THE STUDY SPECTRUM OF FALCIPARUM MALARIA IN CHILDREN AT MGM HOSPITAL, WARANGAL

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ABSTRACT

BACKGROUND

In view of the increase in the incidence of falciparum malaria in our area, most of the patients coming from malaria endemic areas, to know the spectrum of malaria in a district level teaching hospital, we have taken up this subject.

METHODS

It was a Prospective Observational Study during the years July 2013 to July 2015. All children with clinical suspicion of malaria between age group of 0-12 years were admitted in paediatric ward.

RESULTS

During the period of study in 2 years, we have observed that there is progressive increase in the incidence of pf. malaria with particular increase during the months of July to October which is being a rainy season. Retrospective data of the number of pf. malaria cases admitted in our hospital in the previous two years also showed increased incidence.

CONCLUSIONS

Supportive treatment like control of fever, convulsions, blood transfusion is as equally important as specific treatment. Parasite F test is easy to diagnose, even a health worker in PHC can diagnose. Outcome is good when the treatment is started early pointing out to the importance of quick diagnosis and treatment.

KEYWORDS

Falciparum, Malaria, Children, Spectrum, Clinical.

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INTRODUCTION: Malaria has been described in Ayurveda as Vishama Jwara. For many years, it was thought to be due to influence of poisonous miasma or bad air, Hence the name Malaria-Italian name.[1]

Malaria is one of the oldest recorded diseases and is considered as old as mankind. The disease supposedly had its origins in the jungle of Africa. Malaria is one of the most common infection in the world with children being frequent victims of its complications. It is a very familiar tropical infection. In spite of the measures taken to prevent and control Malaria, its situation is getting worst globally.

In India, Malaria has taken the prime position in national health programmes. A wide range of clinical manifestations exist based on the degree of immunity, age of the child and duration of illness. Travellers to Malarious areas often run a high risk of acquiring the disease. Malaria is a protozoan infection transmitted to human begins by female Anopheles Mosquito biting mostly between sunset and sunrise.

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It may also be due to transfusion of infected blood. Congenital Malaria 22 is also reported due to transplacental transmission of malaria parasite.

More than 2 billion people reside in Malaria endemic areas[2]. About 300-600 million new cases of malaria occur every year all over the world. Of these, at least 2-3 million deaths occur despite all the effects. Approximately, 2.48 million malaria cases are reported annually from South Asia of which 75% cases are from India alone. In India, about 2.1 million cases occur every year and the entire population of India (about 95.9%) is under Malaria risk. Most of the fatalities occur in infants and children. In endemic areas, every case of fever/FUO should be suspected as a case of Malaria.

There is not only a global increase in the incidence of Malaria but also an increase in the incidence of P. falciparum species. It is a very alarming finding considering its complications and the development of chloroquine resistance. Important contributing factors of drug resistance are population movement, infrastructure deficiency, deforestation, unplanned development, drug pressure and haphazard use of drugs.

Efforts to eliminate the transmitting agents have failed due to resistance to insecticides. In addition malarial parasites have also developed resistance to the available

therapeutic agents. Hence now the important step lies in the prevention, diagnosis and the treatment of malaria.

Recent advances in the diagnostic techniques have made the diagnosis of Malaria easy. They are not only helping in identification of species but also very useful in followup to judging the effectiveness of the Antimalarial therapy.

AIMS & OBJECTIVES:

1. To study the incidence of falciparum malaria in children who were admitted in MGM Hospital, Kakatiya Medical College, Warangal.
2. To assess the various clinical presentation and complications of falciparum malaria in children.
3. To assess the cause of mortality in children with falciparum malaria cases.

MATERIALS & METHODS: It was a Prospective Observational Study done from July 2013 to July 2015. All the children with clinical suspicion of malaria between age group of 0-12 years who were admitted in paediatric ward.

Inclusion Criteria: All children with clinical suspicion of having malaria proved positive either by peripheral smear or PF test.

Exclusion Criteria: All children with clinical suspicion of malaria but proved negative by peripheral smear and PF test.

1. All children were thoroughly examined clinically and various presentations were noted according to proforma.
2. All were examined for malaria parasite in their blood on the peripheral smear and parasite F test was done for all smear negative and positive cases.
3. Other causes of fever were eliminated by doing appropriate tests like sputum culture, throat swab, CSF, Widal, dengue check, CUE and urine for culture was done to exclude any other form of infection in the body like meningitis, encephalitis.

The axillary temperature of every child was recorded with thermometer immediately after admission.
The temperature grading given as:

- Low grade - 98.4^0 F – 102^0 F.
- Moderate - 102^0 F – 104^0 F.
- High grade - >104^0 F.

The level of consciousness was assessed as:

- G I Coma (Stupor) - response to verbal.
- G II (Light Coma) – response to painful stimuli.
- G III (Deep coma) – no response to pain. Decorticate cerebrate posture.
- G IV (Brain dead) – no pupillary response.

The splenomegally assesed by Hackett's semi-quantitative method.

Drawing a horizontal line below the subcostal margin, from the umblicus & from pubis symphysis.

- G 0 - Not palpable.
- G I - Palpable during inspiration only.
- G II - In between the subcostal and umblical lines.
- G III - At the umblicus level.
- G IV - In between umblicus and symphysis pubis lines.
- G V - Up to symphysis pubis.

Diagnostic Methods:

A) Peripheral Blood smear.
B) Parasite F Test.

A) Peripheral Blood Smear: Done before initiation of treatment on day 3, 7, includes detection of malaria parasite species determination and parasite density measurement.

B) Parasite – F TEST[1]
Done at bedside immediately after admission.

Severe Malaria: Severe malaria considered according to WHO Definition.

Treatment Protocol: All children diagnosed to have pf. malaria were categorised into 2 groups and treatment was given accordingly.

Uncomplicated pf. malaria without vomiting are treated with oral chloroquine as per WHO recommendations in 25 mg/kg/course over a period of 48 hours.

If there is detoration of child condition, oral Quinine 10 mg/kg/dose 3 times a day for 7 to 10 days. Along with Quinine if age is less than 8 years, pyrimethamine & sulfadoxine, 1.25 mg/kg and 25 mg/kg respectively given at the end of therapy. If age is more than 8 years, doxycycline 3 mg/kg/day in 2 divided doses for 7 days given.

If acute malaria is treated with IV quinine initially and shifted to oral quinine as soon as the child starts accepting feeds, the dose is repeated if child vomits within 30 min. of taking drugs.

If patients' general condiions are not improving after 48 hours and parasitic load is not decreased, IV Quinine is discontinued and IV Artesunate given. The dose of Artesunate is 2.4 mg/kg IV followed by 2.4 mg/kg at 12 hours and 24 hours, then 2.4 mg/kg/day (single dose) for 6 days. If child is able to swallow, then oral Artesunate given. At the end of therapy, mefloquine 25 mg/kg (divided into 2 doses - 15 mg/kg and 10 mg/kg 6 hours apart) is given.

Along with specific antimalarial therapy, supportive is therapy given.

The Supportive Therapy is:

1. Rapid clinical assessment with respect to level of conciousness.
2. Good nursing care with proper positioning (30^0 end of the head elevation) meticulous attention to airways, eyes, mucosa and skin given.
3. If unconscious – nasogastric tube inserted to reduce the risk of aspiration.

4. Hyperpyrexia – treated with paracetamol (15 mg/kg/dose) tepid sponging and fanning.
5. Convulsions – midazolam (0.1 mL/kg dose), diazepam (0.1 mL/kg/dose).
6. Hypoglycaemia – IV 25% dextrose 4 mL/kg bolus.
7. Dehydration & shock – adequate fluid & electrolytes.
8. Anaemia – emergency blood transfusion.
9. Renal failure – dialysis.
10. Spontaneous bleeding (DIC) – FFP/Fresh blood transfusion and vit. K.
11. High parasitaemia – exchange blood transfusion.

Repeated clinical examinations were done to know the clinical improvement after 4 hours, 8 hours, 16 hours, 24 hours, 2 days & 1 week after completion of the therapy.

Radical Treatment of Pf. Malaria: Given on the last day of treatment after investigating the G_6PD deficiency, 0.75mg/kg single dose.

Outcome: Progress recorded every 6^{th} hourly for 1^{st} day and every 12^{th} hourly for 2^{nd} day and daily thereafter.

OBSERVATIONS AND RESULTS:

Period	Total No. of Cases	Total Pf. Malaria Cases	Pf. Malaria Cases from July to October	Percent of Total
Jan – 11 to Dec 11	4808	60	42	0.412
Jan- 12 to Dec 12	3998	78	60	0.650
Jan -13 to Dec 13	5740	120	60	0.696
Jan -14 to Dec 14	6090	138	75	0.755
Jan – 15 to Jun 15	2250	60		0.78

Table 1: Incidence of Pf. Malaria Cases

A total of 216 cases in the age group of 0-12 years were studied who were diagnosed as falciparum malaria with peripheral blood smear or parasite F test.

Age Distribution:

Age Group	No. of Cases Diagnosed Falciparum Malaria	Percentage Positive
< 1 Year	12	5.55
1-5 Years	78	36.11
6-9 Years	102	47.22
10-12 Years	24	11.11
Total	**216**	**100.00**

Table 2: Age Incidence of Pf. Malaria Cases

Table 2 shows the distribution of children according to the age group Studied. Out of 216 cases the highest numbers of cases were seen in the Age group of 6 to 9 years. The next frequent groups were 1-5 years, 10 -12 Years and less than 1 year. The distribution of cases according to the percentage was 47.22, 36.11, 11.11, and 5.55 respectively. Youngest baby in this study was of 6 months age.

Sex Distribution:

Age	Male	Female
< 1 year	6	6
1-5 years	36	42
6-9 years	72	30
10-12 years	12	12

Table 3: Sex Incidence of Pf. Malaria Cases

Table 3 shows the distribution of malaria cases according to the sex. In all the ages groups out of 216 cases 126 cases were males and 90 Cases were female. Ratio of males to female is 2.14: 1.

Rural/Urban Predilection:

Area	No. of Cases	Percentage
Urban	48	22.22
Rural	168	77.77
Total	**216**	**100**

Table 4: Rural/Urban Distribution

Of the 216 cases, 168 cases are from rural areas, only 48 cases are from the urban areas. In urban areas also there is distinction between the slum and other regions with most of the cases coming from slums indicating the association of malaria with poverty and environmental condition.

Clinical Manifestations:

Sl. No.	Symptom	No. of Cases	Percentage
1.	Fever	216	100
2.	Headache	174	80.55
3.	Altered sensorium	126	58.33
4.	Vomiting	126	58.33
5.	Refusal of feeds/loss of appetite	114	52.77
6.	Convulsions	78	36.11
7.	Cough	78	36.11
8.	Jaundice	60	27.77
9.	Loose Motions	30	13.88
10.	Oedema of feet	18	8.55
11.	Oliguria	12	5.55
12.	Haematuria	12	5.55
13.	Pain Abdomen	3	2.77

Table 5: Presenting Symptoms of Pf. Malaria Cases

Table 5 shows the symptoms, which were seen most commonly in our study. All the cases were having fever at the same time of presentation to the hospital.

Next frequent symptoms were headache and malaise (80.5%). Altered sensorium and vomiting were third frequent symptoms 126 (58.33%) cases. Refusal of feeds or loss of appetite was seen in 114 (52.77%) cases. The symptom cough was present in 78 (36.11%) cases equalling the convulsions and same% of cases. Jaundice was seen in 60 (27.77%) cases.

Loose motions were present in 30 cases i.e. 13.88%. Oedema of feet with oliguria was seen in 12 cases.

Fever Details:

Sl. No.	Fever	No. of Cases	Percentage
Type			
1.	Continuous Fever	90	41.66%
2.	Intermittent Fever	126	58.33%
Grade			
3.	Low Grade Fever	42	19.44%
4.	Moderate Grade Fever	96	44.44%
5.	High Grade Fever	78	36.11%
Duration			
6.	0 – 5 days	114	52.77%
7.	5 – 10 days	78	36.11%
8.	> 10 days	24	11.11%
Character			
9.	Fever with chills	114	52.77%
10.	Fever with sweating	60	27.37%

Table 6: Fever Details

Table 6 shows the characteristics of fever. Duration of the fever was less than 5 days in 52.77% cases followed by 36.11% cases with duration of fever between 5–10 days and only 11.11% cases showed longer than 10 days' duration. Chills were seen in 52.77% cases (114). Fever was of intermittent nature in 58.3% cases (126) and was continuous in as much as 41.6% cases (90).

Sl. No.	Signs	No. of Cases	Percentage
1.	Anaemia	116	72.22%
	9 – 12 g	54	34.61%
	5- 9 g	48	30.76%
	< 5 g	60	38.46%
2.	CNS Changes (Cerebral Malaria)	126	58.33%
3.	Splenomegaly	108	50%
	Grade – I	60	55.55%
	Grade –II	30	27.77%
	Grade – III	18	16.66%
	Grade –IV	0	0
	Grade – V	0	0
4.	Icterus	78	36.11%
5.	Hepatomegaly	72	33.33%
	1 – 5 cm	54	75.00%
	5 – 10 cm	18	25.00%
6.	Hypotension Shock	48 06	22.22% 12.50%
7.	Bleeding	06	2.77%

Table 7: Clinical Signs of Pf. Malaria (n = 216)

Table 7 shows the clinical signs of malaria which were observed in our study. In our study, anaemia was significant finding with 72.22% cases. The haemoglobin percentages were 9-12 g, 5-9 g and < 5 g in 34.6%, 30.76% and 38.46% of cases respectively. Children with < 5 g were given immediate blood transfusion. Splenomegaly found in 50%, among them Gr. II Splenomegaly found in 27.77%.

Sl. No.	Signs	No. of Cases	Percentage
1.	Coma	126	58.33%
	Grade – I	48	38.09%
	Grade –II	36	28.57%
	Grade –III	42	33.33%
2.	Plantar reflex	114	52.77%
	Flexor	36	31.57%
	Extensor	78	68.42%
3.	DTR Exaggerated	96	44.44%
4.	Abnormal pupils (unequal pupils)	60	27.77%
5.	Decerebrate posture	54	25.00%
6.	Neck Rigidity	24	11.11%
7.	Cerebellar Signs	6	2.77%
8.	Hypotonia	6	2.77%

Table 8: CNS Features of Cerebral Malaria[3-11] (n = 126)

The next frequent signs were related to central nervous system (cerebral malaria). Coma was seen in 126 cases of which 42 cases were Grade III coma, 36 cases in grade II, 48 cases in Grade I Coma, 18 children who were in Grade-III coma expired within 24–48 hours. Variability of plantar reflex, exaggeration of DTR was seen in 114 & 96 no. of cases. Decerebrate posture and abnormal pupils were seen in 54 and 60 cases in 25% and 27.77%. Neck rigidity was seen in 12-24 cases in which CSF analysis was normal. In one case, we observed hypotonia and nystagmus (spontaneous).

Sl. No.	Signs	No. of Cases	Percentage
1.	Fever, Anaemia[12], Jaundice & Hepatosplenomegaly	60	14%
2.	Fever, Anaemia, Hepatosplenomegaly	72	17.28%

3.	Fever, Anaemia, Splenomegaly	90	21%
4.	Fever, Anaemia	30	7.2%
5.	Fever, Splenomegaly	45	10.8%
6.	Only Fever	18	8.3%

Table 9: Combination of Clinical Signs in Pf. Malaria (n=216)

In the study, 90 cases (21%) presented with Fever, Anaemia and splenomegaly. 72 cases (17.28%) presented with Fever, Anaemia and Hepatosplenomegaly. 18 cases presented only with Fever.

Sl. No.	Complication	No. of Cases	Percentage
1.	Cerebral Malaria	126	58.33%
2.	Jaundice (>2 mg/dL)	60	27.77%
3.	Severe Anaemia (<5 g)	60	27.77%
4.	Hypoglycaemia (<40 mg/dL)	54	25.00%
5.	Deep & Rapid breathing (Acidosis)	9	4.16%
6.	Renal failure serum creatinine (>3 mg/dL)	12	5.50%
7.	Congestive Cardiac failure	12	5.50%
8.	Black water fever	12	5.50%
9.	Bleeding (DIC)	6	2.77%
10.	Algid Malaria (shock)	6	2.77%
11.	Pulmonary oedema	3	1.34%

Table 10: Spectrum of Complicated (Severe) Pf. Malaria (n= 216)

In this study, the cerebral malaria was the most common complication of Pf. malaria with 58.33%. Jaundice was found significantly in 60 cases (27.77%), all of them associated with severe malaria. Hypoglycaemia was also found significantly in 54 (25%) cases. CCF and Renal failure were found in 9 (4.16%) cases each. Acidosis was found in 9 cases,all of them associated with Hypoglycaemia. DIC found in 6 cases (2.77%). Black water fever found in 12 cases. Among them, one boy has borderline G6PD deficiency. Algid malaria was found in 6 cases.

Sl. No.	Complications	No. of Cases	Percentage
1.	Cerebral Malaria, Severe Anaemia Jaundice and Hypoglycaemia	39	30.95%
2.	Cerebral Malaria, Severe Anaemia, and Hypoglycaemia	45	35.71%
3.	Cerebral Malaria, Severe Anaemia	54	42.85%
4.	Cerebral Malaria, DIC	6	4.76%
5.	Cerebral Malaria, Algid Malaria	6	4.76%
6.	Cerebral Malaria and Acidosis	9	7.14%
7.	Cerebral Malaria and ARF	9	7.14%
8.	Cerebral Malaria with Hypoglycaemia	42	33.33%
9.	Cerebral Malaria with Pulmonary oedema	3	2.3%

Table 11: Complications Associated with Cerebral Malaria (n=126)

This table shows that most of the complications are seen in a single patient. The patient who had cerebral malaria was found with other complications like severe anaemia, hypoglycaemia and congestive cardiac failure. In this study, renal failure and algid malaria was seen in cerebral malaria patients only.

Sl. No.	Complications	Total No. of Cases	No. of Deaths	Percentage
		216	**18**	**8.3%**
1.	Deep and Rapid Breath (Acidosis)	9	6	2.775
2.	Renal Failure	9	3	1.38%
3.	Bleeding diathesis (DIC)	6	3	1.38%
4.	Severe Anaemia with CCF	12	3	1.38%
5.	Pulmonary Oedema	3	3	1.38%

Table 12: Mortality Details (n=216)

In this study, total no. of deaths were 18 only (8.3%). All of them died within 24 hours of admission. Six children died due to Acidosis (2.77%). Three children died due to renal failure (1.38%). Three children died because of DIC (1.38%). Other six deaths due to severe anaemia with CCF and Pulmonary oedema respectively (1.38%). All these children with cerebral malaria who died were in Grade–III coma. (In this study, total number of cerebral malaria cases are 126). All deaths associate with cerebral malaria, the percentage of mortality in cerebral malaria cases is 14.28%. In this study, mortality is more seen in < 5 years of age group.

Sl. No.	Blood Group	No. of Cases	Percentage
1.	O Group	84	38.88%
2.	A Group	30	13.88%
3.	B Group	78	36.11%
4.	AB Group	24	11.11%
5.	Rh + ve	204	94.44%
6.	Rh – ve	12	5.5%

Table 13: Blood Groups

Out of 216 cases, 84 cases were of O Group and 78 cases of B Group, probably as they are the most common blood groups in general.

Total No. of Cases	PF Test + ve	Peripheral Smear + ve	Peripheral Smear + ve & PF Test + ve	Peripheral Smear – ve &PF Test +ve
216	216	165	165	51

Table 14: Pf. Test & Peripheral Smear

Peripheral smear was negative in 51 cases 23.61% which is significant.

Sl. No.	Name of Drug	No. of Cases	Percentage
1.	Chloroquine	24	11.11%
2.	Artemether and lumefantrine	30	13.85%
3.	Artesunate (IV)	192	88.88%
4.	Doxycycline	36	16.66%
5.	Clindamycin	150	69.44%
6.	Primaquine	186	86.11%

Table 15: Drugs (Pharmacotherapy Details of Pf. Malaria n = 216)

In this study, chloroquine given to children who were in uncomplicated Pf. malaria (11.11%). Oral Artemether and Lumefantrine given to 30 children (13.85%). IV Artesunate given to 192 children (88.88%). Doxycycline given to the 36 children who are above 8 years of age. Clindamycin given to 150 children who responded with Artesunate. Primaquine given to 186 children (86.11%) not given to children < 1 year (12 cases) and 18 died children.

DISCUSSION: In our study, we have observed that there is a steady increase in the incidence of malaria in total pediatric hospital admissions over the period 2 years i.e., 0.69% in 2013 to 0.78% in 2015 (0.755% in 2014). With particular increase during the months of July to October which is being a rainy season. This indicates that ours is an endemic zone for malaria.

The causes of this resurgence of falciparum malaria may be because of:

1. Development of resistance of P. falciparum to chloroquine.
2. Development of vector resistance to DDT and its shortages.
3. Bad hygiene, lack of health consciousness.
4. Improper and inadequate waste water draining system.
5. Problems of overcrowding, urbanization and formations of new slums in the developing towns and cities.

In our study, male to female ratio was 2.14:1. Male preponderance may be due to:

1. Male children have less clothing than female.
2. Male children spend most of the time outdoor getting exposed to mosquito bites.
3. May be because of social and cultural factors like increased reporting of fever cases of male children by patients.

Author's Name	Present Study at MGM Hospital, Warangal	Gopinath et al, 1986	Gupta et al, 1987	Mehta et al, 1989	Dhamija et al, 1992	Jhala et al, 1992
Cases	216	45	72	13	180	
Alt. sensorium	126(58.39%)	30(66.69%)				60%
Seizures	78(36.11%)					60%
Cerebral malaria	126(58.39%)	30(66.69%)				60%
Head ache	174(80.55%)			13	100%	
Vomiting	126(58.33%)				80%	
Splenomegaly	108(50%)					80%
Ataxia	6(2.7%)	4(8.8%)				
Movement disorders	6(2.7%)	3(6.67%)			10%	
Papilledema	0		4	4	17%	
Neck rigidity	24(11.11%)					
Focal signs	36(36%)	16(35%)		5	26%	
Fever	216(100%)					100%
Severe anaemia	60(27.77%)		20(27.77%)			
Spontaneous bleeding	6(2.77%)				3%	2%
Pulmonary oedema	3(1.34 %)				1%	1%
Renal failure	4(5.5%)		4(5.5%)			
Mortality	18(8.3%)		15(20.8%)			

Comparison Study of Different Studies on Pf. Malaria in India[13-19]

Fever is seen in 100% cases, which is similar to Jhala et al, (1992). Vomiting were seen in 80.55% of cases slightly less when compared to Metha et al and Dhanija et al (100% cases). This may be because of children not able to complain of headache below 3 years.

Altered sensorium was seen in 58.3% of cases which is similar to Jhala et al, 1992(60%) and Gopinath et al (1986) (66.6%). Convulsion were present in 36.11% of cases which is nearer to 49.2% of Gupta et al (1987) studies but very less Compared to Jhala et al studies.

Loose motions were seen in 13.8% cases. This may be due to vascular congestion, decreased absorption, sloughing of mucosa secondary to sequestration of parasites in vascular bed.

Cough was seen in significant number of cases i.e., 36.1% of Cases.

Jaundice in 27.7% of cases was noted, most of them were associated with severe anaemia and Grade II or III splenomegaly (According to Hackett grading of splenomegaly).

Splenomegaly was seen in 50% of the cases, less compared to Jhala et al (1992) studies of 80%. This difference may be due to the fact that the above studies were conducted in severe falciparum malaria cases only. Spleen was not palpable in 50% of cases, that means absence of spleen has no significance in the exclusion of the diagnosis particularly in falciparum malaria.

Ataxia, nystagmus and other movement disorders were seen in only case i.e., 2.7%, less when compared to 8.8% of ataxia and 6.6% of movement disorders in Gopinath et al studies.

Of the complications, first and foremost is the cerebral malaria followed by anaemia and icterus. ARF was seen in only 12 cases which differ significantly from cerebral malaria in adults along with pulmonary oedema.

Spontaneous bleeding seen in 6 (2.77%) cases, which is nearer to Jhala et al, (1992) 2%.

Deaths were 18 i.e., 8.3% of cases which is less than 20.8% of Gupta et al (1987) studies and other studies. All the 18 cases were with Grade III Coma.

Pf. Test Vs Peripheral Smear: Peripheral smear is the simple method of identifying the malaria cases, but P. falciparum species are difficult to identify in the peripheral smear. In our study, parasite F test was positive in 51 number of cases i.e., cases in which peripheral smear was negative.

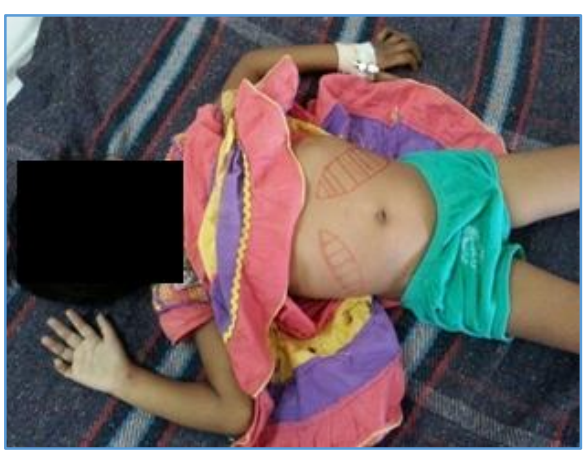
The success of the treatment depends upon the early diagnosis with high degree of suspicion particularly in falciparum malaria. Though parasite F test is costly when compared to peripheral smear, it can save many lives when diagnosed early. Furthermore, this parasite F test is very easy for interpretation and even health workers in primary health centres can diagnose the falciparum malaria with this test.

CONCLUSIONS:

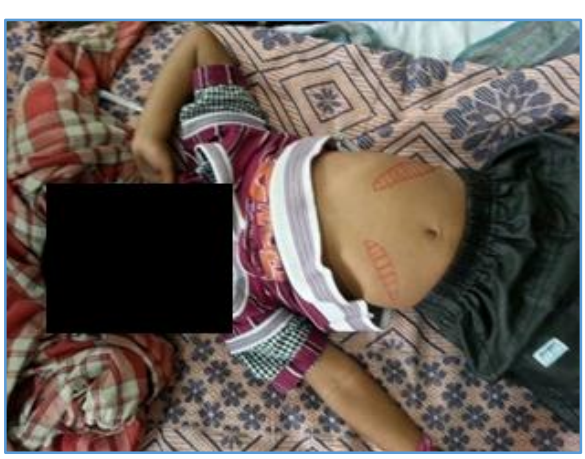
1. The WHO definition for severe falciparum malaria helps in early identification of high risk cases, so that prompt treatment is instituted early, thereby reducing the mortality rate.
2. Fever, anaemia and splenomegaly still are significant as a clinical trial in diagnosis of malaria.
3. Artemisinin derivatives are effective in treating severe malaria.
4. Artemisinin derivatives have a slight advantage over Quinine due to the ease in administration and having fewer side effects.
5. Fever, Headache, Altered Sensorium are the commonest manifestations of falciparum malaria.

LIMITATIONS OF OUR STUDY: As our study is primarily a hospital based study, it is not possible to comment on true incidence of malaria.

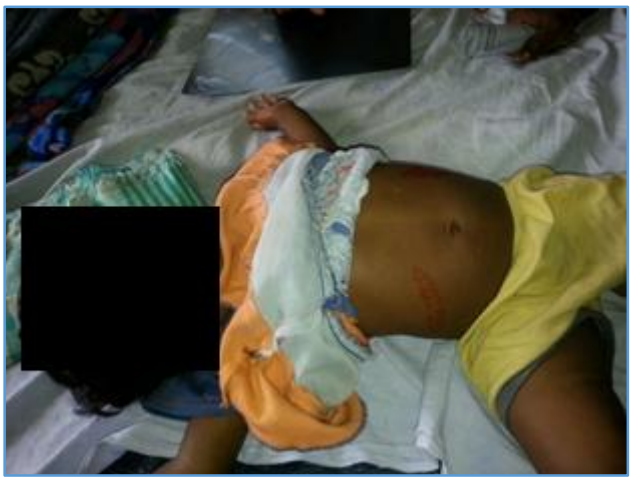
Another limitation is that our hospital is only a referral hospital for the surrounding districts and it is not possible to comment on the prevalence as only serious cases are being referred and most of the cases get treatment outside by private medical practitioners. Hence, it is difficult to come to a conclusion of actual incidence and prevalence of malaria in this part of India.



Child with Severe Anaemia with Hepatosplenomegaly



Child with Hepatosplenomegaly



Child with Cerebral Malaria

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