

Pattern of severe and complicated malaria in children Admitted to Gondar Medical College hospital during 1995-2000

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Abstract

Objective: To describe complications and predictors of mortality among severely complicated cases of malaria.

Design: A retrospective Medical record analysis.

Setting: Gondar Collage of Medical Sciences (GCMS) hospital, Gondar, Northwest Ethiopia. It is one of the teaching hospital in the country and the referral hospital in the Amahara regional state.

Subjects: Clinical records of 427 patients admitted with a primary diagnosis of severe and "complicated malaria" that were admitted between September 1995 and August 2000 were analysed.

Results: Of the 6100 patients admitted during the study period 427 (7%) had a primary diagnosis of malaria. Over half of them (55.1%) were male patients. Blood film was positive in 248/422(58.7%) of them and the rest were diagnosed on clinical ground as probable cases of sever malaria. Children below 6 years of age comprised 65.6% of the total cases. Severe anaemia, coma and hypoglycaemia were found as overlapping clinical features in 369 (86.4%) of them. The over all cases fatality rate was 15.2%. The case fatality rate of malaria associated with coma was 22.9%. When adjustments were made for severe anaemia and hypoglycaemia the fatality rated dropped to 17.9%. The worst predictors of mortality among the known compilations are; shock [OR=22.8 (95% CI=7.2-72.7)] ARDS [OR=5.7(95% CI=0.4-92.8)] pneumonia [OR=3.4(95% CI=1.5-7.4)] *Severe anaemia* [OR=2.15(95% CI=1.20-3.86)], *coma* [OR=2.08(95% CI=1.86-3.66)]. The mean hospital stay of all patients was 7.9 days.

Conclusion and recommendation Once signs of complications are detected there is little time to save the child. Thus emphasis must be given to the management of cases in the nearest health institution. [*Ethiop. J. Health Dev.* 2002;16(1):53-59]

Introduction

Malaria continues to be a major global treat to health, social and economic development (1-3). Almost half of the world's population is at risk of the disease (2). The poor and most underprivileged part of population is severely affected. Each year it causes more than 2.5 million deaths and 300-500 million clinical illnesses, the majority being in sub-Saharan Africa (3-5). Malaria is curbable and can be controlled: this has been demonstrated in the world including ethiopia during the 60s and70s (6-8). But exacerbation of the problem has been observed due to population movement, environmental change and spread of drug resistance.

More than 60% of the population in Ethiopia is at risk of malaria (6). The effect of the clinical illness is more severe in the rural poor where the primary health service is either very poor or not

available, and is more severe in the rural poor where the primary health service is either very poor or not available, and is even more severe in the pregnant women and in children, especially in unstable malarious area (3,9,10). In the unstable malarious area the clinical illness is more of seasonal, and occurs in the form of epidemics. It has also been found that in the low endemic areas all segment of the population has similar risk to severe and complicated form of malaria (5). Any type of the complication is expected irrespective of the age.

Cerebral malaria a serious form of complicated malaria with variable case fatality rates. It has been reported to occur from 3.9 to 30% of the cases in different studies (5,11-14). It was also found to be less common in partially immunised population that lives in stable malarious area, particularly in those beyond 6 years of age.

Severe and complicated malaria should be diagnosed early and managed accordingly if one or more of the signs of complication are observed in patient with *P. falciparum* malaria (15). The condition is a medical emergency, and is usually a result of delayed and inadequate treatment of uncomplicated malaria. These patients must be referred to a centre where there is facility for inpatient care.

Generally the management protocol includes parental administration of quinine and fluid, frequent monitoring of vital signs and blood glucose, monitoring of input and output of fluid. Good nursing care is indispensable especially for comatose patient (15). Other treatable conditions like meningitis should be looked for and managed.

Quinine is the drug of choice for severe malaria in Ethiopia (6). It is effective, and resistance has not been reported so far. Patients are managed with available resource in our Hospital. But the pattern and clinical course of severe malaria has not been analysed recently in our setting.

The present study looks at the complication and case fatality associated with severe malaria in order to provide ways of tackling the problem.

Patients and Method

Definition of terms

Probable severe malaria:- a patient who requires hospitalisation for symptoms and signs of severe malaria and receives antimalarial treatment

Confirmed severe malaria:- a patient who requires hospitalisation for symptoms and signs of severe malaria and receives antimalarial treatment with laboratory confirmation of diagnosis.

Severe malaria:- a patient with probable or confirmed case of malaria with one or more of the complications suggested by WHO

shock:- a patient with severe malaria who develops Hypotension and other signs of inadequate perfusion

coma:- Patients with severe malaria who can't respond to any stimulus appropriately.

Hypoglycaemia:- patient with severe malaria whose blood glucose is less than 45 mg/dl or who showed signs of hypoglycaemia and showed a dramatic response with concentrated glucose administration.

The study is a retrospective case series analysis was conducted at Paediatric ward at Gondar College of Medical Sciences (GCMS) Hospital Gondar, Northwest Ethiopia. The Hospital is a teaching hospital and a referral hospital in the Amhara regional state. The Hospital drains all types of patients that are referred from the health centres and health stations as well as self-referred patients. The Hospital is situated at a low malaria risk area (children with fever has blood

film positivity in less than 5% of the cases) but surrounded by the malaria risk districts (children with fever has blood film positivity in more than 5% of the cases). The Hospital is serving as a second referral centre for the Amahara region and part of Tigray region.

A clinical record of all paediatric patients discharged with a final primary diagnosis of severe and complicated malaria from September 01, 1995 to August 28, 2000 (a period of 5 years) were retrieved using the logbook of patients. Children discharged after treatments for severe and complicated malaria or who died while on treatment for severe and complicated malaria either confirmed or probable were selected. The available information from the records of 427 patients was collected using a performed questionnaire. Adequate information couldn't be obtained for 5 of the patients. Analysis was made using EPI info 2000 statistical package on a personal computer. Tables and diagram are used to summarise the data and statistical tests like odds ratio and 95% confidence interval were applied for some of the categorical data.

Results

there were 6,100 admissions to the paediatric wards during the study period, of these 427(7%) had a primary diagnosis of malaria. At least 2 blood films were done for each patient, and only 55.1% of them had a positive result. Others were treated as probable cases of severe malaria. Among the cases 5.6% were below the age of 6 months, 60% between 6 months and 6 years, the rest above 6 years. Over one half (55.1%) of them were male patients as shown in table 1. Case fatality was higher among the female patients, (17.55% in male vs. 13.4% in female).

Table 1: Sex and outcomes of severe malaria 1995-2000 GCMS paediatric ward

Sex	Died (%)	Improved	Total
Female	33(17.5)	156(82.5)	189(100)
Male	31(13.4)	201(86.6)	232(100)
Total	64(15.2)	357(84.8)	421(100)

OR=1.37 95% CI (0.81-2.34)

Among patients with a primary diagnosis of severe malaria, 369 (85.4%) of them had 3 distinct but overlapping complications. These were severe anaemia, coma and hypoglycaemia (Figure 1). The over all case fatality rate was 15.2%.

Patients with two or more complications had higher fatality rate of malaria associated with coma was 22.9%, when severe anaemia and hypoglycaemia is removed the fatality rate dropped to 17.9%. Similarly for severe anaemia and hypoglycaemia when the effect of the overlapping features were removed the fatality rate dropped from 19.1% and 16.9 to 15.9% and 3.6%, respectively. (Figure 1)

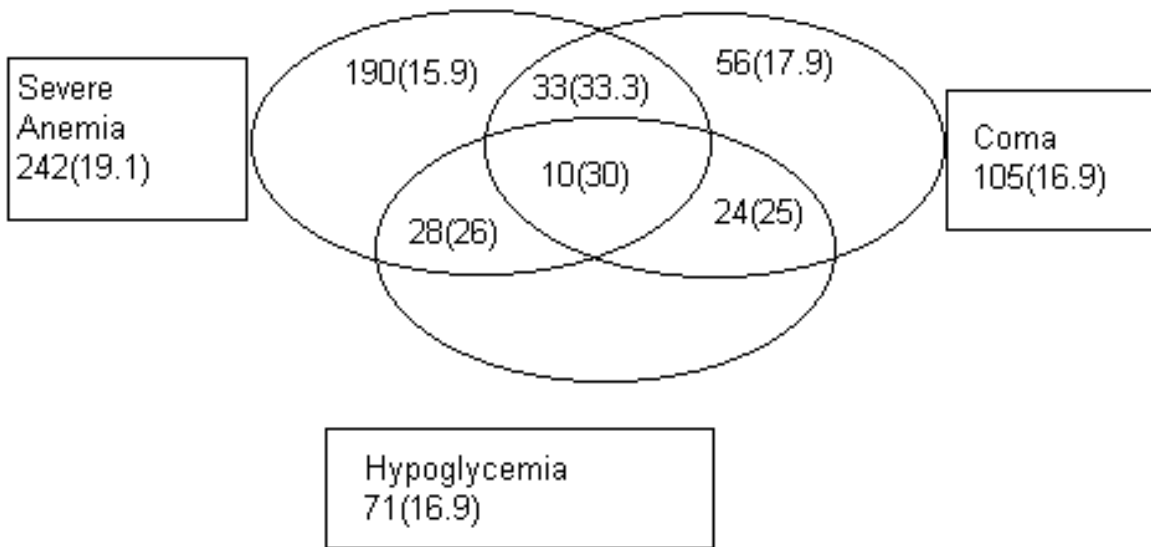


Figure 1: **The 3 commonest complications of malaria on children and the fatality rate in bracket at Gondar Medical College hospital 1995-2000, (n-369).**

Children with severe anaemia were younger; 62.8% of those less than 6 years of age had severe anaemia vs. 46.8% of those who were 6 years and above. Jaundice, haemoglobinuria, ARDS, bleeding tendency and acute renal failure were rarely observed (Table 2).

Table 2: **The frequency of each of the complication of malaria in children at GCMS 1995-2000, n=427.**

Type of complication	Patients with the specific complication	%
Severe anaemia	242	56.7%
Cerebral malaria	105	24.6%
Hypoglycaemia	71	16.6%
convulsion	53	12.4%
Pneumonia	32	7.5%
repeated vomiting	29	6.8%
shock	17	4%
acute renal failure	4	0.9%
bleeding tendency	3	0.7%
ARDS	2	0.5%
Haemoglobinuria	1	0.2%
Jaundice	1	0.2%

The distribution of outcome of treatment by malaria parasite is given in table 3. Patients who were proven cases of malaria had a better outcome than those with a probable diagnosis of malaria, (proportion of death 13.7% vs. 17.8%), but this is not statistically significant ($p>0.05$). *P. vivax* was not associated with bad outcome, the one, who died had an additional problem (disseminated tuberculosis). The other patients who were admitted with the primary diagnosis of *P. vivax* malaria had other additional clinical problems like*.

The worst predictors of death among the complications were; shock [Or = 22.8, (95% CI=7.2-72.7)], ARDS [OR=5.7, (95% CI=0.4-92.8)], pneumonia [OR=3.4, (95% CI=1.5-7.4)], Severe anaemia [OR=2.15, (95% CI=1.20-3.86)], Coma [OR=2.08, (95% CI=1.86-3.66)], Hypoglycaemia [OR=1.78, (95%=0.59-2.34)].

The mean hospital stay of all patients was 7.9 days. Those who improved stayed ~8.7 days and those who died only 4 days. Among those who died, more than 50% died on the day of admission.

Table 3: **blood film result and out comes of severe malaria 1995 - 2000 GCMS paediatric ward**

Blood film	Died (%)	Improved (%)	Total (%)
Negatives	31(17.8)	143(82.2)	174(100)
<i>P. falciparum</i>	32(13.7)	201(86.3)	233(100)
<i>P. vivax</i>	1(6.7)	14(93.3)	15(100)
Total Positives	33(13.3)	215(86.7)	248(100)
Total	64(15.2)	358(84.8)	422(100)

Discussion

Health service morbidity and mortality statistics collected in 1998 in the Amhara Region showed malaria as the first cause of morbidity (16). The prevalence of malaria during this study period was 7% and the case fatality rate 15.2%; this indicates that, malaria continues to be the serious burden in our hospital. The case fatality is on the higher side though it falls with in the wide range of different studies done in other places (5-6, 12, 14). The findings of the present study reflect only the tip of the problem of malaria, because many patients do not visit Hospitals because of geographical and financial inaccessibility and other reasons. Almost all types of the known complication (15) have been observed in our children. The commonest complication was severe anaemia, this was more common on young children less than 6 years of age and this concurred with the findings of a study conducted in Tanzania (17). The worst out come was observed in this age group, when compared to those 6 years and above. This was probably due to the underlying high level of malnutrition and nutritional anaemia. (12).

Regression analysis showed that the worst predicators of death in our patients were; shock ARDS, *Pneumonia, severe anaemia, and coma*. This shows that the commonest complications are also among the predictor of death (17). This implies that, if we manage adequately these complications, one can avert the deaths associated with malaria complications. The fatality increased as the type of complications became multiple. This agrees with reports by other studies (5). In order to avert deaths from malaria; complications should be recognized early enough and the patient managed accordingly. Some complications are rarely reported this can be due to lack of the facility to investigate the patient or a low index of suspicion, often focus being made on the recognised complications.

In this study Hypoglycaemia is relatively common (the third). This might be due to the fact that our patients have variable degree of malnutrition, repeated vomiting, and that they have not been fed for long during the long distance travel to arrive at the hospital. But aggressive treatment via NG tube with concentrated sugar and cereal gruel after admission could have helped to minimise the case fatality (3.6%) associated with it.

Death rate among patients with positive blood film was lower than those who were negative, but the difference was not statistically significant. If they don't have malaria obviously they may have other serious disease that required admission. We treated aggressively with broad spectrum antibiotics in addition to anti malarial; this could be the cause that we didn't see a significant difference between those who were negative and positive.

One of the reasons for malaria mortality is inadequate management of uncomplicated malaria or late arrival (18-19). More than 50% of deaths occurred on the day of admission; most of them came out side of Gondar town. This implies that there is a need to improve the quality (access and effectiveness) of the malaria management in the health centres.

P. Vivax is still a benign cause of malaria (20), and was not a major cause of death in our patients. The one death with a primary diagnosis of *P. Vivax* also had disseminated tuberculosis. Others who survived had mara-smus, severe hypochromic anaemia, marasmic-kwashiorkor etc. in addition to some signs of severe malaria (hypoglycaemia, seizure, con-fusion etc.). In a seriously sick child with *P. vivax* infection additional cause of illness must be looked for or the child must be managed considering possible co-infection with *P. falciparum* (20).

Malaria is most severe in the poorest part of the community and aggravates poverty (3). The mean hospital stay of our patients was around 7.8 days. This is costly for the poorest segment of the population especially for the rural poor (22-23). Malaria strikes hard during the production season; the poor farmer can't afford to be absent from his farm and family for more than 8 days during seeding and harvesting season.

Conclusion recommendation

Severe malaria is still a major problem. Few complications are responsible for many of the deaths. These complications can be prevented or managed with out much difficulty if we are prepared to handle them. To decrease mortality, uncompleted cases of malaria must be treated early and adequately. Once signs of complications are detected, only little time is available to save the life of the child. These patients must be managed in the nearest health institution. Many of the complications can be managed at the health centre level if these are better organised and delegated the responsibility.

The availability of simple laboratory tests at this facility should be ensured and their reliability improved, to assess and manage problems like severe anaemia, (it is simple to diagnose relatively easy to manage and it shouldn't be a significant cause of death). To avoid death due to those complication, blood transfusion service must be decentralised to health centre level. If this service continues to be delivered only in the Hospital, patients out side the city and near by peasant association, may not benefit much from the service, these patients either don't come to hospitals or arrive late. However, transfusion must be done when it is life saving and at least whenever there is a screening facility for HIV.

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