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Research Article

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A Clinico-epidemiological Study of Malaria Patients Admitted in A Tertiary Care Hospital of Bangladesh

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Abstract

Malaria is a public health problem in 90 countries around the world affecting 300 million people and responsible for about 1 million deaths annually. Bangladesh is considered as one of the malaria endemic countries in Asia. Every year large number of people suffered for malaria. But there is little studies about clinico-epidemiology of malaria. Aim: To study the epidemiological and clinical aspects of malaria. Methods: This is a Prospective observational study that was conducted in all medicine unit of Chittagong Medical College Hospital, Chittagong, Bangladesh during August 2017 to June 2018. Total 55 patients were included in the study having malaria diagnosed by blood slide examination or rapid diagnostic test. Patients were enrolled in this study after getting written informed consent from the patient or attendant. Detail demographic and clinical data were recorded in structured case report form. Patients were regularly followed up and outcome recorded. Results: Results showed males (65.5%) of 25±15.109 years of age were the main sufferer. Majority (45%) came from low socio-economic condition (<5000 taka/month). 65.5% patients denied any history of recent travel to malarias' area. 69.1% cases give history of using mosquito net, but only 25.5% have insecticide treated mosquito net. Majority (89.1%) were diagnosed as severe malaria and only few (10.9%) as uncomplicated malaria. Most of the diagnosis done at Chittagong Medical College Hospital, mainly presenting with coma or altered consciousness and convulsion. At field level diagnostic test done in 67.27% cases, of which RDT in 14.5%, BSE in 45.5% and both in 7.3% cases. 78.2% cases outcome were good with improvement and death occurred in 21.8% cases, mainly due to acute renal failure. Conclusion: Though we are making significant effort to control malaria, still we have to improve in controlling malaria based on both preventing the infection and on prompt effective treatment of the infection and illness when it does occur.

Introduction

Malaria, a mosquito-borne, protozoal disease, is older than recorded history, and probably plagued prehistoric man [1]. Malaria is a parasitic infection transmitted by the female Anopheles mosquito infecting human and insect alternatively and caused by four Plasmodium species [2]. Malaria parasites are normally transmitted from one person to another through infective bites of Anopheles mosquitos. The source of infection can be either a sick person or an otherwise symptomless carrier of parasites [3]. The symptoms of malaria are non-characteristic and may be indistinguishable from other febrile illness' in the tropics. The most important characters of malarial fever are intermittency and asymptomatic apyrexial intervals. Other nonspecific symptoms include headache, lassitude, fatigue, abdominal discomfort and muscle and joint aches, anorexia, vomiting and worsening malaise. Atypical symptoms, rapid evolution of severe symptoms and continued type of fever may occur in falciparum malaria. A patient of falciparum malaria may progress from having minor symptoms to having severe disease within a few hours. This usually manifests with one or more of the following: coma (cerebral malaria), convulsion, metabolic acidosis,

severe anaemia, hypoglycaemia, hyerparasitaemia, shock and, in adults, acute renal failure or acute pulmonary oedema. By this stage, mortality in people receiving treatment has risen to 15–20%. If untreated, severe malaria is almost always fatal [4].

Controlling malaria is based on both preventing the infection and on prompt effective treatment of the infection and illness when it does occur. Effective prevention is a priority as this both limits disease and significantly reduces the need for treatment. There are major initiatives under way to reduce malaria in endemic areas and it is estimated that these would be cost effective, even at a cost of $3 billion per year. Successful programmes have involved a combination of vector control, including indoor residual spraying, use of insecticide treated bed nets and intermittent preventive therapy (IPT). One of the most effective ways to prevent malaria transmission is sleeping under an ITN. . Most ITNs are now long-lasting insecticide-treated nets (LLINs). When a mosquito tries to bite a person sleeping under the net, it lands on the net and comes into contact with the insecticide and dies soon thereafter. Scientifically controlled trials on ITNs in settings with variations in transmission risk (from low to very high risk) have shown great benefit in mosquito killing, marked transmission reduction, and markedly improved child survival. When a large pro- portion of the population is using ITNs, they have been shown to have a protective effect for non-users in the community who live near the households with nets, probably because the extensive killing of female mosquitoes is such that few live long enough to transmit malaria. Critical issues for the efficacy and effectiveness of ITNs are that they have an effective insecticide on their surface and that they are used regularly. Current recommendations for malaria-endemic settings are that all people should regularly sleep under an ITN.6 Among the preventive measures, use of insecticide-treated bed nets (ITN)/long-lasting insecticide-treated nets (LLIN) is found to be an effective public health tool for control of malaria, especially among under-five children and pregnant women-the two most vulnerable groups. This has been compared with generation of 'herd immunity' as in the case of vaccines. But for this to happen, coverage has to be 'sufficiently high'. For a family size of five, three bed nets are recommended. To achieve this level of coverage (beyond 80%), mass distribution of insecticidal bed nets (ITN/LLINs) is recommended, including free distribution for equitable coverage. However, the use of insecticidal bed nets is conditioned by knowledge on malaria transmission [6].

Malaria was diagnosed by using rapid diagnostic tests (RDT, FalciVax) to detect PLASMODIUM FALCIPARUM and PLASMODIUM VIVAX-specific antigens. Each FalciVax is rapid self-performing, qualitative, two site sandwich immunoassay utilizing whole blood for the detection of P. FALCIPARUM-specific histidine rich protein-2 (Pf, HRP-2) and P. VIVAX-specific pLDH. The test can be used for specific detection and differentiation of P. FALCIPARUM and P. VIVAXmalaria. Sensitivity of the RDT is similar to that commonly achieved by good field microscopy. Sensitivity and specificity of the RDT used for the detection of P. FALCIPARUM and P. VIVAX is more than 95% and now been recommended for use in the malaria control programme by the World Health Organization8. Prompt treatment—preferably within 24 hours of fever onset—with an effective antimalarial agent is necessary to prevent life-threatening complications. Artemisinin-based combination therapy (ACT) is widely recommended for Plasmodium falciparum, whereas chloroquine remains highly effective for most cases of Plasmodium vivax [5]. In 2006, the Global Fund for AIDS, TB and Malaria (GFATM), awarded Bangladesh USD 39.6 million to support the national malaria control program. These funds were used by the national malaria control program to start advocacy at community level, ITN distribution, introduction of rapid diagnosis test (RDT) Bangladesh adopted artemether-lumefantrine (AL)(Coartem®) as a first-line treatment of P. falciparum malaria and has sought to provide early diagnosis and prompt treatment to 80% of malaria patients.10 Other intervention objectives included effective malaria prevention for 80% of the population at risk and a strengthened epidemiological surveillance system. Surveys indicated that 40% of the households in high risk areas had nets, 10% of which were insecticide treated. Through this grant, it was expected that 80% of households (1.7 million) would be covered with LLINs. Nets currently present in households would be treated and re-treated twice a year with insecticide [10].

Materials and Methods

This was Prospective Observational study that conducted in all medicine units of Chittagong Medical College Hospital on the patients admitted at CMCH diagnosed as malaria as per national guideline with the inclusion criteria include malaria diagnosed by blood slide examination or rapid diagnostic test and declaration of consent to participate after detailed information about the study. Exclusion criteria include those who will not give consent. The study duration was one and half year where Sample were collected from the patients diagnosed as malaria during study period (Approximately 55). After selection of the patient as per inclusion and exclusion criteria the study was conducted by a questionnaire. The first part of the questionnaire includes sociodemographic characteristics of the participants, including use of bed nets and the second part describe clinical aspects of the disease, along with its outcome. Informed signed and witnessed consent took from the patient or patient's attendance. Patients followed up till discharge from hospital. Ethical clearance was taken from the Ethical Committee of CMCH for approval. After collection of data, processing & statistical analysis was done with SPSS.

Results

Table 1: Age Distribution

Age (Years)	Number of patients	Percent
<15	11	20
15-30	29	53
31-45	9	15
46-60	5	9
>60	1	3

Adult persons were the main sufferer as seen in the table but extreme ages could not get spared. Age of the patients ranges from 3-75 with median age was 23 years (SD±15.109yrs). Mean age is 25.29 and maximum (53%) belonged to 15-30yrs age group.

Table 2: Sex Distribution

Sex	Frequency	Percent
Male	36	65.5
Female	19	34.5

Sex distribution of patients show that out of 55 patients 36(65.5%) were male and 19(34.5%) were female giving a male to female ratio of 1.89. Among 19 female patients 7 were pregnant of which 1 patient died due to acute renal failure. Patients came from different hilly and surrounding area of Chittagong division.61.8% from Chittagong district and 25.5% from Cox'sbazar.

Table 3: Socio-economic condition (monthly income)

Taka	Frequency	Percent
<5000	45	81.8
5000-10000	8	14.5
>10000	2	3.6

Low income group (<5000tk/month) were affected mostly (81.8%). Professionally they are farmer or day labour. Housewife and student are also affected.

Table 4: Use of mosquito net

Use	Frequency	Percent
Yes	38	69.1
No	17	30.9

Use of mosquito net is an important protective measure against malaria. Result showed that 38 no of patient use mosquito net but their usage irregularly. Of which only 14 patient had got Insecticide treated mosquito net, all of these provided by either government or NGO.

Table 5: Type of malaria

Malaria	Frequency	Percent
Uncomplicated	6	10.9
Severe	49	89.1

Of 55 patients 49 were diagnosed as severe malaria and 6 as uncomplicated malaria based on blood slide examination or RDT.

Table 6: Diagnostic test done at field level

Methods	Frequency	Percent
RDT	8	14.5
BSE	25	45.5
Both	4	7.3
None	18	32.7

At field level test for diagnosis of malaria done at 37 cases, of which RDT done on 14.5% cases and Blood slide examination on 45.5% cases. Both done only 7.3% cases.18 cases no test done. But positive result found only in few cases.

Table 7: Place of malaria diagnosis

Place of diagnosis	Frequency	Percent
Field level	3	5.5
UHC	12	21.8
District hospital	6	10.9
CMCH	34	61.8

Result shows that diagnosis of malaria in maximum cases (61.8%) done at Chittagong Medical College Hospital, only 5.5% cases at field level. Those who diagnosed as malaria received antimalarial in almost every cases, mainly intravenous quinine and referred to tertiary level hospital.

Table 8: Signs of severity at presentation

Signs and symptoms	Frequency	Percent
Coma or altered consciousness	23	41.8
Convulsion	5	9.1
Hypoglycemia	1	1.8
Acute renal failure	7	12.7
Severe anemia	3	5.5
Jaundice	3	5.5
Severe prostration	2	3.6
Severe vomiting leading to NPO	7	12.7

From 49 patients of severe malaria 23 person presented with coma or altered consciousness,7 pt. presented with acute renal failure and severe vomiting, next common is convulsion(5).Other feature include severe anemia, jaundice, severe prostration.

Table 9: Outcome of malaria

Outcome	Frequency	Percent
Improved	43	78.2
Death	12	21.8

Patients enrolled in this study were improved without any squeal in 78.2% cases and death occurred in 21.8% cases, mostly (12.7%) due to acute renal failure. Other causes include aspiration, sepsis, encephalitis etc. Only 4 cases associated with other comorbid disease like asthma, diabetes mellitus etc. Average duration of hospital was about 5-7 days.

Discussion

The age of the patients in this study ranged from 3 years to 75 years. Most of them were from 15 to 30 years age group comprised of 23 out of 55(53%).Mean age is 25.29 year. So, the majority of patients are of a younger age and this reflects active population are at higher risk. But no age is immune. Malaria occurred in people of all ages with the highest incidence being in young adults. Similar observations

were reported from a previous study in Bangladesh [16].
In this study male was the predominant sufferer with a ratio of 2:1.This is consistent with the clinic epidemiological study done on notheren Sudan. This is likely to be due to the fact that women in this area as part of their traditional and social practice apply local cosmetic ointments on their skins and they have a tendency to expose their bodies to smoke for cosmetic purposes and cover their bodies before sleeping. These factors might act as repellents and consequently reduce their contact with mosquitoes [17]. In one study done on malaria endemic upazillas, 3,760 households in 2008 and 7,895 households in 2011 were surveyed for collecting relevant information. Proportion of households with at least one LLIN, and at least one LLIN/ITN increased (22-59 to 62-67% and 22-64% to 74-76% respectively) over time, including increase in the mean number of LLIN/ITNs per household (≤ 1 to 1 +). The programme achieved > 80% coverage in sleeping under an LLIN/ITN in the case of under-five children and pregnant women, especially in the high-endemic districts [6]. In this study 69% participants said that they have mosquito net but usage not regularly. Only 25% have insectiside treated mosquito net which were provided by either government or NGO's. This statistics is quite different from the previous study. There is also another finding that in previous study it was found that nearly 90% of the under-fives and the pregnant women were sleeping under an insecticidal net7 but in this study only one pregnant lady possessed insectiside treated mosquito net who was from Rangamati district among 7 pregnant and 3 under five children. The ownership of ITMN also not use it properly. Two weeks prior to illness average night spend under is about 4-5 days. Maximum interval for ITMN treated with insecticide was 24 months and minimum 3 month. But it is recommended nets currently present in households would be treated or retreated twice a year with insecticide [9].

Next, information on heath seeking behaviour was elicited. Fever was the initial symptom. The respondents took first consultation after suffering from many days of fever on an average of 5-7 days.55% of them took consultation from local practitioner or traditional healer ,around 18% from physician or health worker, 27%from pharmacy or drugstore sales people. This result is consistent with the findings of Syed M Ahmed, et all. Their findings revealed superficial knowledge on malaria transmission, prevention and treatment by the respondents. Poverty and level of schooling were found as important determinants of malaria knowledge and practices. Allopathic treatment was uniformly advocated, but the 'know-do' gap became especially evident when in practice majority of the ill persons either did not seek any treatment (31%) or practiced self-treatment (12%). Of those who sought treatment, the majority went to the village doctors and drugstore salespeople (around 40%). Also, there was a delay beyond twenty-four hours in beginning treatment of malaria-like fever in more than half of the instances16. In sub-Saharan Africa, recent studies show that 66% people prefer to be treated for malaria in a health care facility, 19% people prefer to buy drugs from a shop and a non- significant proportion of people take medicine from traditional healers, use herbal medicines, self-treatment or have no treatment. Despite the overwhelming preference for health care facilities, and free treatment in government hospitals, people continue to use private clinic / drug vendors at high rates. Results obtained in south- eastern part of Bangladesh are similar to that of sub-Saharan Africa [9]. This is also evident in present study. Giemsa-stained thick and thin blood films and recently Immunochromatographic tests for malaria antigens or RDT are used whenever malaria is suspected. RDT is extremely sensitive and specific for falciparum malaria but less so for other species. RDT has many advantages over blood film. Anyone can do it, no expert require and also less time consuming. So it is now the popular method of detecting malaria. The government of Bangladesh, with financial assistance from the Global Fund for AIDS, TB and Malaria, recently initiated programmes to control malaria. The primary interventions for the programme have focused on distribution of insecticide-treated bed nets, malaria diagnosis at the field level using rapid diagnostic tests (RDT), and artemisinin-based combination therapy (ACT) as the first-line of treatment [15]. This study revealed that diagnostic test for malaria done at periphery in 61.5% cases, of which RDT was done only in 14.8%cases and blood slide on 45.5%, both done on only 7.3% cases. Still 32.7% cases no test was done. From result Plasmodium falciparum was detected in 16.4% cases by RDT and 21.8% cases by blood slide examination. Plasmodium vivax was detected in 1.8% cases by RDT and 3.6% cases by blood slide. Blood slide was negative for 23.6% cases and RDT negative. So, in summary falciparum malaria is more prevalent (89.1%) than vivax malaria (10.9%). Hussain SM et all also find similar result in their study. On their study out of 7,005 malaria cases, 54.22% were falciparum, 26.18% were vivax and 12.02% were mixed infections [18].

In a tertiary level hospital usually more severe and complicated cases are referred. Among the 55 cases 89% diagnosed as severe malaria and 11% as uncomplicated malaria. From this 61.8% cases diagnosed in CMCH, only 5.5% at field level, 21.8% at upazila health complex, 10.9% at district hospital level. During the study period, among patients 89% were levelled as severe malaria and 11% were as uncomplicated malaria after getting admission into CMCH. Common features of severity revealed in this study was coma or alter consciousness (42%), acute renal failure (12.7%), severe vomiting leading to non per os (12.7%), convulsion (9.1%). Others are severe anaemia (5.5%), jaundice (5.5%), severe prostration (3.6%) and hypoglycaemia (1.8%). Similar findings revealed on study done by Hussain et all. They found 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%) [18].

Uncomplicated falciparum malaria equally responded (>97%) to artemether lumefantrine or artesunate mefloquine; non-directly-observed regimen of ACT used in Bangladesh was found to be as good as directly-observed regimen in curing UM (99% vs 100%). Injection quinine was equally effective like artemether (18% vs 19% of deaths) in the treatment of severe malaria. A large multicentre study (SEQUAMAT) comparing injection artesunate with quinine reported reduction in mortality in severe malaria by 35% using artesunate. A similar reduction in mortality (22.5%) was found in African children with severe malaria in a recently-completed large trial using artesunate (AQAMAT). Consistent high fatality and most deaths happening in the community and within the first days following admission in hospital required pre-referral treatment of

severe malaria [18]. Here, 78.2% patients recovered completely without any sequel. Average duration of hospital stay was 5-7 days occur mainly due to acute renal failure (12.8%). Other causes include encephalitis, aspiration pneumonia, sepsis etc. In the study recent malaria situation in Chittagong showed that 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 [18].

Conclusion

Understanding the spatial distribution of malaria, identifying geographic risk factors and the population at risk are important steps toward effective control of malaria. The data presented in this paper may be one step to understanding ongoing malaria control programme in south-eastern Bangladesh from a micro-geographic perspective. More efforts should be focused on people living in remote areas.

Limitation

This study did not cover all the aspects of epidemiology of malaria. It was carried out in a single center and in a short period of time. The sample size was too small to generalize the findings of the study to reference population.

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