Research Article

Malaria: clinical and hematologic profile in children

Atul Choube[1*], Bhavana Tiwari[1], Divya Agarwal[2], Chitra Rani Chauhan[3]

[1]Associate Professor, [2]Sr. Resident, [3]Statistician, Department of Pediatrics, Rama Medical College, Mandhana Uttar Pradesh, INDIA.
Email: generalatul@gmail.com, bhupeshbhavana123@gmail.com

Abstract

Background: Malaria is a protozoan disease caused by Plasmodium species (*P. falciparum, P.Vivax, P.ovale, P. malaria, P. knowlesi*). Even with all these efforts the malaria affects almost all the organs of the body. But one of the chief components affected is blood. So, this work puts in an effort to correlate the pediatric malaria with clinical symptoms and changes in blood. **Setting:** Department of pediatrics Rama Medical College Mandhana from January **Design:** Retrograde, hospital based study **Material and Methods:** This retrograde, hospital based study was conducted in the department of pediatrics Rama Medical College Mandhana from January 2014 to December 2014. All those children who were of age 0 - 14 years, and presented with a history of fever, underwent a peripheral blood smear examination and rapid diagnostic test for malarial parasite. A detailed history and examination were done in the study group and observations and relevant details were recorded on a pre-designed proforma. **Results:** We analysed clinical and hematological parameters in 144 children who were found to be positive for malaria. No significant statistical association found in any hematological parameters. **Conclusion:** In our study we found that usual presentations for malaria were fever, with or without chills and rigors, associated complaints being headache, myalgia, while complicated cases presented with respiratory and CNS symptoms. Common physical findings being pallor, icterus, petechiae, hepatosplenomegaly

Keywords: Malaria, falciparum, vivax.

[*]**Address for Correspondence:**
Dr. Atul Choube, Associate Professor, Department of Pediatrics, Rama Medical College, Mandhana Uttar Pradesh, INDIA.
Email: generalatul@gmail.com
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INTRODUCTION

Malaria is a protozoan disease caused by Plasmodium species (*P falciparum, P.Vivax, P.ovale, P. malaria, P. knowlesi*). Malaria is usually transmitted by the bite of an infected female anopheline mosquito, although blood-borne transmission (blood or blood products transfusion, transplantation, needle-sharing among intravenous drug addicts, accidental nosocomial transmission) or congenital transmission may occur[1]. Malaria prevention and control forms part of Millennium Development Goal 6 – to have halted by 2015 and begun to reverse the incidence of malaria. Owing to a substantial scale-up of prevention and control measures, malaria case incidence rates were reduced by 30% around the globe. In 2005, the World Health Assembly (WHA) set the target of reducing the malaria burden by 75% between 2000 and 2015. According to the *World Malaria Report 2014*, 55 countries and territories with ongoing malaria transmission are on track to achieve a 75% reduction in malaria by 2015. Reported confirmed cases of malaria were 881730 during year 2013 in India and reported deaths due to malaria were 440 in India during year 2013.[2] It is responsible for major morbidity and mortality in rural paediatric population with varying degrees of presentation[3] Even with all these efforts the malaria affects almost all the organs of the body. But one of the chief components affected is blood. So, this work puts in an effort to correlate the pediatric malaria with clinical symptoms and changes in blood.

MATERIAL AND METHODS

This retrograde, hospital based study was conducted in the department of pediatrics Rama Medical College Mandhana from January 2014 to December 2014. All those children who were of age 0 - 14 years, and presented with a history of fever, underwent a peripheral blood smear examination and rapid diagnostic test for malarial parasite. A detailed history and examination

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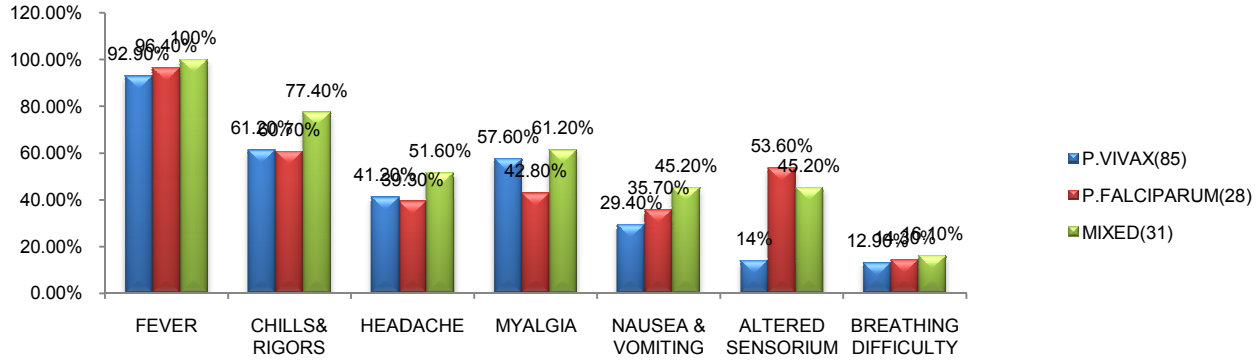
were done in the study group and observations and relevant details were recorded on a pre-designed proforma. All patients with fever were investigated with complete blood counts. The complete blood cell count was done with an automated counter (Coulter), and peripheral smears were examined by a qualified pathologist. Anaemia was defined as haemoglobin concentration of < 8 g/dl and/or haematocrit concentration < 24%, thrombocytopenia was defined as platelet count less than 1.5 lacs per cubic mm. Rapid diagnostic test (RDT) Histidine rich protein II, for detection for *Plasmodium falciparum,* was also done in the study cases. Patients were treated with anti-malarials and other supportive treatment.

RESULTS

Out of 144 children who were found positive for malaria, in 85 cases it was P vivax , 28 it was P faiciparum and in 31 cases mixed infection consisting of both P vivax and P falciparum was found. In our study commonest symptom of presentation was fever. Fever was presenting symptom in 79 (92.9%) patients with vivax malaria, 27 (96.4%) in falciparum malaria and in all 31 (100%) in mixed malarial infection. Next to fever another main complaint was chills and rigors , which was present in 52 (61.2%) in vivax malaria cases 17 (60.7%) in falciparum malaria cases and 24 (77.4%) in mixed infection. Another symptom which was present was myalgia, this was found in 49 (57.6%) cases of vivax malaria, 12 (42.8%) cases of falciparum and 19 (61.2%) cases of mixed infection. Followed by myalgia another symptom which was present was headache. Headache was found in 35 (41.2%) cases of vivax malaria, 11 (39.3%) cases of falciparum malaria and in 16 (51.6%) cases with mixed infection. Nausea and vomiting were also found to be associated in many cases of malaria. Nausea and vomiting was present in 25 (29.4%) cases of vivax malaria, 10 (35.7%) cases with falciparum malaria and 14 (45.2%) cases with mixed infection. Altered sensorium and breathing difficulties were the other presenting complaints. Altered sensorium was present in 12 (14%) cases of vivax infection, 15 (53.6%) cases with falciparum infection and 14(45.25) cases with mixed infection. Breathing difficulties were found in 11 (12.9%) cases with vivax malaria, 4(14.3%) falciparum malaria and 5 (16.1%) case of mixed infection. (table 1)

Table 1: Symptoms

Symptoms	P.vivax(85)	P.falciparum(28)	Mixed(31)
Fever	79(92.9%)	27(96.4%)	31(100%)
Chillsand rigors	52(61.2%)	17(60.7%)	24(77.4%)
Headache	35(41.2%)	11(39.3%)	16(51.6%)
Myalgia	49(57.6%)	12(42.8%)	19(61.2%)
Nausea and vomiting	25(29.4%)	10(35.7%)	14(45.2%)
Altered sensorium	12(14%)	15(53.6%)	14(45.2%)
Breathing difficulty	11(12.9%)	4(14.3%)	5(16.1%)



On examination of the children who were found to be positive for malaria parasite varied clinical manifestations were found. In children with vivax malaria pallor was found in 50 (58.8%), icterus in 20 (23.5%), petechae in 22 (25.9%), splenomegaly in52 (61.2%), hepatomegaly in 32 (37.6%), CNS involvement in 10 (11.7%), respiratory involvement in 5(5.8%) of cases. In children who were found positive for falciparum malaria pallor was detected in 14 (50%), icterus in 8(28.6%), petechae in 5 (17.8%), splenomegaly in 15 (53.6%), hepatomegaly in 12 (42.8%), CNS involvement in 9(32.1%) and respiratory involment in 2 (7.1%) cases. In children with both vivax

and falciparum mixed infection pallor was found in 19 (61.3%), icterus in 11 (35.5%), petechae in 8 (25.8%) splenomegaly in 18(58%), hepatomegaly in 17(54.8%), CNS involvement in 12 (38.7%) and respiratory involvement in 4 (12.9%) cases.

Table2: Signs

Signs	P.vivax(85)	P.falciparum(28)	Mixed(31)
Pallor	50(58.8%)	14(50%)	19(61.3%)
Icterus	20(23.5%)	8(28.6%)	11(35.5%)
Petechiae	22(25.9%)	5(17.8%)	8(25.8%)
Splenomegaly	52(61.2%)	15(53.6%)	18(58%)
Hepatomegaly	32(37.6%)	12(42.8%)	17(54.8%)
Cns involvement	10(11.76%)	9(32.1%)	12(38.7%)
Respiratory involvement	5(5.8%)	2(7.1%)	4(12.9%)

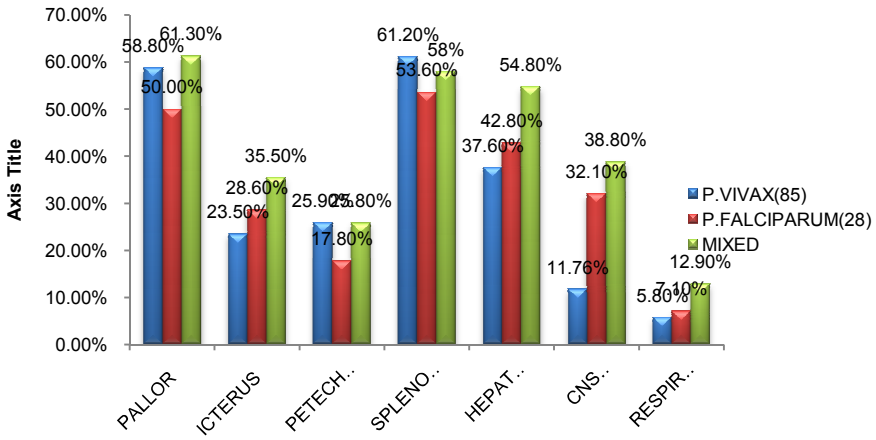


Table 3: Hematological Parameters

Hematological parameters	P vivax Mean ± SD	P falciparum Mean ± SD	Mixed Mean ± SD	p value
Hemoglobin(gm/dl)	8.48 ± 1.67	8.79 ± 1.67	8.55 ± 1.74	0.699
WBC(per cu mm)	5631.76 ± 549.07	5592.85 ± 564.33	5480.65 ± 387.66	0.389
PCV(%)	29.12 ± 3.46	29.36 ± 3.59	28.71 ± 3.29	0.760
MCV(fl)	73.35 ± 7.03	71.89 ± 7.51	71.06 ± 6.22	0.252
MCH(pg)	25.05 ± 3.42	25.32 ± 3.58	25.26 ± 4.12	0.923
MCHC(%Hb/cell)	28.49 ± 2.66	27.93 ± 2.92	28.26 ± 3.17	0.647
Platelet count (lac/cu mm)	1.54 ± 0.67	1.75 ± 0.86	1.62 ± 0.68	0.396

(p-value < 0.05 is significant)

Statistical Analysis

SPSS-21.0 version software was used for statistical Analysis. ANOVA one way use to compare the mean values among the given groups and no significant statistical association was found.

DISCUSSION

Fever was the predominant complaint in our study i.e. 95% of our patients presented with fever of which 67.8% of the patients had chills and rigors. In the study conducted by Kashinkunti *et al* fever was present in 94% of patients.[4] It was also noted that 55.5% of patients in our study had myalgia as their presenting complaint. There was no mention of this complaint in any other studies. Nausea and vomiting was observed in 34% of the patients in our study while in another study conducted by Kashinkunti *et al* and Mehta *et al* it was found in 21% of cases in both studies[4,5]. Breathing difficulty was present in13.8 % of cases in our study. Cough and breathlessness was documented in 2% of cases by Kashinkunti *et al* and 4.47% of cases by Mehta *et al*.[4,5] The higher incidence of these symptoms may be due to higher number of complicated cases being referred to our institute ,in lieu of availability of better intensive care facility . It also signifies that the number of complicated malaria cases were more in our area than in other studies. In our study 28.4% cases had altered sensorium which was more than 10% cases with altered sensorium which was found in the study by Kashinkunti *et al*.[4] This higher percentage could again be due to the study conducted in referral center

where more and more of complicated cases are referred , because of better available facilities. Pallor was present in our study in 57.6% of cases whereas in study conducted by Kashinkunti *et al* pallor was found in 79% of cases. In our study incidence of pallor was more with vivax malaria (58.8%) and in cases with mixed infection (61.3%). It correlates with the study by Sharma[6]. Icterus was noted in 27% of the patients in our study where as it was seen in 16% of patients by Kashinkunti *et al* and it was seen in 46% by Nand[4,7]. Spleenomegaly was detected in 59% of patients in our study whereas in study by Kashinkunti *et al* it was observed in 53% of cases. Another study by Murthy *et al* found spleenomegaly in 50% of patients and splenomegaly to the tune of 60% was observed in study by Nand *et al*.[4,7,8]. Hepatomegaly was observed in 42.3% patients in our study which was detected in 19% of patients in study by Kashinkunti *et al*, whereas study by Murthy *et al* found it to be in the range of 91%, this difference could be due to the fact that work by Murthy *et al* mainly took malarial hepatitis and jaundice in account.[4,8]. CNS involvement in the form of coma, seizures, altered sensorium was detected in 21.5% of cases while in another study by Kashinkunti *et al* it was seen in 10% of patients[4]. In our study, even though CNS manifestations were found significantly more in falciparum malaria (32.1%), considerable number of children with vivax malaria also presented with CNS manifestations (11.7%). This coincides with another study conducted by Tanwar *et al* who showed that P. vivax mono-infection can cause cerebral malaria.[9]. Recently, many more studies have shown increasing association of cerebral malaria with P.vivax monoinfection.[10,11]. In our study percentage of cases with vivax positive malaria were 59%, cases showing falciparum infection were 19.5% and patients showing both vivax and falciparum infection were 21.5%. In the study by Kashinkunti *et al* the percentage of falciparum malaria was 50% and the incidence of vivax and mixed infection was 40% and 10% respectively. In a study by Rajanasthein the prevalence of falciparum was 76.2% where as vivax malaria was just 23.8%[12]. In a study by Reddy *et al*. there was high incidence of vivax malaria i.e. 61.2 % and falciparum being 36.8 %.[13]. As we all know that incidence of particular species varies with geographical area, the area where we have conducted the study is known to be endemic for vivax malaria and hence the higher incidence is noted in our study. In our study we found anemia in 35.5 % of cases, whereas in another study conducted by Kashikunti *et al* anemia was found in 69% of cases, and in study by Sharma el al anemia was present in 86.7% of cases.[4,6]. The higher incidence could be explained by the fact that their study involved cases of falciparum malaria only. We found that severe anemia was seen equally in vivax and falciparum malaria. This is in contrast to a study conducted by Rodriguez-Morales *et al* who suggested that anemia in vivax malaria may be more severe and frequent than falciparum.[14] Thrombocytopenia was present in 45.6% of the cases in the present study. In a study by Kashikunti *et al* observed that 53% of the patients had thrombocytopenia[4]. A large number of children presented with thrombocytopenia with both falciparum and vivax malaria. Infact over half the children with vivax malaria had thrombocytopenia. This is in contrast to a study conducted by Martelo *et al* who found that out of 173 reported cases of malaria, 93% had P. vivax of which only 15% had thrombocytopenia.[15] However, recently many studies have shown that thrombocytopenia was the most common hematological finding in vivax malaria[16,17].

CONCLUSION

In our study we found that usual presentations for malaria were fever, with or without chills and rigors, associated complaints being headache, myalgia, while complicated cases presented with respiratory and CNS symptoms. Common physical findings being pallor, icterus, petechiae, hepatosplenomegaly and complicated cases presenting with respiratory and CNS findings. Anemia and thrombocytopenia was reported commonly on laboratory investigations. To conclude even vivax malaria presents with complications which may contribute to the significant morbidity and mortality caused by malarial fever in an endemic country like India. Therefore, a high index of suspicion is required. Funding

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