

# THE RECENT MALARIA SITUATION IN CHITTAGONG, BANGLADESH

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**Abstract.** This is a retrospective study on 7,005 cases of malaria treated in a base hospital during the period 1998 to 2001. The aim of the study is to analyze the patterns, complications and mortality rates of malaria and its response to standard anti-malarial drugs. Diagnosis of malaria was made from identification of parasites on Giemsa stained thick and thin blood slides among the febrile cases and the clinical (unspecified) malaria was diagnosed as per WHO criteria. Malaria cases accounted for 136.17 per thousand-hospital admissions. Out of 7,005 malaria cases, 54.22% were falciparum, 26.18% were vivax and 12.02% were mixed infections. The most common complications of falciparum malaria were cerebral malaria (2.80%), malarial hepatitis (1.55%), acute pneumonia and/or pulmonary edema (0.22%), acute renal failure (0.13%), algid malaria (0.13%) and black water fever (0.06%). Most of the cases (66.98%) responded (S-response) well to chloroquine. Among the rest, 11.99% required quinine, 9.79% required artemether and 0.08% required both mefloquine and artemether. The total mortality rate was 0.30% but it was 9.25% and 6.17% among complicated malaria and cerebral malaria cases, respectively. Prognosis appeared better on early recognition of complications and initiation of prompt, effective treatment and adequate nursing care. Most mortality was due to complicated falciparum malaria and the emergence of drug resistance.

## INTRODUCTION

Despite global efforts, malaria is still a common health problem in tropical countries throughout the world and a major cause of death. According to the WHO (1990), about 534 million people live in areas endemic for malaria, where the situation is deteriorating. It is estimated that 300 to 500 million cases of malaria and around 1.5 to 3 million cases of death from malaria occur throughout the world each year. Falciparum malaria is the most common and is recognized to produce severe complications leading to fatal outcome (Waiz *et al*, 1993). Malaria is one of the major public health problem in Bangladesh, especially among the Armed Forces personnel engaged in various activities in the Chittagong Hill Tracts. It has been the cause of morbidity and mortality in other parts of Bangladesh, especially in the north and east (Waiz *et al*, 1993).

In this country, before 1960, after the successful malaria eradication program, malaria was virtually eliminated from the plain lands of Bangladesh, except for some endemic pockets in the Chittagong Hill Tracts, Sylhet and border belt areas. However, as malaria eradication was discontinued, the malaria situation has become worst in the Chittagong Hill Tracts due to other

factors, the terrain, the indigenous tribal population and peculiar vector characteristics (DGHS, 1991). Falciparum malaria with its complications causes most morbidity and mortality and became a therapeutic problem due to the development of drug resistance. No signs or symptoms are pathognomic of malaria (WHO, 1996). Patients with falciparum malaria often deteriorate so rapidly that delay in diagnosis or treatment may result in a fatal outcome. The present study was done to observe the incidence and type of malaria and its complications, mortality rates and responses to standard antimalarial drugs.

## MATERIALS AND METHODS

This is a retrospective study of malaria cases admitted to the Combined Military Hospital (CMH) Chittagong during the period of 1998 to 2001. A total of 7,005 cases of malaria were included in this study. Blood samples were taken from all the clinically suspected malaria cases and final diagnosis were made by microscopic confirmation of malarial parasites on thick and thin blood films (Giemsa stained). Unspecified malaria cases were diagnosed as defined by WHO (1990). All the patients were from the Army, BDR, Police and Ansar deployed in the Chittagong Hill Tracts area, and none was on chemoprophylaxis. All diagnosed cases were treated with chloroquine in conventional doses, except for severe falciparum malaria, which showed resistance to chloroquine. They were treated with either quinine dihydrochloride or

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artemether via parenteral route, according to the clinical state or biochemical parameters of the patient. No case of cerebral malaria was treated with steroid, but blood transfusions were given in selected cases. Resistant strains of malaria were ascertained by therapeutic response as determined by parasite count in peripheral blood (WHO, 1990).

## RESULTS

The consecutive four years' malaria profile at The Combined Military Hospital Chittagong showed the

total number of patients admitted during the period 1998 to 2001 was 51,440, out of which malaria cases numbered 7,005, which amounts to 136.17 per thousand hospital admission per year, as shown in Table 1. Out of 7,005 malaria cases, falciparum was 3,798 (54.22%), mixed infection 842 (12.02%), vivax 1,834 (26.18%) and unspecified 531 (7.58%), as shown in Table 2. Among the 4,640 cases of falciparum malaria, a total of 227 (4.89%) developed various complications as shown in Table 3. Many of them had more than one complication. The most common complications were cerebral malaria 130 (2.80%), hepatic impairment and

Table 1  
Malaria in Combined Military Hospital Chittagong, 1998-2001.

Year	Total hospital admissions	Total malaria cases	Percentage
1998	14,762	2,501	16.94
1999	12,532	1,881	15.00
2000	12,514	1,323	10.57
2001	11,632	1,300	11.17
Total	51,440	7,005	13.62

Table 2  
Distribution of different types of malaria.

Year	Total malaria	Falciparum (%)	Vivax (%)	Mixed infection (%)	Unspecified (%)
1998	2,501	1,167 (46.66)	745 (29.78)	358 (14.31)	231 (9.23)
1999	1,881	1,179 (62.67)	352 (18.71)	223 (11.85)	127 (6.75)
2000	1,323	633 (47.84)	420 (31.74)	155 (8.69)	115 (8.69)
2001	1,300	819 (63)	317 (24.38)	106 (8.15)	58 (4.46)
Total	7,005	3,798 (54.22)	1,834 (26.18)	842 (12.02)	531 (7.58)

Table 3  
Frequency of complications in falciparum malaria.

Year	Total malaria	Total falciparum (%)	Frequency of complications	
			to total malaria (%)	% to falciparum
1998	2,501	1,525 (60.98)	72 (2.88)	4.72
1999	1,881	1,402 (74.53)	54 (2.87)	3.85
2000	1,323	788 (59.16)	49 (3.70)	6.21
2001	1,300	925 (71.15)	52 (4.00)	5.62
Total	7,005	4,640 (66.24)	227 (3.24)	4.89

Total falciparum = falciparum malaria plus mixed falciparum.

/or malarial hepatitis 72 (1.55%), acute pneumonia and/or pulmonary edema 10 (0.22%), acute renal failure 6 (0.13%), algid malaria 6 (0.13%), and black water fever 3 (0.06%), as shown in Table 4. The frequency of complications among total malaria and complicated malaria cases is shown in Table 5. Among the total malaria cases, most of the patients (5,473; 78.13%) were treated with chloroquine, 840 (11.99%) with quinine dihydrochloride, 686 (9.78%) with inj artemether and 6 (0.08%) with combinations of artemether and mefloquine, as shown in Table 6. The response of

falciparum malaria to anti-malarials during 1998-2001 is shown in Table 7. Despite the increase in the number of falciparum cases, 6,984 (99.70%) had complete recovery (Table 8). The mortality rate was 21 (9.25%) among the complicated group, of which 14 (6.17%) died of cerebral malaria and 7 (3.08%) died due to other causes as shown in Table 9. In cases of complicated malaria, the prognosis depended on the early recognition of complications and the initiation of prompt effective treatment and adequate supportive management.

Table 4  
Distribution of complications among the falciparum malaria cases.

Year (no. of falciparum malaria cases)	Cerebral malaria (%)	Hepatic impairment and/or malarial hepatitis (%)	Acute pneumonia and/ or pulmonary edema (%)	Acute renal failure (%)	Algid malaria (%)	Black water fever (%)
1998 (1,525)	43 (2.81)	22 (1.44)	3 (0.19)	1 (0.0)	2 (0.13)	1 (0.06)
1999 (1,402)	32 (2.28)	16 (1.14)	3 (0.12)	1 (0.07)	1 (0.07)	1 (0.07)
2000 (788)	25 (3.17)	18 (2.28)	2 (0.25)	2 (0.25)	1 (0.12)	1 (0.12)
2001 (925)	30 (3.24)	16 (1.72)	2 (0.21)	2 (0.21)	2 (0.21)	-
Total (4,640)	130 (2.80)	72 (1.55)	10 (0.22)	6 (0.13)	6 (0.13)	3 (0.06)

Table 5  
Frequency of complications among total malaria and complicated malaria (CM) cases.

Number	Cerebral malaria (%)	Malaria hepatitis (%)	Pneumonia and/or pul edema (%)	Acute renal failure (%)	Algid malaria (%)	Black water fever (%)
Total (7,005)	130 (1.86)	72 (1.02)	10 (0.14)	6 (0.08)	6 (0.08)	3 (0.04)
CM (227)	130 (57.27)	72 (31.72)	10 (4.41)	6 (2.64)	6 (2.64)	3 (1.32)

Table 6  
Response to antimalarial drugs.

Year	Total malaria	Chloroquine (%)	Quinine (%)	Artemether (%)	Arte & Mefl <sup>a</sup> (%)
1998	2,501	2,028 (81.08)	253 (10.11)	220 (8.79)	-
1999	1,881	1,496 (79.53)	194 (10.31)	190 (10.10)	1 (0.053)
2000	1,323	990 (74.82)	198 (14.96)	133 (10.05)	3 (0.151)
2001	1,300	959 (73.76)	195 (15)	144 (11.07)	2 (0.153)
Total	7,005	5,473 (78.13)	840 (11.99)	686 (9.79)	6 (0.08)

<sup>a</sup>Arte & Mefl = Artemether mefloquine combination.

Table 7  
Response of falciparum malaria to anti-malarial drugs.

Year	F malaria	Chloroquine (%)	Quinine (%)	Artemether (%)	Arte + mefl (%)
1998	1,525	1,052 (68.98)	253 (16.59)	220 (14.43)	-
1999	1,402	1,017 (72.54)	194 (13.84)	190 (13.55)	1 (0.07)
2000	788	454 (57.61)	198 (25.13)	133 (16.88)	3 (0.38)
2001	925	585 (63.25)	195 (21.08)	143 (15.44)	2 (0.22)
Total	4,640	3,108 (66.98)	840 (18.10)	686 (14.78)	6 (0.13)

Table 8  
Prognosis in relation to total malaria and falciparum malaria.

	Number	Complications (%)	Recovery (%)	Death (%)
Total	(7,005)	227 (3.24)	6,984 (99.70)	21 (0.30)
Falciparum	(4,640)	227 (4.89)	4,619 (99.55)	21 (0.45)

Table 9  
Frequency of complications, recoveries, deaths and causes of death.

Year	Total complications	Recovery (%)	Death (%)	Cause of death			
				Cerebral malaria (%)	Pul edema (%)	ARF (%)	Algid malaria
1998	72	65 (90.27)	7 (9.72)	5 (6.94)	2 (2.76)	-	-
1999	54	49 (90.74)	5 (9.25)	4 (7.4)	1 (1.85)	-	-
2000	49	45 (91.83)	4 (8.16)	2 (4.08)	1 (2.04)	1 (2.04)	-
2001	52	47 (90.38)	5 (9.61)	3 (5.76)	-	1 (1.92)	1 (1.92)
Total	227	206 (90.75)	21 (9.25)	14 (6.17)	4 (1.76)	2 (0.88)	1 (0.44)

## DISCUSSION

Malaria is an important parasitic disease of human beings, which causes significant morbidity and mortality among troops deployed in the Chittagong Hill Tracts and is still one of the major health problem of the Bangladesh Army (Hussain *et al*, 1996). In this study, about 136.17 hospital beds per thousand hospital admissions were occupied by malaria patients during the whole year in the Combined Military Hospital Chittagong, which is much lower than Waiz *et al* (1990), who showed 275.63 per thousand. Out of 7,005 malaria cases, 4,640 patients (66.24%) had falciparum malaria, which is nearer to another study in the hill districts, where the rate of falciparum was 68% (DGHS, 1991). In this 4-year study, complicated malaria cases numbered 227 (4.89%), of which 130 (2.80%) developed cerebral malaria and 97 (2.09%)

had other complications: acute pneumonia and/or pulmonary edema 10 (0.22%), hepatic impairment and/or malarial hepatitis 72 (1.55%), acute renal failure 6 (0.13%), algid malaria 6 (0.13%) and black water fever 3 (0.06%) in relation to the total number of falciparum malaria cases. Negligible complications could be found in other malaria cases.

Cerebral malaria is the most common and serious complication of falciparum malaria and is the leading cause of death (Waiz and Chakrabarty, 1990; Faiz, 1995). Mortality from cerebral malaria varies from 20% to 50% (Phillip and Gilles, 1988). In our study, out of 4,640 falciparum malaria cases, 130 (2.80%) had cerebral malaria, of whom 14 (6.17%) died. This is significantly less than other studies (Faiz, 1995; Nicholus *et al*, 1998). Jaundice is common in falciparum malaria (Nicholus *et al*, 1998). In our study,

72 patients had jaundice, which was 1.55% of the total; 31.72% of the complicated malaria cases had jaundice but none developed hepatic encephalopathy or died. In this study 10 patients (0.22% of total and 4.41% among the complicated group) had acute pneumonia and/or pulmonary edema, of whom 4 patients (1.76%) died. Six patients (0.13% of the total and 2.64% of the complicated group) had acute renal failure, of whom 2 patients (0.88%) died. Renal impairment was common in adults with severe malaria, is a marker of the severity of disease and carries a high risk of mortality (Soni and Gouws, 1996). In our study, 6 patients (0.13% of the total, and 2.64% of the complicated group) had algid malaria, and one patient died. Three patients (0.06% of the total, but 1.32% of the complicated group) had black water fever with no mortality, which was similar to Soni and Gouws (1996). In this study, chloroquine was found effective in 66.98% cases and was the drug of choice for both types of malaria, except in complicated cases where either quinine dihydrochloride or artemether in parenteral form were administered. In our study, among the 227 patients with complications, 206 patients (90.75%) had complete recovery and 21 patients (9.25%) died of various complications, which is fewer than Faiz (1982), who found 13% mortality. Among these, deaths due to cerebral malaria numbered 14 (6.17%), acute pneumonia and/or pulmonary edema 4 (1.76%), acute renal failure 2 (0.88%) and one patient (0.44%) died due to algid malaria.

The overall malaria situation has been improving gradually since 1998 in respect of the total number, complications and mortality, as shown in Tables 2, 3 and 9. Responses to standard antimalarials like chloroquine are gradually decreasing and there is an increasing trend to use quinine, artemether or mefloquine, which is a reflection of emerging multidrug resistant malaria in this part of the world (Bang and Ward, 1993; Nicholus *et al*, 1998).

### Conclusion

Malaria, still being the major cause of morbidity and mortality, continues to haunt military medical men striving to map a strategy effectively to control this invasive parasitic infection. The rising incidence particularly of drug-resistant fatal falciparum malaria, and the ominous trend of change in the species proportions drive health-care providers into disarray in finding a cure for the disease. The high incidence of malaria morbidity and mortality has definite impacts on the morale of the troops. The non-approachable hilly terrain, the unscheduled nature of the duties, the short stays in the hill tracts, and often non-compliance with, and negligence of, preventive measures, lead to high

incidences of malaria and death due to its complications. Early diagnosis, prompt effective treatment and the prevention of complications can reduce the mortality rate. However, a national broad-based study should reflect the exact malaria situation in Bangladesh, especially in the Chittagong Hill Tracts.

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