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Study of hematological parameters indiagnosed cases of malaria at tertiarycare centre, Jhalawar

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Abstract

Background: The present study was conducted for assessment and correlation of level of parasitemia with haematological changes which could guide the diagnosis and treatment of malaria and in turn decreasing mortality and morbidity.

Methods: The present study was conducted in the Department of Pathology, Jhalawar Medical College, Jhalawar, Rajasthan, India. The present study was conducted from Feb. 2020 to Oct. 2021. The total of 50 of any age group reporting to Department of Pathology were enrolled for the study. The study was carried out after obtaining approval from the Institutional Research Ethical Committee. An informed and written consent was obtained from all the blood donors.

Results: Out of 50 subjects, all had 1-5% parasite species. Out of 20 patients with P. falciparum infection, all had 1-5% parasite species. Among 4 patients of P. falciparum + P. vivax infection, all had 1-5% parasite species. Out of 26 patients with P. vivax parasitic infection, all had 1-5% parasite species.

Conclusion: The present study revealed that the antigen-based method has a better correlation with both the gold standard i.e. microscopy and the clinical settings. We conclude that the RDT for malarial diagnosis is as reliable as microscopy. We recommend that only the antigen-based method kits be imported and or used in India and even other parts of world with malaria endemicity is observed.

Keywords: Malaria, RDT, Haematological profile.

Introduction

In few of the most populated and tropical areas of the world, Malaria has been reported to continue as a major health problem. It is also advocated as one of the imperative reasons of different febrile diseases in the world.Worldwide, malarial cases were recognized as one of the most prevailing human infections, that accounts for around 225 million cases every year.[1] It has been

reported that globally malaria cases were decreased from 219 million cases in the year 2017 as compared to 239 million cases which were reported in 2010.[2-3] However, there was no significant progress in the reduction during 2015–2017.[4]

Haematological complications are the representative indices having prognostic and follow-up value. Clarification of process of pathogenesis that shows the derangement in the blood component is being highly explored and observed. During the developmental path of parasite along the circulatory system of vertebrate, a thorough understanding the life cycle of Plasmodium and its interactions with erythrocytes being the host cells, plays a vital role in managing the haematological and other complications of severe malaria in future.[5]

Thus, the present study was conducted for assessment and correlation of level of parasitemia with haematological changes which could guide the diagnosis and treatment of malaria and in turn decreasing mortality and morbidity.

Material and methods

The study was carried out in Department of Pathology, Jhalawar Medical College, Jhalawar, Rajasthan, India to study the hematological parameters in diagnosed cases of malaria. All participants submitted informed consent before enrolment.

A hospital based cross-sectional study from February 2020 to October 2021 (duration includes time required for data collection, analysis and report writing). All male and female patients of all age groups presenting with malaria to the department of pathology, JMC, Jhalawar during this period.

Inclusion Criteria

All male and female patients of all age group with malarial infection.

Exclusion Criteria

Other hemoparasite infected cases.

The study was started after approval from Ethical Committee of our institution.

Results

Table 1: Type of malaria in which rapid antigen card is positiveor negative

Rapid Antigen Card	PF(N=20)		PF PV(N=4)		PV(N=26)		TOTAL	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Negative	4	20	0	0	2	7.69	6	12.0
Positive	16	80	4	100	24	92.31	44	88.0
TOTAL	20	100	4	100	26	100	50	100.0

Out of 50 subjects, 88% had positive RAC and 12% had negative RAC. Out of 20 patients with P. falciparum infection, maximum 80% had positive RAC. Among 4 patients of P. falciparum +P. vivax infection, all had positive RAC. Out of 26 patients with P. vivax parasitic infection, maximum 92.31% had positive RAC

Table 2 : Type of parasite and platelet count

Parasite species	PF(N=20)		PF PV(N=4)		PV(N=26)		Total
	Freq.	%	Freq.	%	Freq.	%	
<20,000	5	25	1	25	0	0	6
20,000-50,000	8	40	2	50	4	15.38	14
50,000-1lakh	6	30	1	25	7	26.92	14
>1lakh	1	5	0	0	15	57.69	16
TOTAL	20	100	4	100	26	100	50

Out of 50 subjects, maximum had >1lakh platelet count, followed by 20,000-50,000 and 50,000-1lakh parasitic count. Out of 20 patients with P. falciparum infection, maximum 40% had 20,000-50,000 platelet count. Among 4 patients of P. falciparum + P. vivax infection, maximum 50% had 20,000-50,000 platelet count. Out of 26 patients with P. vivax parasitic infection, maximum 57.69% had >1lakh platelet count.

Table 3: Type of parasite and parasite count

Parasitespecies	PF(N=20)		PF PV(N=4)		PV(N=26)		TOTAL
	Freq.	%	Freq.	%	Freq.	%	
<1%	0	0	0	0	0	0	0
1-5%	20	100	4	100	26	100	50
>5%	0	0	0	0	0	0	0
TOTAL	20	100	4	100	26	100	50

Out of 50 subjects, all had 1-5% parasite species. Out of 20 patients with P. falciparum infection, all had 1-5% parasite species. Among 4 patients of P. falciparum + P. vivax infection, all had 1-5% parasite species. Out of 26 patients with P. vivax parasitic infection, all had 1-5% parasite species.

Table 4: Type of parasite and Reticulocyte count

Parasitespecies	PF(N=20)		PF PV(N=4)		PV(N=26)		TOTAL
	Freq.	%	Freq.	%	Freq.	%	
<1%	3	15	1	25	0	0	4
1-3%	13	65	0	0	20	76.92	33
>3%	4	20	3	75	6	23.08	13
TOTAL	20	100	4	100	26	100	50

Out of 50 subjects, 33% had 1-3% reticulocyte count, followed by 13% with >3% and 4% with <1% reticulocyte count. Out of 20 patients with P. falciparum infection, 65% had 1-3% reticulocyte count, followed by 20% with >3% and 15% with <1% reticulocyte count.. Among 4 patients of P. falciparum + P. vivax infection, 75% with >3% and 25% with <1% reticulocyte count. Out of 26 patients with P. vivax

parasitic infection, 23.08% with >3% and 76.92% with 1-3% reticulocyte count.

Table 5 : Type of parasite and RBC count

Parasite species	PF(N=20)		PF PV(N=4)		PV(N=26)		Total
	Freq.	%	Freq.	%	Freq.	%	
0-50 Lakh	0	0	1	25	0	0	1
50 Lakh - 2.5 Million	4	20	3	75	8	30.77	15
2.5 Million-5.0 Million	14	70	0	0	16	61.54	30
>5.0million	2	10	0	0	2	7.69	4
TOTAL	20	100	4	100	26	100	50

Out of 50 subjects, 30 had 2.5-5million, followed by 15 patients with 50 lakh- 2.5million RBC count. Out of 20 patients with P. falciparum infection, 70% had had 2.5-5million, followed by 20% with 50 lakh-2.5million RBC count. Among 4 patients of P. falciparum + P. vivax infection, 75% with 50 lakh-2.5million RBC count, and 25% with 0-50lakh RBC count. Out of 26 patients with P. vivax parasitic infection, 61.54% had 2.5- 5million RBC count, followed by 30.77% with 50 lakh-2.5million RBC count.

Discussion

Worldwide, malarial cases were recognized as one of the most prevailing human infections, that accounts for around 225 million cases every year.[1] In few of the most populated and tropical areas of the world, Malaria has been reported to continue as a major health problem.

In India, distribution of malarial parasite is heterogenous in nature, because of varied climatic conditions and physiological risk factors. Malaria is caused by protozoal parasite of the genus plasmodium that infects and finally kills the red blood cells of human body. Four different species of plasmodia are identified causing malarial infection in human beings; P. falciparum, P. malariae, P. ovale and P. vivax. Among these, P. falciparum is the main cause of morbidity and mortality. Whereas in India, Plasmodium vivax is the main malarial parasite that contributes towards the majority of cases.[6]

As the signs and symptoms of malarial infection are non-specific in nature, thus the clinical diagnosis of the disease is tough. The symptoms of malaria resemble the manifestations of various other febrile illnesses that occur in different tropical zones. An accurate and prompt diagnosis is crucial for the effective treatment planning of malarial infection.[7]

We found that out of 50 subjects, maximum had >1lakh platelet count, followed by 20,000-50,000 and 50,000-1lakh parasitic count. Out of 20 patients with P. falciparum infection, maximum 40% had 20,000-50,000 platelet count. Among 4 patients of P. falciparum + P. vivax infection, maximum 50% had 20,000-50,000 platelet count. Out of 26 patients with

P. vivax parasitic infection, maximum 57.69% had >1lakh platelet count.

Maina RN et al.[7] found that in their study malaria infected children in western Kenya, had a significantly lower platelets, lymphocytes, red blood cell count, eosinophils, and hemoglobin (Hb) count. Whereas the absolute neutrophil and monocyte counts and mean

platelet volume (MPV) were found to be higher as compared to non-malaria infected children.[10]

Similarly, Joshi H et al.[8] found that mean platelet count was higher in P. falciparum infection than platelet count in patients with P. vivaxinfection. [8]

In malaria infection, Anaemia is found to be the most common complications occurring in younger children and pregnant women especially in high transmission areas. But still the pathogenesis of anaemia during malaria infection is not clearly understood. It is advocated that it might be the result of the parasite targeting the red blood cell primarily and causing RBCs destruction, bone marrow dysfunction, accelerated removal of both parasitized and non-parasitized RBCs, and the level of parasitemia.[9]

We found that out of 50 subjects, 33% had 1-3% reticulocyte count, followed by 13% with >3% and 4% with <1% reticulocyte count. Out of 20 patients with P. falciparum infection, 65% had 1-3% reticulocyte count, followed by 20% with >3% and 15% with <1% reticulocyte count. Among 4 patients of P. falciparum + P. vivax infection, 75% with >3% and 25% with <1% reticulocyte count. Out of 26 patients with P. vivax parasitic infection, 23.08% with >3% and 76.92% with 1-3% reticulocytecount.

Conclusion

The present study revealed that the antigen based method has a better correlation with both the gold standard i.e. microscopy and the clinical settings. We conclude that the RDT for malarial diagnosis is as reliable as microscopy. We recommend that only the antigen based method kits be imported and, or used in India and even other parts of world with malaria endemicity is observed.

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