Qualitative Analysis of Malaria Cases Reported at a Tertiary Care Hospital in Ahmedabad: A Record Base Study

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ABSTRACT

Introduction: Malaria is a life threatening parasitic disease caused by parasites known as Plasmodium vivax, Plasmodium falciparum, Plasmodium Ovale and Plasmodium malariae. P.falciparum and P.vivax are equally prevalent in India.In India about 95% of the population resides in malaria endemic area.

Objectives: To study the clinical profile of malaria at tertiary care hospital.

Method: A retropective study was conducted in V.S.Hospital Ahmedabad, a tertiary care hospital January 2016 to December 2016. This study included 491 patients of age 13 years and above with either a smear positive for plasmodium species or malarial antigen positive by RDT (rapid diagnostic test) admitted in the hospital.

Results: Total 491 patients were admitted with malaria in v.s. hospital during the year of 2016, out of which 352 (71.69%) cases were positive for P.Vivax malaria, 109 (22.19%) were positive for P.Falciparum malaria and 10 (2.0%) cases were positive for both species. Total 20 (4.07 %) patients expired.

Conclusion: Although P. vivax was the commonest species affecting the population , P. falciparum cases were more complicated and were associated with higher morbidity and mortality. Malaria presented with multi organ involvement had poor prognosis.

Key words: Malaria, P.vivax, P.falciparum.

INTRODUCTION

Malaria is a life threatening parasitic disease caused by Plasmodium vivax, Plasmodium falciparum, Plasmodium Ovale and Plasmodium malaria.[1] It is one of the major health problems in India. It is transmitted by the infective bite of Anopheles mosquito. Symptoms of malaria include fever and flu-like illness including shaking chills, headache, muscle aches, and tiredness.[2] The manifestations of severe malaria include cerebral malaria, with abnormal behavior, impairment of consciousness, seizures, coma, or other neurologic abnormalities, severe anemia, acute respiratory distress syndrome (ARDS), blood coagulopathies, hypotension, acute kidney injury, hyperparasitemia, metabolic acidosis and hypoglycemia.

Among above mentioned species P. vivax and P. falciparum are commonest in India. There were roughly 212 million malaria cases and an estimated 429000 malaria deaths world wide.[3,4] In India about 95% of the population resides in malaria endemic area.[1] There were 41,856 cases reported from Gujarat in 2016.[1] Among 429000 deaths 6% deaths were in India, out of which deaths due to P. vivax were 51 % in the year of 2015.[5]

Ahmedabad is a fifth largest city of the India and fast growing urban city of the Gujarat having estimated population of 7 million in 2016.[5,6] In last few years there has been tremendous industrial and commercial development in and around the city. On the other side of the coin it has a little darker side also in form of increase in vector born diseases.

Rapid urbanization, growth of slums and squatter settlements, uncontrolled population growth, inadequate basic infrastructure in squatter settle-

ments, have created the conditions conducive for the spread of vector born diseases. (Malaria, dengue, chikunguniya etc.)

Malaria research center (India council of Medical research, New Delhi) has observed that nearly almost 10 % of malaria cases reported in India in recent years have occurred in the urban areas.[6]

Considering the above data, we wanted to study the clinical profile, complications and outcome of disease in rapidly growing Ahmedabad.

METHODS

The records of malaria cases available in Medical Record Section (MRS) of the V.S.Hospital, Ahmedabad were obtained for the study. V.S.Hospital Ahmedabad is a tertiary care hospital situated in the heart of Gujarat. This study included all patients of age 13 years and above, with either a smear positive for plasmodium species or malarial antigen positive by RDT (rapid diagnostic test) admitted in the medical ward of hospital from 1st January 2016 to 31st December 2016. As it was a hospital policy to admit all patients having malaria irrespective of the severity of situation, none of the case treated as OPD bases.

There were total 491 case such records available from which clinical features, demographic profile, report of smear examination and/or antigen test, the species, complication(s), death or discharge from the hospital were noted. P. falciparum, P. vivax and mixed infections were included in the study. Categorization of severe malaria was carried out according to WHO guidelines.[7] Diagnostic methods used were conventional Thick & thin Peripheral smear stained with Leishman stain, examined under oil immersion. Rapid diagnostic tests were based on detection of specific plasmodium antigen, LDH (optimal test) for vivax & HRP2 for falciparum. Apart from peripheral blood film & rapid diagnostic test other investigations were undertaken like complete blood count, bleeding time, clotting time, random blood sugar, blood urea, S. creatinine, total Serum Bilirubin (Direct and Indirect), SGPT, SGOT, Chest radiograph, ECG ,ultra sonography of abdomen. Other tests like CT brain, MRI brain and echocardiography were also performed as and when required.

Statistical analysis- Data was entered in Micro soft excel and analysed by using Trial version of SPSS 20. Chi square test of significance was used. Case Fatality Rate was calculated as the percentage of cases expired after admission.

Ethical consideration- Permission of Superintendents was taken to get the case records.

RESULTS

Total 491 patients were admitted with malaria in v.s. hospital during the year of 2016. Out of 491 patients 42 patients took discharge against medical advice while 20 patients expired resulted in Case fatality Rate (CFR)of 4.1%. 455(92.6%) patients were from urban area while 36 (7.33%) patients were from rural area. Among all 365 (74.33%) patients were male and more than half of the cases were below 30 years of age (59.7%) while 13% of cases were above 50 years of age. Age distribution was similar in both sexes. (Table 1).

358 (72.91%) cases were positive for P. Vivax malaria, 122 (24.84%) were for P. Falciparum malaria and 11 (2.24%) cases were positive for both species.

Fever was the chief complaint in all cases followed by chills and rigor in 450 (91.6%) and headache in 334 (68.02%). Vomiting was present in 96 (19.5%). Jaundice was seen in 51 (10.1%) patients. Hepatomegaly was seen in 58 (11.81%) and splenomegaly was seen in 72 (14.66%) patients. Diarrhoea was seen in 42 (8.55%) patients. Altered sensorium was seen in 7 (1.42%) patients. Raised urea was seen in 60 (1.22%) patients.

Table 1- Age & sex wise distribution of malaria cases

Age (Years)	Female (n=126)(%)	Male (n=365) (%)	Total (n=491) (%)
<20	41 (32.5)	91 (24.9)	132 (26.8)
21-30	31 (24.6)	126 (34.5)	157 (32.9)
31-40	24 (17.8)	57 (15.6)	81 (16.4)
41-50	13 (19)	41 (11.2)	54 (10.9)
51-60	12 (9.5)	25 (6.8)	37 (7.5)
> 60	5 (3.9)	25 (6.8)	30 (6.1)

Evaluation of Expired cases- Total 20 (4.07 %) patients expired, out of which males were 12 (60%). Among 20 deaths 13 (1.70%) were due to P. Falciparum, 6(11.92%) were due to P. vivax and 1(10%) was due to mixed infection. Among expired patients 15 had severe thrombocytopenia and 4 of them required platelet transfusions. Severe anemia was seen in 21 (4.27%) patients. Leucopenia was seen in 219 (44.60%) patients. Thrombocytopenia was the most common complication (76.4%) among all malaria cases, followed by hepatic (10.1%) and renal (2.4%) involvement.

About 1.41% patients developed severe metabolic acidosis. Out of total 491 patients 7(1.42%) patients developed acute respiratory distress syndrome. Out of 12 pateints who developed acute kidney injury, 9 patients' were requiered hemodialysis. Out of 126 female 10 (8.47%)were pregnant out of which 9 were positive for P.vivax and 1 was positive for p.falciparum ,among which 1 expiered who had p.falciparum malaria garde III.

Table 2: Profile of expired & survivors of malaria

Parameters	Death (N=20)		Survivors		P Value*
	cases	Mean ± SD	Cases	Mean ± SD	
Age years	20	47.1 ± 17.2	471	31.9 ± 15.14	<0.0001
Duration of symptom onset to hospitalization (Days)	20	4.26 ± 2.16	470	3.54 ± 2.05	0.094
Hemoglobin	20	9 ± 1.78	463	11.14 ± 2.15	<0.0001
Total count	20	10401 ± 6671.9	463	5830.5 ± 4577.1	<0.0001
Absolute platelet count	20	60738 ± 87220	461	81533 ± 58317	<0.0001
Urea	20	113.55 ± 63.51	463	31.89 ± 24.23	<0.0001
Creatinine	20	2.81 ± 2.7	462	1.09 ± 4.59	<0.0001
Alanine aminotransferase(ALT)	20	41.3 ± 27.52	463	37.54 ± 48.17	0.100
S.Bilirubin mg/dl	20	9.5 ± 10.5	463	1.4 ± 1.9	0.07
Random blood sugar	20	119.95 ± 126.36	463	91.2 ± 35.42	0.991
Parasitological clearance days	20	2.5† ± 1.25	441	2.5 ± 1.16	NA
Parasitic Index	20	2.13‡ ± 2.63	6	1.14 ± 1.12	

* As per Mann Whitney U test; †Parasitological clearance days were not available as two patients expired on the same day of admission; ‡Parasitic Index was available in 4 patients only.

Table 3: Case Fatality as per the type of infection

Type of malaria	Survivor	Expired	Total	CFR*
Pv	352 (74.7)	6 (30)	358 (72.9)	1.70%
Pf	109 (23.1)	13 (65)	122 (24.8)	10.70%
Mixed	10 (2.1)	1 (5)	11 (2.2)	9.10%
Total	471 (100.0)	20 (100)	491 (100)	4.07%

*CFR= Case Fatality Rate
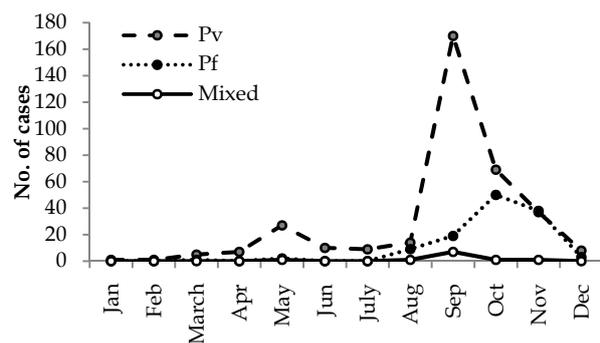
Figure 1: Month wise distribution of malaria cases during the year 2016

Table 2 depicts the comparision of parametres between expired and survived patients. As this data was not following normal distribution, Mann Whitney U test was applied to compare above parameters between Expired & Survivor patients. Test could not be applied for parasitic clearance and parasite index as there were available for 4 and 2 survived patients only. All parameters listed in Table 2 were available with expired patient's records while some parameters records were not available with some survivors. Therefore frequency for each parameter is different in survivor group. Age of expired patients was significantly higher than age of survivors. Renal functions (Serum urea and serum creatinin) and complete blood count (Hb, total counts and platelets) were significantly detoriated in expired patients, while there was no significant difference in liver functions (SGPT, Serum bilirubin) of both the groups.

However malaria cases are reported throughout the year, the first peak of cases was observed in the month of May followed by second peak in the month of September (Graph). Monthly data suggest that P. falciparum cases were maximum in the October followed by November while P. vivax cases were maximum in the month of September followed by in October.

DISCUSSION

Malaria is still a major health problem in India. The course of malaria is variable depending on the various factors like time duration from symptom onset to hospitalization, grade of parasite at the time of admission to the hospital and presence and development of complications of malaria. In our study maximum no. of cases were due to the P.vivax (71.69%), followed by P. Falciparum (22.19%) and mixed infection (2.0%). Similar results have been found in other studies also[8]. Even though P. vivax infection was more common throughout the year, P. falciparum speices were associated with greater severity and mortality.

Maximum cases were reported in the month of September 196 (39.91%) while maximum death occurred in the month of August (33%) followed by September and November. Reason may be at the initial stage of epidemic malaria may be malaria might be missed diagnosed or late diagnosed by first contact doctor and then cases were sent to tertiary care hospital.

Presence of multiple organ involvement made the prognosis worst. Out of 20 deaths 6 (11.92%) deaths were due to P. vivax malaria. This suggests that P. vivax can cause severe and fatal disease[8]. According to world malaria report 2016 out of 429000 malaria deaths worldwide 6% deaths occurred in India[4]. P. vivax infection accounted for 51% of deaths among them. Previously it was documented that p. falciparum is more virulent

than p. vivax, but current studies and data shows that p. vivax is presenting with severe malaria now a days[9]. In our study p. vivax cases are more than the p. falciparum cases but mortality is more with p. falciparum malaria.

Males were more affected 365 (74.33%) than females 126 (25.66%); similar to other studies[10] .This may be due to more outdoor activities of male as compared to female.

Maximum cases were in the age group of 21-30 years group (31.77%) which is comparable to other studies.[11,12] Urbanization lead to migration of large number of young people in the city for occupational benefits. This may be the reason for increase in number of cases in thia particular age group.

Among 491 cases reported 455 (92.6%) were from urban area, out of which 16 (3.5%) pateints expiered. In our study there were two picks of P.vivax malaria in the year. The first was in the month of May (n= 30) and the other was in the month of September (n= 196) which declined up to the end of the October. (Graph). Contrarily to this maximum deaths occurred in the month of August (8 deaths from 24 admissions). As the cases of P.vivax started declining, there was rise in the cases of P.faciparum. Similar pattern has been observed in other study. [13] Fever was the most common symptom.[14] The most common complication observed was thrombocytopenia (76.4%) of which 4.8% patients were transfused with platelet rich components.[7,15] Case Fatality Rate was highest in P.Falciparum malaria (10.70%).(Table-3) Case Fatality Rate was 3.3% and 6.3% amongst males and females respectively. This difference in Case fatality rate (CFR) was not significant. ($p < 0.05$)

CFR was highest in patients with cerebral malaria (100%) followed by multi organ dysfunction (80%) and ARDS (71.4%). Mean age of expired patients was 47.05 years. Other studies showed that age may be the independent risk factor for a fatal outcome in malaria.[16]

CONCLUSION

Malaria is one of the most important causes of morbidity and mortality in Ahmedabad. Our study reveals that malaria complication was higher in persons above 45 years with fever especially during epidemic months, apart from early detection and treatment they must be monitored for occurrence of different complications from very early stage which can lower case fatality rate. Patients with malaria considering the increase in P. falciparum cases in post monsoon period extra preventive measures should be taken by authority to decrease the mosquito breeding sites and there by decreasing the burden of malaria in the society. Middle aged patients presenting with P.falciparum malaria along with anemia, low platelets and early renal involvement should be monitored carefully to reduce the life threatening complications and mortality.

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