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Knowledge and treatment seeking behavior regarding malaria among the residents of tribal dominated areas of Mandla district in central India – A cross-sectional study

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ABSTRACT

Background: Malaria is both a result and a cause of a lack of development. Dearth of information, education, and communication activities and awareness, knowledge regarding malaria is poor particularly in tribal population of Mandla. **Aims and Objectives:** The aim of the study was to assess the malaria knowledge and treatment-seeking behavior among the residents of the tribal dominated areas of Mandla district and to study their association with the sociodemographic characteristics. **Materials and Methods:** A total of eight villages were selected from which 25 households were randomly selected making a total sample size of 200 households, from these 200 households, 200 adult respondents were identified for administration of the study questionnaire. **Results:** The age of the respondents ranged from 18 to 80 years, with a mean age of 37 years (SD = 14.7). Overall, 48.5% of respondents had correct knowledge about perceived cause of getting malaria. The treatment seeking behavior of the respondents were associated with sociodemographic profile of the participants the age of the participants, the association was found to be highly statistically significant (P = 0.001). **Conclusion:** Malaria prevention campaigns should be tailored according to knowledge gaps, practices, environment, resources, and preferences in different areas of the Mandla District, using the health education/awareness most likely to outreach the far corners of the district where most residents were tribals.

Key words: Malaria; Knowledge; Tribal; Prevention; Control

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INTRODUCTION

Mandla is characterized predominantly by unstable malaria transmission, the seasonal transmission being related to rains. Most of the population are tribal and has little or no immunity towards malaria because of low and unstable transmission of malaria. As a result, all age groups of population living in malaria prone areas are at risk of infection and get affected. The WHO has recently released the Global Technical Strategy for Malaria 2016–2030, which advocates acceleration of global malaria elimination efforts and has set targets to reduce malaria mortality rate and malaria case incidence globally by 90% by 2030 (baseline 2015).[1]

Despite of the huge financial budget provided to the National Malaria Control Program Which is approximately 4045.2 crore INR with the aid from GFATM, World Bank and Government of India/State Governments,[2,3] lack of information education and communication activities and awareness, knowledge regarding malaria is poor particularly in tribal population of Mandla.[4] Efforts to prevent and control malaria both contribute to and benefit from sustainable development. The objectives of reducing the disease burden and eliminating malaria are intrinsically linked to most of the sustainable development goals, as they were to nearly all of the millennium development goals. Malaria is both a result and a cause of a lack of

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development. About 98% of tribals believed that malaria was transmitted by drinking or bathing in contaminated water. First line of treatment is through "guniyas," the village traditional healers, failing which injections were given by unqualified practitioners (quacks) in the market place. Primary health-care system is their last resort. Tribals did have knowledge about mosquito breeding in stagnant water (43%) yet all efforts were made to store rain water around their houses and in agricultural fields. Further, they did not understand the relevance of residual spray for control of mosquito/malaria.[5] In the context of the above scenario, the present study was conducted to understand the actual framework in the tribal dominated district.

Aims and objectives

1. To assess the malaria knowledge and treatment-seeking behavior among the residents of the tribal dominated areas of Mandla district.
2. To study their association with the sociodemographic characteristics.

MATERIALS AND METHODS

Study settings

The study was carried out at household level in selected administrative blocks of Mandla district (MP) with a population of 1,054,905.[6] The district Mandla lies almost entirely in the catchments of river Narmada and its numerous tributaries along with the forest core and fringe areas It has a tropical monsoon climate. It is considered as a malaria high-risk city and the district is classified as highly endemic with an API of 2–5.[5,7-13]

Study design and sample

A community-based cross-sectional study was conducted in Mandla (M.P), India from June to September 2018. A sample size of 200 was taken in accordance with the guidelines of monitoring and evaluation framework of national vector borne disease control program under MOHFW.[14] The whole Mandla district is divided into nine administrative blocks according to the latest census,[6] out of which two were selected with the highest API (2–5) thereafter four sub health centers were randomly selected from each selected block and then one village is selected through simple random sampling; therefore, a total of eight villages were selected from which 25 households were selected making a total sample size of 200 households.

From these 200 households, 200 adult respondents were identified for administration of the study questionnaire. The questionnaire was administered either to the head of the household or in his absence to a responsible adult above 18 years of age. The locked house or non-responsive respondents and children were excluded from the study. Informed consent was taken from all respondents and confidentiality was ensured throughout the study. The ethical clearance was taken from Institutional Ethical and Review Committee of Netaji Subhash Chandra Bose Medical College Jabalpur. The study was done in accordance to world medical association Declaration of Helsinki.

The data were collected using pre-tested semi-structured questionnaire which had two parts. The first part of the questionnaire included sociodemographic characteristics such as age, gender, education, and socioeconomic status. The second part of the questionnaire included knowledge about malaria in respect to symptoms, malaria transmission, preventive measures of malaria, and health seeking behavior of malaria prevention. Regarding correct knowledge of malaria transmission, symptom and treatment seeking behavior, mosquito bite as the perceived cause, fever as most important symptom of malaria, and visit to the allopathic practitioner in case of fever was considered as the correct response, respectively. The collected data were tabulated and analyzed using MS Office Excel software. The analyzed data were expressed as proportions. Chi-square test was applied to obtain an association between independent and dependent variables.

RESULTS

Sociodemographic characteristics

The sociodemographic characteristics of the respondents are shown in Table 1. The age of the respondents ranged from 18 to 80 years, with a mean age of 37 years (SD=14.7). Approximately 64.5% of the respondents were male. Around 32% of the respondents belongs to general category followed by tribal which were about 31.5%.

The largest proportion (30%) of respondents were illiterate followed by only literate (26%), and by middle school (16.5%). Occupation wise about 30% of the respondents were daily wage workers followed by 21% house wife and 20% unemployed. Approximately 44% of respondents reported being from the "class 5 followed by 34.5%" of 'class 4'according to BG Prasad SES scale.[15]

Malaria related knowledge

Overall, 48.5% of respondents had correct knowledge about perceived cause of getting malaria, that is, mosquito bite, followed by 14.5% which believes in supernatural and evil reasons for getting malaria (Table 2), However, large proportions of respondents believed that malaria could be contracted by drinking contaminated water and bad sanitation. Most of the respondents, that is, 42% out of total 200 uses bed nets, while 18% uses mosquito coils

followed by smoke of leaves and cow dung, repellant creams, and no measures which were 17.5%,15%, and 7.5% respectively as preventive practices. When correct response about getting malaria were associated with sociodemographic variables, the level of education of the respondents (Table 3) was found to be highly statistically significantly (P=0.001).

Treatment seeking behavior

When asked the first place one would go to receive treatment for malaria, a large majority (56.5%) of respondents replied that they would go to the government hospital to receive treatment, while 13% said that they would go to the private allopathic doctor (Table 4). Approximately 11.5% and 3.5% said they would go to quacks and faith healers respectively.

Table 1: Sociodemographic characterstics of respondents

S. No.	Variable	Categories	Total (%)
1.	Age	18–29 year	20 (10)
		30–39 year	56 (28)
		40–49 year	45 (22.5)
		50–59 year	46 (23)
		>60 year	33 (16.5)
2.	Sex	M	129 (64.5)
		F	71 (35.5)
3.	Caste	General	64 (32)
		OBC	60 (30)
		SC	13 (6.5)
		ST	63 (31.5)
4.	Religion	Hindu	178 (89)
		Muslim	10 (5)
		Christian	6 (3)
		Others	6 (3)
5.	Family type	Nuclear	85 (42.5)
		Joint	115 (57.5)
6.	Type of house	Kuccha	56 (28)
		Semi pucca	105 (52.5)
		Pucca	39 (19.5)
7.	Level of education	Ill-literate	60 (30)
		Only literate (non-formal)	52 (26)
		Primary school	24 (12)
		Middle school	33 (16.5)
		High school	10 (5)
		Higher secondary	10 (5)
		Graduate and Postgraduate	11 (5.5)
8.	Occupation	Daily wage worker	60 (30)
		Housewife	42 (21)
		Self employed	19 (9.5)
		Student	6 (3)
		Government sector	23 (11.5)
		Private sector	10 (5)
		Unemployed	40 (20)
9.	Socio-economic status	Class 1 (Rs. 6642 and above)	0 (0)
		Class 2 (Rs. 3321–6641)	7 (3.5)
		Class 3 (Rs. 1193–3320)	35 (17.5)
		Class 4 (Rs. 996–1192)	69 (34.5)
		Class 5 (<995)	88 (44)

The treatment seeking behavior of the respondents were associated with sociodemographic profile (Table 5) of the participants the age of the participants the association was found to be highly statistically significant (P=0.001). Furthermore, male sex and higher level of education was also statistically significant with the correct treatment seeking behavior which is visiting to an allopathic practitioner in case of malaria symptoms.

DISCUSSION

This study provides baseline data on knowledge and treatment seeking behavior practices regarding malaria in various administrative blocks of Mandla district, Madhya Pradesh, India, around the time of a malaria outbreak and the start of a widespread awareness campaign. Overall, respondents had excellent knowledge regarding the mosquito bite as the means of transmission, and fever as a symptom of malaria; however, there were misconceptions. This finding is not surprising, as prior research has found similarly high rates of knowledge about malaria transmission in India, but with most respondents reporting some incorrect information.[16]

Malaria knowledge regarding transmission was greatest among well-educated participants, this finding is also consistent with previous research that found better malaria-related knowledge in India to be associated with higher education level.[17] Most common malaria prevention

Table 2: Knowledge wise distribution of the respondents

S. No.	Knowledge regarding various domains of malaria	Responses	Frequency (n=200) (%)
1.	Transmission of malaria	Mosquitoes bite*	97 (48.5)
		Drinking dirty water	19 (9.5)
		Excessive cold/heavy	8 (2.5)
		Bad Sanitation	22 (11)
		Don't know	25 (12.5)
		Miscellaneous cause^	29 (14.5)
2.	Symptom of malaria	Fever*	131 (65.5)
		Shivering and chills	83 (42.5)
		Loss of appetite	11 (10.5)
		Headache	80 (40)
		Vomiting	35 (17.5)
		General weakness	123 (61.5)
3.	Prevention practices	Bed nets	84 (42)
		Repellant creams	30 (15)
		Mosquitoes coils	36 (18)
		Smoke of leaves and cow dung	35 (17.5)
		No measure	15 (7.5)

*Correct response, ^Supernatural and evil causes

Table 3: Association between malaria transmission knowledge and socio demographic variables

S. No.	Socio demographic variable	Categories	Frequency of correct response regarding knowledge of transmission of malaria (%)	Frequency of incorrect response regarding knowledge of cause of malaria (%)	P-value
1.	Age	18–29 year	8 (40)	12 (60)	0.116
		30–39 year	30 (53.57)	26 (46.43)	
		40–49 year	26 (57.7)	19 (42.3)	
		50–59 year	20 (43.4)	26 (56.6)	
		>60 year	10 (30.3)	23 (69.7)	
2.	Sex	M	67 (51.9)	62 (48.1)	0.022
		F	29 (35.8)	52 (64.2)	
3.	Caste	General	38 (59.3)	26 (40.7)	0.031*
		OBC	30 (50)	30 (50)	
		SC	6 (46.1)	7 (53.9)	
		ST	21 (33.3)	42 (66.7)	
4.	Religion	Hindu	83 (46.6)	95 (53.4)	0.479
		Muslim	3 (30)	7 (70)	
		Christian	4 (66.6)	2 (33.4)	
		Others	2 (33.4)	4 (66.6)	
5.	Family type	Nuclear	49 (57.6)	36 (42.4)	0.212
		Joint	51 (44.3)	64 (55.7)	
6.	Type of house	Kuccha	30 (53.5)	26 (46.5)	0.483
		Semi pucca	56 (53.3)	49 (46.7)	
		Pucca	25 (64.1)	14 (38.9)	
7.	Level of education	Ill-literate	18 (30)	42 (70)	0.0001*
		Only literate (non-formal)	19 (36.5)	33 (63.5)	
		Primary school	13 (54.1)	11 (45.9)	
		Middle school	18 (54.5)	15 (45.5)	
		High school	7 (70)	3 (30)	
		Higher secondary	9 (90)	1 (10)	
		Graduate and Postgraduate	11 (100)	0 (0)	

*P<0.05 is considered statistically significant

Table 4: Treatment-seeking behavior among the residents in case of fever

S. No.	Treatment seeking behavior of respondents in case of fever	Total (n=200) (%)
1.	No treatment	9 (4.5)
2.	Home remedies	4 (2)
3.	Government health facility*	113 (56.5)
4.	Private Hospital*	36 (13)
5.	Quacks	23 (11.5)
6.	Faith Healers	7 (3.5)
7.	Others	8 (4)

*Correct response (includes registered medical practioner)

practice used was the use of bed-nets, with about 42% of respondents reporting doing so. This finding is almost in concordance with the results of another study in which is around 30% of the respondents were using bed-nets,[18] However the proportion is fairly low with the previous research that found the usage around 83.5% and 78.9% in Mizoram and Assam, respectively.[19]

Prevention practices differed somewhat across the participants. Results suggest that respondents (18%) use mosquito coils as a protective measure and almost equally, that is, 17.5% use smoke of leaves and cow-dung, perhaps because most of the respondents belongs to tribal areas with poor housing conditions and with incomplete walls that allow mosquitoes to enter easily, and the local government distributes free bed nets in those areas. However, even though most residents in construction sites reported using bed nets, none reported using insecticide-treated bed nets, use liquid repellents and mosquito sprays, perhaps due to cost related reasons. When asked about the last time, the area was fogged by city officials, respondents gave a wider range of responses than would have been expected from residents of the same neighborhood. This discrepancy in reports of fogging suggests that residents do not always know when city officials are fogging. Because knowledge of fogging may influence residents' perceived need for other preventive measures. Similar findings were reported in a study done by Dhawan et al.,[18] which states that city officials should consider whether their communication with the public about fogging could be improved.

It is clear that higher level of education is the only factor which is positively associated with correct knowledge regarding transmission of malaria and also most important symptom of malaria. This finding is consistent with the study by Mishra et al.,[20] which found that even though most village health workers knew that bed nets were effective in preventing malaria, all did not use them.

Table 5: Association between treatment seeking behavior and sociodemogra PHIC variables

S. No.	Socio demographic variable	Categories	Frequency of correct response regarding treatment seeking behavior (%)	Frequency of incorrect response regarding treatment seeking behavior (%)	P-value
1.	Age	18–29 year	7 (35)	13 (65)	0.0001*
		30–39 year	48 (85.7)	8 (14.3)	
		40–49 year	35 (77.7)	10 (22.3)	
		50–59 year	29 (63)	17 (37)	
		>60 year	18 (54.5)	15 (45.5)	
2.	Sex	M	72 (55.8)	57 (44.2)	0.0001*
		F	20 (28.1)	51 (71.9)	
3.	Caste	General	49 (76.5)	15 (23.5)	0.203
		OBC	43 (71.6)	17 (28.4)	
		SC	7 (53.8)	6 (46.2)	
		ST	38 (62.3)	23 (37.7)	
4.	Religion	Hindu	92 (51.6)	86 (48.4)	0.094
		Muslim	2 (20)	8 (80)	
		Christian	3 (50)	3 (50)	
		Others	5 (83.3)	1 (16.7)	
5.	Family type	Nuclear	65 (76.4)	20 (23.6)	0.142
		Joint	77 (66.9)	38 (33.1)	
6.	Type of house	Kuccha	25 (44.6)	31 (55.4)	0.910
		Semi pucca	50 (47.6)	55 (52.4)	
		Pucca	19 (38.7)	20 (51.3)	
7.	Level of education	Ill-literate	32 (53.3)	28 (46.7)	0.002*
		Only literate (non-formal)	20 (38.4)	32 (61.6)	
		Primary school	15 (62.5)	9 (37.5)	
		Middle school	22 (66.6)	11 (33.4)	
		High school	4 (40)	6 (60)	
		Higher secondary	8 (80)	2 (20)	
		Graduate and postgraduate	11 (100)	0 (0)	

*P<0.05 is considered statistically significant

Limitations of the study

The present study is cross sectional quantitative study. it would have been more beneficial if some in-depth interviews with some key stakeholders and tribal people was taken to support the evidences generated through quantitative findings.

CONCLUSION

Differences in malaria-related knowledge and prevention practices across sectors of Mandla district are apparent. While most individuals are aware of the disease and know the means of transmission, the most common symptoms and some prevention strategies, there are also knowledge gaps that need to be filled and widespread misconceptions that need to be corrected. Education regarding malaria is especially needed in the villages, where a sizeable proportion of residents seem unaware of the disease, and in the construction sites, where knowledge is also poorer. Malaria prevention campaigns should be tailored according to knowledge gaps, practices, environment, resources, and preferences in different areas of the Mandla District, using the health education/awareness most likely to outreach the far corners of the district where most residents were tribals. Where use of bed nets is feasible, malaria control efforts should emphasize use of insecticide-treated bed nets. Research exploring the reasons for use or non-use of various prevention practices is needed so that barriers to effective prevention campaigns other than knowledge can be identified and addressed.

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REFERENCES

1. World Malaria Report 2017. Geneva: World Health Organization; 2017. Available from: https://www.apps.who.int/iris/bitstream/handle/10665/259492/9789241565523-eng.pdf;jsessionid=D4404DE39A941CD8F902DBD1FBE42B0C?sequence=1 [Last accessed on 2021 Dec 02].
2. Global Technical Strategy for Malaria 2016-2030; 2015. Available from: https://www.who.int/docs/default-source/documents/global-technical-strategy-for-malaria-2016-2030.pdf [Last accessed on 2021 Dec 05].
3. Mishra S, Bharti PK, Shukla MM, Ali NA, Kashyotia SS, Kumar A, et al. Clinical and molecular monitoring of *Plasmodium falciparum* resistance to antimalarial drug (artesunate+sulphadoxine-pyrimethamine) in two highly malarious district of Madhya Pradesh, Central India from 2012-2014. Pathog Glob Health.

2017;111(4):186-194.

https://doi.org/10.1080/20477724.2017.1331875

4. Kumar A, Valecha N, Jain T and Dash AP. Burden of malaria in India: Retrospective and prospective view. Am J Trop Med Hyg. 2007;77 Suppl 6:69-78.
5. Chand G, Chaudhary NK, Soan V, Kaushal LS, Sharma RK and Singh N. Transmission dynamics and epidemiology of malaria in two tribal districts in Madhya Pradesh, India. Indian J Med Res. 2015;141(5):556-566.

   https://doi.org/10.4103/0971-5916.159513
6. Census of India 2011-Madhya Pradesh Series 24-Part XII-A-District Census Handbook, Mandla. Available from: https://www.lsi.gov.in:8081/jspui/bitstream/123456789/2097/1/38136_2001_man.pdf [Last accessed on 2021 Dec 15].
7. Singh N, Chand SK, Bharti PK, Singh MP, Chand G, Mishra AK, et al. Dynamics of forest malaria transmission in Balaghat District, Madhya Pradesh, India. PLoS One. 2013;8(9):e73730.

   https://doi.org/10.1371/journal.pone.0073730
8. Herdiana H, Cotter C, Coutrier FN, Zarlinda I, Zelman BW, Tirta YK, et al. Malaria risk factor assessment using active and passive surveillance data from Aceh Besar, Indonesia, a low endemic, malaria elimination setting with *Plasmodium knowlesi*, *Plasmodium vivax*, and *Plasmodium falciparum*. Malar J. 2016;15(1):468.

   https://doi.org/10.1186/s12936-016-1523-z
9. Singh N, Bharti PK and Kumre NS. Active v. Passive surveillance for malaria in remote tribal belt of Central India: Implications for malaria elimination. Pathog Glob Health. 2016;110(4-5):178-184.

   https://doi.org/10.1080/20477724.2016.1223920
10. Chaturvedi N, Krishna S, Bharti PK, Gaur D, Chauhan VS and Singh N. Prevalence of afebrile parasitaemia due to *Plasmodium falciparum* and *P. vivax* in district Balaghat (Madhya Pradesh): Implication for malaria control. Indian J Med Res. 2017;146(2):260-266.

    https://doi.org/10.4103/ijmr.IJMR_1538_16
11. Branch O, Casapia WM, Gamboa DV, Hernandez JN, Alava FF, Roncal N, et al. Clustered local transmission and asymptomatic *Plasmodium falciparum* and *Plasmodium vivax* malaria infections in a recently emerged, hypoendemic Peruvian Amazon community. Malar J. 2005;4:27.

    https://doi.org/10.1186/1475-2875-4-27
12. Prasad H. Evaluation of malaria control programme in three selected districts of Assam, India. J Vector Borne Dis. 2009;46(4):280-287.
13. Singh N, Dash AP and Thimasarn K. Fighting malaria in Madhya Pradesh (Central India): Are we losing the battle? Malar J. 2009;8:93.

    https://doi.org/10.1186/1475-2875-8-93
14. Available from: https://www.nvbdcp.govt.operationalmanual/urbanmalariaschemethirdedition 2017/districtmalariareportforJabalpur/2016-2017 [Last accessed on 2021 Dec 21].
15. Majumder S. Socioeconomic status scales: Revised Kuppuswamy, BG Prasad, and Udai Pareekh's scale updated for 2021. J Family Med Prim Care. 2021;10(11):3964-3967.

    https://doi.org/10.4103/jfmpc.jfmpc_600_21
16. Rasania SK, Bhanot A and Sachdev TR Awareness and practices regarding malaria of catchment population of a primary health Centre in Delhi. J Commun Dis. 2002;34(1):78-84.
17. Singh RK, Das MK, Dhiman RC, Mittal PK, Dua VK, Sreehari U, et al. Evaluation of indoor residual spray and insecticide treated bed nets in a malaria endemic area of Santhal Pargana, Dumka district (Jharkhand). J Commun Dis. 2012;44(3):169-179.
18. Dhawan G, Joseph N, Pekow PS, Rogers CA, Poudel KC and Bulzacchelli MT. Malaria-related knowledge and prevention practices in four neighbourhoods in and around Mumbai, India: A cross-sectional study. Malar J. 2014;13:303.

    https://doi.org/10.1186/1475-2875-13-303
19. Prakash A, Bhattacharyya DR, Mohapatra PK, Goswami BK and Mahanta J. Community practices of using bed nets and acceptance and prospects of scaling up insecticide treated nets in north-east India. Indian J Med Res. 2008;128(5):623-629.
20. Mishra SK, Satpathy R and Panigrahi P. Malaria awareness of village health workers from Sundargarh in Orissa-the state contributing half of the malaria-related deaths in India. Trop Doct. 2007;37(2):126-127.

    https://doi.org/10.1177/004947550703700234

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