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SHORT COMMUNICATION

Epidemiological Profile of Malaria Cases admitted to a Tertiary Care Centre of Odisha

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Abstract

A record based study was conducted in a tertiary care centre of Odisha to know the socio-demographic and other epidemiological factors associated with the case fatality among the inpatient malaria cases admitted to medicine indoor. Total 557 laboratory confirmed malaria cases were studied. Majority of them (36%) belonged to 21-30 years age group and 85% were males. About 87% cases were from rural areas. More than 90% malaria cases were infected either by *Plasmodium falciparum* or by both *P. falciparum* and *P. vivax*. Among the complicated malaria cases, the most common complication was cerebral malaria (38%) followed by acute renal failure (ARF) (24%), hepatopathy (23%), both ARF and hepatopathy (11%), shock (4%) and algid malaria (1%). The overall case fatality rate was 10.6%. In complicated malaria, case fatality was significantly higher among female cases than male cases (35% vs 12%). Also the age specific case fatality rates in both the categories i.e. uncomplicated and complicated cases of malaria shows a gradual increase with the increase in age from <30 year, 30-50 year and >50 years age group.

Keywords: Epidemiological factors, tertiary care centre, malaria cases, *Plasmodium falciparum*, case fatality.

Introduction

Malaria is one of the major public health problems in India. Around 1.5 to 2 million laboratory confirmed cases are being reported in the country per annum (Sunderlal *et al.,* 2013). The proportion of *Plasmodium falciparum* malaria cases has increased from 39% in 1995 to 52% in 2010 (Park, 2013). During the recent past, 84% of the total malaria case load was contributed by Odisha, Chhattisgarh, Jharkhand, Madhya Pradesh, Uttar Pradesh, Assam, Meghalaya, Maharashtra, Gujarat and West Bengal (Sunderlal *et al.,* 2013). Odisha has only 4% land area and 3% population of India. But in 2010, Odisha contributed 20% of cases and 17% of deaths due to malaria to the country's burden. Around 85% of the cases reported from the state are due to *Falciparum* malaria (Pf) (Odisha state malaria information system, 2011). Out of 30 districts of Odisha, endemicity wise distribution shows that 12 districts are low endemic (API <5), 6 districts are moderate endemic (API >=5-10) and rest 12 districts are high endemic (API>10) (Program implementation plan 2009-10; Malaria Control Program in Orissa, 2011). The earlier non-endemic costal districts are now reporting increasing number of malaria cases with complications and death. There are very few studies highlighting on the epidemiological factors which contribute to the morbidity and mortality of inpatient malaria cases in the state. Hence, the study was conducted with the following objectives:

- To study the epidemiological factors associated with malaria.
- To detect the common causes associated with the case fatality among the inpatient malaria cases.

Materials and methods

Study location: The study was conducted in the medical record section of S.C.B. Medical College and hospital, Cuttack, Odisha with the prior permission of the medical Superintendent. All the bed head tickets of indoor patients admitted to Medicine Dept. during the 1st April 2010 to 31st March 2011 were screened and all laboratory confirmed positive cases of malaria were considered for the present study.

Experimental design: The study subjects included all positive cases of malaria confirmed by any of the following tests like microscopic examination of blood smear for Malaria parasite, immune chromatographic test (MP-ICT) or Malaria parasite Quantitative Buffy Coat test (MP-QBC). The suspected malaria cases found negative by any of the above mentioned laboratory tests were excluded from the study. Centre for Disease Control and Prevention guideline was adopted for classifying malaria into uncomplicated and complicated (severe) form (CDC, 2011). Necessary information was collected from the bed head tickets of the confirmed malaria cases as per the objectives of the study. The data thus collected were analyzed with suitable statistical procedures using SPSS version 16.

Results and discussion

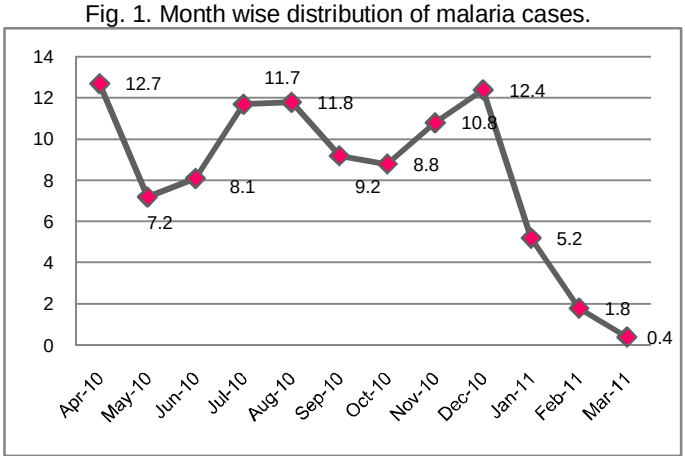
Total 557 confirmed malaria cases were treated during the study period. Among these malaria cases, 81(15%) were in the age group of <20 years, 203(36%) were in 21-30 years of age followed by 111(20%) in 31-40 years, 85(15%) in 41-50 years, 49(9%) in 51-60 years of age and 28(5%) above 60 years of age.

Table 1.Socio-demographic profile of malaria cases (N=557).

Characteristics	No	%
Age in years		
<20	81	14.5
21-30	203	36.4
31-40	111	19.9
41-50	85	15.3
51-60	49	8.8
>61	28	5
Sex distribution		
Male	475	85.3
Female	82	14.7
Residence		
Urban	70	12.6
Rural	487	87.4

Age range=15-81 years, mean age=34.74, std deviation=14.384.

Fig. 1. Month wise distribution of malaria cases.



Sex wise distribution shows that 475(85%) were males and 81(15%) were females. Regarding their residence, 487(87%) belonged to rural areas and 70(13%) to urban areas as shown in Table 1. Joshi and Gowardhan (2013) in a retrospective analysis of malaria and its complications had also found the preponderance of cases in 21-30 years age group. Similar study conducted by Muddaiah and Prakash (2006) at a tertiary care hospital in South Canara found that 36.8% belonged to age group of 21-30 years. The same study also mentioned that males outnumbered the female cases (81% vs 19%). Wasnik *et al.* (2012) in a hospital based study in central India also found that among the admitted malaria cases, males were more than females (75% vs 25%). In the present study, endemicity wise distribution of cases shows that 381(70%) were from low endemic districts, 94(17%) from moderate endemic and 72(13%) from high endemic districts of Odisha. Rest 10 malaria cases were from neighbouring states.

Month wise distribution of malaria cases during the year 2010-11 (Fig. 1) shows that more number of admission occurred in the months like April (13%), July and August (12% each), November (11%) and December (12%). The lowest admission happened in the month of March (0.4%) followed by February (1.8%) and January (5.2%). Figure 1 shows three peaks i.e. in April-July-August and December. The present study being a hospital based study did not reflect the usual seasonal trend in the community. Regarding the monthly distribution pattern of malaria, Muddaiah and Prakash (2006), in a similar hospital based study had mentioned an increase in number of cases from the month of June onwards. In the present study, majority of the patients i.e. 309(56%) got admitted within 5 days of onset of symptoms while 201(36%) patients between 5-10 days and 47(8%) patients after 10 days of onset of symptoms. The health seeking behaviour among the urban vs rural patients showed that 51(73%) of the urban malaria patients and 258(53%) of rural malaria patients took admission within 5 days of onset of the symptoms.

Regarding the duration of stay in the medicine indoor, majority of malaria patients i.e. 400(72%) stayed in the hospital for a duration of 1-5 days, followed by 122(22%) patients for 6-10 days, 24(4%) patients for 11-15 days and rest 11(2%) patients stayed for more than 16 days. The mean duration of stay for malaria cases was 4.68±3.31 days. A study conducted by Velip *et al*. (2006) at a tertiary care hospital of Goa reported that the mean length of stay among malaria patients was 4.2(±2.0) days. In the present study, report of laboratory investigation showed that out of 557 cases of malaria, 49(9%) were infected by *Plasmodium vivax (Pv),* 236 (42%) by *Plasmodium falciparum (pf)* and 272(49%) by both *P. vivax* + *P. falciparum.* Complication wise breakup of malaria cases according to the centre for disease control guidelines shows that 197 cases were uncomplicated malaria and 360 cases were complicated malaria cases.

Among the complicated malaria cases, cerebral malaria contributed to 38% cases, followed by ARF (24%) cases, hepatopathy (23%) cases, both ARF and hepatopathy (11%) cases, shock (4%) and algid malaria (1%) cases. Regarding case fatality, the present study shows that out of 59 deaths, 56 deaths occurred among the complicated cases of malaria and 3 deaths among the uncomplicated cases. Case fatality was higher in complicated malaria than uncomplicated malaria (15.6% vs 1.5%). In uncomplicated cases of malaria, case fatality was more among males than females as three deaths occurred among the 169 male patients vs no death among 28 female patients. But sex wise distribution of case fatality among the complicated cases of malaria showed that out of 360 complicated malaria cases, 37(12%) deaths occurred among 306 male cases and 19(35%) deaths occurred among 54 female cases. Hence in complicated malaria, case fatality was significantly higher among female cases than male cases [x^2= 18.635, p<0.001] as shown in Table 2.

Table 2. Sex wise mortality among the complicated cases of malaria (N=360).

Sex wise	Death		No death		Total	
	No.	%	No.	%	No.	%
Male	37	12.1	269	87.9	306	85
Female	19	35.2	35	64.8	54	15
Total	56	15.6	304	84.4	360	100

df–1, X^2 =18.635, p value -0.001.

Table 3. Distribution of malaria cases according to age, complication and mortality.

Age group	Uncomplicated cases			Complicated cases		
	Total No.	Death cases	%	Total No.	Death cases	%
<30	108	0	0	176	19	10.8
30-50	71	2	2.8	125	21	16.8
>50	18	1	5.5	59	16	27.1
Total	197	3	1.5	360	56	15.5

df–2, X^2 =4.414, p>0.05, df–2, X^2 =9.188, p<0.02.

Similar high case fatality rate among females (5.5% vs 1.65%) was also reported by Antony *et al*. (2013) in a study, conducted in Kerala, India. Sarkar *et al.* (2012) in a study on severe *falciparum* malaria in secondary and tertiary health facility had reported similar finding (20.5% vs 5.9%). In the present study, age wise distribution of case fatality in both the categories i.e. uncomplicated and complicated cases of malaria showed a gradual increase in age specific case fatality rate in <30 years, 30-50 years and >50 years age group as shown in Table 3.

Conclusion

The present study reveals that majority of malaria cases admitted to the medicine indoor of this tertiary health care centre were young adult males belonged to rural areas of the state. An increase in number of cases in post-monsoon period was also observed but being a hospital based study it does not reflect the usual seasonal trend of malaria observed in the community. More than 90% of cases were infected by *Plasmodium falciparum* or by mixed infection i.e. by both *P. falciparum* and *P. vivax*. In case of complicated malaria though the proportion of female cases were only 15%, higher case fatality rate was observed among the female cases than their male counterparts. The sex specific case fatality rate among the female and male cases were 35% vs 12%. The study also shows that the age specific case fatality rate due to malaria increased with the increase in age in both uncomplicated and complicated malaria.

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