

## Original article

# A Study of investigation report on death audit due to malaria in New Civil Hospital, Ahmedabad City, Gujarat, India

Niti Talsania<sup>1</sup>, Krunal Modi<sup>2</sup>, Pooja Chaudhary<sup>2</sup>

<sup>1</sup>Professor, <sup>2</sup>Resident, Community Medicine Department, B. J. Medical College, Ahmedabad, Gujarat, India

Correspondence: Krunal Modi Email: [kan0096@yahoo.co.in](mailto:kan0096@yahoo.co.in)

## ABSTRACT

**BACKGROUND:** Malaria mortality is a public health challenge that has been met with various solutions. Malaria eradication is still a day dream for our country and perhaps for our future generation too.

**AIMS AND OBJECTIVES:** To find out the cause of death of 17 deaths due to *P. Falciparum* and *P. Vivax*(Mix Infection) and associate co-morbidities in New Civil Hospital, Ahmedabad, Gujarat

**METHODOLOGY:** A retrospective study was done on 17 malaria death patients in New Civil Hospital, Ahmedabad. Detailed history from starting of first symptom to death with their laboratory investigation was taken in preformed, structured proforma and analyzed in Microsoft Excel and compared with State and National mortality data.

**RESULTS:** During our study period of October 2006 to November 2007, 17 deaths were recorded in Hospital due to malaria. 5 patients died due to complications of *Plasmodium Vivax* infection and 12 patients died due to *Plasmodium falciparum*. Maximum patients (88.2%) presented with fever (Intermittent and Continuous). Immediate cause of death due to complication was maximum with Acute Renal Failure (29.4%) followed by Acute Respiratory Distress Syndrome (23.5%) and Septicemia (23.5%). Our death data are contradictory from state and national mortality data due may be to under reporting of malaria deaths by authority.

**KEY WORDS:** Death audit, *P. Falciparum*, *P. Vivax*, Malaria mortality

## INTRODUCTION

Malaria and other vector borne diseases remain one of the major tropical health challenges in the world today<sup>1</sup>. Vector borne diseases, mainly malaria, remains a leading cause of morbidity and mortality, world-wide, at present about 100 countries in the world and 40% population are considered malarious, almost half of which are in Africa, south of Sahara. More than 2400 million of the world's population is still at risk. The incidence of malaria worldwide is estimated to be 300–500 million clinical cases each year, with about 90% of these cases occurring in Africa,

south of Sahara—mostly caused by *Plasmodium falciparum*<sup>2</sup>. Approximately 1.1-2.7 million people die every year due to malaria globally<sup>3</sup> including one child in every 30 sec<sup>4</sup>. Malaria is still the most important cause of morbidity and mortality in India with approximately 2 to 3 million new cases arising every year<sup>5</sup>. If we look at the epidemiological trends of India there is a trend towards increasing proportion of *Plasmodium falciparum* cases<sup>6</sup>. The true effect of the malaria burden in India remains uncertain, but evidence is increasing that the scale of the burden has been greatly under-estimated—which is particularly surprising for a country that boasts of a space programme and is an emerging global economic leader<sup>7</sup>. The mosquito-borne diseases result in avoidable ill-health and death which also has been emphasized in National Health Policy<sup>8</sup> and Millennium Development Goals (MDGs)<sup>9</sup>. National Vector Borne Disease Control Programme (NVBDCP)<sup>10</sup> under the aegis of National Rural Health Mission (NRHM)<sup>11</sup> is one of the most comprehensive and multifaceted public health activities in India including prevention and control of mosquito-borne diseases.

Ahmedabad is rapidly developing into the main industrial city of Gujarat, India. It is situated on the bank of river *Sabarmati* and *Narmada* river canal passes through it. Unplanned urbanization and development is going on throughout the city. Because of this, there are many slum areas in the city. Most of the time, atmosphere here is hot and humidity is around 60% to 70%, favorable for mosquito breeding. Ahmedabad is endemic for urban malaria and *An.culicifacies*<sup>12</sup> is most abundant in the villages situated on the bank of rivers. In Ahmedabad, average Monthly Blood Examination Rate (MBER), Slide Falciparum Rate (SFR) and Slide Positivity Rate (SPR) were 7.6%, 0.2% and 0.05% accordingly in 2010<sup>13</sup>.

## MATERIALS & METHODS

The retrospective study on 17 malaria death patients was conducted in New Civil Hospital, Ahmedabad with over 3000 beds capacity which is apex level tertiary care hospital of Gujarat and also serves the neighboring states.

Around one year survey and death record data due to malaria was collected in structured proforma from all the wards of the hospital during October 2006-November 2007. The deaths were confirmed by clinical and laboratory findings.

**RESULTS**

In 17 malaria death patients, 4 patients were <12 years and 13 patients were >12 years. 7 patients were male and 10 were female, as depicted in Table I. Average age for male patient was 36.8 years and for female it was 21.8 years. 5 patients were migrants from other cities. In death analysis, average days of occurrence of symptoms from 1<sup>st</sup> symptom to death was 8.4 days. 5 patients died due to complications of *Plasmodium Vivax* infection and 12 patients died due to *Plasmodium falciparum*. The deaths in our study and subsequent, suggest failure of authority to take preventive steps during monsoon and pre monsoon era.

**TABLE I: SEX WISE DISTRIBUTION OF STUDY DEATHS AND RECENT DEATHS IN NEW CIVIL HOSPITAL DUE TO MALARIA**

AGE (YEARS)	SEX			
	MALE (%)		FEMALE (%)	
	Oct 2006-Nov 2007	2011*	Oct 2006-Nov 2007	2011*
Less than 12	0 (0)	1 (9)	4 (40)	2 (25)
More than 12	7 (100)	10 (90)	6 (60)	6 (75)
Total	7 (100)	11 (100)	10 (100)	8 (100)

\*Data of August and September, Figures in parenthesis indicate percentage.

**TABLE II: PRESENTING SYMPTOMS OF PATIENTS AT THE TIME OF ADMISSION**

PRESENTING SYMPTOM	NO. OF PATIENTS * (%)
INTERMITTENT FEVER	9 (52.9)
CONTINUOUS FEVER	6 (35.3)
RIGORS	11 (64.7)
VOMITING	2 (11.8)
UNCONCIOUSNESS	9 (52.9)
ABNORMAL BEHAVIOR	7 (41.8)
HEADACHE	4 (23.5)
URINE SUPPRESSION	2 (11.8)
CONVULSIONS	1 (5.9)

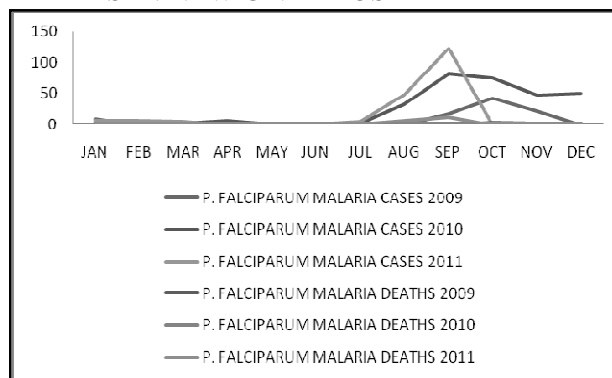
\*Multiple symptoms present, Figures in parenthesis indicate percentage.

**TABLE III: IMMEDIATE CAUSE OF DEATH DUE TO P. FALCIPARUM AND P. VIVAX MALARIA**

CAUSE OF DEATH	NO. OF PATIENTS (%)
ARDS	4 (23.5)
Acute Renal Failure	5 (29.4)
Hepatic Failure	1 (5.9)
Septicemia	4 (23.5)
Cerebral Malaria	2 (11.8)
Pulmonary Edema	1 (5.9)
Total	17 (100)

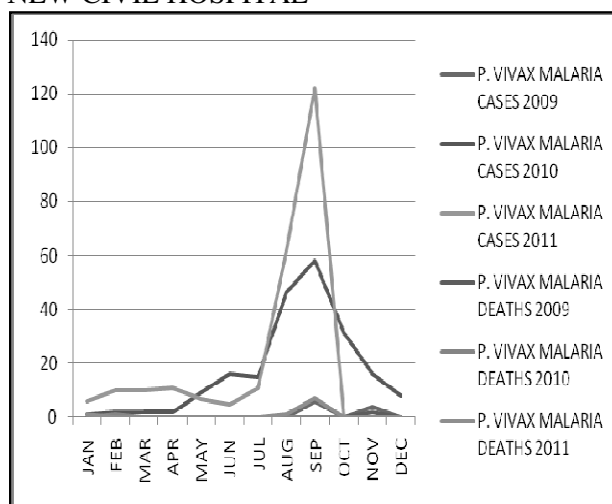
\*ARDS=Acute Respiratory Distress Syndrome, Figures in parenthesis indicate percentage.

**FIGURE 1: MONTH WISE LAST THREE YEAR P. FALCIPARUM CASES AND DEATHS IN NEW CIVIL HOSPITAL\***



\*up to September 2011

**FIGURE 2: MONTH WISE LAST THREE YEAR P. VIVAX CASES AND DEATHS IN NEW CIVIL HOSPITAL\***



\*up to September 2011

Various classical symptoms with which patients were presented at the time of admission are depicted in Table II. Fever and rigors were the main symptoms. 9 patients presented in unconscious condition which shows seriousness of disease and associated severe complications.

Table III shows the immediate cause of death due to complications of malaria. 5 (29.4%) patients died due to Acute Renal Failure. 2 (11.8%) patients died due to very severe complications of cerebral malaria. Rest of the patients died due to other complications like Acute Respiratory Distress Syndrome (ARDS), liver failure, septicemia and pulmonary edema (co-morbidities) as shown in the table.

Figure I depicts monthly reported cases and deaths in New Civil Hospital, Ahmedabad

during last three years due to *P. Falciparum*. Data shows increased cases and deaths during June-September month means during monsoon and post monsoon season which shows the seasonal trends of disease. Recent cases and deaths showing epidemic like situation compared to previous months.

TABLE IV: LAST THREE YEAR MALARIA CASES AND DEATHS IN GUJARAT AND INDIA<sup>14\*</sup>

Year	GUJARAT			INDIA		
	MALARIA CASES	PF CASES (%)	DEATHS (%)	MALARIA CASES	PF CASES (%)	DEATHS (%)
2009	45902	8485 (18.9)	34 (0.4)	1563574	839877 (53.7)	144 (0.02)
2010 <sup>P</sup>	64730	13170 (20.3)	10 (0.08)	1495817	779549 (52.1)	767 (0.09)
2011 <sup>P</sup>	12808	2073 (16.2)	0 (0)	336545	180894 (53.7)	75 (0.04)
TOTAL	123440	23728 (19.2)	44 (0.2)	3395936	1800320 (53.01)	986 (0.05)

\*up to May 2011, p = provisional, Figures in parenthesis indicate percentage.

Figure II depicts monthly reported cases and deaths in New Civil Hospital, Ahmedabad during last three years due to *P. Vivax*. Data show same pattern like *P. Falciparum* malaria means increased cases and deaths during particular months. Here, deaths are due to mixed infection with *P. Vivax*.

NVBDCP data of last three year cases and deaths due to malaria in Gujarat and India are depicted in Table 4 which is contradictory than the cases and death in New Civil Hospital, Ahmedabad alone which lighting on the issue of weak reporting from bottom to top in India.

## DISCUSSION

In our study, mean age of patients who died due to malaria was 28 year which was 23 years in Papua<sup>15</sup> study. The most commonly reported complaints were fever (88%), vomiting (12%) and headache (24%) which is also comparable with Papua<sup>15</sup> study. Most of the burden of malarial mortality is borne by the economically productive age<sup>16</sup> which is true in our study, also. Deaths in children are 23% in our study, almost same as another study<sup>15</sup> in which it was 16%. Male: Female death ratio in our study was 1: 1.4 which is contradictory to Kumar A<sup>16</sup> study. This difference could be due to less number of death data in our study. When we examined the

risk of severe diseases among people having quantitatively equal risk of infection, adults were seen to be at significantly higher risk which is comparable to other studies<sup>17,18</sup>. Falciparum malaria showed distinct seasonal peaks<sup>16</sup> which correlates with our study. Deaths due to complications are also comparable with another study<sup>15</sup>. The emergence of resistance to chloroquine in *P. falciparum* in many pockets of the country and reports of reducing sensitivity in *P. Vivax* are major causes of concern<sup>19-22</sup> and it is reflected in our study too. Another important issue seen in our study was possibility of under reporting from New Civil Hospital and NVBDCP by authority as mentioned in few other studies<sup>16, 23, 24</sup> and it is also published in the recent article in the 20 November 2010 issue of *The Lancet*<sup>25</sup> which estimates the number of malaria deaths annually in India to be between 125000 and 277000 (average 205000), numbers substantially different from the official figures of about 1000 and 15000 deaths by WHO. The findings of this article force us to sit back and mull over this wide disparity. It also forces a comment on the malaria mortality counts as reported officially, as also the current malaria policy and its future direction.

## CONCLUSION

In conclusion, it may be appropriate to look beyond the numbers (malaria deaths) as rightly pointed out by the article published in *the Lancet*<sup>25</sup> which also urges us to wake up to the problem of malaria in India rather than the mortality count alone. Counterfeit drugs and drug resistant to malaria is also a burning problem in India which must be tackled by strong hands. A good investment on malaria control not only makes public health sense but also economic sense in the present era of economic liberalization in India. Firm malaria control is imperative for human resource development, which in turn is important for equitable and sustained economic growth.

## LIMITATION

Limitation of our study is the limited number (17) of deaths due to *Plasmodium falciparum* and *Plasmodium Vivax* during one year period. There may be limitation to generalize the findings major community or whole population.

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