ISSN: 0975-3583, 0976-2833 VOL14, ISSUE9, 2023

Original Research Article

To correlate clinical profile & laboratory parameters of Plasmodium vivax (Pv) and Plasmodium falciparum (Pf) malaria in paediatric patients

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Abstract

Background & Methods: The aim of the study is to correlate clinical profile & laboratory parameters of Plasmodium vivax (Pv) and Plasmodium falciparum (Pf) malaria in paediatric patients. Chills &/or rigor was most common symptom associated with fever. Nausea & vomiting, pain in abdomen, headache, diarrhoea & cough were the next complaints in decreasing order.

Results: Chills and/or rigors:- Chills and/or rigors was most common associated symptom with fever. It was present in 63% of patients with falciparum malaria and 59% of patients with vivax malaria. Nausea and Vomiting:- Nausea and vomiting was next frequent symptom after chills and rigor. It was observed in 37 % and 44% of patients with falciparum and vivax respectively. Abdomen pain:- It was seen in about 33 % of patients with vivax malaria and with 27% of patients with falciparum malaria. Diarrhoea:- Diarrhoea was noted in 14% & 10% cases of Pf & Pv respectively. Cough:- Cough was a presenting complaint in 14% & 22% of the patients with falciparum and vivax respectively. Febrile Seizure:- Pf & Pv were the precipitating factors in 4% & 10% of cases respectively. Loss of consciousness and seizures:- Loss of consciousness was observed in 22% of Pf cases.

Conclusion: In this observational study, conducted on hospitalized children diagnosed with malaria, a total of 31 (62%) patients were affected with Plasmodium falciparum (Pf) & 19 (38%) were affected with Plasmodium vivax (Pv). Percentage of falciparum cases was high. This is a part of overall trend of increasing number of falciparum cases. Proportion of Pv patients from younger age group (<5 yr) was significantly higher. In the < 5 yr age group, M:F ratio was almost equal but after this period of life male children were affected predominantly.

Keywords: clinical, Plasmodium vivax, and Plasmodium falciparum, malaria & paediatric.

Study Design: Observational Study.

1. Introduction

Malaria is transmitted exclusively through the bites of Anopheles mosquitoes. The intensity of transmission depends on factors related to the parasite, the vector, the human host and the environment[1].

About 20 different Anopheles species are locally important around the world. All of the important vector species bite at night. Anopheles mosquitoes breed in water and each species has its own breeding preference; for example some prefer shallow collections of fresh water, such as puddles, rice fields and hoof prints[2]. Transmission is more intense in places where the mosquito lifespan is longer (so that the parasite has time to complete its development inside the mosquito) and where it prefers to bite humans rather than other animals. For

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE9, 2023

example, the long lifespan and strong human-biting habit of the African vector species is the main reason why more than 90% of the world's malaria deaths are in Africa[3].
Transmission also depends on climatic conditions that may affect the number and survival of mosquitoes, such as rainfall patterns, temperature and humidity[4]. In many places, transmission is seasonal, with the peak during and just after the rainy season. Malaria epidemics can occur when the climate and other conditions suddenly favour transmission in areas where people have little or no immunity to malaria. They can also occur when people with low immunity move into areas with intense malaria transmission, for instance to find work or as refugees[5].
Human immunity is another important factor, especially among adults in areas of moderate or intense transmission conditions[6]. Partial immunity is developed over years of exposure and while it never provides complete protection, it does reduce the risk that malaria infection will cause severe disease.

2. Material and Methods

A total of 50 confirmed cases of malaria were taken up for the study from the admitted patients at Tertiary Care Centre of M.P. among them 31 were falciparum positive, 19 were vivax positive.

- **Inclusion criteria:**

(a) Children <14 years of age with fever, who were tested positive for plasmodium vivax/falciparum.
(b) Parental consent was not taken, because the study was done following standard hospital practice without introduction of any experimental procedures.

- **Exclusion criteria:**

(a) All patients were investigated for other co-existent infections including enteric fever, dengue and hepatitis, whenever deemed relevant. Patients having another infection with plasmodium such as enteric fever and hepatitis were excluded.
(b) Patients affected with chronic hemolytic anemia & chronic liver disease was excluded.

3. Result

Table 1
Comparison of duration of stay in Plasmodium falciparum and Plasmodium vivax malaria

	P. falciparum		**P. vivax**		
	Mean	**SD**	**Mean**	**SD**	**p value**
Duration of hospitalization	5.59	1.94	4.81	1.93	0.65

P value < 0.001 highly significant; <0.05 significant; >0.05 not significant

Table 2: Age and sex distribution in plasmodium species

TOTAL NO. OF PATIENTS	=50
Male	=27 (54%)
Female	=23 (46%)
M:F	=1.17

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE9, 2023

TOTAL NO. OF Pf Male Female M:F	=31 (62%) =21 (67.7%) =10 (47.6%) =2.1
TOTAL NO. OF Pv Male Female M:F	=19 (38%) =11 (57.8%) =08 (42.2%) =1.37

Table 3: Clinical profile of Pf and Pv malaria

CLINICAL FEATURES	**PLASMODIUM FALCIPARUM**	**PLASMODIUM VIVAX**
Fever	31(100%)	19(100%)
Chills & Rigors	19(63%)	11(59%)
Vomiting	11(37%)	08(44%)
Abdominal Pain	08(27%)	06(33%)
Diarrhoea	04(14%)	02(10%)
Headache	04 (14%)	04(22%)
Myalgia	03(10%)	03(18%)
Cough	04(14%)	04(22%)
Febrile Seizure	01(4%)	02(10%)
Loss of consciousness	07(22%)	01(5%)
Convulsion	04(14%)	01(5%)
Splenomegaly	16(53%)	11(60%)
Icterus	05(18%)	03(17%)
Oedema	03(12%)	03(16%)
Pallor	20(67%)	11(60%)

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Chills &/or rigor was most common symptom associated cases. Nausea & vomiting, pain in abdomen, headache, diarrhoea & cough were the next complaints in decreasing order.

- Chills and/or rigors:- Chills and/or rigors was most common associated symptom with fever. It was present in 63% of patients with falciparum malaria and 59% of patients with vivax malaria.
- Nausea and Vomiting:- Nausea and vomiting was next frequent symptom after chills and rigor. It was observed in 37 % and 44% of patients with falciparum and vivax respectively.
- Abdomen pain:- It was seen in about 33 % of patients with vivax malaria and with 27% of patients with falciparum malaria.
- Diarrhoea:- Diarrhoea was noted in 14% & 10% cases of Pf & Pv respectively.
- Cough:- Cough was a presenting complaint in 14% & 22% of the patients with falciparum and vivax respectively.
- Febrile Seizure:- Pf & Pv were the precipitating factors in 4% & 10% of cases respectively.
- Loss of consciousness and seizures:- Loss of consciousness was observed in 22% of Pf cases.

4. Discussion

Among cases with malaria, proportion of Pv and Pf varies in different parts of India, with 10-30% cases caused by Pf and remaining 70–90% by Pv in most parts of the country. Ashwani K et al[7] in their analysis on 'burden of malaria in India: retrospective and prospective view' have stated a continued rise in Pf and its proportion has gradually risen to nearly 50% of total cases in recent years. Hazra et al[8] from Calcutta had reported 73.3% Pv & 26.7% Pf in their study of 225 cases. A study has reported 54.5% Pv, 36.6% Pf and 8.9% of mixed infection. This shows that the parasite profile is different in various places. In present series, percentage of falciparum cases (61.3%) was high. This is a part of overall trend of increasing number of falciparum cases.

Yadav D et al[9] from New Delhi has reported higher proportion of vivax malaria (74.8%) in children <5 years of age, compared with Pf (55.7%). Kochar et al[10] has also reported higher proportion of vivax malaria in children <5 year of age (67.4%) compared with Pf (30.4%). In our study also, Pv malaria was more frequently observed in younger children (<5 year age) in comparison to Pf malaria, which affected children of all ages. Proportion of Pv patients from younger age group (<5 year) was significantly higher (65%) in our study.

A study on adult malaria cases, have shown a M:F ratio of 2.9:1. Many other studies have shown higher male ratio, ranging from 1.5:1 to 3:1. The incidence of malaria is more in adult men than in women due to the working pattern & sleeping habit (outside the house) in rural areas i.e. men are exposed to mosquito bites outdoors whereas females are less exposed. In present series, Male - Female ratio in the younger (< 5 year) age group was almost equal but after this period of life male children were affected predominantly. This is in line with the adolescent and adult malaria trend[11].

5. Conclusion

In this observational study, conducted on hospitalized children diagnosed with malaria, a total of 31 (62%) patients were affected with Plasmodium falciparum (Pf) & 19 (38%) were affected with Plasmodium vivax (Pv). Percentage of falciparum cases was high. This is a part of overall trend of increasing number of falciparum cases. Proportion of Pv patients from younger age group (<5 yr) was significantly higher. In the < 5 yr age group,

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