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Child Health

Early Clinical Diagnosis of Falciparum Malaria Helps Reduction in Morbidity and Mortality among Children

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Abstract **Original Research Article**

Total 100 cases of falciparum malaria, in the age group of 9 months to 12 years, were studied in the paediatric ward of Chittagong Medical College Hospital from March to August, 2003 with the objectives of studying the clinical presentations of falciparum malaria and their response to therapy, in children. Diagnosis of falciparum malaria was done by clinical examination as well as microscopical demonstration of *Plasmodium falciparum* in blood. Majority cases; 42 were within 4-6 years of age group, amongst them 61% were male and 39% female. Majority cases 31%had malaria during the month of April 17% in May. Regarding regional distribution of patients, most of the patients came from Hill-tracts, Fatikchari 12%, Rangunia 5%, Cox'sbazar 16% Chittagong 21%. Presenting symptoms included fever 100%, vomiting 15%, headache 7%, diarrhea 8%, altered consciousness 28%, respiratory distress 10%, dark urine 14%. Among febfile patients, clinicalstages was present, 29.1% percent cases developed cerebral malaria (10%), pulmorary oedema (21%) black-water fever signs, among complicated falciparum malaria were rise of temperature (100%), pallor (69%), hepatomegaly alone (56%), splenomegaly alone (33%), hepatosplenomegaly 23% and jaundice 22%. Among 6 cases of cerebral malaria, Blantyre coma seale score 3 of more was observed in 78.5% cases and score <3 in 21. 4% cases. The following signs were also observed: brisk tendon reflexes 2805%, positive babinski's sign 21.4%, convulsion 52% pulmonary oedema 7.2%, abolished tendon reflexes 7.1% constricted pupil 7.1%, nuchal stiffness 14.2%, kernig's sign 7.1%. Majority of patients 63% had parasite count 500-10,000 their peripheral blood and count was plenty in only 2% cases. Most of the patients were anaemic but 13% cases had sever anaemia. Initial treatment was started with chloroquine in 6 cases, among them 4 cases showed parasite clearance in peripheral blood after 3days of treatment. The rest 2 patients having persistent parasitaemia were treated with quinine. Fresh 94 cases of cerebral malaria (92+2=94 cases) were treated with quinine therapy and these cases showed no parisitaemia in peripheral blood after treatment. Total survivors were 90 with 2 cases of residual change. But 10% patients died of cerebral malaria (5%), black-water fever with renal failure (3%), pulmonary oedema (2%). In conclusion we can said that falciparum malaria is quite common in children in and around Chittagong district. Symptomatology of falciparum malaria in children is quite different from that of adults. Case can easily be diagnosed clinically and studying peripheral blood film.

Keywords: falciparum malaria, paediatric, microscopical demonstration, pulmonary oedema.

INTRODUCTION

Malaria; a global health problem which affects more than 40% of the world population in 143 countries [1]. Over 300 millions of new malaria cases are added every year [2]. It kills more than one million people world wide each year and of these more than 15-25% are under 5 children [3]. In South East Asia 9 countries out of 11 including Bangladesh are facing malarial health problem seriously. Main victims of this problem are children and pregnant women [4]. They are 75% of total affected people [2].

Falciparum malaria has got no particular characteristic clinical picture of its own and can be mimicked by a variety of febrile infectious illness in the tropics [5]. Severe malaria is falciparum malaria that is sufficiently serious to be an immediate threat to life. Occurs almost invariably as a result of delay in treating the uncomplicated malarial cases [1].

So there is a necessity to see the clinical presentations, response to anti-malarial therapy (before laboratory confirmation) and its outcome in children.

Considering WHO's focus on the clinical disease in its malaria control efforts there is a need for such data to guide diagnostic efforts in the absence of effective microscopy in highly endemic zone to start empirical treatment with antimalarial drug which significantly reduces morbidity and mortalilty due to falciparum malaria [6].

OBJECTIVE

General Objective

- The aim of current study is to early diagnosis of falciparum malaria from clinical presentations and early administration of treatment in the reduction of morbidity & mortality.

Specific Objective

- To see the variable clinical presentations of falciparum malaria in children and response to therapy.

METHODOLOGY

Study type: It was a Prospective study.

Study place and period: At pediatric wards of Chittagong Medical College Hospital, Chittagong.

Study period: From March, 2003 to August, 2003.

Sampling method: Non-probability purposive sampling method was used to select sample population.

Study population: A total of 100 cases of falciparum malaria amoung 9 months to 12 years age group were included in the study.

Procedure and Data Collection

Data were collected by preformed semi-structured questionnaire. Diagnosis of falciparum malaria was done by clinical examination as well as microscopic demonstration of asexual form of plasmodium in the blood film. Patients admitted with any suggestive symptoms of falciparum malaria clinically were examined for parasite in their peripheral blood at least twice. All cases were thoroughly examined clinically. Thick and thin films were prepared on slides from blood obtained by finger prick and daily parasite count were done by a pathologist in all the cases and in doubtful cases two separate pathologists examined the films. In addition to blood for Mp, other laboratory evaluations were Total and differential leucocyte count, Hb%, Random blood glucose, unine analysis, serum electrolytes, BUN, serum creatinine, chest X- ray, serum bilirubin.

RESULTS

Table-1: Age distribution (N-100)

Age (Years)	Number of Patients	Percentage (%)
9m-11m	11	11
1-3 Yrs.	29	29
4-6 Yrs.	42	42
7-9 Yrs.	14	14
10-12 Yrs.	13	13

Table-1 shows that that 42% were in the 4-6 years, 11% in the 9-11 months age group. It is observed that younger adult are more sufferer than late adult.

Table-2: Sex distribution (N=100)

Sex	Number of patients	Percentage (%)
Male	61	61
Female	39	39

In this study 61% male and 39% female, which is almost same as study done by "Kanti Parimal Nath. It is because of female population is still less than male in Bangladesh and female child is less cared in our socio-economic culture.

Table-3: Month wise distribution on patients (N=100)

Months	Number of Patients	Percentage (%)
January	5	5
February	7	7
March	19	19
April	31	31
May	17	17
June	15	15
July	5	5
August	1	1

Table-3 shows that cerebral malaria is more common in the May and June. In this series 31% in April, 14% in March, 17% in May and 15% in June. It may be due to yearly variation of rain-fall, temperature, and humidity.

Table-4: Regional distribution. (N=100)

Region	Number of Patients	Percentage (%)
Rauzan	4	4
Fatikchari	12	12
Rangunia	5	5
Chittagong Hilltracts (Rangamati, Bandarban, Khagrachari)	24	24
Boalkhali	3	3
Patia	3	3
Chandanaish	4	4
Banskhali	4	4
Cox's bazar	16	16
Ctg	21	21
Satkania	5	5
Other than ctg /Feni	1	1
Sitakund	1	1

Here falciparum malaria has a firm root in Chittagong hill- tracts. In this study cases reported are from 24% from Hilltracts, 21% from Chittagong district.

Table-5: Features in cerebral Malaria (N=28)

Clinical Features observed	Number of Patient	Percentage (%)
Blantyre coma scale Score: < 3 Score : 3 or more	 6 22	 21.42 78.57
Convulsion	16	57.14
Brisk tendon reflexes	8	28.57
Planter extensor	6	21.42
Absent reflexes	2	7.14
Constricted pupil	2	7.14
Deconjugate eye movement	6	21.24
Decerebrate rigidity of Decorticate rigidity	5	17.85
Nuchal residity	4	14.2
Kernig's sign	2	7.14

Among 6 cases of cerebral malaria, Blantyre coma seale score 3 of more was observed in 78.5% cases and score <3 in 21. 4% cases. The following signs were also observed: brisk tendon reflexes 2805%, positive babinski's sign 21.4%, convulsion 52% pulmonary oedema 7.2%, abolished tendon reflexes 7.1% constricted pupil 7.1%, nuchal stiffness 14.2%, kernig's sign 7.1%.

Table-6: Parasite density in peripheral blood on Admission (N=100)

Parasite count per Milliliter of blood	Number of Patient	Percentage (%)
<500	8	8
500-10,000	63	63
1000-50,000	17	17
Infinity	2	2

Majority of patients 63% had parasite count 500-10,000 their peripheral blood and count was plenty in only 2% cases. Most of the patients were anaemic but 13% cases had sever anaemia. Leucoopenia was observed in 5% leucocytosis in 39% cases. Evidence of haemolysis was present in 22% cases; which included jaundice, severe anaemia (Hb%=<5 g/ dl), increased serum bilirubin level and reticulocytosis.

Table-7: Distribution of HB concentration (N=100)

Hb (gm/dl)	Number of Patient	Percentage (%)
<5	13	13
5-9	42	42
10-12	31	31
>12	14	14

Table-8: Total & Differential count of WBC (N=100)

WBC	Number of Patient	Percentage (%)
<4,000/cu m.	5	5
4000-11,000/ca m.	77	77
>11,000/cu m.	18	18
Monocytosis	14	14
Lymphocytosis	39	39
Normal D.C	47	47

In the present series, we found severe anaemia in 13% cases, moderate anaemia in 42% cases and mild anaemia in 3% cases. Here eucocytosis was in 18% cases, leucopenia in 5% cases and normal leucocyte Count in 77% cases.

Table-9: CSF analysis

Parameters	Case									
	1	2	3	4	5	6	7	8	9	10
Pressure	N	η	N	N	N	η	N	N	N	η
Colour	C1	C1	C1	C1	C1	C1	C1	C1	C1	C1
Cells (Normal 5/ ca m. Lymphocyte	10	08	05	12	9	11	10	14	08	06
Sugar normal (40-80 mg/..)	35	45	40	50	45	60	45	35	60	40
Proteins (Normal 15-49mg/dl)	30	35	40	30	40	30	40	45	35	40

CSF were hazy in 11% percent cases. In the present series, we found CSF clear in all the cases of cerebral malaria, No significant changes in laboratory findings of CSF was observed.

Table-10: Outcome of patients with falciparum malaria after treatment.

Out come	Number of patients	Percentage (%)
Survived	90	90
Expired	10	10
Cerebral malaria	28	28
Blackwater fever	9	9
Renal failure	3	3
Residual change in the survivors	2	2

In the hospital 90% survived without any residual changes and 10% died.

Table-11: Specific treatment (N=100)

Initial treatment Started with	No Patients		Percentage of Total patient (%)
Chloroquine	Effective	Resistant	
	4	2	6
Quinine	94	-	94

DISCUSSION

Malaria is one of the tropical diseases against which WHO expressed its concern [7]. Malaria is considered as a severe health problem upon the people of Bangladesh since 1970. It is known as hyper endemic with its hilly areas. Younger age group is more vulnerable to the disease than adult. It is because of children are less immune or not immune. From a study by Hussain and Chakraborti [9, 10].

Sex distribution of patients in their study (Hussain and Chakraborty) was not representative. Because their study was on soldiers in Combined Military Hospital most of the patients were natuarally male [9, 10]. In my study 61% male and 39% female, which is almost same as study done by "Kanti Parimal Nath" [10]. It is because of female population is still less than male in Bangladesh and female child is less cared in our socio-economic culture.

In study on pediatric admission to Royal Victoria Hospital in Banjul, Brew ster showed that there is a marked variation on paediatric admission [11]. Which peaked following rainy season. Mortality of falciparum malaria is high in the rainy season than dry season. Rahman showed that cerebral malaria is more common in the May and June. In this series 31% in April, 14% in March, 17% in May and 15% in June. It may be due to yearly variation of rain-fall, temperature, and humidity [12].

Travelling history is an important clue in the diagnosis, mortality and morbidity of falciparum malaria. But no such travel history (From outside to endemic zone or staying outside for some period then back to endemic zone) was noted in this study. It is because of location of Chittagong Medical College

Hospital. Where most of the patients are from bearby endemic zone. Migratory sufferers are brought to other hospitals. In one study by waiz mentioned that Falciparum malaria has a firm root in Chittagong hill-tracts [13]. In this study cases reported are from 24% from Hilltracts, 21% from Chittagong district. This is more or less consistent with study of Waiz.

Patient with malaria developed normocytic norm chromic, sometimes hypochromic normocytic and very rarely macrocytic anemia. During a paroxysmal attack of fever, there may be leucocytosis. Later there is leucopenia with monocytosis and sometimes with monocytisis and sometimes with lymphocytosis [14]. In Hussain's study, he showed that 3% cases were severely anaemic, 7% patient had leucopenia, 78% had normal leucocyte count, 7% patient had leucocytosis, 43% patient had monocytosis, 27% patients had lymphocytosis. But in the present series, we found severe anaemia in 13% cases, moderate anaemia in 42% cases and mild anaemia in 3% cases. Here leucocytosis was in 18% cases, leucopenia in 5% cases and normal leucocyte Count in 77% cases.

This series also showed monocytosis in 14% cases and lymphocytosis in 39% cases. So, with some variability, most of the patients developed anaemia and some patients had leucopenia with lymphocytosis and monocytosis, which are consistent with former study.

Haemolysis is the commnest cause of anaemia in patients with falciparum malaria. In Hussain's study, 15% patients had evidence of haemolysis where only 4% cases had clinical jaundice. In the present series, 69% patient had evidence of haemolysis and luny 22% patients had clinical jaundice which are not consistent with former study. Here 47% of anaemia may be nutritional.

Faiz *et al*., showed that CSF were hazy in 11% percent cases [15]. In the present series, we found CSF clear in all the cases of cerebral malaria, No significant changes in laboratory findings of CSF was observed.

P. falciparum developed chloroquine resistance in African rural areas. In Thailand and Vietnam resistance to quinine is increasing [16]. In this study, in 96% cases other than cerebral malaria initially were treated with chloroquine. On the 4th day after treatment with chloroquine, 94% patients showed clearance of parasite from peripheral blood. The remaining 2% patients of uncomplicated malaria were treated with quinine therapy. All patients were cleared of parasite from their peripheral blood. So, in our study, we observed 2% patients with falciparum malaria did not respond to chloroquine, but all patients on falciparum malaria responded to quinine therapy alone.

CONCLUSION

This analysis also states that the symptomatology of falciparum malaria in children differs from that of adults having very good response to early quinine therapy. So early suspicion of falciparum malaria in children with adequate quinine therapy can reduce unwanted mortality.

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