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KEY WORDS:

DEMOGRAPHIC PROFILE AND HAEMATOLOGICAL CHANGES IN PLASMODIUM FALCIPARUM MALARIA CASES IN NORTHERN INDIA

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ABSTRACT

Background and Objectives: Malaria continues to be a great health problem in some of the most populated areas of the world & continues to cause significant morbidity and mortality worldwide. In this study we aimed to study the demographic profile and hematological parameters in falciparum malaria cases.

Materials and methods: This open prospective study was conducted in the Department of Medicine, in a tertiary health care centre of northern India. This study was comprised of 100 consecutive patients of P. falciparum malaria who were admitted here. The detailed history and clinical examination of all included patients were done. All the patients were investigated such as CBC, peripheral blood smear (thin & thick) for M.P., blood sugar, S. bilirubin, SGOT, SGPT, urea, creatinine, s. proteins, S. electrolytes, x-ray chest, ABG if needed. Microscopic examination of blood films is accepted as the current universal "Gold standard" for the diagnosis of malaria.

Results: Maximum cases were in 20-30 yrs (36%) age group followed by >40 yrs age group (28%). Out of 100 cases, 65 patients were males and 35 were females. The maximum female were of 20-30 yrs. age group (54.28%) and maximum males were more than 40 yrs. age (35.38%). Maximum cases of complicated malaria & uncomplicated malaria were in 20-30 yrs age group i.e. 30.43% and 40.74% respectively. Maximum incidence of falciparum malaria were between July-Oct. Out of 10 patients who died, 5 patient had leucocytosis and 3 patient had severe thrombocytopenia.

Conclusion: Studying the demographic profile and haematological parameters will help the clinician in establishing early therapeutic measures, thus preventing the morbidity and mortality.

INTRODUCTION:

Malaria is a major public health problem in India, though it is both a preventable and treatable disease. It imposes great socioeconomic burden on humanity, and with six other diseases (diarrhea, HIV/AIDS, tuberculosis, measles, hepatitis B, and pneumonia), accounts for 85% of global disease burden[1,2] In this scenario, analysing the demographic profile, and seasonal variations in falciparum malaria cases will be a worth contribution for providing control measures. Also, the hematologic parameters are a major factor in determining the treatment, prognosis and outcome of the patient. So, in this study we aimed to study the demographic profile and hematological parameters in falciparum malaria cases.

MATERIAL AND METHODS

This open prospective study was conducted in the Department of Medicine, in a tertiary health care centre of northern India. This study was comprised of 100 consecutive patients of P. falciparum malaria who were admitted here. The patients were enrolled in the study as per the inclusion & exclusion criteria –

(A) Inclusion Criteria –

a. Adult patients with age >18yrs. of any sex.
b. Patients presenting with fever, headache, bodyache
c. Confirmed P. falciparum by demonstrating asexual form of P. falciparum in blood smear.

(B) Exclusion criteria –

a. Negative peripheral smear for P. falciparum
b. Mixed plasmodium infection
c. Evidence of any co-existing morbid disorder live diabetes mellitus, chronic renal disease, chronic liver disease, RHD, CAD which could affect the outcome.

All included patients were given written consent. The detailed history and clinical examination of all included patients were done. All the patient were evaluated for the various clinical presentations as per a predefined proforma. All the patients were investigated such as CBC, peripheral blood smear (thin & thick) for M.P., blood sugar, S. bilirubin, SGOT, SGPT, urea, creatinine, s. proteins, S. electrolytes, x-ray chest, ABG if needed. Microscopic examination of blood films is accepted as the current universal "Gold standard" for the diagnosis of malaria.

OBSERVATION

This was an open prospective study included 100 admitted patients of age > 14 yrs and both sexes of patients infected with P. falciparum

Table - 1: Distribution of falciparum Malaria cases in various age groups

Age group	Number of Patients	% Age
<20 yrs	20	20%
20-30 yrs	36	36%
31-40 yrs	16	16%
>40 yrs	28	28%
Total	**100**	**100%**

This table shows that maximum cases were in 20-30 yrs (36%) age group followed by >40 yrs age group (28%).

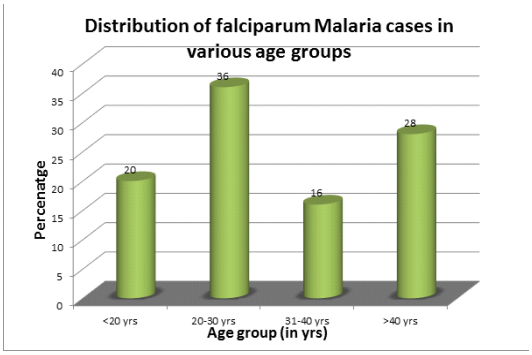

Table - 2: Sex wise distribution of cases in various age groups

Age group	Male	Female
<20 yrs	13 (20%)	7 (20%)
20-30 yrs	17 (26.1%)	19 (54.28%)
31-40 yrs	12 (18.46%)	4 (11.42%)
>40 yrs	23 (35.38%)	5 (14.28%)
Total	**65**	**35**

Out of 100 cases, 65 patients were males and 35 were females. The maximum female were of 20-30 yrs. age group (54.28%) and maximum males were more than 40 yrs. age (35.38%).

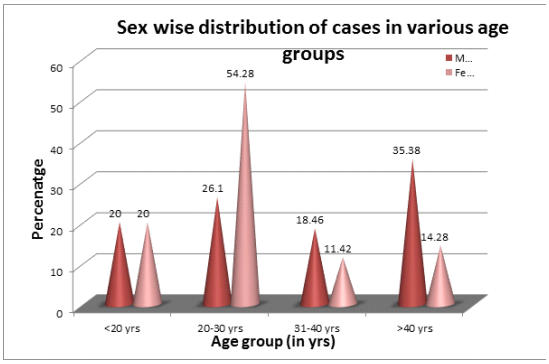

Table - 3: Table showing Severity of falciparum malaria in various age groups

Age group	Uncomplicated	Complicated
<20 yrs	11 (20.37%)	9 (19.56%)
20-30 yrs	22 (40.74%)	14 (30.43%)
31-40 yrs	6 (11.11%)	10 (21.73%)
>40 yrs	15 (27.77%)	13 (28.26%)
Total	**5 4**	**46**

Above table shows that the out of 100 cases, 54 cases were of uncomplicated malaria and 46 cases were having complicated malaria. Maximum cases of complicated malaria & uncomplicated malaria were in 20-30 yrs age group i.e. 30.43% and 40.74% respectively.

Patients was categorized into uncomplicated and complicated malaria category on the basis on the basis of clinical and biochemical parameters.

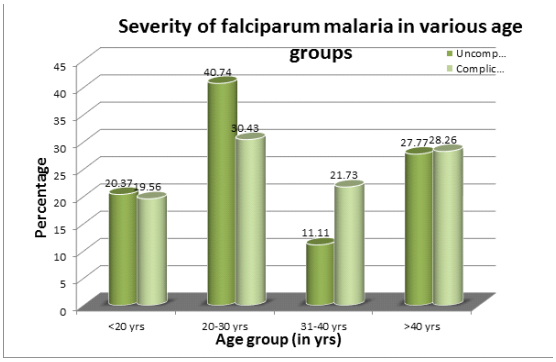

Table - 4: Sex wise distribution of severity of falciparum malaria

Age group	Uncomplicated (n=54)		Complicated (n=46)	
	Male	Female	Male	Female
<20 yrs	9 (19.56%)	2 (25%)	6 (16.66%)	3 (30%)
20-30 yrs	21 (45.65%)	1 (12.5%)	11 (30.55%)	3 (30%)
31-40 yrs	4 (8.69%)	2 (25%)	8 (22.22%)	2 (20%)
>40 yrs	12 (26.08%)	3 (37.5%)	11 (30.55%)	2 (20%)
Total	**46**	**8**	**36**	**10**

Above table shows that out of 54 cases of uncomplicated malaria, 46 were males & 8 were females. Maximum males (45.65%) were of 20-30 yrs. of age group. Out of 46 cases of complicated malaria, 36 were males and 10 were females.

Table - 5: Seasonal incidence of falciparum malaria

Months of year	Uncomplicated (n=54)	Complicated (n=46)	Total (n=100)
March-June	16	6	22
July-Oct	18	26	44
Nov.-Feb.	14	20	34

Above table shows that maximum incidence of falciparum malaria were between July-Oct. Most of the cases of complicated malaria were between July-Oct. months.

Hematological parameters

Hematological parameters in our patients were- Haemoglobin ranged from 3.9 gm/dl to 14gm/dl. WBC count ranged from 1900cells/cu mm to 56,400 cells/cu mm. Platelet count ranged from 20,000 to 7.5 lakhs/cumm.

Table 6 showing haematological parameters in patients who died (n=10)

Parameters	Range	Criteria for severity*	Patient fulfilling criteria for severity
Hb	4-10.8	< 5 gm%	1
TLC	2000-18800	> 12000 /l	5
Platelets count	20000-1.8 lacs	< 50000 /l	3

* as mentioned in Harrison textbook of Internal Medicine, 17th Edition, 203,1284.

Above table shows that out of 10 patients who died, 5 patient had leucocytosis and 3 patient had severe thrombocytopenia.

DISCUSSION

Infection with plasmodium falciparum is more serious than with other malarial species, because of frequency of severe and total complications associated with it

Age distribution

In the present study maximum number of cases were seen in 20-30 yrs age group. Out of 100 cases, 36(36%) patients were of 20-30 years age group. Incidence of uncomplicated and complicated malaria were also maximum in this age group. Chaudhary D.S. et al (1983)[3] found that there was a progressive increase in incidence from infancy to 16-25 age group. The increase in man vector contact and immunity may be responsible for this.

Seasonal variation

In present study, the highest incidence was seen during July-Oct for both complicated and uncomplicated malaria. Out of 100 cases, 44 cases were reported during period of July-Oct, of which 26 cases were complicated malaria and 18 cases were uncomplicated malaria. The highest incidence was reported during July to December by Gopinathan V.P. (1981)[4] and Chander et al (1989)[5] in their studies because of relative humidity and temperature during this period was favorable for the transmission.

HAEMOTOLOGICAL CHANGES

Haematological abnormalities are considered a hallmark of malaria and reported to be most pronounced in P. falciparum infection. The pathogenesis of anaemia in multifactorial. It results from the obligatory destruction of red cells containing parasites at merogony, the shortened survival of red cells from which parasites have been extracted by the spleen, and the accelerated destruction of non-parasitized red cells that parallels disease severity, all compounded by bone marrow dyserythropoiesis. In severe malaria anaemia develops rapidly, the rapid haemolysis of unparasitized red cells is the major contributor to the decline in haemocrit. The degree of anaemia and the rate at which it develops very enormously. The haemoglobin concentration may fall by upto 2 g/dl each day. Thus, it is both the absolute haemoglobin concentration and the magnitude of the fall that determine the clinical consequences of anaemia.[6]

In the present study, Overall 5 patients had severe anemia (Hb < 5 gm%). All the patients with severe anaemia were in complicated group. No patient were in uncomplicated malaria group. 1 out of 5 patients with severe anaemia died in study. This difference was statistically highly significant.

The leucocyte count in falciparum malaria is low to normal. However leucocytosis can occur when associated with secondary bacterial infection and pernicious malaria (Sharma SK et al, 1990).[7] T. Deb et al (1992)[8] observed leucopenia in 65.6% and leucocytosis in 5.7% while Sharma SK et al (1990)[7] reported leucopenia in 6.6% and leucocytosis in 13.3% cases.

Thrombocytopenia is a common observation in falciparum malaria. The mechanism of thrombocytopenia is poorly understood. The thrombocytopenia is thought to be caused by increased spleenic sequestration, immune mediated destruction and shortened platelet survival.[9] The degree of thrombocytopenia is associated with severity of falciparum malaria. In most of cases, spontaneous recovery occurs with treatment. In present study, incidence of thrombocytopenia increased with increasing parasite density.

CONCLUSION

Malaria has a devastating socio-economic impact on affected countries. Such is the effect that cost of control measures is worthwhile, considering the disability, mortality, economic loss and industrial insufficiency in the affected population. Prediction of the hematological changes enables the clinician to establish an effective and early therapeutic intervention in order to prevent the occurrence of major complications.

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