 (62.5)
Doxycycline	8 (44.4)	18 (21.7)	6 (37.5)
Quinine	2 (11.1)	-	1 (6.3)
Artemether	2 (11.1)	-	-
Artemether-Lumefantrine	1 (5.6)	4 (4.8)	-
Arteether	-	13 (15.7)	4 (25.0)

Anti-malarial therapy based on WHO guidelines

We have conducted a comparison study on the anti-malarial drug prescribing pattern with the WHO. In single drug therapy, Primaquine was the most prescribed anti-malarial drug (20.4%), followed by Chloroquine (7.2%), Artesunate (3.8%), and Arteether (1.3%), irrespective of the type of therapy. In combined drug therapy Chloroquine with Doxycycline (10%), Artesunate with Doxycycline (8.2%), Artesunate with Sulphadoxine/Pyrimethamine (12%) were prescribed and considered as rational in accordance with WHO. Thus, 78.7% of these cases have been treated in accordance

with the WHO norms. The study result also shows the drug therapeutical management of the remaining 21.3% of cases was not according to the WHO norms. We have observed the inappropriate combinations in antimalarial drug therapy which include (20.7%) and an inappropriate choice of anti-malarial drug at the rate of (0.6%) during the study (Table 6). A Similar study report also suggested that Chloroquine with Sulphadoxine/Pyrimethamine is not a suitable combination especially in first-line treatment of *P.falciparum*⁹. A study by Abuaku B K et al found that inappropriate doses of chloroquine prescriptions were more in private than government health care systems¹⁰.

Table 6: Anti-malarial mono and combination therapy based on WHO guidelines

Correct anti-malarial mono and combination therapy (78.7%)		
Description	Number (Frequency)	Percentage (%)
Chloroquine	23	7.2
Artesunate	12	3.8
Primaquine	65	20.4
Arteether	4	1.3
Artemether-Lumefantrine	4	1.3
Chloroquine+Arteether	13	8.2
Chloroquine + Doxycycline	16	10.0
Primaquine+Artesunate	4	2.6
Artesunate+ Sulphadoxine/Pyrimethamine	12	7.5
Artesunate+Doxycycline	13	8.2
Others	13	8.2
Inappropriate combination or choice of anti-malarials (21.3%)		
Sulphadoxine/Pyrimethamine	2	0.6
Chloroquine+Artesunate	17	10.7
Chloroquine+ Sulphadoxine/Pyrimethamine	16	10.0
Total		100

CONCLUSION

Malaria is a significant and serious public health problem in Karnataka state and particularly in Dakshina Kannada district. Our study has defined the characteristics of malaria cases admitted to K S Hedge Charitable Hospital in Mangalore. The age group of 15 to 45 years is mostly affected, which includes a high number of male adults. Seasonal trend showed occurrence of cases mainly during early rainfall [May-August; n=47, 40.17%] and a late peak during November-December [n=28, 24%]. Majority of the cases were infected by *P.vivax*. Fever was present in all cases; abdominal symptoms dominate in *P.falciparum* infection when compared with *P.vivax* infection.

Chloroquine was the most commonly prescribed antimalarial drug during this study period. Due to raising fear of resistance, multidrug approach has been tried in majority of cases and thereby helped in

preventing resistance and serious complications. We have observed that 78.7% of these cases have been given treatment according to WHO guidelines and the remaining did not.

There is a need for special treatment protocol for malarial based on the different plasmodium species and for drug resistant malaria in this particular locality. It is suggested that adequate vector control measures associated with active surveillance will certainly reduce the malaria transmission in this region. Moreover, Implementation of regular training programs, workshops and other modes, to enhance the prescription patterns among prescribers should be encouraged for better patient care.

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CONFLICTS OF INTEREST: Nil

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