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Community knowledge on malaria among febrile patients in an endemic district of Orissa, India

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ABSTRACT

Background & objectives: Evidence on the community knowledge and perceptions on malaria are crucial to design appropriate health communication strategies for malaria control. Orissa, an Indian state with a large proportion of indigenous populations and hilly terrains contributes to the highest malaria burden in India. A study was undertaken to assess the knowledge on malaria among community members who had experienced fever and chills in the endemic district of Boudh in Orissa.

Methods: A cross-sectional community-based survey was carried out with respondents (n=300) who had fever with chills within two weeks prior to data collection through a multi-stage sampling and interviewed them using a pre-tested, structured interview schedule.

Results : About 90% of respondents recognized fever as a common symptom of malaria, 72.3% said mosquito bites cause malaria, 70.3% of respondents reported mosquito control and personal protection to be the method of malaria prevention, and 24.6% identified chloroquine as the drug used for treatment. Women and scheduled tribe (ST) respondents were found to have lower level of appropriate knowledge of causes, symptoms, and prevention methods of malaria than their counterparts.

Interpretation & conclusion: The study population had a fair knowledge of malaria about the causes, symptoms, treatment, modes of prevention and outcomes of non-treatment compared to most of the studies conducted in similar settings. However, the relatively low awareness among women and tribal population calls for more context specific communication strategies. Such strategies should be based on information needs assessment of different population subgroups, especially of women and members of the ST community, using media that is accessible and clearly understood by different groups.

Key words Community knowledge; febrile patients; malaria; Orissa

INTRODUCTION

Malaria is one of the world's major public health concerns and contributes to 243 million clinical cases and under a million deaths each year. About two thirds of the confirmed cases of malaria in southeast Asia are reported from India[1]. The distribution of malaria in the country is so widespread that 95% of the country's population lives in malaria-risk areas. The northeast, central and eastern states of India account for the maximum malaria burden in India[2].

Orissa, a state on the eastern coast contributes to the highest number of malaria cases and deaths in the country.With 3.8% of India's population, Orissa contributed 24.4% of the total malaria cases, 40% of *Plasmodium falciparum* infections and 17.3% malaria deaths of the country in the year 2009[3]. Tribal settlements are the most malaria endemic areas in the state and are also economically under-developed, have a difficult terrain, poor communication facilities and inadequate health infrastructure[4]. In recent years, Orissa has introduced a number of community and facility-based approaches to enhance prevention and prompt treatment of malaria. Prevention and appropriate treatment of malaria is indispensable to reduce the severity and complexity of the disease, and thereby economic burden and long-term adverse effects on the health system[5].

However, prevention and prompt treatment of malaria depends not only on service availability but more importantly, on people's knowledge, attitude and practices related to malaria-like symptoms. Addressing health equity requires specific attention to community understanding and practices about malaria among rural and tribal populations since it poses a major threat to them. Evidence on the knowledge of malaria among people who have suffered malaria like symptoms (fever and chills) in endemic areas are few in endemic Indian settings, especially in Orissa. Generating such evidences can better guide the policies and programmes of government and non-government agencies in delivering health communication strate-

gies targeting timely, effective and affordable treatment for malaria to various vulnerable groups in similar settings. We tried to assess knowledge regarding the causes, symptoms, prevention, treatment, and outcomes of non-treatment of malaria among persons affected by febrile illness (fever and chills) in the endemic district of Boudh in Orissa.

MATERIAL & METHODS

The study was carried out in Boudh, a central district in Orissa; spread over 3444.70 km^2 with one-third covered by forests. As per the Census 2001, the district had 373,038 inhabitants (1.02% of Orissa's total population), with 95% of population belonging to rural areas and 13% being tribal population. Agriculture is the major economic activity in the district. Literacy rate is 58.43%[6].

The study was a cross-sectional community-based survey carried out during the high malaria transmission season June–August 2006. We selected respondents through multi-stage sampling. In each stage, we selected the sampling units based on the criteria of maximum morbidity and mortality due to malaria in the previous year. One block primary health centre (BPHC) out of the three in the district, all three primary health centres (PHCs) under these BPHC area and one sub-health centre within each PHC were selected. Finally, three to five villages within each sub-health centre's coverage area were selected at random.

Since it was a malaria endemic district and the study period coincided with the high transmission season, with the assumption of a prevalence rate of 10%, power 5%, and 95% CI, the required sample size was 138. This number was doubled and rounded off to 300 to minimize the design effect of a multi-stage sampling.

A house-listing was undertaken within each of the sample villages to identify cases with fever and chills within two weeks prior to the survey. Only those persons were interviewed who had fever with chills within previous two weeks of data collection. We interviewed the mother, primary care giver or head of the household for respondents who were under 12-yr old.

The information from 300 respondents was collected with the help of a pre-tested interview schedule, translated to the local language Oriya. The questions were asked on the knowledge of malaria in terms of the causes, symptoms, prevention, treatment, and outcomes of non-treatment. All the information was entered in Microsoft Excel and analyzed with SPSS version 14. Chi-square *p*-value of <0.05 was considered as statistically significant.

Ethical clearance for the study was obtained from the Institutional Ethics Committee of Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum, Kerala. Written pre-informed consent from the participants was obtained after explaining them about the objectives of the study.

RESULTS

Sample characteristics

In the study group, 180 (60%) were men and 120 (40%) were women with a mean age 25.66 yr. The mean age for men was 24.98 yr (range: 2–80 yr), whereas for women it was 26.68 yr (range: 2–75 yr). More than half of the sample was >14 yr. About 43% of the respondents belonged to scheduled castes, 19% to scheduled tribes and the remaining 38% were from other castes. About 58% had at least one year of schooling with the mean age of schooling 2.59 yr. About 35.8% women and 72.8% men had any schooling, and their mean age of schooling was 1.44 and 3.36 yr, respectively (Table 1). The single largest occupation group was of students (26.3%), while farmers and daily-wage labourers were one-fifth each. The 'not-working' category included respondents who were too young, too old, not looking for work or unable to do any kind of work for living. We calculated the standard of living index by using the standard of living (SLI) matrix of National Family Health Survey 2 (NFHS-2) with slight modification for the rural population[7]. The distribution showed that more than half of the study population had low standard of living.

Knowledge about malaria

About 86% of respondents (Male 92.8, Female 78.3%) had ever heard of malaria. In the study setting malaria was known in the name of *"malaria"* and there was no other local term for the same. Nearly 89% of the respondents were ready to speak about the causes of malaria, based on their perceptions, while 11% could not identify any cause of malaria. Most of the respondents attributed multiple causes for malaria. About 72% identified mosquito bite as a cause. The other responses were contaminated water (58.3%), bathing in wild streams (8%), malnutrition (7%) and unhygienic living conditions (4.7%) (Table 2). A majority of respondents were able to cite multiple symptoms of malaria, whereas 6.3% could not identify any of the symptoms. Fever was identified by most of them (93.7%) as the prime symptom followed by chills (85.3%), headache (55.3%), body ache (43.7%), and vomiting (18%). A small proportion of the respondents included convulsions, cough and diarrhoea as symptoms of malaria. When asked about malaria treatment, 32.7%

Table 1. Socio-demographic characteristics of the respondents

Variable	Male (n=180)	Female (n=120)	Total (n=300)
Age (yr)			
< 5	28 (15.6)	15 (12.5)	43 (14.3)
5–14	51 (28.3)	30 (25)	81 (27)
> 14	101 (56.1)	75 (62.5)	176 (58.7)
Mean ± S.D.	24.98 ± 20.44	26.68 ± 19.03	25.66 ± 19.87
Caste			
Scheduled Caste*	74 (41.1)	55 (45.8)	129 (43)
Scheduled Tribe**	30 (16.7)	26 (21.7)	56 (18.7)
Others	76 (42.2)	39 (32.5)	115 (38.3)
Education (years of schooling)			
Non-literate (0 yr)	49 (27.2)	77 (64.2)	126 (42)
Primary school (1–5 yr)	88 (48.9)	33 (27.5)	121(40.3)
High school and above (>6 yr)	43 (23.9)	10 (8.3)	53 (17.7)
Mean ± S.D.	3.36 ± 3.03	1.44 ± 2.40	2.59 ± 2.95
Occupation			
Farmer	44 (24.4)	18 (15.0)	62 (20.7)
Trader	3 (1.7)	0 (0)	3 (1)
Daily-wage labourer	38 (21.1)	22(18.3)	60 (20)
Homemaker	0 (0)	33 (27.5)	33 (11.3)
Student	55 (30.6)	24 (20)	79 (26.3)
Not working	40 (22.2)	23 (19.2)	63 (20.7)
Standard of living index (yr)			
Lower (0–14)	89 (49.4)	68 (56.7)	157 (52.3)
Middle (15–24)	85 (47.2)	50 (41.7)	135 (45)
Higher (25–67)	6 (3.3)	2 (1.7)	8 (2.7)

Figures in parentheses indicate percentages; *Socio-economically marginalized community, given special privileges by the Government of India; **Socio-economically marginalized indigenous population, given special privileges by the Government of India.

mentioned the name of a tablet other than chloroquine, 24.6% mentioned chloroquine, 28% mentioned injections, whereas 14.7% did not know about modes of treatment (Table 2). The respondents were also questioned to assess their awareness on the availability of malaria treatment services in the locality. The responses included: doctors in the primary health centre (43.3%), village-level untrained providers (29%), community health workers (22.3%) and homoeopath (1.7%). A few (3.7%) respondents did not know the availability of malaria treatment facilities (Table 2).

About 70% of respondents reported mosquito control and personal protection to be the method of malaria prevention, while 58% said drinking clean water and 10.3% said eating nutritious food, whereas 26.3% reported that they were unaware of the prevention modalities. Reported methods of mosquito control were destruction of bushes and water logging areas, and personal protection measures were: use of bed nets, insecticide spray, and mosquito repellent creams. When asked what untreated malaria would lead to, the majority (78.7%) said it would lead to death, 6% said brain (cerebral) malaria; while 14.7% were not aware of the consequences (Table 2).

Correlates of knowledge on malaria

We tried to find out the association of social, demographic and economic factors with respondents' knowledge about the causes, symptoms, prevention, treatment and disease outcomes. We considered "fever with chills" as correct symptoms; "chloroquine tablets" as correct treatment; and "mosquito control and personal protection measures" as correct prevention of malaria.

The predictor variables sex, caste, and education emerged out to be statistically significant with the following outcome variables related to knowledge about malaria, i.e. ever heard of malaria, correct knowledge of malaria symptoms, and correct knowledge of malaria prevention (Table 3). In other words, in the study area, a male belonging to a caste group other than SC or ST and having had some schooling was associated positively with correct knowledge about malaria. We could not find any association of socio-demographic factors with other knowl-

Table 2. Reported knowledge of respondents on malaria

Responses	n=300	Percent
Causes		
Mosquito bite	217	72.3
Contaminated water	175	58.3
Bathing in wild streams	24	8
Malnutrition	21	7
Others (Heavy work, hot food, living in unhygienic conditions)	14	4.7
Do not know	33	11
Symptoms		
Fever	281	93.7
Chills	256	85.3
Headache	166	55.3
Bodyache	131	43.7
Vomiting	54	18
Others (Convulsions, cough, diarrhea)	28	9.3
Do not know	19	6.3
Treatment		
Chloroquine tablets	74	24.6
Other tablets	98	32.7
Injection	84	28
Do not know	44	14.7
Availability of treatment		
Doctor in the PHC	130	43.3
Village level untrained provider	87	29
Community health worker	67	22.3
Homeopath	5	1.7
Do not know	11	3.7
Prevention		
Mosquito control and personal protection	211	70.3
Drinking clean water	174	58
Eating nutritious food	31	10.3
Do not know	79	26.3
Reported consequences of untreated malaria		
Death	236	78.7
Brain (cerebral) malaria and death	18	6
Others (anemia, typhoid)	2	0.67
Do not know	44	14.7

edge related outcome variables.

We examined the association between predictor variables and knowledge of malaria through multiple logistic regressions (Table 4). Predictor variables were those whose chi-square *p*-values found out to be significant (< 0.05). The multivariate analysis also showed that sex and caste were independently associated with the knowledge outcome variables. Women and scheduled tribe respondents were respectively twice and four times less likely to have appropriate knowledge of causes, symptoms, and prevention methods of malaria than their counterparts (Table 4).

Table 3. Correlates of knowledge of respondents on malaria

Variables	Ever heard of malaria				Correct knowledge of malaria symptoms				Correct knowledge of malaria prevention			
	Yes	No	Total	*p*-value	Yes	No	Total	*p*-value	Yes	No	Total	*p*-value
Sex												
Male	167 (92.8)	13 (7.2)	180	0	164 (91.1)	16 (8.9)	180	0.001	139 (77.2)	41 (22.8)	180	0.001
Female	94 (78.3)	26 (21.7)	120		92 (76.7)	28 (23.3)	120		72 (60)	48 (40)	120	
Total	261 (87)	39 (13)	300		256 (85.3)	44 (14.7)	300		211 (70.3)	89 (29.7)	300	
Caste												
SC	114 (88.4)	15 (11.6)	129	0	113 (87.6)	16 (12.4)	129	0	101 (78.3)	28 (21.7)	129	0
ST	40 (71.4)	16 (28.6)	56		37 (66.1)	19 (33.9)	56		27 (48.2)	29 (51.8)	56	
Others	107 (93)	8 (7)	115		106 (92.2)	9 (7.8)	115		83 (72.2)	32 (27.8)	115	
Total	261 (87)	39 (13)	300		256 (85.3)	44 (14.7)	300		211 (70.3)	89 (29.7)	300	
Education												
No schooling	100 (79.4)	26 (20.6)	126	0.001	97 (77)	29 (23)	126	0.001	77 (61.1)	49 (38.9)	126	0.002
Any schooling	161 (92.5)	13 (7.5)	174		159 (91.4)	15 (8.6)	174		134 (77)	40 (23)	174	
Total	261 (87)	39 (13)	300		256 (85.3)	44 (14.7)	300		211 (70.3)	89 (29.7)	300	

Figures in parentheses indicate percentages.

Table 4. Multiple logistic regression on selected predictor variables

Predictor variable	Odds ratio	95% CI	*p*-value
Ever heard malaria			
Sex			
Female*	1.00	–	–
Male	2.77	1.28–5.99	0.009
Caste			
ST*	1.00	–	–
Others	4.26	1.63–11.16	0.003
Know malaria symptoms correctly			
Sex			
Female*	1.00	–	–
Male	2.71	1.29–5.69	0.008
Caste			
ST*	1.00	–	–
Others	4.96	1.98–12.39	0.001
Know malaria prevention correctly			
Sex			
Female*	1.00	–	–
Male	2.44	1.18–5.06	0.016
Caste			
ST*	1.00	–	–
Others	4.87	1.96–12.14	0.001

*Reference group.

DISCUSSION

The present study in Boudh district of Orissa state demonstrates that the study population had a fair knowledge about causes, symptoms, treatment, modes of prevention and outcomes of non-treatment. The proportion with correct knowledge of causes was higher when compared to findings from several studies in sub-Saharan Africa, southeast Asia and India, although one study from Bangladesh has reported higher level of awareness. The knowledge of correct symptoms was higher than a few studies conducted in Indian settings[8–16]. Most of the respondents were familiar with the signs and symptoms of malaria, as may be expected from a population in a malaria endemic area. About two-third of the respondents enumerated preventive measures of malaria correctly as compared to two-fifth 40.6% in a study conducted among fever patients in a tertiary care hospital in an endemic setting in India[8].

We found a significant difference between men and women with women faring worse than men with respect to their knowledge about various aspects of malaria. No other study in Indian settings examined sex differences in knowledge about malaria. However, there are few studies in Africa about women's malaria knowledge, beliefs and practices[17-19]. In the present study, we found women's knowledge level to be higher than those studies in African settings.

The present study established a relationship between levels of education and appropriate malaria knowledge; as >92% of respondents having substantially good knowledge about malaria had some schooling. This corroborates with the evidence from studies in Zambia, Ethiopia, and Gambia where higher levels of education was associated with improved knowledge[20–22]. This finding also justifies the less awareness among women in the study, as the number of women with any schooling was less compared to men among the respondents. The communication media need to be more women-centric. For instance, community-based organizations like women's self-help groups (SHG) can be an appropriate platform to sensitize the women about malaria. A setting like Orissa requires rigorous and continuous capacity development of women SHGs to enable them to understand the issues of women *vis-à-vis* malaria and other general health concerns. The village-based community health volunteers known as ASHA (accredited social health activists) and the female multipurpose health workers based at the health sub-centre can attend the monthly meetings of the SHGs and village health and sanitation committees (VHSCs) to spread awareness about malaria and availability of services.

We also found the vulnerability of ST population groups who did not have adequate knowledge about malaria. The level of reach of the health system and the acceptability of its generic strategies may have contributed to this. This situation necessitates having more focus on tribal population in terms of malaria control strategies and sensitization as majority of malaria cases (specifically falciparum malaria) are reported from tribal areas. Identification of local volunteers and building their capacity to carry out health education can be a viable option to sensitize such vulnerable groups. Public awareness campaigns are possible to encourage people to promptly seek medical care, adherence to treatment and prevention. It is important to bear in mind that any public awareness campaign will have to be carefully researched and planned on the appropriateness of the behaviour it is advocating to different vulnerable groups and settings. The language, theme and mode of delivery of such sensitization activities need to be acceptable and easy to understand to the tribal groups and to women. This can be designed and tested collaboratively along with the community representatives before incorporating it into the programme. Similarly, there should be regular monitoring and follow up to ensure the information leads to behaviour change and reduction in disease burden among the target population.

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