

DEATH AUDIT OF DEATHS DUE TO MALARIA AT LG HOSPITAL, AHMEDABAD (GUJARAT) DURING THE YEAR 2011

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ABSTRACT

Context: Approximately half of the world's population is at risk of malaria. Understanding of profile of deaths due to malaria can help in appropriate and early management of cases and thereby reducing mortality in future.

Aims: To study the seasonal pattern, profile, survival period, symptoms, signs, and complications, treatment details of malaria death cases and study the facilities for management.

Materials and Methods: Information about deaths due to malaria was procured from the indoor case papers of cases from the medical record department of LG hospital from January 2011 to December 2011 and subsequently analysis was done using appropriate statistical software.

Results: A total of 32 malaria deaths occurred in the above mentioned period. Overall CFR was 3.4% for indoor malaria cases. Mean age of cases was 42.23 years. There were 53.1% of patients falling in the age group 50 years and above. Out of total deaths, 59.37% were males and 40.63% were females. Twenty (62.5%) cases were positive for *Plasmodium falciparum*, 8 (25%) case for *Plasmodium vivax*, and 4 (12.5%) case were having mixed infection. Median survival period was 23.5 hours. The most common presenting symptom was intermittent fever and altered sensorium. All cases were given treatment as per guidelines of National drug Policy on Malaria (2010) immediately after diagnosis. Facility survey revealed all facilities as per recommendation under NVBDCP.

Conclusions: Malaria still remains one of the important causes of admission and mortality. Early identification and referral of complicated malaria cases from community to higher health care facilities can reduce the mortality.

Key words: Case-fatality Rate (CFR), Survival period, Malaria, National Drug Policy on Malaria (2010)

INTRODUCTION:

Most malaria cases and deaths occur in sub-Saharan Africa. However, Asia, Latin America, and to a lesser extent the Middle East and parts of Europe are also affected.¹ Malaria is one of the major public health problems of the our country. According to the *World malaria report 2011*, there were about 216 million cases of malaria (with an uncertainty range of 149 million to 274 million) and an estimated 655 000 deaths in 2010 (with an uncertainty range of 537 000 to 907 000).¹ Around 1.5 million laboratory confirmed cases of malaria are annually reported in India. In Gujarat, 86,005 malaria cases were reported with *P. Falciparum* percentage being 17.72

during 2011.² In Ahmedabad city the number of cases was 7,158 with *P. Falciparum* cases 1265 and percentage being 17.7%. One of the reasons attributed to rise in proportion of *P.falciparum* cases is resistance to chloroquine, which was used for a long time as the first line of treatment of malaria cases. *P.falciparum* infections are known to lead to severe malaria, if timely treatment with effective drugs is not administered. Often the cases are managed by the many practitioners (allopathy/other pathies) before they reach tertiary care institute. Tertiary care hospitals are usually the places where the cases would report in complicated or stubborn conditions which often contribute to poor prognosis amongst them. So the present study

was carried out to know seasonal variation, socio-demographic profile, duration of survival, symptoms, investigations and treatment details of the cases and also to carry out facility survey for management of cases of complicated malaria.

MATERIALS AND METHODS

The information about the cases of deaths due to malaria was obtained from the indoor case papers from medical record department of the LG Hospital. Case papers of all 32 deaths which occurred during the year 2011 were procured and data so obtained were analyzed using Microsoft excel and EPI Info 6.

OBSERVATIONS AND RESULTS:

Table1: Month-wise indoor cases and deaths due to malaria

| Month | Indoor cases (%) | Deaths (%) | Case fatality rate (%) |
|-----------|------------------|------------|------------------------|
| January | 7 (0.7) | Nil | 0 |
| February | 2 (0.2) | 1 (3.1) | 50 |
| March | 14 (1.5) | Nil | 0 |
| April | 24 (2.6) | 1 (3.1) | 4.2 |
| May | 31 (3.3) | Nil | 0 |
| June | 31 (3.3) | 2 (6.3) | 6.5 |
| July | 57 (6.1) | Nil | 0 |
| August | 207 (22.1) | 8 (25) | 3.8 |
| September | 236 (25.1) | 6 (18.8) | 2.5 |
| October | 170 (18.1) | 8 (25) | 4.7 |
| November | 93 (9.9) | 1 (3.1) | 1.1 |
| December | 67 (7.1) | 5 (15.6) | 7.5 |
| Total | 939 (100) | 32 (100) | 3.4 |

Total 939 cases of malaria were admitted from January to December 2011 in LG hospital and 32 deaths occurred during the same period. Highest number of cases, 613 (65.3%) were reported during the months of August to October. Month-wise distribution of deaths showed that maximum deaths, 22 (68.8%) were concentrated in the months of August-October which coincides with the high transmission season for malaria.

The overall case fatality rate (CFR) was observed as 3.4 %. The range of CFR was from 0 % to 50 %. Higher CFR was during the month of February and December can be attributed to the cases who reported with the associated illnesses. (Table1)

Table2: Socio-demographic profile

| Variable | Number (n=32) (%) |
|--------------------|-------------------|
| Age (years) | |
| 0-4 | 2 (6.3) |
| 5-9 | 1 (3.1) |
| 10-19 | 5 (15.6) |
| 20-49 | 7 (21.9) |
| 50-59 | 6 (18.8) |
| 60 years and above | 11 (34.3) |
| Sex | |
| Male | 19 (59.37) |
| Female | 13 (40.63) |

The range of age of the deceased was from 2 months to 87 years. Majority, 11(34.3%) belonged to age 60 years or more. However there was one infant death and one death of child whose age was one and a half year. Mean age of deceased was 42.23 years and standard deviation of 25.53 years. Mean age of female cases was 34.35 years and standard deviation of 28.49 years whereas mean age of males was 44.34 years with standard deviation of 25.48 years. Looking at the mean age it was observed that females died at younger age than males but this difference in mean age of cases was statistically not significant ($z=1.01$, $p>0.05$) Male: Female ratio of death cases was 1.46:1. (Table2)

Table3: Duration of survival

| Duration | Number (%) | Cumulative frequency | Cumulative Percentage |
|----------|------------|----------------------|-----------------------|
| Hours | | | |
| 0-6 | 7 (21.8) | 7 | 21.8 |
| 6-12 | 3 (9.4) | 10 | 31.2 |
| 12-18 | 3 (9.4) | 13 | 40.6 |
| 18-24 | 8 (25) | 21 | 65.6 |
| Days | | | |
| 1-6 | 7 (21.8) | 28 | 87.4 |
| >6 | 4 (12.5) | 32 | 100 |
| Total | 32 (100) | 32 | 100 |

Duration of survival after admission was very short as 21 (65.6%) cases died within 24 hours of admission indicating that patients were already having complications at the time of admission leading to poor prognosis. The median survival period was 23.5 hours. Only 4 (12.5%) cases died after 6 days of admission. The range of survival period was from 2 hours to 13 days with maximum cases in first 24 hours. (Table3)

Table4: Results of Blood Smear Examination (BSE) and Rapid Diagnostic Test (RDT)

| Investigation | p. vivax | p. falciparum | Mixed infection | -ve | Total |
|---------------|----------|---------------|-----------------|------|-------|
| RDT | 1 | 2 | 2 | 1 | 6 |
| BSE | 8 | 19 | 3 | 2 | 32 |
| Total | 8 | 20* | 4* | Nil# | 32 |

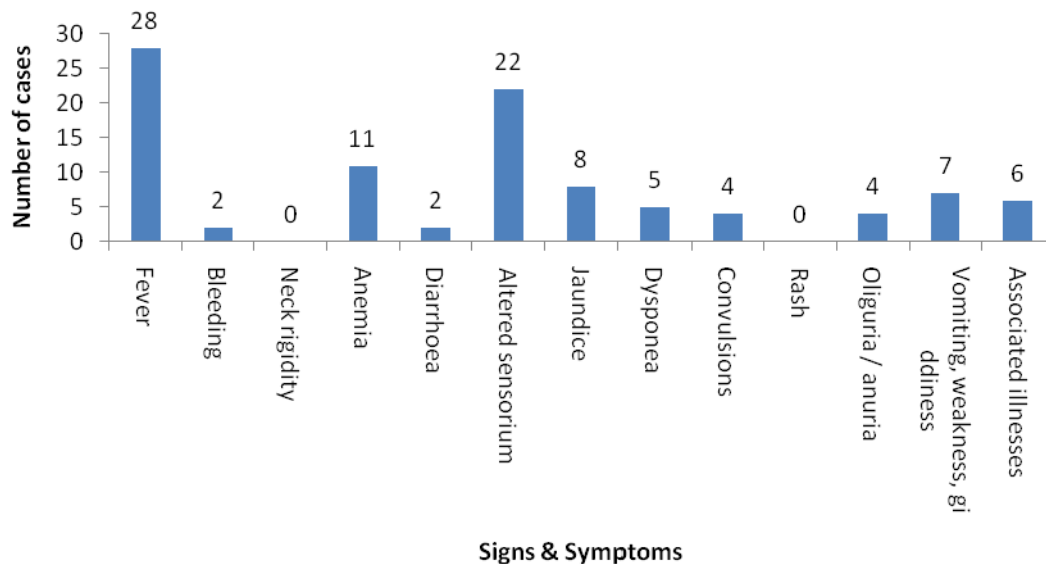
*one case was positive only by RDT but negative in BSE, #cases negative by blood smears were positive by RDT and vice versa

All cases were subjected to blood smear examination. Rapid Diagnostic Test was performed in 6 cases. Blood smear results were positive in 30 cases. There were 2 cases which

showed positive test by RDT whereas they were negative by blood smear examination. Out of these two cases one was positive for p. falciparum and one for mixed infection. In one case of p.falciparum, the blood smear was positive but rapid test was negative.

Out of 30 cases showing positive blood smear 19 (63.3%) were of p. falciparum, 8 (26.7%) were p.vivax and 3(10%) had mixed infection.

Considering positivity by either of the test 8 (25%) were positive for p. vivax, 20 (62.5%) were positive for p.falciparum and 4 (12.5%) had mixed infection. Ratio of p.falciparum: p.vivax was 2.5:1. (Table4)

**Figure 1: Symptoms and signs among the cases**

Fever, altered sensorium and anemia were the most common symptoms associated with high mortality. Altered sensorium was present in 22 (68.75%) cases indicating that patients had developed cerebral complications before reaching tertiary care facility. The infant who died had severe anemia and thrombocytopenia.

Associated illnesses were present in 6 (18.75%) cases. Hypertension, diabetes, Ischemic heart disease, COPD were the common associated illnesses. One pediatric patient who died at age of one and a half year had pneumonia as associated illness. (Figure1)

Treatment details:

All the cases were given treatment as per guidelines of National Drug Policy on Malaria (2010) after confirmation of diagnosis by blood

smear examination. Those showing negative blood smear but positive RDT were also treated as per above guidelines. Antibiotics and other supportive treatment were given along with anti-malarial drugs. One patient was suffering from tuberculosis hence was continued with AKT along with antimalarials. The commonest complications in all patients were cerebral malaria, acute respiratory failure, thrombocytopenia, acute congestive cardiac failure, jaundice, acute renal failure, septicaemia etc. All the patients were managed in ICCU as they suffered above mentioned complications.

Facility survey:

- Adequate stocks of antimalarials [Chloroquine, Primaquine, Artesunate, ACT, Quinine, etc.] were available.

- Adequate stocks of parenteral antibiotics, anticonvulsants, antipyretics were also available.
- Intravenous infusion equipment and fluids were available.
- Facility for special nursing for patients in coma was available.
- Well-equipped laboratory for diagnosis of malaria and all investigations were available.
- Facility of the ICU was also fully functional.
- Sufficient manpower in terms of the physician, resident doctors and supportive laboratory and paramedical staff was available during the stay of the cases.

DISCUSSION

Average CFR in the present study was 3.4% . In a study by Vyas et al CFR varied from 1.74 to 4.27%, with an average CFR of 3.03%.³ Overall case fatality rate was 21% in a study by Jain et al.⁴ In a study at Mozambique among indoor malaria cases among children of less than 15 years of age, CFR varied from 1.6 to 4.4%.⁵ Case fatality ratio was 3.5% in another study at Ghana.⁶ In a study among Gabonese children, the CFR was 8.9%.⁷ Majority of deaths in the current study were reported during the months of August to October which is the high transmission season for malaria in Ahmedabad. This is similar to the observation in another study by Oduro AR et al.⁶ However, study among Gabonese children revealed no seasonal difference in mortality suggesting perennial transmission of malaria in that region.⁷ Males accounted for 59.37% of total death cases and this finding is similar to findings of other studies.^{3,5,7} Forty seven percent deaths occurred in the age group less than 50 years. This is similar to finding in an another study in Ahmedabad city. ³In a study of malaria prevalence in Cambodia, the majority of malaria cases were in the age group of 0 to 39 years.⁸ Median duration of survival after hospitalization was 23.5 hours in current study and 65.6% deaths occurred in first 24 hours. In another study, the median duration of survival after hospitalization was 3 days and majority of deaths due to severe malaria occurred in the first 48 hours of admission.⁵ Highest risk of death was associated with delay in seeking treatment and severity of illness before admission as evident from the very short median survival period in the present study which is similar to the findings by Zeidan Z et

al.⁹ Intermittent fever, altered sensorium, and anemia were the most common presenting symptom in the present study. Severe anemia was most common presentation in the study in Ghana,⁶ fever was the most common presentation in a study by Dzeing-Ella *et al.*⁷ whereas Bassat *et al.* reported severe prostration, respiratory distress, and severe anemia as the common presentation in severe malaria.⁵ In the current study 25% deaths were among the p.vivax monoinfection cases. In a study by Kochar DK et al it was observed that Plasmodium vivax monoinfection was almost equally serious to cause significant mortality in comparison to P. falciparum.¹⁰ Further evaluation is required for such cases.

RECOMMENDATIONS:

Tertiary care health facilities are usually the places where the cases would report in complicated stage. Role of IEC for generating awareness for early recognition and reporting of fever cases is very important. Early recognition of severe malaria cases from community by health workers clubbed with prompt pre-referral treatment and early referral to higher level of health care may improve chances of survival.

Hospital-based results underestimate the real burden of disease in the community and are greatly influenced by health-seeking behaviour hence involvement of private practitioners in correct and early management of cases by their sensitization for national drug policy on malaria (2010) is very much required.

Focussed camps for detection of fever and malaria cases during high transmission season could help in early diagnosis, identification of complicated cases and their timely referral thereby reducing mortality due to malaria.

IEC/BCC for vector control and personal protection is also very much required.

As 25% cases had p.vivax monoinfection, detailed prospective study amongst indoor cases of malaria due to p.vivax is required to find out the underlying pathology.

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