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Original Research Article

Comparative Study of Clinicoetiological Profile of Cerebral Malaria in Hospitalized Children Due to P. Falciparum and P. Vivax

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Abstract:

Background & Methods: The aim of the study is to comparative study of clinicoetiological profile of cerebral malaria in hospitalized children due to p. falciparum and p. vivax. All those children who were previously neurologically normal, of age 6 months - 18 years and presented with a history of fever with generalised convulsion and loss of conscious for more than 30 min, underwent a peripheral blood smear examination and rapid diagnostic test for malarial parasite.

Results: Out of 41 children infected with P. Vivax, intermittent fever was present in 41 (100%), chills and rigors 24(58.5%), headache4(9.7%), vomiting18(43.9%), loses tools 2(4.8%), GTCS-1episode 15(36.5%), GTCS>1episode26(63.4%), respiratory distress in 24(58.5%), pallor in 18 (43.9%), icterus in 4 (9.7%), edema in 3 (7.3%), hypotension in 3 (7.3%), hypoglycaemia in 2(4.8%), hepatomegaly in 34 (82.9%) and splenomegaly in 28 (68.2%), rashes 2(4.8%), abnormal bleeding 3 (7.3%)and black water fever was present in none of the patients. For 29 children with P. Falciparum, the same symptoms had different percentages as follows: intermittent fever was present in 29 (100%), chills and rigors 16(55.1%), headache 2(6.8%), vomiting 7(24%), loose stools1(3.4%), GTCS-1episode 21(72.4%), GTCS>1episode 8(27.5%), respiratory distress in 14 (48.2%), pallor in 14 (48.2%), icterus in 1 (3.4%), edema in 4 (13.7%), hypotension in 2 (6.8%), hypoglycaemia in 2(6.8%), hepatomegaly in 23 (79.3%) and splenomegaly i(72.4%), rashes 3(10.3%), abnormal bleeding 3(10.3%), black water fever 1(3.4%).

Conclusion: The features which were present in more percentage of the cases infected with P. Vivax were chills and rigors, headache, vomiting, loses tools, GTCS>1episode ($p < 0.05$) was a significant finding, respiratory distress, hypotension, icterus, hepatomegaly. However, in P. Falciparum the symptoms like GTCS-1episode ($p<0.001$)is highly significant association, hypoglycaemia, pallor, edema and splenomegaly, rashes, abnormal bleeding and black water fever were more commonly reported. Among these, chills and rigors, loose stools, hypoglycaemia, hypotension, pallor, hepatomegaly and splenomegaly were more or less found in equal number of the patients.

Keywords: clinicoetiological, cerebral, malaria, children, p. falciparum and p. vivax.

Study Design: Comparative Study.

Introduction

Malaria is one of the most successful parasites ever known to mankind. After thousands of years, it remains the world's most pervasive infection, affecting at least 91 different countries and some 300 million people [1].

It is ever-present in the tropics and countries in sub-Saharan Africa, which account for nearly 90 percent of all malaria cases. The majority of the remaining cases are clustered in India, Brazil, Afghanistan, Sri Lanka, Thailand, Indonesia, Vietnam, Cambodia, and China. Malaria causes 1 to 1.5 million deaths each year and in Africa, it accounts for 25 percent of all deaths of children under the age of five [2].

Malaria has been a major public health problem in India. Intermittent fever with high incidence during the rainy season, coinciding with agriculture, sowing and harvesting, was first recognized by Romans and Greeks who associated it with swampy areas [3]. They postulated that intermittent fevers were due to the 'bad odour' coming from the marshy areas and thus gave the name 'malaria' ('mal'=bad + 'air') to intermittent fevers. In spite of the fact that today the causative organism is known, the name has stuck to this disease.

Malaria poses a great socioeconomic burden on humanity, causing about 2414 deaths daily and slowing the economic growth by 1.3% per year in the endemic areas [4]. According to the World

Malaria Report 2011, in the South East Asian (SEA) region, both the highest number of confirmed cases (1,495,817) and the highest number of deaths (1023) were reported from India.

Malaria is endemic in the tropics and subtropics with India as a major contributor to the morbidity and mortality in the South-East Asian region [5]. Because children form a great part of the Indian population, the percentage of malarial deaths is very high. India contributes to 77% of the total malaria in South East Asia and about 95% of the population of moderate to high risk of malaria in SEA region is living in India [6-8]. If the prevalence of malaria stays on its present upwards course, the death rate could double in the next twenty years.

Material and Methods

The present work is a prospective hospital based study conducted in a Department of Paediatrics Sri Siddhartha Institute of Medical Sciences and Research Centre, T begur for 01 year. A total of 70 children who fulfilled the inclusion criteria for cerebral malaria were included in the study. Clearance was obtained from the institutional ethical committee.

Inclusion criteria:

1. Age group of 6 months – 18 years.

2. Unarousable coma – no localizing response to pain persisting for more than 30 min ,if the patient has experienced generalized convulsion.

3. Peripheral smear positive for p.falciparum and p. Vivax.

Exclusion criteria:

1. Diagnosed cases of malaria on peripheral blood smear who were conscious.

2. Other causes of coma like hypoglycemia and neuroinfections excluded by appropriate investigations.

Diagnosis, species and number of parasites were determined by giemsa stained thick and thin peripheral blood films and examined under oil emersion. The slide was considered negative when there were no parasites in the 100 high-power field. The pbf was reviewed 2 times by experienced microscopists.

All those children who were previously neurologically normal, of age 6 months - 18 years, and presented with a history of fever with generalised convulsion and loss of conscious for more than 30 min, underwent a peripheral blood smear examination and rapid diagnostic test for malarial parasite. Accordingly, they were classified as cerebral malaria where the peripheral smear was positive and other probable causes of loss of consciousness ruled out by appropriate investigations. If the patients presented with fever, convulsion and/or coma, then inj. Quinine or inj. Artesunate was given emperically.

Result

Table 1: age wise distribution of p. Vivax and p. Falciparum cases

Age Group	P. vivax(n=41)		P. falciparum(n=29)		
Age	**No.**	**%**	**No.**	**%**	**%**
0.6 mo - < 1yr	05	100	00	0	100
1yr – <5yr	09	47.4	10	52.6	100
5yr -< 10yr	17	60.7	11	39.3	100
10yr-18yr	10	55.5	08	44.5	100
Total	41		29		70

Out of the 5 infants who had malaria, none of them had falciparum infection. All of them were positive for vivax. In 1-5 years of age group, out of 19 patients, 9(47.4%) had vivax and 10(52.6%) had falciparum malaria. In 5-10 years age group, out of 28 patients, 17(60.7%) had vivax and 11(39.3%)had falciparum malaria. A total of 18 patients belonged to age group of 10-18 years. Of these 10(55.5%) had vivax and 8(44.5%) had falciparum malaria.

Table 2: socio economic status of patient with p. vivax and p. falciparum (according to bg prasad classification)

SE Status	P. Vivax(41)	P. Falciparum(29)	
	No	No	Total
Upper	**00**	00	00
Upper Middle	04	01	05
Lower Middle	12	09	21
Upper Lower	17	12	29
Lower	08	07	15
Total	41	29	70

None of the patients belongs to upper class out of 41 pts with vivax 4 (9.7%) belongs to upper middle, 12 (29.2%) lower middle,17 (41.4%) upper lower,8 (19.5%) lower class out of 29 pts with falciparum 1 (3.4%) belongs to upper middle,9 (31%) lower middle, 12 (41.3%) upper lower and 7 (24.1%) lower class.

Table 3 Signs and symptoms of p. Vivax and p. Falciparum cases

Signs and Symptoms	P. Vivax(N=41)		P. Falciparum(N=29)				
	No	%	No	%	X2	P	INF
Fever	41	100	29	100	NC		
Chills and Rigors	24	58.5	16	55.1	0.07	>0.05	NS
Headache	4	9.7	2	6.8	0.17	>0.05	NS
GTCS -1 Episode	15	36.5	21	72.4	13.83	<0.001	HS
GTCS >1 Episode	26	63.5	8	27.5	8.72	<0.05	S
Respiratory Distress	24	58.5	14	48.2	0.72	>0.05	NS
Hypoglycemia	2	4.8	2	6.8	0.12	>0.05	NS
Hypotension	3	7.3	2	6.8	0.004	>0.05	NS
Pallor	18	43.9	14	48.2	0.13	>0.05	NS
Icterus	4	9.7	1	3.4	1.01	>0.05	NS
Edema	3	7.3	4	13.7	0.79	>0.05	NS
Hepatomegaly	34	82.9	23	79.3	0.14	>0.05	NS
Splenomegaly	28	68.2	21	72.4	0.13	>0.05	NS
Rashes	2	4.8	3	10.3	0.76	>0.05	NS
Abnormal Bleeding	3	7.3	3	10.3	0.19	>0.05	NS
Black Water Fever	0	0	1	3.4	NC		

(X2-Chi-Square, Inf-Inference, S-Significant, HS-Highly Significant, NS-Nonsignificant, NC-Not Calculated)

Out of 41 children infected with P. Vivax, intermittent fever was present in 41 (100%), chills and rigors 24(58.5%), headache4(9.7%), vomiting18(43.9%), loses tools 2(4.8%), GTCS-1episode 15(36.5%), GTCS>1episode26(63.4%), respiratory distress in 24(58.5%), pallor in 18 (43.9%), icterus in 4 (9.7%), edema in 3 (7.3%), hypotension in 3 (7.3%), hypoglycaemia in 2(4.8%), hepatomegaly in 34 (82.9%) and splenomegaly in 28 (68.2%), rashes 2(4.8%), abnormal bleeding 3 (7.3%)and black water fever was present in none of the patients.

For 29 children with P. Falciparum, the same symptoms had different percentages as follows: intermittent fever was present in 29 (100%), chills and rigors 16(55.1%), headache 2(6.8%), vomiting 7(24%), loose stools1(3.4%), GTCS-1episode 21(72.4%), GTCS>1episode 8(27.5%), respiratory distress in 14 (48.2%), pallor in 14 (48.2%), icterus in 1 (3.4%), edema in 4 (13.7%), hypotension in 2 (6.8%), hypoglycaemia in 2(6.8%), hepatomegaly in 23 (79.3%) and splenomegaly i(72.4%), rashes 3(10.3%), abnormal bleeding 3(10.3%), black water fever 1(3.4%).

Table 4: Incidence of cerebral malaria due to p vivax and p falciparum

P. Vivax	%	P. Falciparum	%	Cerebral Malaria
41	59%	29	41%	70

Pts with p vivax were responsible for 59%of cerebral malaria cases and the rest 41% were due to p falciparum.

Discussion

Till the last decade, severe or complicated malaria was synonymous with the P. Falciparum infection; the burden and the virulence of vivax malaria had been underestimated. The severity of the malaria which was caused by P. Vivax has increased significantly price rn et al, but most of the public literature on severe P. Vivax malaria consists of case reports or small descriptive clinical series, which lack denominators. It was only recently that the severe disease which was caused by P. Vivax was reported in the larger studies on malaria from the SEA region [9].

Brewester et al reported an incidence of 45% malaria admissions of which 11.3% had Cerebral malaria; Ikome le et al reported a 7.1% incidence of cerebral malaria, whereas in the present study, cerebral malaria accounted for 7% of total malaria admissions [10].

In our study large number of patients belonged to 5 - 10 yrs age group, s h ahmed et al 40% of cases bet 6 – 10 yrs ,has similar findings in their study. Males outnumbered females in our study, which is comparable to other studies sh ahmed et al (21 males versus 9 females).

Large number of cases in our study is from hindu religion, which is not reported in other studies. In our study majority of the cases belonged to lower socio economic status and also more common during rainy season which is comparable to study done by vidan jain et al, sitalakshmis et al [11]. Greater understanding of the mechanisms through which SES and malaria policies interact to influence disease risk can help to reduce health disparities and reduce the malaria burden in an equitable manner.

Children do not present with classical features of malaria but may have protean manifestations like gastroenteritis, pneumonia, meningitis, encephalitis, or hepatic dysfunction [12-13]. The atypical presentation in paediatric age group is further compounded by the irregular and incomplete treatment taken prior to hospitalization.

Fever is a characteristic feature of P. falciparum infection, but a sizeable proportion of these children (17.8%) with cerebral malaria were afebrile on admission as observed. Self-medication with antipyretic or antimalarial agents was common (about 70% of the children) and may contribute to this finding. Faiz et al reported intermittent fever (83%),vomiting (80%), headache (75%), and convulsion (60%) Garg RK et al in children with cerebral malaria [14]. In our study fever was a major complaint seen all patients and vomiting and headache was infrequently present.

Conclusion

We studied total 70 patients of cerebral malaria out of which 41 cases were due to p vivax(59%) and 29 cases were due to p falciparum(41%).incidence of cerebral malaria due to p vivax is more than p falciparum. Majority of the cases belonged to upper lower (29) followed by lower middle (21) according to BG PRASAD classification. The features which were present in more percentage of the cases infected with P. Vivax were chills and rigors, headache, vomiting, loses tools, GTCS>1episode($p < 0.05$) was a significant finding, respiratory distress, hypotension, icterus, hepatomegaly. However, in P. Falciparum the symptoms like GTCS-1episode ($p<0.001$)is highly significant association, hypoglycaemia, pallor, edema and splenomegaly, rashes, abnormal bleeding and black water fever were more commonly reported. Among these, chills and rigors, loose stools, hypoglycaemia, hypotension, pallor, hepatomegaly and splenomegaly were more or less found in equal number of the patients.

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