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Original Research Article.

Clinico-Laboratory Profile and Response to Current Treatment Regimens of Malaria in South Eastern Rajasthan

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ABSTRACT

Introduction: Malaria continues to be one of the important public health problems in India. Rajasthan is an endemic zone of malaria with still a high prevalence rate. A revised knowledge of present scenario of malaria is almost under control. This prospective study was conducted to analyze various types of presentation of Malaria in adults, its complications and response to current treatment regimens available.

Materials and Methods: This cross sectional study was completed over a period of 12 months; from 1st November 2015 to 31st December 2016; carried out in Department of Medicine RNT medical college and attached group of hospitals Udaipur (Raj). 200 patients who presented with fever and associated symptoms with test positive for malaria by slide and/or MPQBC (Malaria Parasite Quantitative buffy coat) and inclusion criteria were enrolled in the study. These patients were then subjected to treatment regimens with regular vital monitoring and laboratory tests. The main method to establish diagnosis was microscopy of PBF, however MPQBC helped in diagnosis of cases missed on slide examination and mixed infections. The presence of various complications, treatment response and outcome was studied.

Results & Conclusion: *P. falciparum* was the major parasite type causing malaria as 56% cases. All complications cerebral malaria, respiratory distress, haematological, malaria hepatopathy, acute renal failure and electrolyte disturbances were noted in greater frequency in *P. falciparum.* However even *P. vivax* accounted for complicated cases of malaria in this region. For dysnatremia, hyponatremia was more common than hypernatremia with increase frequency amongst *P.falciparum* cases and higher in cerebral malaria. There was a good response to artesunate and quinine drug with 2nd line drugs. However 14 patients in artesunate group were subsequently shifted to quinine based therapy after treatment failure. A total of 4 deaths were reported all *P.falciparum* positive. However an early diagnosis and adequate treatment with antimalarials with timely supportive therapy with Hemodialysis and blood component transfusion can save lives in malaria.

Keywords: Malaria, Laboratory Profile, P. falciparum, vivax.

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INTRODUCTION

Malaria continues to be one of the important public health problems in India. As per World Health Organization report 2015, South East Asian Region (SEAR) bears the second largest burden of malaria (10%), only being next to African region (88%).[1] Among South-east Asia region, India shares two-thirds of the burden (66%) followed by Myanmar (18%) and Indonesia (10%).[2] The malaria situation remains a major problem in certain states and geographical pockets in India. The majority of malaria cases and deaths in India are being reported from Orissa, Rajasthan, Jharkhand, Chattisgarh, Madhya Pradesh and the Seven North Eastern states. Rajasthan is an endemic zone of malaria with still a high prevalence rate. About approximately 33,000 cases (2013 data NVBDCP) reported annually from Rajasthan. Malaria is caused by protozoan parasite of genus Plasmodium. Six species of the plasmodium *P. falciparum, P.vivax, 2 subtypes of P.ovale, P.malariae* and *P.knowlesi* cause malaria in humans. The common clinical manifestations are fever with chills and rigors, headache, vomiting, jaundice and common sign being splenomegaly, pallor and icterus.[3] Hematological abnormality which is most commonly seen in malaria is thrombocytopenia followed by anemia. Both are seen with all types of malaria but most commonly with *P. falciparum* malaria.[4]

Malaria has been a serious problem in some parts of the country due to the slow progress in its control. The wide spectrum of presentations and its changing trends, emerging resistance in species, lack of proper health infrastructure, inability to control the disease in endemic areas, and movement of the population are some of the factors responsible for failure to curb malaria. A revised knowledge of present scenario of malaria is almost under control. This prospective study was conducted to analyze various types of presentation of Malaria in adults, its complications and response to current treatment regimens available as per NVBDCP Guidelines (2004).

AIMS AND OBJECTIVES

To determine the clinico-laboratory profile of Malaria in adults. To know its presentation, severity and response to current treatment regimens.

MATERIALS AND METHODS

Study Area: R.N.T. Medical College and Associated Groups of Hospitals of Udaipur in (South Rajasthan).

Study Population: All patients admitted in Inpatient Department with complaints of fever with chills and rigor associated with pain abdomen, vomiting, any bleeding manifestation, altered mental status, yellowish discoloration of skin and sclera with loss of appetite to the Department of Medicine.

Study Period: One year from March 2016 to December 2017.

Sample Size: A total number of 200 patients Diagnosed as Positive cases of malaria (PBF/MPQBC).

Inclusion Criteria: All the cases tested positive for malaria parasite by slide or MPQBC and admitted at the medicine ward in the age group of 14 year and above were included.

Exclusion Criteria: Patients presenting with fever (malaria smear negative), but treated empirically for malaria. Patients presenting with clinical features mimicking malaria (malaria parasite test negative or positive), as in leptospirosis, dengue fever and sepsis.

Study Design: This study was an Institution based observational cross sectional study.

Data Analysis: The SPSS for the windows 20.0 Statistical package program was used in the evaluation of the data. The quantitative data of the groups was compared using ANOVA (Analysis of Variance) and Tukey's HSD Post Hoc test for multiple comparisons and the qualitative data was compared using Chi-square test. P value < 0.05 was considered significant.

OBSERVATIONS

In this study male patients were 54% of the total study population. The Male to Female ratio was 1.1.7. There was no statistical significance (p=0.433) of gender distribution to the type of Malaria. The majority of patients 38.5% were in the age group 21-30years.The next group with greater proportion 18.5% was case was 31-40years. 25(12.5%) cases were >/ 60 years. In the present study 112(56%) patients were *P. falciparum* positive, 80(40%) were *P.vivax* positive and 8(4%) patients had mixed infections, positive for both *P. falciparum* and *P.vivax*. Majority of cases 71.5% cases were diagnosed on PBF, 25% patients were positive by MPQBC and 3.5 % of the cases were positive by both tests of which majority 2% cases were of mixed infections. This finding had strong statistical relation, p=0.00.

In *P.falciparum* 8(7.1%), in *P.vivax* 17(21.7%) and in mixed infections 1(12.5%) patients had haemoglobin <7gm%. The prevalence of severe thrombocytopenia with platelet count <20,000/mm3 was (16.1%) in *P.falciparum*, (21.1%) in *P.vivax* and 0 in mixed infection. The patients with serum bilirubin levels >3mg/dl were 22(19.6%) in *P.falciparum*, 12(15.0%) in *P.vivax* and 4(50.0%) in mixed infection. 78(70.0%) patients of *P.falciparum*, 49(61.0%) patients of *P.vivax* and 7(88.0%) patients with mixed infection had complicated malaria.

Among 200 patients, 128(64%) patients received Quinine and 72(36%) patients received Artesunate. However 14 patients were received Quinine as second drug when they failed to respond to Artesunate.

As per 2nd line agents Doxycycline was administered to 52.3%, followed by clindamycin to 46.7% and next Mefloquine to 1%. In the study *P. falciparum* positive patients with abnormal bleeding requiring transfusion are 18.75% PCV, 13.40% RDP and 2.60% FFP. *P. vivax* positive patients requiring transfusion were 6.25% PCV, 10% RDP and 3.75% FFP.

However patients with mixed infections had greater probability of receiving transfusion, being 50% each for PCV, RDP and FFP. Out of the 5 patients of *P. falciparum* in ARF, 4 required HD. Whereas *P.vivax* positive cases recovered with conservative management. Only 1 case of mixed developed ARF who also underwent Hemodialysis.

The study showed a total mortality of 4 patients out of which there were 3 cases of *P. facliparum* alone and 1 case of mixed *P.falciparum* and *P.vivax* case. *P. falciparum* had a mortality of 2.6% despite antimalarial treatment.

Table 1: Frequencies of various complications in malaria

Complications	P. falciparum (n=112)		P. vivax (n=80)		Mixed (n=8)	
	No.(x)	%(x/112)	No.(y)	%(y/80)	No.(z)	%(z/8)
Coma	20	17.8	11	13.7	2	25.0
Convulsions	11	9.7	3	3.7	2	25.0
Prostration	7	6.3	1	1.2	3	37.0
Dyspnea	22	19.5	6	7.5	3	37.0
Pulmonary edema	5	4.4	3	3.7	1	12.0
Bleeding	14	12.4	7	8.7	2	25.0
Haemoglobinuria	1	0.8	0	0	1	12.0
Vomiting	26	23.2	12	1.5	4	50.0
Jaundice	24	21.3	13	16.2	5	62.5
SBP /< 80mm Hg	7	6.2	2	2.5	3	37.0
DBP /< 60mm Hg	4	3.5	0	0	2	25.0

Table 2: Correlation of various laboratory parameters v/s type of malaria

Parameter	P. falciparum	P. vivax	Mixed	P value
Haemoglobin				
Mean	9.77	10.71	9.40	0.667
Range	3.90-15.00	3.00-13.80	5.70-12.60	
Platelet				
Mean	82,562	93,138	48,250	0.137
Range	5,000-3,60,000	15,000-3,40,000	12,000-1,00,000	
Total count				
Mean	5,225	5,407	6,475	0.68
Range	3,200-8,300	3,400-8,300	4,400-8,200	
Total bilirubin				
Mean	2.85	2.33	5.4	0.016
Range	0.15- 27.0	0.70- 10.0	1.5-11.5	
Direct bilirubin				
Mean	1.74	1.29	3.5	0.42
Range	0.05-19.3	0.05-6.8	0.3-8.8	
AST				
Mean	120	113.20	268.0	0.31
Range	24-1006	23-888	34-600	
ALT				
Mean	133.90	107	91.12	0.46
Range	23- 1133	26-689	46-434	
ALP				
Mean	85.7	81.2	127.62	0.03
Range	32-520	34-630	36-230	
Blood urea				
Mean	40.91	38.16	76	0.001
Range	14.0-211.0	23.0-177.0	32.0-210.0	
Serum creatinine				
Mean	1.38	1.16	2.23	0.001
Range	0.7-3.4	0.70-2.13	1.06-6.1	
Random blood glucose				
Mean	101.0	101.28	95.75	0.129
Range	30.0-347.0	23.0-328.0	50.0-167.0	
Serum sodium				
Mean	132.0	136.80	134.5	0.129
Range	108-168	123-167	115-167	
Serum potassium				
Mean	3.92	3.78	3.97	0.058
Range	2.9-4.9	2.8-6.4	3.2-5.0	

Table 3: Prevalence of Dysnatremia in Cerebral Malaria

Cases of cerebral malaria	Normal sodium	Hyponatremia	Hypernatremia	Total
P. falciparum	7(32.0%)	13(59.0%)	2(9.0%)	22
P. vivax	5(36.0%)	6(43.0%)	3(21.0%)	14
Mixed	0	1(50.0%)	1(50.0%)	2

DISCUSSION

Malaria is responsible for major health concern in south-eastern region of Rajasthan and is found to affect comparatively the younger adult population without gender predominance. *P. falciparum* was the major parasite type causing malaria as 56% cases. The main method to establish diagnosis was microscopy of PBF, however MpQbc helped in diagnosis of cases missed on slide examination and mixed infections. In our study patients with reduced haemoglobin <7gm% were highest in *P.vivax* 21.1%.This is contradictory to Chowta et al[5] who reported 37% patients with anemia from KMC Attava observed. Higher rates of anemia were recorded in *P. falciparum* (60%) and *P. vivax* (19%) patients of Saudi Arabia and Indonesia.[6,7] All complications cerebral malaria, respiratory distress, haematological, malaria hepatopathy, acute renal failure and electrolyte disturbances were noted in greater frequency in *P. falciparum.* All complications were noted with a

greater frequency amongst *P. falciparum* cases which goes as per literature.[8] However even *P. vivax* accounted for complicated cases of malaria in this region.

In our study severe thrombocytopenia with platelet count <20,000/mm3 was (16.1%) in *P.falciparum*, (21.1%) in *P.vivax* and 0 in mixed infection. From another part of India, thrombocytopenia was reported in 50% of *P. falciparum* and 65% of *P.vivax* patients[9] which are different to our values. A recent study from Mumbai has shown thrombocytopenia in (13%) of *vivax* and (82%) of *falciparum* patients.[10]

For dysnatremia, hyponatremia was more common than hypernatremia with increase frequency amongst *P.falciparum* cases and higher in cerebral malaria.

Jasani *et al*[11] reported that malaria infection led to reduction in the levels of both sodium and potassium. English *et al*[12] reported (55%) cases of hyponatremia (sodium < 135 mmol/L) and (3%) cases of hypernatremia.

There was a good response to artesunate and quinine drug with 2nd line drugs. However 14 patients in artesunate group were subsequently shifted to quinine based therapy after treatment failure. A total of 4 deaths were reported all *P.falciparum* positive. However an early diagnosis and adequate treatment with antimalarials with timely supportive therapy with HD and blood component transfusion can save lives in malaria.

SUMMARY AND CONCLUSION

Malaria is responsible for major health concern in south-eastern region of Rajasthan and is found to affect comparatively the younger adult population without gender predominance. *P. falciparum* was the major parasite type causing malaria as 56% cases. The main method to establish diagnosis was microscopy of PBF, however MpQbc helped in diagnosis of cases missed on slide examination and mixed infections. All complications cerebral malaria, respiratory distress, haematological, malaria hepatopathy, acute renal failure and electrolyte disturbances were noted in greater frequency in *P. Falciparum.* There was a good response to artesunate and quinine drug with 2nd line drugs.

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