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Original Article

Awareness and Practices on Malaria and its Prevention in Two Northern Districts of Karnataka- Understanding the Ground Realities

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ABSTRACT

Introduction: Malaria is a disease with global public health importance. India is endemic for the disease and accounts for 4% of global deaths due to Malaria. Karnataka contributes 0.89% of cases annually of the country and is in the pre-elimination phase of the disease. The study was conducted in two districts of Karnataka to assess the awareness about malaria and practices on its prevention and treatment among residents of the districts. **Materials and Methods:** A cross-sectional study was conducted in 2 urban and 6 rural randomly selected clusters in Raichur and Bagalkot districts of Karnataka. A total of 480 individuals were assessed for their perception and practices related to malaria prevention by direct interview and observation checklist using a pre-tested structured interview schedule. The data collected was analyzed using SPSS-22. **Results:** The present study found that 43.1% of study subject were aware that malaria is transmitted through mosquito bite. 39% of respondents were able to identify at least one symptom of malaria while 44.6% were aware of at least one preventive measure to be taken against transmission of the disease. 60.8% of households surveyed under the study owned at least one mosquito net in their house. The proportion of houses where indoor residual spraying was done was only 3.5%. **Conclusion:** The overall awareness about malaria and its prevention was notably low in the study region. So, we recommend additional behavioural change communication programmes and other appropriate interventions from the health system to improve them.

Key words: Malaria, Knowledge and practices, Mosquito net, Prevention, Indoor residual spray.

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INTRODUCTION

Malaria is a major neglected tropical disease affecting at least 100 countries in the world. It is a communicable disease caused by Plasmodium and spread mainly by infected Anopheles mosquitoes.[1]

An estimated 219 million cases of malaria occurred worldwide in 2017 alone according to World Health Organization (WHO) reports.[2] More than 90% of cases in 2017 occurred in the African continent and 5% of malaria cases were seen in the WHO South East Asia region.[2] Fifteen countries in sub-Saharan Africa and India carried almost 80% of the global malaria burden.[2] India accounts for 4% of total malaria cases worldwide.[2] In 2017, there were an estimated 435000 deaths from malaria globally, compared with 451000 estimated deaths in 2016 and 607000 in 2010.[2]

Malaria continues to be a major public health concern in India with 21.98% of Indian population living in high transmission areas and 67% in low transmission areas. The major portion of malaria cases in India are caused by plasmodium falciparum and development resistance to existing drugs by the species is rising the concern in the country.[3,4]

Karnataka a southern Indian state is endemic for malaria. Presently 0.89% of annual malaria cases in the country are reported from Karnataka. The annual parasite index has come down below 1 since 2004 and presently the state is classified in category 2 (Pre elimination phase).[3,5] Raichur and Bagalkot are two districts in Karnataka where malaria is in the pre-elimination phase or category 2. The annual parasite incidence in some of the PHCs under the district is more than one even though the average annual parasite index is less than 1.[5]

The strategies for prevention and control of malaria and its transmission are surveillance and case management by passive and active case detection, early diagnosis and complete treatment and sentinel surveillance, Integrated vector management by indoor residual spray (IRS), Insecticide Treated bed Nets (ITNs) and Long-lasting Insecticidal Nets (LLINs) and anti-larval measures, epidemic preparedness and early response and supportive interventions like capacity building, behavioural change communication,

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inter-sectorial coordination, monitoring and evaluation and operational research and applied field research.[5]

One of the major factors which determine the risk of malarial infection, transmission, health and treatment seeking behaviour, prevention potential is the extent to which a community is aware about the disease and its prevention. The awareness about the condition will facilitate the healthy practices for prevention and treatment. In this in the background, the present study was conducted in two malaria endemic districts of North Karnataka with objectives to assess the knowledge and practices about malaria, its prevention and treatment.

MATERIALS AND METHODS

A cross-sectional study was conducted in October 2018 in Raichur and Bagalkot districts of Karnataka as per the instructions of Regional Health Office, Ministry of Health and Welfare, Government of India, Bengaluru. From each of the selected districts, three rural areas (clusters) and one urban slum were included in the study. Hence, we have included, totally eight clusters across two districts of which six clusters were from rural areas and two clusters were from urban areas.

Selection of clusters

Multistage random sampling technique was adapted for selection of clusters. In consultation with District Vector Borne Disease Control Officers, three primary health centres (PHCs) from each district were selected randomly by lottery method. From each of these PHCs one Sub centre and from these sub centres one village was identified again through the lottery method. Hence from two districts six rural clusters were demarcated. Coming to urban clusters in each district one urban town was selected randomly and from the selected town, one urban ward was selected through the list of wards using lottery method. Thus, two urban clusters and six rural clusters were identified for undertaking the study. From the selected clusters 60 houses were included in the study and hence a total sample size across eight clusters was 480.

Selection of households

From a centre point in the village/ward identified with the help of a local resident, all directions were numbered and one street was selected randomly by lottery method. The first 60 unlocked houses in selected direction where the household members are permanently residing were included in the study.

Data collection

From the selected houses, details regarding Sociodemographic characteristics, awareness about malaria and its prevention were collected by interviewing adult responsible respondent using a pretested structured interview schedule through interview technique after explaining the purpose of the survey and obtaining verbal consent. The awareness regarding malaria was assessed by 7 questions regarding spread, symptoms, diagnosis, treatment and preventive measures of malaria. Practices related to malaria prevention were assessed by gathering information on the presence and usage of bed nets, insecticide-treated nets, long-lasting insecticide treated nets and levels of spraying done in households, other measures to prevent mosquito bites, utilization of services for malaria treatment.

Statistical analysis

The data collected was entered in Microsoft Excel spreadsheet and analyzed with SPSS version 22 licensed to JSS Academy of Higher Education and Research. Percentages were used for descriptive data and chi-square test was performed for testing association the associations were interpreted as statistically significant at $P<0.05$. The results were expressed with tables and relevant pictorial representations.

RESULTS

Total 480 samples were selected for the study out of which 240 were from Bagalkot district and 240 from Raichur district. Among the respondents, 120 were residents of the urban area and 360 were from the rural area. 123 (25.6%) respondents were males and 357 (74.4%) were females. Mean age of the respondents was 35.8 with a standard deviation of 13.80.

Among respondents, 207 (43.1%) were aware that malaria is transmitted by mosquito bite. 165(34.4%) respondents among 480 respondents were aware that mosquitos lay egg in water. 187 (39%) respondents were able to identify at least one symptom of malaria. 214(44.6%) respondents were able to enlist minimum one method of prevention of malaria. Among the study population, 183 (38.1%) could quote at least one measure of confirming the diagnosis of malaria. 46.3% (222) respondents of our study knew at least one local person or facility providing blood testing for malaria diagnosis. Of the 480 people surveyed 186 (38.8%) were aware that they have to approach a health facility in case of malaria infection and 222 persons (46.3%) knew local persons or facility providing treatment of malaria. Among the rural and urban populations, no significant change in general awareness about malaria was noted. However, awareness regarding facility/ person to approach for diagnosis of malaria and what should be done for curing malaria was significantly high in rural areas. (Table 1)

Out of 480 respondents, 244 (50.8%) were aware of at least one facility to approach for diagnosis of malaria. 114 persons (23.7%) named doctor as the service provider for diagnosis while 26 (5.4%) named ANM, 74 (15.4%) named ASHA, 16 (3.3%) chose multipurpose worker male and 14 (2.9%) chose Anganwadi Worker as the diagnostic service provider. The remaining 236 respondents (49.1%) were not aware of any facility/ person to approach for diagnosis of Malaria. For the treatment of malaria most of the respondents who were aware of at least one, named doctor/ health facility as the service provider (119-24.7%). The number of people named ASHA, AWW, ANM and MPW(M) as treatment providers was 68 (14.16%), 10 (2.08%), 20 (4.16%), 15 (3.12%). The remaining 232 respondents (48.3%) were not aware of any facility/ person to approach for treatment of Malaria.

Considering overall knowledge scores, 96 (80%) of respondents in urban areas and 274 (76.1%) in rural areas had poor 24 (20%) in urban areas and 83 (23.1%) in rural areas had average knowledge on malaria. This difference in knowledge between rural and urban areas was not statistically significant. (Table 2)

Majority of the respondents (292, 60.8%) own at least one mosquito net in their house. And most of them (278 respondents) use them regularly. However, our survey found that only 36 of them are insecticide-treated nets or LLIN provided by the government. Rest all were non-insecticide treated regular mosquito nets. The proportion of houses were indoor spraying was done was only 3.5% with 17 households did spraying at least once in the last three months. (Table 3)

As per practice of malaria prevention is concerned, 91 (75.8%) of respondents in urban areas and 217 (60.3%) in rural areas had poor practice and 29 (24.2%) in urban areas and 126 (35%) in rural areas had average practice on malaria. 17 (4.7%) of respondents in rural areas had satisfactory malaria prevention practices. This difference in practice between rural and urban areas was found to be statistically significant. (Table 2)

DISCUSSION

Most of the existing literatures shows a higher awareness about the diseases in different Indian communities compared to our study setting. It

Table 1: Comparison of item wise knowledge regarding Malaria among urban and rural respondents.

Query	Awareness		Total	*P* value**
	Urban (*n* = 120)	Rural (*n* = 360)		
Malaria is transmitted by mosquito bite	45 (37.5%)	162 (45.0%)	207 (43.1%)	0.151
Mosquitos lay eggs in water	35 (29.2%)	130 (36.1%)	165 (34.4%)	0.165
Symptoms of malaria*	39 (32.5%)	148 (41.1%)	187 (39.0%)	0.94
Measures to prevent malaria*	46 (38.3%)	168 (46.7%)	214 (44.6%)	0.112
Where to confirm diagnosis of malaria	35 (29.2%)	148 (41.1%)	183 (38.1%)	0.020
Local person/ Facility providing blood test for diagnosis	48 (40.0%)	173 (48.3%)	222 (46.3%)	0.113
Consume tablets for curing malaria	36 (30.0%)	150 (41.7%)	186 (38.8%)	0.023
Local person/ facility providing treatment for malaria	47 (39.2%)	175 (48.6%)	222 (46.3%)	0.072

*At least one correct response
** Chi-square test

Table 2: Comparison of overall Knowledge and practice levels among rural and urban populations.

Category	Urban Areas (*n* = 120)	Rural Areas (*n* = 360)	p Value
Knowledge level			
Poor	96 (80%)	274 (76.1%)	0.567*
Average	24 (20%)	83 (23.1%)	
Satisfactory	0	3 (0.6%)	
Good	0	0	
Practice level			
Poor	91 (75.8%)	217 (60.3%)	0.001*
Average	29 (24.2%)	126 (35%)	
Satisfactory	0	17 (4.7%)	
Good	0	0	

* Fisher's test for significance

Table 3: Comparison of practice between rural and urban areas.

Query	Practice		Total (*n* = 480)	*P* value
	Urban (*n* = 120)	Rural (*n* = 360)		
Household owns a mosquito net	47 (39.2%)	245 (68.1%)	292 (60.8%)	<0.001*
Respondent slept under a bed net last night	41 (34.2%)	237 (65.8%)	278 (57.9%)	<0.001*
Respondent slept under an ITN/LLIN last night	0	36 (10%)	36 (7.5%)	<0.001**
The house was sprayed at least once in last three months	0	17 (4.7%)	17 (3.5%)	0.009**
The respondent slept in room sprayed by insecticide in the last three months	0	17 (4.7%)	17 (3.5%)	0.009**
Respondent slept under an ITN/LLIN every day in last six months or slept in a sprayed room every day in last three months.	18 (15%)	80 (22.2%)	98 (20.4%)	0.116*

*Chi-square Test
** Fisher's Exact Test

was observed that 64% residents of two districts in Orissa state in the country were aware that malaria is transmitted by mosquitoes as studied by K. N. Vijayakumar *et al.*[6] Another study conducted by Patmawati Tyagi, Arati Roy and M S Malhotra among residents of different occupational and economic categories in Eastern Delhi showed that all respondents were aware of the transmission of malaria by mosquitoes.[7] A study done by Gaurav Dhawan *et al.* in Mumbai also showed a 100% awareness about this in both rural and urban settings.[8]

Contradictory to our observation, a much higher percentage of people correctly identified water as the breeding place of mosquitoes in the study conducted by Gaurav Dhawan *et al.* in Mumbai (70%). The awareness about breeding places was higher in urban areas (83%) compared to rural areas (76%).[8] In the study from Delhi by Patmawati Tyagi, *et al.* a minimum of above 90% respondents knew the vector breeding places correctly.[7] Gaurav Dhawan *et al.* in Mumbai observed that all respondents knew fever as a symptom of malaria. The above study was conducted in a setting where only persons who have already heard about Malaria was included while we included all adults residing in the area. The major difference in knowledge of symptoms could be attributed to this.[8]

In a study conducted by Kiran K Dayanand *et al.* in Urban areas of Mangaluru, it was observed that 24.1% of native residents believed that eliminating mosquito breeding places can prevent malaria. 53.1% opined use of bed nets and 6.2% opined use of mosquito repellents as preventive measures for Malaria.[9] In an another study conducted by K N Vijayakumar *et al.* from a tribal belt in Orissa state, 64% of respondents knew that avoiding mosquito bites will prevent malaria.[6] In the study from Delhi, it was noted that 81% of primary school teachers, 64.5% of factory employees, 40% of business group and 60% of respondents in lower economic group said that they will approach local government health facility in case of malaria infection.[7] Another study shows that 50% of respondents showed hospital/ health centre/doctor as the person or facility to approach for treatment of Malaria.[8] A study conducted in Mangaluru by Kiran K Dayanand *et al.* looked into the treatment seeking behaviour of the native malarial infected individuals and they showed that 46.3% would approach allopathic clinics.[9] Another study by Rajiv Kumar *et al.* in Northern India shows that 70.9% respondents were aware that they should consult a doctor for Malaria treatment while 8.1% told they would do nothing for treatment.[10]

Study by Prakash A *et al.* on community practices of using bed nets in north eastern parts of the country showed that the average bet net usage per family was (2.01 to 2.65).[11] Another study conducted from the neighbouring country of Myanmar by Thae Maung Maung *et al.* for assessing household ownerships of bed nets shows that 97.2% household owned at least one bed net while 63.3% houses had at least one ITN or LLIN.[12] Another study from Myanmar by Wint Phyo Than *et al.* shows that 955 of houses in the study area had at least one bed net in their house.[13]

Among construction workers in urban areas of Mangalore where Malaria is highly endemic a relatively lower level of knowledge was observed in a similar study. The mean knowledge score was 9.95 ± 3.19 out of a maximum possible score of 16 and only less than 12% could explain preventive measures of Malaria.[14] In a study conducted by Meena Krishan Kumar, majority of respondents did not know the cause of Malaria and only 37.6% knew Mosquito as the transmitting agent.[15] A better awareness about the disease terminology, symptoms, mode of transmission, causative agent and blood smear examination was seen in a southern district in Tamil Nadu where a minimum of 75% respondents had awareness in all the above aspects. The awareness was significantly high in endemic areas compared to non-endemic areas. Even though the district showed a better treatment seeking behaviour, the utilization of Indoor Residual Spray was low (39.7%).[16] A study by Maumita A *et al.* In West Bengal, India showed that in their study setting, among 156 samples, 87.8% heard about malaria and 70.8% of them knew the causative agent. According to 71.5% of the study participants drains were the breeding places of mosquitos. However, regardless of a better knowledge only about 46.8% of the population was mosquito repellent users.[17] A very good awareness, more than 95%, was seen in a tribal community of West Bengal. But notable portion of study participants (36.78%) opined they would approach traditional healers for treatment of Malaria.[18]

CONCLUSION

From this study, we conclude that the general awareness about malaria and its prevention and the level of community personal protection is notably low in the study region. Since the study setting is endemic for vector borne diseases like Filariasis and Malaria, different Information, Education and Communication (IEC) activities are going on under National Vector Borne Disease Control Programme (NVBDCP). However, it is evident that these programmes are not sufficient enough to raise the knowledge about Malaria and improve the practices to prevent its transmission. The district health authorities have to design and implement effective Behavioural Change Communication Strategies to bridge this gap.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

ABBREVIATIONS

WHO: World Health Organization; **IRS:** Indoor Residual Spraying; **ITN:** Insecticide Treated Nets; **LLIN:** Long Lasting Insecticidal Nets; **PHC:** Primary Health Centre; **SPSS:** Statistical Package for Social Sciences; **ANM:** Auxiliary Nursing Midwife; **ASHA:** Accredited Social Health Activist; **AWW:** Anganwadi Worker; **MPW(M):** Multipurpose Worker-Male; **IEC:** Information, Education and Communication; **NVBDCP:** National Vector Borne Disease Control Program.

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