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General Medicine

PREVALENCE OF MODS IN PATIENTS OF MALARIA AND ASSOCIATION WITH TYPE OF MALARIA

Deep Kamal Soni — PG Resident, Department of Medicine, Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly

Amit Chaturvedi* — Asst. Professor , Department of Medicine, Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly *Corresponding Author

A B Mowar — Professor and Head of Department , Department of Medicine, Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly

KEYWORDS :

INTRODUCTION-

Malaria continues to be a major public health problem in South East Asia Region with nearly 290 million people estimated to be at risk. Of the reported cases of malaria, India accounts for 77% of the cases in the South East Asian Region. As reported in 2006, Odisha accounts for the second highest number of malaria cases in the country (17.86%), with 86.92% of these being Plasmodium falciparum malaria, which constitute 29.63% of total number of Plasmodium falciparum malaria cases in the country (1)

states inhabited by ethnic tribes mainly in the forest ecosystems, meso to hyperendemic conditions of malaria exist with the preponderance of P. falciparumto the extent of 90% or even more (2).

Uttarakhand, the hilly state of India, falls under hypo endemic zone of malaria (3). Nine anopheles species are reported to cause malaria in Kumaonregion (4), while three species are reported to be the dominant vector for malaria in Garhwal region (5).

Saini et al (2010) reported 14% positivity for malarial parasite among suspected fever patients and out of them 30% patients were infested by P falciparum while rest 70% patients were infested by P vivax(6).

AIMS & OBJECTIVES

1. To study the prevalence of MODS in patients with malaria.
2. To study the association of MODS with type of malaria

MATERIALS & METHODS

The study was conducted in the Department of Medicine, Shri Ram murti smarak institute of medical sciences, bareilly over a period of 12 months. Subjects were recruited among patients from medical wards of Shri Ram murti smarak institute of medical sciences, bareilly, diagnosed to be having malaria.

Study Design:
Type of study- Observational and analytical study.

Sample size and sampling methods- Total 124 consecutive cases of malaria presenting over a period of one year.

Inclusion Criteria

- Patients above 18 years of age, with a diagnosis of malaria

Exclusion Criteria

- Any condition other than malaria, which could lead to MODS such as pancreatitis, dengue, leptospirosis, enteric fever, scrub typhus etc.

Investigations

- Complete haemogram
- Erythrocyte sedimentation rate (ESR)
- Reticulocyte count
- Complete urinalysis
- Peripheral blood smear for malarial parasite (PS for MP):
- Rapid malaria test (RMT): An immuno-chromatographic test using monoclonal anti-HRP-2 (Falciparum specific) and monoclonal anti-pLDH (Vivax specific) antibodies coated on the test lines.
- Malaria parasite index
- Liver function tests-
- Serum bilirubin (total, direct and indirect)
- Serum ALT
- Serum AST
- Serum ALP
- Serum total proteins
- Serum albumin
- Serum globulin
- A/G ratio
- Prothrombin time / INR
- Serum creatinine
- Blood urea nitrogen
- Serum potassium,
- Serum sodium,
- Serum G6PD
- Chest x-Ray PA view
- ECG
- Fundus examination
- Other special tests like Arterial blood gas analysis, aPTT, Serum fibrinogen, Serum FDP, D-dimer test, ultrasonographic examination of abdomen, viral markers like antibodies to HAV, antibodies to HEV, HBsAg antigen and antibodies to HCV, urine culture and sensitivity, blood culture and sensitivity and echocardiography were done wherever required.

The patients were given standard anti-malarial treatment as per WHO guidelines and response was assessed for outcome.

RESULTS

The present study was carried out on 124 malaria patients. Age wise distribution with type of malaria species is summarized in Table 1.

Table 1. Age-wise distribution of malaria patients (n=124)

Age group (years)	Number of cases (%)			Total cases (%)
	Type of malaria			
	PF (n=67)	PV(n=52)	PF+PV(n=5)	
18 – 29	26 (38.80%)	25 (48.07%)	1 (20%)	52 (41.93%)
30 – 49	23 (34.32%)	16 (30.76%)	0	39 (31.45%)
30 – 49	23 (34.32%)	16 (30.76%)	0	39 (31.45%)
50 – 70	14 (20.89%)	9 (17.30%)	4 (80%)	27 (21.77%)
> 70	4 (5.97%)	2 (3.84%)	0	6 (4.83%)
Total	67	52	5	124

In our observational study, the mean age of the patients was 38.01 ± 16.83 years. Age range was 18-85 years. Majority of the patients, 41.93%, were between 18-29 years of age group. Looking at the prevalence of type of malaria, falciparum malaria dominated the scenario, as majority of the patients (54.03 %) had P. falciparum mono-infection, followed by P. vivax (41.93%) and mixed infection (4.03%).

Fever was the most common presenting complaint, occurring in 97.58% cases and was associated with chills in 87.90 %.The mean duration of fever was 7.01 ± 5.02 days.Other common complaints were jaundice, nausea/vomiting, bodyache, headache, rashes, bleeding manifestations in form of hematuria, epistaxis and gum bleed, pain abdomen.

Table 2. Symptomatologyof malaria patients (n=124)

Symptom	Number of cases (%)			Total number of cases (%)
	Type of Malaria			
	PF n=67	PV n=52	PF+PV n=5	
Fever	65 (97.01%)	51 (98.07%)	5 (100%)	121 (97.58%)
Chills	59 (88.05%)	46 (88.46%)	4 (80%)	109 (87.90 %)
Bodyache	18 (26.86%)	15 (28.84%)	1 (20%)	34 (27.41%)
Headache	16 (23.88%)	11 (21.15%)	2 (40%)	29 (23.38%)
Jaundice	29 (43.28%)	16 (30.76%)	2 (40%)	47 (37.90%)
Vomiting	26 (38.30%)	18 (34.61%)	1 (20%)	45 (36.29%)
Bleeding manifestation (hematuria/bleeding from nose/bleeding gums)	14 (20.89%)	10 (19.23%)	1 (20%)	25 (20.16%)
Pain abdomen	15 (22.38%)	10 (19.23%)	0	25 (20.16%)
Loose stools	7 (10.44%)	0	0	7 (5.64%)
Shortness of breath	9 (13.43%)	7 (13.46%)	0	16 (12.90%)
Altered sensorium	6 (8.90%)	0	0	6 (4.83%)
Decreased urine output	10 (14.92)	3 (5.76%)	1 (20%)	14 (11.29%)

Table 3. Signs observed in malaria patients (n=124)

Clinical sign	No. of cases	Percentage (%)
Tachycardia (>100/min)	58	46.77
Hepatomegaly	58	46.77
Pallor	56	45.16
Icterus	51	41.12
Splenomegaly	48	38.70
Pedal edema	41	33.06
Hepato-splenomegaly	32	25.80
Rashes on body (purpura / echymoses /petechiae)	28	22.58
Crepitations in chest	18	14.51
Subconjunctival hemorrhage	10	8.06
Neurological deficit	6	4.83
Lymphadenopathy	3	2.41

On clinical examination, tachycardia was the most common sign seen in 46.77% of the patients. Other signs frequently observed were hepatomegaly (46.77%), splenomegaly (38.70%), hepato-splenomegaly (25.80%), pallor (45.16%), icterus (41.12%), pedal edema (33.06%) and rashes on body (purpura/ecchymosis/petechial) (22.58%).

Table 4. Thrombocytopenia in malaria patients as per type of malaria

Platelet count (thousand/ cumm)	Number of cases (%)			Total number of cases (%)
	Type of malaria			
	PFn=67	PV n=52	PF+PV n=5	
<20	29 (43.28%)	23(44.23%)	1(20%)	53(42.74%)
21-50	15(22.38%)	15(28.84%)	1(20%)	31(25%)
51-100	13(9.40%)	8 (15.38%)	2(40%)	23(18.54%)
101-150	4(5.97%)	47.69%)	1(20%)	9 (7.25%)

The average platelet count at admission was 49,430/cumm. Thrombocytopenia (platelet count<150,000/cumm) was seen in 93.5% of the patients. The prevalence of thrombocytopenia (platelet count <150,000/cumm) among P.falciparum patients was 91.05%, whereas it was 96.16% among P.vivax patients and 100% in mixed infection. Overall, severe thrombocytopenia (platelet count<20,000/cumm) was seen in 42.74% malaria patients. Severe thrombocytopenia was seen in 43.28% patients with falciparum malaria, 44.23% with vivax malaria and 20% with mixed infection.

Table 5. Association between thrombocytopenia and type of malaria

Thrombocytopenia	Number of cases			p value
	Type of malaria			
	PFn=67	PV n=52	PF + PV n=5	
Present	61	50	5	0.61
Absent	6	2	0	

There was no significant association between type of malaria and thrombocytopenia (p=0.61).

Table 6. Association between thrombocytopenia and type of malaria

Thrombocytopenia	Number of cases			p value
	Type of malaria			
	PFn=67	PV n=52	PF + PV n=5	
Present	61	50	5	0.61
Absent	6	2	0	

There was no significant association between type of malaria and thrombocytopenia (p=0.61).

Table 7. Association between type of malaria and severe malaria, as per WHO criteria

Severe malaria	Number of cases (%)			Total number of cases (%)	p value
	Type of malaria				0.014
	PF n=67	PV n=52	PF+PV n=5		
Present	54(80.60%)	31(59.61%)	5(100%)	90(72.58%)	
Absent	13(19.40%)	21(40.39%)	0(0%)	34(27.41%)	

In our study, 72.58% (90/124) of the patients had severe malaria, as per WHO criteria for severe malaria. All the patients of mixed species malaria infection had severe malaria. While, 80.60% (54/67) of the patients with falciparum mono-infection had severe malaria, it was found only in 59.61% (31/52) of the vivax group of mono-infection. There was a significant association between severe malaria and type of malaria (p= 0.014).

Table 8. Manifestations of severe malaria as per WHO criteria

Manifestations	Number of cases (%)			Total number of cases (%)	p value
	Type of malaria				
	PF (n=67)	PV (n=52)	PF+PV (n=5)		
Anemia (Hb<5gm%)	4 (5.97%)	1 (1.92%)	0	5 (4.03%)	0.50
AKI (Serum Creatinine>3mg/dl)	11 (16.41%)	6 (11.53%)	2 (40%)	19 (15.32%)	0.17
AKI (Serum Creatinine>3mg/dl)	11 (16.41%)	6 (11.53%)	2 (40%)	19 (15.32%)	0.17
Hyperbilirubinaemia (Serum Total Bilirubin > 3mg/dl)	27 (40.29%)	19 (36.53%)	3 (60%)	49 (39.51%)	0.55
Hypoglycemia (RBS <40mg/dl)	5 (7.46%)	0	0	5 (4.03%)	0.12
Algid malaria (Systolic B.P. <70 mm Hg)	0	4 (7.69%)	0	4 (3.22%)	0.07
Cerebral Malaria	5 (7.46%)	0	0	5 (4.03%)	0.12
Hyperparasitaemia (MPI> 5%)	2 (2.98%)	1 (1.92%)	0	3 (2.41%)	1
Hemoglobinuria	24 (35.82%)	9 (17.30%)	2 (40%)	35 (28.22%)	0.05
Acidosis/acidaemia	17 (25.37%)	8 (15.38%)	1 (20%)	26 (20.96%)	0.39
ARDS (PO2/FiO2<200)	8 (11.94%)	3 (5.76%)	0	11 (8.87%)	1
DIC	8 (11.94%)	2 (3.84%)	1 (20%)	11 8.97%)	0.15

The most common manifestation of severe malaria as per WHO criteria were hyperbilirubinaemia, hemoglobinuria, acidosis/acidaemia, and AKI. Algid malaria was seen only in Plasmodium vivax malaria, while acid base disturbances, ARDS, DIC, and hemoglobinuria were predominantly seen in Plasmodium falciparum malaria.

Table 9. Prevalence of MODS as per WHO criteria of severe malaria in different types of malaria

Type of malaria	Number of cases (%)		p value
	MODS	Non-MODS	
PF(n=67)	33 (49.25%)	34 (50.75%)	0.381

PV(n=52)	19 (36.53%)	33 (63.46%)	
PF + PV(n=5)	2 (40%)	3 (60%)	
Total	54 (43.54%)	70 (56.45%)	

The prevalence of MODS, as per WHO criteria for severe malaria, was highest in falciparum malaria cases (49.25%), followed by malaria due to mixed infection (40%) and vivaxmalaria (34.61%); but no significant association was seen between MODS and type of malaria (p= 0.381).

Table 10. Association between type of malaria and outcome of MODS as per WHO criteria of severe malaria

Type of malaria	Outcome of MODS		p value
	Number of Survivors (%)	Number of non-survivors (%)	
PF (n=33)	28 (84.85%)	5 (15.15)	0.52
PV (n=19)	18 (94.44%)	1 (5.56%)	
PF + PV (n=2)	2 (100%)	0 (0%)	
Total (n=54)	48 (88.67%)	6 (11.32%)	

No significant association was observed between type of malaria and outcome of MODS (p= 0.52).

DISCUSSION

Malaria is one of the most important infectious diseases in the world. Malaria due to P. falciparum is the most deadly while P. vivax is less dangerous but more widespread (7).

We studied 124 patients proven to have malaria by rapid malaria test and peripheral blood smear. Majority(58.87%), of these patients belonged to rural area and 41.13 % to urban area. Similar finding were seen in another study (8) on 100 patients where 59 % of the study subjects belonged to rural area and 41 % to urban area.

In our study, 72.58% (90/124) patients had severe malaria according to WHO criteria for severe malaria. Galande et al (9) found prevalence of severe malaria in 43% (43/100) of their cases.

Hypoglycaemia was seen in 4.03% in our cases, whereas, it was reported in 1.5% of the cases by Ratan et al (10) and in 3% of the cases by Galande et al (9).

ARDS was prevalent in 8.87% (11/124) cases in our study. Majority (8/11) of the malaria associated ARDS cases had P. falciparum mono infection and the rest had P. vivax mono infection. The observed difference was statistically not significant. Thisobservation was in accordance with the results of the studies conducted by Limaye et al (11) and Ratan et al (10). Ratan et al observed malaria associated ARDS in 7% (14/201) of all malaria cases and majority of them {71.42% (10/14)} had P. falciparum mono infection, followed by P. vivax mono infection {21.42% (3/14)} and mixed species infection {7.14% (1/14)}. The observed difference, in this study too, was not statistically significant. Limaye et al (11) had prevalence of ARDS of 5.58% (38/680). Thus the prevalence of ARDS observed in our study is comparable to that in other studies.

In our study, 72.58% (90/124) patients had severe malaria according to WHO criteria for severe malaria. Two or more complications/MODS were observed in 60% (54/90) patients. Sarkar et al (12) studied 900 patients and found severe malaria in 22.22% (200/900) patients, according to WHO criteria for severe malaria. Two or more complications/MODS were observed in 46% (92/200) patients. The difference can be attributed to the selection of patients and the large sample size of their study. Sarkaret al (12) had included vivaxmono-infection patients only while we had selected every patient of malaria irrespective of the type.

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