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Original Research Article

Incidence of mortality due to malaria with typical and atypical presentation

Shital N. Rathod[1], Arvind Chavan[1]*, Shilpa Sharma[2], Tushar Rathod[3], Koustubh Bavdhankar[1]

[1]Department of Medicine, Dr. SCGMC, Nanded, Maharashtra, India
[2]Department of Medicine, MGM Hospital, Navi Mumbai, Maharashtra, India
[3]Department of Orthopedics, Seth GS Medical College, Mumbai, Maharashtra, India

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***Correspondence:**
Dr. Arvind Chavan,
E-mail: drarvindchavan@gmail.com

ABSTRACT

Background: Malaria, despite intensive efforts to control, remains a leading cause of morbidity and mortality in humans. India contributes to 61 per cent of malaria cases and 41 per cent of malaria deaths in SEAR countries. The objective of the present study was to find out an incidence of mortality due to malaria with typical and atypical presentation.
Methods: The present was conducted over a period of three years. During the study period 630 patients with clinical suspicion of malaria were tested for malaria using peripheral smear, QBC and RDT.
Results: The mortality rate in this study group 161 (25.55%) out of which maximum mortality observed in patients with falciparum malaria either singly or with mixed infestation. There is no significant correlation between the typical and atypical presentations in the different age groups with mortality.
Conclusions: For timely diagnosis and treatment a high index of suspicion for the disease should be maintained by treating physicians, especially in endemic areas. They should be aware of the varied manifestations to minimize the mortality due to malaria.

Keywords: Atypical presentation, Malaria, Mortality, Typical presentation

INTRODUCTION

Malaria, a disease caused by infection by the protozoan parasite of the genus plasmodium, is a disease of global importance. The four Plasmodium species infecting humans are: *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium ovale* and *Plasmodium malariae*.

As per the WHO estimates 207 million cases of malaria occurred globally in 2012 and 6,27,000 deaths; about 80 per cent of these cases were found in African countries and 13 per cent in South East Asia Region (SEAR) countries.[1] India contributes to 61 per cent of malaria cases and 41 per cent of malaria deaths in SEAR countries.[2] In India, approximately 539 million people reside in high transmission areas, i.e. defined as more than one case per 1000 population.[1]

The typical presentation of malaria consists of paroxysms of fever alternating with periods of fatigue but otherwise relative wellness. Symptoms associated with febrile paroxysms include high fever, rigors, sweats, and headache, as well as myalgia, back pain, abdominal pain, nausea, vomiting, diarrhea, pallor, and jaundice.[2] However, classical presentation is seen in only 50%–70% of the cases with the rest having atypical manifestations. In endemic regions, malaria can present with unusual features due to development of immunity, increasing

resistance to antimalarial drugs, and the indiscriminate use of antimalarial drugs.[3] As a result of lack of awareness of atypical manifestations, it is not uncommon for malaria to get diagnosed late or even remain unrecognized, resulting in severe illness or death. The study was conducted to find out an incidence of mortality due to malaria with typical and atypical presentation.

METHODS

The present was conducted over a period of three years. During the study period 630 patients with clinical suspicion of malaria were tested for malaria using peripheral smear, QBC and RDT. Detailed clinical examination was done, and patients were given anti-malarial treatment and complications and outcome were noted. All the enrolled patients were subjected to investigations like hemogram, renal function tests, liver function tests and blood sugar. Other investigations like serum electrolytes, ABG, chest X ray etc., were done whenever required. The results were tabulated and statistically analyzed using SPSS version 17.

The patients were divided into 0-5 years, 6-60 years and >60 years age groups (Table 1). The predominant age group was 6-60 years. The age ranged from 1 month to 67 years. The Male: Female ratio was 14:9. The common etiologies were congenital, post infective and intracranial bleed in 26.1% (n=6) each. Most no of cases with favorable outcome was seen in 6-60 years age group, whereas >60 years age group had the most no of cases with poor outcome.

Inclusion criteria

- Patients attending outpatient department as well as inpatient department (both wards and intensive care unit)
- Both male and female patients between age group 14 years onwards
- Patients with positive malarial smears (more than two)
- Patients with smear negative with positive rapid malarial antigen test.

Exclusion criteria

- Smear negative patients for malarial parasite and negative rapid malarial antigen with fever with chills and rigors, in spite of clinical suspicion of malaria
- Pregnant females
- Patients with chronic systemic disorder like liver cirrhosis, immunocompromised individuals and patients on chemotherapy for malignancy.

RESULTS

Highly significant correlation seen among patients of Acute renal failure (ARF) with mortality in the age groups of 20-39 and 40-59 years (p value -0.000) and in the age group of 14-19 years (p value-0.001). Thrombocytopenia highly correlated with mortality. In the patients studied between the age group of 40-59 yrs (p-value 0.042). Highly significant correlation seen in cerebral malaria and mortality is seen in in the age group of 20-39 yrs, (p value - 0. 000).

Table 1: Mortality due to complicated malaria as per type of malarial infestation.

Age/outcome		Cerebral malaria	ARF	Hypoglycemia	ARDS	Thrombocytopenia
14-19 yrs	Cured (%)	22 (68.8)	17 (51.5)	12 (80)	17 (81)	31 (75.6)
	Expired (%)	10 (31.3)	16 (48.5)	3 (20)	4 (19)	10 (24.4)
	p Value	0.524	0.001	0.510	0.361	0.632
20-39 yrs	Cured (%)	53 (59.6)	70 (53)	47 (82.5)	62 (70.5)	90 (78.9)
	Expired (%)	36 (40.4)	62 (47)	10 (17.5)	26 (29.5)	24 (21.1)
	p Value	0.000	0.000	0.127	0.341	0.176
40-59 yrs	Cured (%)	34 (77.3)	24 (50)	22 (84.6)	19 (79.2)	40 (85.1)
	Expired (%)	10 (22.7)	24 (50)	4 (15.4)	5 (20.8)	7 (14.9)
	p Value	0.665	0.000	0.203	0.600	0.042
Above 60 yrs	Cured (%)	10 (76.9)	2 (66.7)	7 (77.8)	4 (57.1)	12 (85.7)
	Expired (%)	3 (23.1)	1 (33.3)	2 (22.2)	3 (42.9)	2 (14.3)
	p Value	0.549	0.496	0.748	0.049	0.432

There was statistical significant increase in incidence of mortality in patients who presented with chills between age group of 20-39 yrs (p value - 0.005). More patients in the age group of 14-19 yrs with complaints of breathing difficulty had a fatal outcome (80.8%). There is no significant correlation between the incidence of the other typical presentations in the different age groups with mortality. Age group of above 60yrs had minimal mortality compared to other age groups. Patients who presented with abdominal pain seemed to have a higher mortality in the age group of 20-39 yrs (p value - 0.033).

Table 2: Mortality in patients with typical presentations.

Age gr.		Fever	Chills	Rigors	Headache and body ache	Breathing difficulty
14-19 yrs (218)	Expired (%)	74 (71.8)	4 (19.0)	11 (61.1)	68 (73.1)	21 (80.8)
	Cured (%)	29 (28.2)	24 (30.8)	7 (38.9)	25 (26.9)	5 (19.2)
	p value	0.337	0.172	0.216	0.938	0.306
20-39 yrs (287)	Expired (%)	263 (73.5)	174 (69.3)	38 (69.1)	237 (74.8)	79 (70.5)
	Cured (%)	95 (26.5)	77 (30.7)	17 (30.9)	80 (25.2)	33 (29.5)
	p value	0.069	0.002	0.335	0.652	0.272
40-59 yrs (105)	Expired (%)	87 (74.4)	67 (74.4)	11 (73.3)	73 (75.3)	26 (74.3)
	Cured (%)	30 (25.6)	23 (25.6)	4 (26.7)	24 (24.7)	9 (25.7)
	p value	0.500	0.816	0.874	0.900	0.908
>60 yrs (20)	Expired (%)	17 (81.0)	11 (84.6)	5 (100.0)	14 (82.4)	7 (77.8)
	Cured (%)	4 (19.0)	2 (15.4)	0	3 (17.6)	2(22.2)
	p value		0.586	0	0.736	0.748

Table 3: Mortality in patients with atypical presentations.

Age gr.		Lack of taste	Throat discomfort	Cough	Pain in abdomen	Diarrhoea	Vomiting	Rash	Urinary complaints
14-19 yrs (218)	Cured (%)	00	13 (76.5)	21(70)	26 (78.8)	9(81.8)	40 (69.0)	26 (76.5)	25 (80.6)
	Expired (%)	00	4 (23.5)	9 (30.0)	7 (21.2)	2 (18.2)	18 (31.0)	8 (23.5)	6 (19.4)
	p value	00	0.724	0.668	0.370	0.486	0.320	0.581	0.257
20-39 yrs (287)	Cured (%)	6 (85.7)	38 (82.6)	61 (72.6)	80 (82.5)	38 (77.6)	138 (72.6)	88 (72.7)	86 (70.5)
	Expired (%)	1 (14.3)	8 (17.4)	23(27.4)	17 (17.5)	11 (22.4)	52 (27.4)	33 (27.3)	36 (29.5)
	p value	0.486	0.170	0.683	0.033	0.580	0.444	0.623	0.237
40-59 yrs (105)	Cured (%)	1 (100)	14 (87.5)	27(84.4)	26 (74.3)	10 (83.3)	50 (73.5)	34 (79.1)	33 (84.6)
	Expired (%)	00	2 (12.5)	5 (15.6)	9 (25.7)	2 (16.7)	18 (26.5)	9 (20.9)	6 (15.4)
	p value	0.562	0.216	0.155	0.855	0.483	0.677	0.446	0.094
>60 yrs (20)	Cured (%)	00	5 (100.0)	4 (80.0)	6 (75.0)	2 (100.0)	11 (78.6)	4 (80.0)	7 (100.0)
	Expired (%)	00	00	1 (20.0)	2 (25.0)	00	3 (21.4)	1 (20.0)	00
	p value	00	0.214	0.950	0.586		0.694	0.950	0.116

There was no significant correlation between mortality and the atypical symptoms in the different age groups.

DISCUSSION

In present study 630 patients were taken from study out of which 469 patients recovered from their illness and 161 patients were died. An overall mortality of 25.55% was seen. This was higher compared to the mortality rates seen in some other studies. Mortality rate of 10% has been reported by Harris et al in his studies in clinical profile of *Plasmodium falciparum* malaria in South India, Khoo et al studied Malaria requiring intensive care and found a mortality of 15% for severe falciparum malarial infection; the overall mortality reported by him was 1.2%.[4,5] Bruneel et al reported mortality of 11% in patients with severe malarial infection.[6] Murthy found mortality in 20.25% of patients with Falciparum malarial infection.[7] He found higher mortality was associated with higher parasite count, presence of complications like anemia, jaundice, renal failure, DIC, ARDS and septicaemia.

The commonest complication associated with a fatal outcome in this study was Acute Renal Failure (75/161; 63.97%) This was followed by Cerebral Malaria (36.64) and then ARDS (23.60%). Cerebral malaria has a mortality of 30% in a series from a major public hospital.[8] There was a strong statistical correlation between the incidence of acute renal failure in malarial

patients and mortality (p value - 0.000). Patients with thrombocytopenia showed mortality of (26.70%), and patients with hypoglycaemia (11.80%).

A study of the correlations of symptomatology with mortality was done. No overall statistical significant data emerged. However, there was a seasonal correlation of statistical significance in mortality of patients who presented with cough between October 2007 to January 20008 (p value - 0.005). In addition, there was statistical significant mortality in patients who presented with chills between age group of 20-39 years. (p value - 0.005). Both these findings need to be further studied to ascertain their validity. No specific reason for this association could be found.

Surprisingly, present study did not show a strong correlation between patients presenting with breathing difficulty and mortality (p value - 0.005). Increased awareness of respiratory complication and prompt initiation of treatment could be contributing reason. Also, fluid overload could have been present in a large number of these patients, since as a referral hospital, we receive patients who have been earlier hospitalised elsewhere. We had lowest mortality in the age group of above 60 years. This is in contrast to other studies which report higher mortality in the elderly. Highly significant mortality was present during June to September total 54% (p value -0.000). The general belief that incidence of malaria drops after the monsoon months, was proved here.

CONCLUSION

To conclude, for timely diagnosis and treatment a high index of suspicion for the disease should be maintained by treating physicians, especially in endemic areas. They should be aware of the varied manifestations to minimize the mortality due to malaria.

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