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Original Research Article

A comparative study on awareness about malaria and dengue among the tribal and urban population of Madhya Pradesh

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ABSTRACT

Background: World health organisation (WHO) stresses the importance of education and public awareness of vector-borne diseases. The present study attempts to assess the knowledge, attitude and behavioral practices regarding clinical signs, symptoms, transmission and preventive measures of malaria and dengue.
Methods: One tribal (Barwani) and one non-tribal district (Indore) of Indore division of the state of Madhya Pradesh. These two districts were identified based on the simple random sampling technique using chit method of all the 8 districts covered under Indore division. Study design was cross sectional study. Study population were individuals more than 18 years of age from general population residing in Indore and Barwani districts of MP.
Results: The 78.1% study subjects did not know the type of mosquito responsible for transmission of malaria and 92.44% study subjects had no idea about the type of mosquito involved in dengue transmission. The 37.8% study subjects did not know the common breeding site of female Anopheles mosquitoes, 28.9% study subjects knew that stagnant clean water was the breeding site of female Anopheles mosquitoes and 54.7% study subjects had no idea about the breeding place of *Aedes* mosquito. Only 29.5% study subjects were aware that most frequent time of female anopheles bite was at dusk and dawn.
Conclusions: Awareness regarding the type of mosquito, its breeding place and biting time was poor. Knowledge regarding symptoms of malaria was better as compared to that of dengue. Awareness practice regarding source reduction was poor in study population.

Keywords: Malaria, Dengue, Awareness, Knowledge, Attitude, Behaviour practices

INTRODUCTION

According to WHO data, vector-borne diseases account for more than 17% of all infectious diseases, causing more than 700 000 deaths annually. They can be caused by parasites, bacteria or viruses.[1] With more than 100 countries reporting the presence of the disease and an estimated 100 million cases annually, dengue (DEN) incidence has increased thirty-fold over the past fifty years. DEN is a significant remerging arboviral disease. South East Asia is home to more than a billion people who are at risk of contracting DEN. India is known to have an endemic case of DEN; historically, outbreaks have mostly affected urban and semi-urban areas, but more recently, outbreaks have also been reported from rural areas across the globe.[2-4]

A crucial element in reducing the burden of vector-borne diseases is behavioural change. WHO stresses the

importance of education and public awareness, so that people know how to protect themselves and their communities from mosquitoes, ticks, bugs, flies and other vectors.[1] Madhya Pradesh has a tribal population of about 21%, which accounts for 14.7% of the nation's total tribal population. The main health issues affecting tribal people are hepatitis, hemoglobinopathies, tuberculosis, fluorosis, malaria, and other vector-borne illnesses.[5-6] The two important vector borne diseases affecting India in general and Madhya Pradesh in particular are malaria and dengue.

The best method for controlling mosquito breeding may be environmental control, particularly source reduction. To encourage community participation, public motivation through health education is necessary, as is typically legislation and law enforcement. To prevent mosquito bites, personal protective measures like mosquito nets, screening, repellents, anti-mosquito coils, and vaporizers are just as important as environmental control.[7-9]

The objective of the study was to assess the knowledge, attitude and behavior practices regarding clinical signs, symptoms, transmission and preventive measures of malaria and dengue among the general population of two districts of Madhya Pradesh.

METHODS

Study site

One tribal area (Barwani) and one non-tribal area (Indore) of Indore division of the state of Madhya Pradesh. These two districts were identified based on the simple random sampling technique to choose from all the 8 districts covered under Indore.

Study design

The study was a cross sectional study.

Study duration

The study was conducted for one year from January to December 2021.

Study population

Individuals more than 18 years of age from general population residing in Indore and Barwani districts of MP. Individuals more than 18 years of age from general population residing in Indore and Barwani districts of MP, who responded to questions regarding dengue and Malaria and their control measures and who gave written informed consent.

Inclusion and exclusion criteria

Residents must be under the age of 18, have lived in the village or tribal area for more than six months, and be willing to participate in the study in order to meet the linclusion criteria. Those who were unreachable even after three visits were not considered

Sample size determination

Assuming the prevalence of good awareness about dengue and malaria infection as 50%, along with absolute precision of 8%, the sample size was 157. Adding a non-response rate of 10%, the sample size arrived was 174. In our study a sample of 193 and 191 from tribal and non-tribal areas included respectively.

Study tools

Pre designed semi structure questionnaire for general population regarding knowledge attitude and behavior practices regarding clinical signs, symptoms, transmission and preventive measures of malaria and dengue among the general population in Indore and Barwani district. Data collection was done house to house in the selected villages.

Data analysis

The data was analysed with IBM SPSS version 22.0 Frequency and mean were calculated.

Ethical consideration

The study was conducted after getting approval from institutional ethics committee. Informed written consent was obtained from the study participants.

RESULTS

The study population were maximum in age group>51 years in Barwani whereas, study population were maximum in age group31-40 years in Indore. The 63.02% of interviewees were males, 36.97% were females. The 25.78% study population were illiterates, 22.92% were

Primary class passed 28.9% were secondary class passed and 22.39% were graduates and above. The 33.3% study population were dependents earning no income, 29.42% were earning >Rs. 15000.

The 99.73% of the study population have heard of malaria. The 81.5% study population were aware that transmission of malaria is by mosquito bite. The 78.1% study population did not know the type of mosquito responsible for transmission of malaria. The 28.9% study population knew that stagnant clean water is the breeding site of female *Anopheles* mosquitoes. Only 29.5% study population were aware that most frequent time of female Anopheles bite is at dusk and dawn. The 43.75% of study population were aware of the common symptoms of malaria, fever, headache and nausea among study subjects. The 42.7% study population were aware that specific and accurate treatment of malaria is available. Awareness was higher in Indore district as compared to

Barwani district. The 54.9 % study population thought that malaria is a preventable disease; awareness was higher in Indore district as compared to Barwani district. Statistically significant difference seen between Indore and Barwani regarding mosquito net and Mosquito coils and liquid vaporizer.

The 64.58% of the study population were felt that prevention of water stagnation reduces mosquito breeding sites. The 63.02% of the study population felt that changing water in storage tanks is effective in reducing the breeding site of mosquitoes. The 53.9% study population prefer mats, coils and agarbattis and only 15.10% study subjects prefer mosquito nets as a personal protective measure against mosquito bites. 26.04% study population thought that ITNs provide protection against all vector borne diseases like malaria, dengue etc, and 64.32% did not know about protection being provided by ITNs against other vector borne diseases. Among 58 ITN users, 89% actually liked using ITNs.

Table 1: Frequency distribution of participant's socio-demographic factors, (n=483).

Characteristics	Barwani (Tribal), n=193 (%)	Indore (Non-tribal), n=191 (%)	Total	P value
Age (Years)				
18-30	27 (14.)	49 (25.7)	76 (19.8)	0.005
31-40	47 (24.4)	56 (29.3)	103 (26.82)	
41-50	45 (23.3)	37 (19.4)	82 (21.4)	
≥51	74 (38.3)	49 (25.7)	123 (32)	
Gender				
Male	129 (66.84)	113 (59.16)	242 (63.02)	0.119
Female	64 (33.16)	78 (40.83)	142 (36.9)	
Education status				
Illiterate	49 (25.38)	50 (26.17)	99 (25.78)	0.063
Primary	49 (25.38)	39 (20.41)	88 (22.92)	
Secondary	62 (32.12)	49 (25.65)	111 (28.90)	
Graduate and above	33 (17.09)	53 (27.74)	86 (22.39)	
Income				
No income (dependant)	64 (33.16)	64 (33.5)	128 (33.3)	0.013
<3000	0 (0.0)	2 (1.0)	2 (0.5)	
3000-5000	1 (0.51)	12 (6.3)	13 (3.4)	
5000-10000	18 (9.32)	21 (11.0)	39 (10.2)	
10000-15000	50 (25.90)	39 (20.4)	89 (10.2)	
>15000	60 (31.08)	53 (27.7)	113 (29.4)	

Table 2: Knowledge about malaria among study population, (n=483).

Variables	Barwani (Tribal), n=193 (%)	Indore (Non-tribal), n=191 (%)	Total	P value
Heard of malaria				
Yes	192 (99.5)	191 (100)	383 (99.73)	1.000
No	1 (0.5)	0	10.3	
Transmission of malaria				
By fly bite	0 (0.0)	0 (0.0)	0 (0.0)	0.014
By mosquito bite	150 (77.7)	163 (85.4)	313 (81.5)	
Do not know	43 (22.3)	28 (14.6)	71 (18.5)	
Any other	0 (0.00)	0 (0.00)	0 (0.00)	
Type of mosquito responsible for transmission of malaria				
Aedes	1 (0.5)	0 (0.0)	1 (0.3)	0.035
Anopheles	33 (17.1)	50 (26.2)	83 (21.6)	
Do not know	159 (82.4)	141 (73.8)	300 (78.1)	
Breeding site of female *Anopheles* mosquitoes				
Running dirty water	5 (2.6)	15 (7.9)	20 (5.2)	0.004
Stagnant clean water	45 (23.3)	66 (34.6)	111 (28.9)	
Stagnant dirty water	60 (31.1)	48 (25.1)	108 (28.1)	
No idea	83 (43)	62 (32.5)	145 (37.8)	

Continued.

Variables	Barwani (Tribal), n=193 (%)	Indore (Non-tribal), n=191 (%)	Total	P value
Most frequent time anopheles of mosquito bite				
Day time	0 (0)	1 (0.26)	1 (0.26)	<0.0001
At dusk and dawn	52 (26.9)	61 (31.9)	113 (29.5)	
Night	109 (56.4)	64 (33.57)	173 (45.0)	
Do not know	32 (16.7)	65 (34.0)	97 (25.26)	
Knowledge about malaria symptoms				
Yes	82 (42.48)	86 (45.02)	168 (43.75)	<0.0001
No	12 (6.21)	57 (29.84)	69 (17.96)	
Do not know	99 (51.29)	48 (25.13)	147 (38.28)	
Availability of specific and accurate treatment of malaria				
Yes	69 (35.7)	95 (49.7)	164 (42.7)	0.005
No	124 (64.3)	96 (50.3)	220 (57.3)	
Malaria is a preventable disease				
Yes	101 (52.3)	110 (57.6)	211 (54.9)	0.027
No	0 (0)	5 (2.6)	5 (1.3)	
No idea	92 (47.7)	76 (39.7)	168 (43.8)	

Table 3: Perception of study population about breeding of mosquitoes, (n=483).

Variables	Barwani (Tribal), n=193 (%)	Indore (Non-tribal), n=191 (%)	Total	P value
Prevention of water stagnation reduces mosquitoes breeding sites				
Yes	120 (62.17)	128 (67)	248 (64.58)	0.321
No	0 (0.0)	0 (0.0)	0 (0)	
No idea	73 (37.82)	63 (32.98)	136 (35.42)	
Changing water in storage tanks weekly is effective in reducing the breeding site of mosquitoes				
Yes	120 (62.17)	121 (63.35)	242 (63.02)	0.478
No	0 (0.0)	0 (0)	0 (0)	
No idea	73 (37.82)	70 (36.64)	143 (37.23)	

Table 4: Awareness among about dengue among the study participants, (n=483).

Variables	Barwani (Tribal), n=193 (%)	Indore (Non-tribal), n=191 (%)	Total	P value
Heard of dengue				
Yes	173 (89.6)	175 (91.6)	348 (90.62)	0.504
No	20 (10.4)	16 (8.4)	36 (9.375*)	
Mode of dengue transmission				
By fly bite	8 (4.1)	9 (4.7)	17 (0.5)	0.012
By mosquito bite	123 (64.4)	151 (78.2)	274 (71.35)	
Do not know	62 (32.12)	31 (16.23)	93 (24.22)	
Type of mosquito involved in dengue transmission				
Female *Aedes*	5 (2.6)	20 (10.5)	25 (6.5)	0.002
Female *Anopheles*	1 (0.52)	2 (1.0)	3 (0.78)	
Female *Culex*	1 (0.52)	0 (0.0)	1 (0.26)	
No idea	186 (96.4)	169 (88.5%)	355 (92.44)	
Mosquito breeding place				
Clean and protected water containers	8 (4.1)	0 (0.0)	8 (2.08)	0.003
Closed drainages	1 (0.5)	0 (0.0)	1 (0.26)	
Open stored water containers and discarded items	74 (38.3)	91 (47.6)	165 (42.96)	
No idea (Do not know)	110 (57)	100 (52.4)	210 (54.69)	

Continued.

Variables	Barwani (Tribal), n=193 (%)	Indore (Non-tribal), n=191 (%)	Total	P value
Time of *Aedes* mosquito bite				
When the person is sleeping	2 (1)	7 (3.7)	9 (2.34)	0.691
Night time only	32 (16.6)	22 (11.5)	54 (14.06)	
When the person is awake	9 (4.7)	0 (0.0)	9 (2.34)	
Day time, throughout the day	61 (31.6)	64 (33.50)	125 (32.55)	
Do not know	89 (46.1)	100 (52.35)	189 (49.22)	
Dengue transmission-season				
Summer season	2 (1)	20 (10.5)	22 (5.72)	<0.0001
Rainy season	25 (13)	85 (44.5)	110 (28.65)	
Winter season	7 (3.6)	2 (1)	9 (2.34)	
Post rainy season	43 (22.3)	6 (3.1)	49 (12.76)	
Do not know	116 (60.1)	78 (40.8)	194 (50.52)	
Symptoms of dengue infection				
Sudden onset of high fever	3 (1.6)	12 (6.3)	15 (3.90)	<0.0001
Muscle and joint pain	3 (1.6)	18 (9.4)	21 (5.46)	
All of above (Sudden onset fever, muscle and joint pain)	30 (15.5)	41 (21.5)	71 (18.49)	
Do not know	157 (81.3)	120 (62.8)	277 (72.14)	

The 90.62% of study population heard of dengue infection. The 71.4% of study population were aware that dengue is transmitted by mosquito bite; awareness was higher in Indore district as compared to Barwani district. The 92.44% study population were not aware of mosquito involved in dengue transmission. Awareness was more in Indore as compared to Barwani district. The 54.7% study population were not aware regarding the breeding place of *Aedes* mosquito. Awareness regarding breeding place of mosquito was more in Indore district as compared to Barwani district. Only 32.5% study population had correct idea that *Aedes* mosquito bite during the daytime. Only 28.6% of the study population were aware that the dengue transmission is more in rainy season. Awareness was more in Indore district as compared to Barwani District. The 72.14% study population were not aware of the symptoms of dengue infection, while only a few (18.5%) aware of all symptoms of dengue. Awareness more in Indore district as compared to Barwani district.

DISCUSSION

In the present study, Individuals more than 18 years of age from the general population residing in Indore and Barwani districts of MP were interviewed regarding various aspects of dengue and malaria and their control measures.193 individuals were selected from Barwani and 191 were selected from Indore district for the study based on multi stage simple random sampling and were interviewed using inter personal interview technique.

The knowledge, attitude and practices regarding clinical signs, symptoms, transmission, and preventive measures of malaria and dengue among the general population was one of the key objectives. In the present study, study subjects were maximum in age group>51 years in Barwani whereas study subjects were maximum in age group 31-40 years in Indore. This finding was very similar to the study of Kumar et al found that the mean age of respondents was 38.5 years.[9] However, in that study 57.5% of respondents were females but in the present study 63.5% were males.

In the present study, 25.78% study subjects were illiterates, 22.92% were primary passed, 28.9% were secondary passed and 22.39% were graduates and above similarly in the study by Malhotra et al they found that total 30.80% of the respondents were illiterate out of which 16.5% and 45.25% were in rural and slum respectably.[10] In the present study, 33.3% study subjects were dependents without any earnings, 29.42% were earning >15000 rupees. Malhotra et al reported in her study that monthly income of majority of families in slums ranged from rupees 3000-5000 and in rural areas from rupees 5000-20,000.[10]

The present study found that 99.73% study subjects have heard of malaria and 90.62% of study subjects were aware of dengue as an infection. Almost similar findings were reported by Chinnakali et al where they found that 96.3% had heard about dengue. The 81.5% study subjects were aware that transmission of malaria was by mosquito bite and 71.4% of study subjects were aware that dengue was also transmitted by mosquito bite.[11] In a study by Poddar et al it was found that of all respondents 97.9% and 90.9% were aware of the transmission agent of both

malaria and dengue, respectively which was higher than the findings of present study.[12]

Present study shows that 78.1% study subjects did not know the type of mosquito responsible for transmission of malaria and 92.44% study subjects had no idea about the type of mosquito involved in dengue transmission. In the study by Poddar et al, only 7.3% and 23.3% could identify the vectors of malaria and dengue respectively.[12]

In present study 37.8% study subjects did not know the common breeding site of female anopheles mosquitoes, 28.9% study subjects knew that stagnant clean water was the breeding site of female anopheles mosquitoes and 54.7% study subjects had no idea about the breeding place of Aedes mosquito similarly study by Boratne et al in 2010 found that 290 (59.79%) male and 726 (61.06%) female respondents knew correctly about the breeding place for vectors of malaria and dengue.[13] In another study, by Mehta et al there was good knowledge about correct mosquito breeding places among 86.5% respondents.[14]

Only 29.5% study subjects were aware that most frequent time of female anopheles bite was at dusk and dawn; 45.0% responded that female anopheles bites at night. The 32.55% study subjects had correct idea about the timing of mosquito bite in dengue infection (Day time, throughout the day). The 50.5% study subjects had no idea about the season of *Aedes* mosquitos' abundance. Study by Mathania et al in 2016 found that 78.8% were not aware that early mosquito bites can transmit malaria and 86.5 % said that only midnight-biting mosquito bite was responsible for malaria transmission.[15]

The 51.3% study subjects were aware about the symptoms of malaria. The 43.75% of study subjects were aware of the common symptoms of malaria like fever, headache and nausea. The 56.3% study subjects were aware that high fever, chills, rigor, fever, shivering were features of malaria. As far as dengue was concerned, 72.14% study subjects had no idea about indicators of suspicion of dengue infection. The 64.8% study subjects did not know as to how to confirm the dengue infection. Ayub et al in 2015 found that only 75.87% and 70.29% were aware of the symptoms of malaria and dengue respectively.[16]

Our study findings revealed that 42.7% study subjects were aware that specific and accurate treatment of malaria was available. The 54.9 % study subjects were aware that malaria was a preventable disease. The 86.7% of the study subjects were aware that Smoke of neem items and cow dung cake drove away mosquitoes. The 75.3% of the study subjects were aware that mosquito coils and liquid vaporizer were useful against Mosquitoes. The 74.5% of the study subjects were aware that wearing long sleeved clothing was protective against mosquito bites. The 80.9% of the study subjects were aware that ITNs (impregnated mosquito nets) were useful protecting against mosquito bites. Among 58 ITN users, 89% actually liked using ITNs. Only 26.04% study subjects agreed that ITNs provide protection against all vector borne diseases like malaria, dengue etc.; 64.32% did not know about the protection provided by ITNs against vector borne diseases. Only 17.7% study subjects preferred ITNs over DDT spray as preventive measures. Similarly In the study by Kumar et al the common personal protective measures used were liquid mosquito repellents (HIT, All Out, Good Night, etc.) (55.7%), followed by mosquito nets (42.5%) and mats, coils, and agarbattis (30.2%).[9] Pandit et al reported that mosquito coil, mosquito mat, repellent, ITNs and traditional Neem leaf burning were the various methods of personal protective measures amongst the study participants.[17] In their study, most popular were mosquito coils (57%) followed by ITNs (39%). Similar findings were reported in other studies. For example, Snehlatha et al reported in their study that most popular method was mosquito coils in urban and rural areas; Babu et al from Orissa reported that76% of urban and 58% of rural households were using untreated bed nets.[18,19]

The 64.58% of the study subjects were aware that preventing water stagnation was necessary for the eradication of breeding sites of mosquitoes. The 63.02 % of the study subjects were aware that eradication of breeding site by changing water storage tanks was effective. In the study by Kumar et al 84.9% reported that they cleaned the water containers or stagnant water in their houses regularly.[9] The 34.9% of the study subjects considered that malaria can be a severe disease. The 52.8% study subjects believed that it was impossible to prevent malaria. 48.7% study subjects believed that malaria was a problem in their respective areas. The 28.38% study subjects believed that malaria prevention control was the collective responsibility of government and community.

The limitation of the study was the sampling done to choose the tribal area of the district was purposive sampling method.

CONCLUSION

In the general population, most of the study population have heard of malaria and dengue as an infection and were aware that it is transmitted by mosquitoes. However, awareness regarding the type of mosquito, its breeding place and biting time was poor. Only one third study subjects were aware that most frequent time of female anopheles bite is at dusk and dawn; less than half responded that female anopheles bites at night. Knowledge regarding symptoms of malaria was better as compared to that of dengue. Majority of study population seek appropriate medical care and prefer allopathic treatment in case children in family have any ailments. More than half of study subjects were aware to consult a medical doctor in case of a child presenting with fever (suspecting malaria) whereas majority study subjects

were aware to consult a doctor as a first action in case the child has fever (suspecting dengue). Majority of the study population used mats, coils and agarbattis and very few study subjects prefer mosquito nets as a personal protective intervention against mosquito bites but very few study subjects were aware of importance of ITNs in the prevention of vector borne diseases. Awareness and practice regarding source reduction was poor in study population.

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