Volume-3, Issue-9, Sept-2014 • ISSN No 2277 - 8160

Research Paper | Medical Science

A Study of Clinical Profile and Determinants of Malaria in Rural Area of Central India

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ABSTRACT

Human habits and behaviour had a strong epidemiological relation with the occurrence of malaria. This paper discusses host, environmental and entomological factors responsible for malaria cases and also clinical profile of malaria cases. The present community based cross-sectional study was carried out in the rural field practice area of the medical college during June 2011-May 2012.

Of the 59 cases detected 55.93% were males. 69.49% cases were above 15 years of age. 50% of patients were involved in outdoor occupation, 81.35% belonged to lower socioeconomic class. Fever was found in all the cases. Other associated symptoms present were headache, nausea, generalized bodyache, vomiting and abdominal pain. 57.63% subjects did not use any protective measures against mosquitoes. Stagnant water was found collected around the house in 91.53% and vegetation was present in 57.63% of the cases. Mosquito breeding sites were observed in 98.31% of cases' house.

Habits and behaviour of the people and also the environmental factors like housing conditions in this rural area were more prone for occurrence of malaria

KEYWORDS : Malaria, personal protective measures, breeding places

Introduction:

Even now, centuries since its aetiology and life-cycle were elucidated, malaria continues to present a daunting public health challenge. About 95% population in the country resides in malaria endemic areas. In India, 14,95817 cases were detected during 2010 and 767 deaths occurred while in Maharashtra State, during 2011, 66445 malaria cases were detected and 65 deaths occurred.[1,2]

Transmission, prevalence and distribution of parasite species are determined by local conditions. Malaria is predominantly a rural disease and is closely related to agricultural practices. Socio-economic conditions of the community, ignorance, poor housing conditions and impoverished conditions have direct bearing on the problem of malaria and hinder disease control strategy. Other "local" risk factors for malaria transmission: introduction of cases from other areas, travel history, history of malaria in family, male forest workers, distance to nearest health facility, rainfall and live stock.[3,4,5,6,7]

Although national programs are being implemented to curb the disease since many years, it has proved elusive and of recurrent nature. Hence, it can be said that the key to malaria control lies in understanding local malaria with a primary understanding of the host, environmental and entomological factors responsible for malaria cases in the particular area. Hence, the present study was planned to identify personal, family, household, entomological and environmental risk factors related to malaria fever in a rural population of the district.

Material and methods:

Study area: The present study was carried out in the rural field practice area of the medical college.

Study design: Community based cross-sectional study.

Study subjects: All the malaria cases who were the permanent residents of the area, diagnosed by the active and passive surveillance were included in the study, irrespective of the age.

Study period: June 2011 – May 2012.

Study setting: The rural block area located towards the west of the district. This Block consists of 117 villages with a population of 1,93,605 (Census 2011). There were four Primary Health Centres (PHCs) in this block. After examining the data of the previous three years from these PHCs, it was evident that malaria cases occurred consistently more in the villages catered by one particular PHC. The population of this PHC -catered area was 124059. There were seven sub-centres comprising 26 villages. These 26 villages were selected for studying the clinical profile, host and environmental factors of the malaria cases.

Methodology: Cases occurring in the selected study villages were identified and traced within seven days of diagnosis with the help of Anganwadi workers (AWWs) and Multi Purpose Workers (MPWs). Information regarding the source of case detection (active/passive) and type of parasite detected for every case was obtained from the PHC. Before starting the interview, study participants were well informed about the nature of the study and consent was taken. Study protocol and proforma were approved by Institutional Ethical Committee. Following parameters were studied: Socio-demographic profile, sleeping habits, use of personal protective measures; history of travelling to the other places and visitors visiting the house; clinical symptoms, duration and type of fever; environmental factors.

Statistical analysis: After the completion of data collection, data entry was done into Excel data file. Data analysis was done by Epi_ info version 6.04 software. Statistical analysis was done by percentages, chi-square test.

Results:

A total of 59 cases of malaria were observed during the study period of which 55 (93.22%) were of Plasmodium vivax and 4 (6.78%) were of Plasmodium falciparum. Maximum cases 39 (66.10%) were detected in rainy season followed by winter 18 (30.51%) and in summer season 2 (3.39%). Significantly more cases were found in the rainy season compared to other two seasons ($\chi 2 = 31.75$, $p= 0.0000$, df 1)

Host factors

Out of total 59 patients, 33 (55.93%) were male and 26 (44.07%) were female. Maximum number 15 (25.42%) patients were in the age group of 6 to 15 years and 26 to 35 years age groups each. 1

farmer (1.69%), 17 farm laborers (28.82%) and 3 construction laborers (5.08%) whose work place is a risk factor for malaria, contributed about 35.6% of total occupation. Again the occupations in which there is a practice of sleeping outside i.e. industry workers 7 (11.86%) and security guards 1 (1.69%), contribute about 13.55% of the total patients. Thus malaria prone working conditions contributed to nearly 50% of total patients. Also, maximum number of the patients were 29 (49.15%) belonged to lower socio-economic class (class IV). **(Table 1)**

Clinical Profile:

All the patients presented with fever. The mean duration of fever was 6.20 ± 3.57 days (range 2-15 days). None of the patients reported to the health facility on the day of occurrence of fever. About 35 (59.32%) patients had high grade of fever, 24 (40.68%) had low grade. Chills and shivering were present in 57 (96.61%) patients followed by sweating in 54 (91.52%), headache in 45(76.27%) and nausea in 35 (59.32%) patients. **(Table 2)**

Table 1: General characteristics of malaria cases

	SEX			
	Males (n=33)		Females (n=26)	
	No.	%	No.	%
AGE (yrs)				
≤5	00	00	01	3.85
6-15	08	24.24	07	26.92
16-25	06	18.18	05	19.23
26-35	09	27.27	06	23.08
36-45	06	18.18	02	7.69
≥46	04	12.13	05	19.23
EDUCATION				
Illiterate	04	12.12	05	19.23
I ry	05	15.15	03	11.54
II ry	12	36.36	18	69.23
Higher II ry	09	27.27	00	00
Graduate & above	03	9.10	00	00
OCCUPATION				
Unemployed	06	18.18	15	57.69
Agriculture workers	10	30.30	08	30.77
Industry Worker	07	21.22	00	00
Shopkeeper	04	12.12	00	00
Construction labourer	02	6.06	01	3.85
Others	04	12.12	02	7.69
SES (Prasad's Classification)				
Class I	00	00	00	00
Class II	01	3.03	00	00
Class III	07	21.21	03	11.54
Class IV	17	51.52	12	46.15
Class V	08	24.24	11	42.31

No visitor having fever visited the house of the cases in preceding 15 days. Only three (5.08%) subjects among cases had history of travelling to area where fever case was present in preceding15 days.

Behavioural Determinants:

Out of 59 cases, 14 (23.73%) slept outside either in front of the house or on terrace of the house. One (1.69%) patient who was farmer by occupation slept in the cattle-shed. Even most of the patients slept inside the house which might be because of the rain and cold during rainy and winter season, about 34 (57.63%) patients slept near possible hiding/resting places of mosquitoes inside or outside the house (like curtain, furniture, cupboard, clothes, dark places, etc.). 34 (57.63%) patients did not use any personal protective measure for prevention from mosquito bite. **(Table 3)**

Environmental determinants:

25/59 (42.37%) patients were living in kutcha houses. Natural light was found to be inadequate in the houses of 50 (84.75%) patients, while ventilation was improper in the houses of 56 (94.92%) patients. Overcrowding was observed in the houses of 37 (62.71%) patients. These conditions made the households susceptible for the disease.

Seepage of water was present in 25 (42.37%) houses which was a source of continuous presence of dampness in the house. In about 34 (57.63%) houses, water drainage system was open while in 23 (38.98%), waste water drained in front of the house. In 53 (89.83%) houses garbage was disposed in open i.e. unsafe .In about 54 (91.53%) cases, stagnant water collection was present surrounding their house. In 34 (57.63%) cases, vegetation was present surrounding the house. Cattle-shed was present in/near the house of 14 (23.73%) cases and among these only 4 (28.57%) were found to be clean and remaining 10 (71.43%) were occupied with excreta of animals and fodder.

Table 2: Associated symptoms in malaria patients

ASSOCIATED SYMPTOMS	CASES (N=59)	PERCENTAGE
Fever	59	100
Chills & shivering	57	96.61
Sweating	54	91.52
Headache	45	76.27
Nausea	35	59.32
Bodyache	28	47.46
Vomiting	22	37.29
Abdominal pain	15	25.42
Joint pain	04	6.78
Cough	03	5.08

Table 3: Distribution of cases according to the sleeping habits and use of personal protective measures

	NO. OF CASES (N = 59)	%
Sleeping place		
Indoor	44	74.58
Outdoor	14	23.73
Cattle shed	01	1.69
Sleeping close to resting places of mosquitoes		
Yes	34	57.63
No	25	42.37
Sleeping near fan		
Yes	7	11.86
No	52	88.14
Personal protective measures		
Mosquito Repellants (mats/coil/ cream)	20	33.90
Burning of neem leaves/ cowdung	05	8.47
Nothing	34	57.63

Breeding places were observed in and around house of 58 (98.31%) cases. Regarding the number of sites, two sites were found in and around the houses of 23 (38.98%) cases while one site in 25 (42.37%) cases, and three and more sites found in and around the house of 10 (16.96%) malaria patients. Distribution of the type of breeding places of mosquitoes in and around house was as shown in **table 4**.

Table 4: Distribution according to the sanitary conditions and breeding places in/around house

	NO. OF CASES (N=59)	%
Sanitary conditions surrounding house		
Presence of stagnant water	54	91.53
Presence of vegetation	34	57.63
Regular cleaning of surrounding space	14	23.73
Presence of cattle shed	14	23.73
Presence of Well/hand-pump near house	35	59.32
Presence of Construction site near house	08	13.56
BREEDING PLACES		
Domestic		
Water tanks	12	20.69
Drum	11	18.97
Coolers	08	13.79
Peridomestic		
Drainage water	30	51.72
Discards	16	27.59
Stagnant water/stagnant water at construction site	14	24.14
Cattle shed	11	18.97

Discussion:

Of the 59 cases detected from the area, males were more as compared to females and more in the productive age group (72.88%). Findings were similar to Kinikar AG et al[8], Muddaiah M et al[9] and Anand PK et al[10] This is because males are more frequently exposed to the risk of acquiring malaria than females because of the out-door life they lead. In present study, nearly 50% of patients were involved in occupations where working environment is more favourable for human and vector contact and exposed to outdoor activities. Also, maximum cases were having lower education and of lower socio-economic status. *Parajuli K et al* [11], *Srivastava HC et al* [12] and *Taviad PP et al* [13] also found more cases with theses occupation, low literacy and lower SES. Due to lower education, people are not aware of symptoms, treatment and proper preventive measures against malaria.

Fever, the most cardinal symptom of malaria was found in all the cases. Other associated symptoms present were headache, nausea, generalized bodyache, vomiting and abdominal pain. Even though proportion of symptoms in various studies varies, it was found that in most cases fever with chills, sweating, headache, nausea, vomiting and generalized bodyache were the common symptoms of the malaria.[4,9,13]

Human habits and human behaviour had a strong epidemiological relation with the occurrence of malaria. In the present study, more cases were sleeping inside house. But *Srivastava HC et al* [11] found more cases sleeping outdoor. This might be because most of the cases in the study found in rainy and winter season during which people preferred sleeping indoors. In the current study, 3(5.08%) cases travelled to the area where fever case was present in preceding 15 days which was close to the finding of *Srivastava HC et al* [11] We found that the practice of using personal protective measure was less in the patients which increases susceptibility of patients for the mosquito bite. *Sharma PK et al* [14] and *Asl HM et al* [15] also found low use of personal protective measures.

In the study, sanitary conditions were poor in and around house in all cases. These conditions in the houses of cases made housing sanitation very poor making them more vulnerable for resting and breeding of mosquitoes which had increased contact between human and vectors. [16] In the present study, mosquitoes were observed in the house of all the cases and mosquito breeding sites were observed in 98.31% of cases' house. Water tanks, drainage water and water collected in discards were the key breeding sites for mosquitoes.

Conclusion:

Habits and behaviour of the people and also the environmental factors like housing conditions in this rural area were more prone for occurrence of malaria and needs to be corrected by creating awareness in community.

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