



Studies on Knowledge, Attitude and Practices in Malaria Endemic Tribal Areas of Bihar and Jharkhand, India

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Abstract

Knowledge, attitude and practices (KAP) in tribal and rural population of four malaria endemic districts in Bihar and Jharkhand states in respect of malaria were studied. The results of this study showed that most of the respondents (92.5%) were known to malaria and aware of the common symptoms of malaria (82.4%) like fever, shivering and cold etc. However, considerable (28.4%) number was not aware that malaria is caused by mosquito bite. Knowledge about resting sites of malaria vectors was good as 48.8% respondents reported cattle sheds, 32.4% respondents reported human dwellings and 15% damp dark places. Most of the respondents were not aware of mosquito breeding associated with clean water bodies.

The attitude of respondents towards vector control programme was very poor as 67.8% respondents lost faith in DDT spraying because of its ineffectiveness in controlling the mosquito nuisance. More than two third of respondents were regular user of treated bed nets and it was considered the best option for protection from malaria and mosquito bite. Proper health education is warranted to increase community knowledge and awareness in local language at the individual and community level to promote malaria prevention, to enhance the IRS coverage and use of bed nets for successful malaria control. Insecticide spray may be more acceptable to the communities, if appropriate and more effective insecticide is being used.

Keywords: Malaria; Vector mosquito; IRS; Bed nets; KAP

Introduction

Malaria is still endemic in over 100 countries worldwide. There were 216 million cases of malaria in 2010 globally [1]. In India, about 1.31 million malaria cases with 753 deaths were reported in the year 2011 out of which more than half cases were of *Plasmodium falciparum* [2]; the actual number of cases may be much more than the number of confirmed cases reported by National Malaria Control Programmes [2]. Jharkhand and Bihar are malarious endemic states and under the Enhanced Malaria Control Project (EMCP) funded by the World Bank from 1997 [3] and contributes about twelve percent of the total malaria cases.

In India, Malaria is transmitted by six Anopheline mosquitoes which are primary vectors of malaria [4]. There are some other mosquito species playing a limited role in malaria transmission and recognized as secondary vectors of malaria [4,5]. The control of malaria and other vectors borne diseases mainly depends on application of insecticides. Indoor residual spray (IRS) and use of insecticide-treated bed nets (ITN) are the most widely practiced effective strategies to control malaria [5].

Information, education and communication (IEC) activities are being done for improvement in IRS acceptance and better coverage. There is scanty information available on the causes of refusal of IRS activities which also vary place to place. Socio-economic conditions of the community have direct bearing on the problem of malaria. Lack of proper knowledge and impoverished conditions of people contribute increasing malaria [6-14]. Community Participation (CP) and Community Knowledge (CK), attitude, behaviour and practices direct interaction with community plays an important role in successful implementation of malaria control programme [6,14]. Earlier studies related to KAP in respect of malaria provide contradictory informations [15-30]. Therefore, a study was undertaken to assess the CK, attitude, behaviour and practices of residents about malaria, season and symptoms of malaria, its transmission, protection methods, vector mosquitoes and their breeding habitats, resting places, control measures, causes of refusal of IRS and regular use of Insecticide Treated

bed Nets (ITNs) in four districts of Bihar and Jharkhand among the rural and tribal population.

Materials and Methods

This study was carried out in twenty eight endemic villages of Jharkhand and Bihar selected on the basis of higher malaria incidence. A house hold cross-sectional survey was conducted in 426 adult villagers of both sex during the months of February-March, 2008 in Vaishali, Patna; March-April, 2008 in Katihar (Bihar) and September-October, March-April, 2010 in Koderma district (Jharkhand). About ten percent of the village households were covered in the survey. Head of each household was interviewed for this purpose in local language. If husband or wife both were not present only adult respondent of more than 18 year were interviewed. All participants gave verbal consent. The first part of the questionnaire included demographic characteristic, whereas the second part had questions on knowledge, attitude and practices of residents about malaria, symptoms of malaria, transmission, protection methods of malaria, malaria vectors, and mosquito breeding, resting places, refusal of DDT spray and regular use of ITNs for malaria control etc. The natural habitats, socio-economic conditions, living environment, their ecology and vegetation of all the villages were identical.

Data collected was subsequently entered in to computer software Microsoft excel programme for statistical analysis and X² test was

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performed with two variables to compare different groups. The relationship between sex, educational and family status were analysed with malaria awareness, its symptoms and transmission, mosquito breeding and resting, IRS acceptance and IEC activities.

Results

A total of 426 respondents were interviewed from 28 villages. Most of the respondents (72.4%) represented from low income group community. The detailed demographic characteristic of the community has been depicted in Table 1. Literacy rate was very poor as only 4.4% were graduate and above level of education and 14.6% up to class 10th class. There were poor living conditions leading to higher risk of Malaria transmission. The unemployment among the subjected population was very high (53.1%). Table 2 shows the knowledge, attitudes and

Sr. no	Variable	Respondent	No. of HHs surveyed	% HHs surveyed
1	Sex	1. Male 2. Female	165 261	38.6 61.4
2	Educational status	1. Illiterate 2. Primary level education 3. School level education 4. High school level education 5. College level education	157 110 76 64 19	37.2 26.1 17.7 14.6 4.4
3	Family status	1. Low economic group 2. Middle economic group 3. High economic group	311 99 16	72.4 23.9 3.7
4	Employment	1. Service 2. Business/Self employed/ 3. Farmer 4. Student 5. Unemployed	32 11 89 69 226	7.5 2.5 20.8 16.1 53.1

Table 1: Demographic characteristic of the community (n=426).

Sr. no.	Details	Response (n=426)	
		No. of HHs	% of HHs
1	Awareness of malaria 1. Yes 1. No 3. Do not know	394 6 26	92.4 1.4 6.1
2	Transmission season of malaria 1. Rainy 2. Post rainy 3. Winter 4. Summer 5. Do not know	189 134 13 40 50	44.4 31.4 3.0 9.4 11.8
3	If yes, aware symptoms of malaria 1. Yes 2. No 3. Do not know	317 77 32	74.4 18.1 7.5
4	If yes, what are the symptoms of malaria 1. Fever, Cold, Headache, Shivering 2. Enlargement of liver and spleen 3. Not know	351 60 15	82.4 14.1 3.5
5	Perception on malaria prevention 1. Can be prevented 2. Cannot be prevented 3. Not known	339 67 20	79.6 15.7 4.7
6	If yes, methods of malaria prevention adopted 1. Taking medical care from PHC 2. Taking medical care from Private clinics 3. Taking Desi treatment 4. By Ojhas 5. Did noting	332 54 26 6 8	77.9 12.6 6.1 1.4 1.9
7	Weather malaria transmitted by mosquito bite 1. Yes 2. No 3. Not Known	284 121 21	66.7 28.4 4.9

8	Where do malaria mosquitoes breed 1. In clean water 2. In polluted water 3. Garbage 4. Not known	113 232 62 19	26.5 54.5 14.5 4.5
9	Practices on control of mosquito breeding 1. By filling water bodies 2. By taking control measures (larvicide, oil etc.) 3. Not responded	78 139 209	18.3 32.6 49.1
10	What preventive measures taken to avoid mosquito bite at night (use of bed nets, mosquito repellents, use of mustard oil, coils, mats, vaporizers, any others indigenous methods etc.) 1. Yes 2. Did not take any control measures 3. Not Known	312 79 35	73.2 18.5 8.2
11	Practices on regular use of treated bed nets to protect from mosquito bites and malaria 1. Yes 2. No 3. Not responded	289 126 11	67.8 29.6 2.6
12	If not, What the reasons not using treated bed nets 1. Inconvenient during the summer season. 2. It is not affordable for all members due to costly. 3. Only one bed net received from Government department, which was used for children 4. Mosquito coil used to protect from malaria 5. Use of cow dung mixed with dry leaves of Neem plant to keep free from mosquitoes	30 194 80 53 69	7.0 45.5 18.8 12.4 16.2
13	Where do mosquitoes rest 1. Indoor (human dwelling) 2. damp dark places 3. Outdoor (cattle sheds) 4. Not known	138 67 208 13	32.4 15.7 48.8 3.1
14	Whether spray has been made in all rooms of your house 1. Yes 2. No 3. Not Known	185 221 20	43.4 51.9 4.7
15	How many numbers of rounds of DDT spray done during last year in your house 1. One 2. Two 3. Not Known	185 197 44	43.4 46.2 10.3
16	Whether are the IRS beneficial 1. Yes 2. No 3. Not Known	101 289 36	23.7 67.8 8.5
17	Whether Acceptance on IRS 1. Yes 2. No 3. Not Known	186 201 39	43.6 47.2 9.1
18	If not, what are reasons for refusal of IRS 1. House locked due to during IRS activities 2. Due to bed smell 3. Inconvenient 4. Mal practices of spray worker 5. Such type of DDT spray does not reduce the mosquito biting & No more effective in reducing mosquito bite 6. No prior information 7. Spray men charge money, rice and grains which is not affordable, hence they left the non-paying family. 8. Not Known	36 46 31 13 184 53 21 42	8.5 10.8 7.3 3.0 43.2 12.4 4.9 9.9
19	Have seen malaria worker in last one/two months and given IEC activities 1. Yes 2. No 3. Not Known	194 171 61	45.5 40.1 14.3
20	Whether any type of IEC activities carried out in the village 1. Yes 2. No 3. Not Known	19 370 37	4.5 86.8 8.7
21	Type of spraying-patchy/partial/incomplete observed by team	313	73.5

Table 2: Community knowledge, behaviour and practices on malaria vector and its control.

practices of respondents about malaria. Their knowledge about malaria transmission routes was poor as considerable (28.4%) number was not aware that malaria is caused by mosquito bite. Respondents were asked about malaria, transmission season, symptoms, prevention of malaria and prevention methods adopted. Most of the respondents (92.5%) were aware of malaria disease, 44.4% of the respondents reported transmission season as rainy season and 31.4% post rainy season and others did not responded. The respondents (74.4%) were known to common symptoms of malaria, 82.4% respondents reported fever, shivering and cold etc., and 14.1% respondents reported enlargement of liver and spleen. About prevention of malaria 79.6% respondents reported malaria can be prevented and 15.7% reported that it cannot be prevented. A large number of persons (77.9%) were taking treatment from the nearest Primary Health Centre (PHC) and 12.6% were taking treatment from privet clinics.

On being asked about malaria transmission, mosquito breeding and resting sites, 28.4% of the respondents were not aware of malaria transmission by mosquito bite. Only one fourth (26.5%) community were aware about mosquito breeding in clean water bodies as ponds, rivers and streams etc., only one third (32.6%) respondents were taking control measures. The knowledge of resting sites of mosquito was good as 48.8% respondents reported cattle sheds and 32.4% reported human dwellings and 15.7% dump dark places.

The respondents were questioned about the coverage and acceptance on IRS, number of rounds of DDT spray done during last year in their houses, preventive measures to avoid mosquito bite and IEC activities in their villages during last year. About half of the respondents (46.2%) reported two round of spray, while 43.4% reported single round of spray. About two third (73.2%) respondents taken preventive measures to avoid mosquito bite and 18.5% did not take any control measures. It was found that 67.8% house holders had lost their faith in DDT spraying because of its ineffectiveness in controlling mosquito nuisance. Only 23.7% respondents believed that IRS with DDT was effective against mosquitoes, 12.4% respondents did not have any prior information

regarding date and time of spray. The refusal rate for IRS in human dwellings was 47.2%. Our team also observed quality of spray very poor as 73.5% was patchy/partial /incomplete/not uniform. The community was reluctant to accept IRS with DDT due to ineffectiveness. Insecticide spray may be more acceptable to communities if appropriate and more effective insecticide is being used. Most of villagers (86.8%) were not aware of any type of IEC activities carried out for malaria in their villages during the last year.

The use of bed nets was found popular as 67.8% respondents used bed nets to protect them from mosquito bite and malaria prevention. The rest of 29.6% respondents did not use bed nets mainly because of financial reasons as the cost of bed nets about Rs. 150-300 was quite high for the poor community. Some of the respondents were finding the bed nets inconvenient during summer season when it becomes too hot to sleep inside the net. A few respondents practiced burning of cow dung with dry leaves of "Neem" as indigenous method for the personal protection. The reason was also they found it is quite effective and without any financial implication. Use of coil/repellant was not popular among the community (12.4%) due to side effects like congestion, breathing trouble etc.

Statistical analysis

Some of the questions were analysed statistically after clubbing the answers for knowledge awareness in terms of yes or no (Tables 3-5). The awareness of malaria was significantly higher in male population ($p < 0.00039$) than among the females. Similarly the answer for IEC activities, awareness of symptoms of malaria, and how it is transmitted was also significantly higher among the male population than the females. However, there was no significant difference ($p > 0.05$) between the male and female population so far as the question about awareness of breeding and resting of vector mosquitoes is concerned. Similarly there was no significant difference ($p > 0.05$) in the answer for the acceptance of IRS between the male and female population (Table 3).

With respect to literacy the literate population of the village was

Sr. no.	Details	Total	%	Male	%	Female	%	P-value
1.	Awareness of malaria							
	1. Yes	394	92.48	162	98.18	232	88.88	0.000392 *
2. No	32	7.51	3	1.81	29	11.11		
2.	If yes, aware symptoms of malaria							
	1. Yes	317	74.41	137	83.03	180	68.96	0.001191 *
2. No	109	25.59	28	16.96	81	31.03		
3.	Perception on malaria prevention							
	1. Can be prevented	339	79.58	144	87.27	195	74.71	0.001732 *
2. Cannot be prevented	87	20.42	21	12.72	66	25.28		
4.	Weather malaria transmitted by mosquito bite							
	1. Yes	284	66.67	120	72.72	164	62.83	0.03487 *
2. No	142	33.33	65	27.27	97	37.16		
5.	Where do malaria mosquitoes breed							
	1. In clean water	113	26.53	62	37.58	51	19.54	3.99852
2. other	313	73.47	103	62.42	210	80.46		
6.	Where do mosquitoes rest							
	1. Indoor	138	32.39	59	35.76	79	30.27	0.23824
2. Outdoor	288	67.61	106	64.24	182	69.73		
7.	Whether Acceptance on IRS							
	1. Yes	186	43.66	64	38.79	122	46.74	0.106798
2. No	240	56.34	101	61.21	139	53.26		
8.	Whether any type of IEC activities carried out in the village							
	1. Yes	19	4.46	12	7.21	7	2.68	0.02535 *
2. No	407	95.54	153	92.73	254	97.32		

Table 3: Statistical analysis about malaria awareness between male and female of the villagers.

Sr. no.	Details	Total	%	Low educated	%	Higher educated	%	P-value
1.	Awareness of malaria							
	1. Yes	394	92.48	237	88.76	157	98.74	0.0001574 *
2. No	32	7.51	30	11.24	2	1.26		
2.	If yes, aware symptoms of malaria							
	1. Yes	317	74.41	188	70.41	129	81.13	0.014185 *
2. No	109	25.59	79	29.58	30	18.86		
3.	Perception on malaria prevention							
	1. Can be prevented	339	79.58	204	76.40	135	84.91	0.03520 *
2. Cannot be prevented	87	20.42	63	23.60	24	15.09		
4.	Weather malaria transmitted by mosquito bite							
	1. Yes	284	66.67	140	52.43	144	90.57	6.7497
2. No	142	33.33	127	47.57	15	9.43		
5.	Where do malaria mosquitoes breed							
	1. In clean water	113	26.53	35	13.11	78	49.06	4.33844
2. other	313	73.47	232	86.89	81	50.94		
6.	Where do mosquitoes rest							
	1. Indoor	138	32.39	39	14.61	99	62.26	2.8098
2. Outdoor	288	67.61	228	85.39	60	37.74		
7.	Whether Acceptance on IRS							
	1. Yes	186	43.66	108	40.45	78	49.06	0.08319
2. No	240	56.34	159	59.55	81	50.94		
8.	Whether any type of IEC activities carried out in the village							
	1. Yes	19	4.46	4	1.50	15	9.43	0.000124 *
2. No	407	95.54	263	98.50	144	90.57		

* Significant difference (p<0.05)

Table 4: Statistical analysis about malaria awareness between literate and illiteracy status in the villagers.

Sr. no.	Details	Total	%	Low & middle economic group	%	High economic group	%	P-value
1.	Awareness of malaria							
	1. Yes	394	92.48	378	92.19	16	100.00	0.02452 *
2. No	32	7.51	32	7.80	0	0.00		
2.	If yes, aware symptoms of malaria							
	1. Yes	317	74.41	302	73.66	16	100.00	0.01749 *
2. No	109	25.59	108	26.34	0	0.00		
3.	Perception on malaria prevention							
	1. Can be prevented	339	79.58	323	78.78	16	100.00	0.03887 *
2. Cannot be prevented	87	20.42	87	21.22	0	0.00		
4.	Weather malaria transmitted by mosquito bite							
	1. Yes	284	66.67	268	65.37	16	100.00	0.00393 *
2. No	142	33.33	142	34.63	0	0.00		
5.	Where do malaria mosquitoes breed							
	1. In clean water	113	26.53	97	23.66	16	100.00	1.15386
2. other	313	73.47	313	76.34	0	0.00		
6.	Where do mosquitoes rest							
	1. Indoor	138	32.39	124	30.24	14	87.50	1.15778
2. Outdoor	288	67.61	286	69.76	2	12.50		
7.	Whether Acceptance on IRS							
	1. Yes	186	43.66	183	44.63	3	18.50	0.04056 *
2. No	240	56.34	227	55.37	13	81.50		
8.	Whether any type of IEC activities carried out in the village							
	1. Yes	19	4.46	17	1.75	2	12.50	0.11227
2. No	407	95.54	393	98.25	14	82.50		

* Significant difference (p<0.05)

Table 5: Statistical analysis about malaria awareness between low and high economic group of village population.

having better awareness about malaria and the perception about its prevention. It was significantly higher among the educated community (p<0.05) than the illiterate population. There was no significant difference (p>0.05) in the knowledge about malaria transmission and breeding and resting habitats of vector mosquitoes between literate and illiterate population of the village (Table 4).

The awareness of malaria and its symptoms and transmission

was very high (100%) among the population with higher economic group and was significantly different (p<0.05) from the low economic group. Similarly the perception that malaria can be prevented and is transmitted by mosquitoes was much higher than those with lower economic group (p<0.05). However, there was no significant difference (p>0.05) between low and high economic groups so far as the awareness about the breeding and resting habitats of mosquitoes is concerned.

Also, there was no significant difference ($p>0.05$) between low and high economic group population as far as the awareness of IEC activities in the village are concerned (Table 5).

Discussion

The awareness about malaria and its symptoms was very high in the village population which is obvious as the disease prevalence is very high in this area. There was significant difference in the awareness between male and female, illiterate and literate and low and high income group population. The awareness was high in male which may be because the females stay at home and less informed than males. Similarly the awareness was high among the educated people than the less educated people and in high income group as compared to low income group population which is quite obvious people with higher education and economic status has better understanding. In general the knowledge about breeding and resting behaviour of mosquitoes is concerned was low in the total population but there was a good awareness about how the malaria is transmitted and how it can be prevented.

No significant difference between male & female, illiterate & literate and low & high income group was observed so far as the breeding and resting habitats of mosquitoes are concerned indicating that the entire population was uniformly aware of these questions.

With the launching of malaria eradication programme in 1958, with IRS being the main stay of the programme, a drastic reduction in malaria prevalence was observed in many malaria endemic parts of the country [5]. The DDT was very effective and its acceptance among the community was very good [5]. But, after the resurgence of malaria and development of resistance in the vector mosquitoes there has been considerable refusal for IRS in these areas. Singh et al. [31] reported more than half of respondents refused IRS with DDT in their houses in a malaria endemic area of Santhal Pargana, Dumka district (Jharkhand) which indicates that the community with a low literacy rate still warrant strengthening of health education. As per the guidelines of WHO IRS coverage should be more than 80% in houses of targeted population [32]. To achieve the desired IRS coverage, community participation is also very important [15]. The housing patterns mostly mud plastered with thatched roof adjoining to cattle sheds in study area and other factor is poor living conditions and poor health seeking behaviour of tribal population and their environment makes them vulnerable to malaria [9-14]. Existence of a positive relationship between poverty and illness in every social structure cannot be denied; morbidity and mortality are documented to be higher among the poor [33].

The illiteracy among the respondents was high (63.3%) along with 26.1% primary level education in our study area. This factor can affect the success of malaria control programme as illiteracy level has also direct correlation with prevalence of disease along with other factors [34]. In our study also there was a significant difference between illiterate and literate population so far as the IRS it's concerned. People with higher level of education showed better acceptance for IRS. Study carried out in Manipur revealed that rural tribal have inferior level of knowledge compared to their urban population [16]. These findings are similar to our study as being tribal and rural population the knowledge of respondents regarding breeding and resting sites of mosquitoes was very poor and they had little knowledge regarding various aspects of malaria. However, they were aware of the common symptoms of malaria such as fever, shivering, headache and cold. On the other hand there are some reports showing no association between educational level and knowledge and malaria prevalence [17-19]. Few studies have reported diverse findings and significant difference in age,

education and income in Zimbabwe and Malawian [20,21]. There are reports of misconceptions about malaria vector, breeding habitats and transmission pattern due to lack of knowledge [22] and use of preventive measures which are indicators of socio-economic status an important factor associated with malaria [12-14].

The human behaviour is also a contributing factor to malaria prevalence which has been largely neglected in research on vector borne diseases [23]. Studies carried out in Jaisalmer district of Rajasthan on the behaviour of different cast group and transmission magnitude of malaria revealed three times higher in backward classes as compared to forward classes [24]. In slum communities from Delhi it was found that more than half of respondents were known that mosquito bite can transmit malaria but aware of only few symptoms of malaria [35]. Similarly, rural and tribal communities of Bastar district of Madhya Pradesh [36] were also aware of causes of malaria, but exhibiting no relation with prevalence of malaria.

Personal protection has very important role in malaria prevention but the people were not found using any type of preventive method to prevent mosquito bite in rural area of Karnataka state [27]. However, about forty percent respondents utilized ITN at night in malaria endemic villages of East-Godavari district of Andhra Pradesh [35] and almost all the respondents in Assam [37]. Use of mosquito nets was also found very popular all round the year in Bhutan and Mexico [38,39]. This is in accordance to our findings where most of the respondents believed in use of bed nets and they were using bed nets at night. Although IRS could protect against malaria, it is useful only when vectors are endophilic and people sleep inside their houses. There is a need to encourage and educate the people to reduce refusal rate of IRS, because the available reports shows an increasing trend of refusal of IRS in our country [31,35,37]. It has been found that significant improvement in awareness of people occurs in respect of malaria control after proper health education, as majority of the people were found aware of the causes of malaria and common symptoms, season of malaria, and breeding places of mosquitoes [25]. Thus, proper health education should be given to increase community knowledge and awareness in local language at the individual and community level to promote malaria prevention, to enhance the IRS coverage and use of insecticide treated bed nets for successful malaria control.

Conclusion

Our study indicates little knowledge, less awareness and inadequate practices of respondents on various aspects of malaria and its control which may be one of the important factors responsible for the persistence of malaria in tribal areas of Bihar and Jharkhand states. As IRS alone is not enough for malaria control use of bed nets in houses and mosquito repellents is also required to enhance malaria control in the tribal areas of the country. Insecticide spray may be more acceptable to the communities, if appropriate and more effective insecticide is being used. There is an urgent need for special campaign to educate the illiterate and poor rural communities on malaria, vector mosquitoes and disease transmission to increase awareness about malaria. This motivation will result in the enhanced acceptance and coverage of the IRS and regular use of bed nets. IEC activities should be taken up to increase community's knowledge and awareness in local language at the individual and community level, to promote malaria prevention, to enhance the IRS coverage and use of bed nets for successful malaria control.

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