

Evaluation of changes in the cognitive, affective, and psychomotor domains of learning following an interprofessional intervention for malaria and its control among the Bedia tribe, a particularly vulnerable tribal group, in rural Eastern India

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ABSTRACT

Background: The “Bedia” tribal people are found all over India; they are poor, illiterate, and confined culturally. In many parts of India, malaria, a disease caused by mosquitoes, is becoming more common. Raising awareness and educating people about it is the best method to stop disease and maintain good health. **Objective:** This study aimed to determine the perception, attitudes, and practices of a particularly vulnerable tribal group—the “Bedia”—in the rural region of eastern India. **Methods:** A questionnaire with 19 structured questions has been created. The Bedia participants received the questionnaire from us. They had already responded. The intervention took the form of several health education workshops that were created in response to the deficiencies identified in the pre-test assessment’s replies. The identical questionnaire used for the pre-test evaluation was given to each participant for the post-test who attended the training sessions. **Results:** The current study found that while the first cognitive domain question on malaria transmission was not statistically significant, changes in malaria breeding grounds, regions with higher mosquito numbers, and the source of information about malaria are. Their knowledge of the treatment for malaria and the agent used to treat it is statistically significant in the current study, but the fifth question on the most common symptom of malaria was not statistically significant. The answers to the questions about “What you will do if you see someone suffering from malaria,” “How much time was spent in the malaria control program,” “Malaria detection,” and “Regular usage of bed-nets” in the affective and psychomotor domains all had statistical significance. **Conclusions:** Our research on interventions to raise awareness of malaria in this tribal region of northern West Bengal, eastern India, bordering Bangladesh, was published for the first time to our knowledge. In the majority of the items from the cognitive, psychomotor, and affective learning domains, we have seen significant changes.

Keywords: Affective, cognitive, interprofessional, malaria, psychomotor

Introduction

The “Bedia” tribal people are found throughout India and are affected by poverty, uninformed, and confined culturally. Despite having a vulnerable health situation due to malarial morbidities,

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they disregard their diseases and do not visit primary care physicians when they are ill for various reasons, including poverty.^[1,2] Malaria, a disease spread by mosquitoes, is becoming prevalent throughout many regions in India. Plasmodium, the parasite that causes malaria, may be found in both human and animal blood and is usually transmitted to humans by infected mosquitoes.^[3,4]

India accounted for 58% of all malaria cases in the WHO's South-East Asia Region. Currently, according to the National Vector Borne Disease Control Program's official statistics, there are 400–1,000 annual deaths and 0.7–1.6 million confirmed cases of malaria in India. However, a study conducted by groups from the office of the registrar general of India, the Centre for Global Health Research at St. Michael's Hospital, and the University of Toronto, Canada, reported that malaria causes 205,000 malaria deaths per year in India before the age of 70 years (55,000 in early childhood, 30,000 at ages 5–14, and 120,000 at ages 15–69), with a cumulative probability of death from malaria before the age of 70 years of 1.8%. The study found that 90% of deaths occurred in rural areas, and 86% of those deaths occurred at home without any medical care.^[3,5-7] Beliefs and practices about malaria are often related to the culture of the community which can influence the control strategies. As a result, implementing culturally appropriate, long-lasting, and effective interventions requires understanding local knowledge and practices related to the disease.^[8,9] The best way to prevent disease and maintain good health is to raise awareness and educate people about it. Studies on knowledge, attitude, and practices showed that direct community involvement is crucial in avoiding the malaria problem.^[10-12] Community attitudes, perceptions, and beliefs regarding malaria symptoms, treatment, prevention, and control can affect attempts to combat the disease and are frequently underestimated in control efforts.^[13,14] A thorough review of the literature finds that there is very little information regarding the population's awareness, attitudes, and practices regarding malaria in the country's rural and tribal populations in particular. In the abovementioned context, this study was conducted to ascertain the knowledge, attitudes, and practices of a particularly vulnerable tribal group, specifically the "Bedia," in the rural area of eastern India, about malaria and its control. It also opens up the possibility of creating control programs by the primary care physicians who work in various regions of India.

Methods

This was a study of qualitative research intervention regarding awareness of a neglected tropical disease namely "Malaria" among the marginalized population in the predominantly tribal-populated rural neighborhood.

Study area

This study was carried out among the "Bedia" tribal folk at the village "Mahatopara", in Karandighi block, in the district Uttar Dinajpur, West Bengal, India.

Study period

This study was carried out for a period of 12 months from 21 December 2019 to 20 March 2020.

Questionnaire preparation

We created a questionnaire with 19 questions with input from the faculty of the medical education department at MGM Medical College and LSK Hospital in Kishanganj, Bihar. The study participants' native language, Bengali, was used to create this schedule. To ensure acceptance, time management, and feasibility, the instrument underwent pretesting on a subsample of 10 individuals in the relevant college's field practice region. Our research team members agreed that an assessment was disregarded if more than 5% of the data were missing or unanswered. Additionally, to validate the instrument, additional piloting was done if any inquiry went unanswered.

Different parts of the question

In this partially open-ended questionnaire, five questions were from socio-demography, viz., age, gender, educational status, occupation, and family income per month. Of the rest 14 questions, seven questions were prepared to assess the knowledge domain regarding malaria transmission; Four questions were made to assess the level of perception, and the rest three questions were made to assess practice or intended practice or reported practice. Out of 14 questions, eight were of multiple-choice questions (MCQ) type where multiple responses were allowed, five were of yes or no response type, and the rest one was an open-ended question.

Inclusion criteria

The study included all adult males and females who were willing to participate. A few Bedia society students who agreed to take part in the study were also included.

Exclusion criteria

The study excluded those who were really unwell and unwilling to participate.

Data collection

Data was gathered by asking them to assemble in a primary school inside the participants' rural neighborhoods. Each participant received a personalized explanation of the study, and their verbal informed permission was collected. The rigorous upkeep of anonymity, confidentiality, and protection of all collected data as well as its usage only for research was guaranteed to the participants. We gave the subjects a well-structured questionnaire. They had already responded. "Interview techniques" were employed for people who could not read or write, and responses were recorded in the questionnaire.

Intervention

The intervention aims to increase tribal people's cognitive, affective, and psychomotor awareness of malaria. During the

holidays, the training was delivered in the classrooms of the tribal area's primary school. The intervention consisted of a number of health education workshops, which were designed as an interprofessional approach including doctors, nurses, other healthcare professionals, and tribal members of the community in response to the shortcomings highlighted in the pre-test assessment's responses.

Post-test

The identical questionnaire that was used for the pre-test assessment was given to every participant in the training programs.

Data analysis method

We tabulated and examined all of the responses. The open-ended questions and responses were manually examined using content analysis.

Ethics committee permission

The Institute Ethics Committee (IEC) of the MGM Medical College and LSK Hospital, Kishanganj, Bihar, India, approved this study, and the trial was started after receiving approval from the institute's governing body. The Foundation for the Advancement of International Medical Education and Research Regional Institute at Manipal Academy of Higher Education (MAHE), Manipal, India, and the faculty members of Manipal University's FAIMER International Institute for Leadership in Interprofessional Education (MUFILPE) served as mentors for this study, which was carried out as a self-funded project as a continuation of the fellowship activities.

Results

There were 120 total participants of which 63 (52.5%) were men and 57 (47.5%) were women. Regarding their level of education, 23 participants had no formal education, 59 participants had completed primary school, 30 participants completed secondary school, 7 participants had completed higher secondary education, and one participant had completed graduation. In terms of their employment situation, 39 individuals were unemployed, 52 were non-skilled employees, 19 were skilled workers, and 9 were semi-professional workers. Regarding their family's monthly income, 69 of the participants had less than 2000 rupees, 28 had between 2001 and 4,000, 12 had between 4001 and 6000, 7 had between 6001 and 8000, 3 had between 8001 and 10,000, and one had more than 10,000 [Table 1].

The first question about the transmission of malaria was not statistically significant and was not in the 95% range of acceptance in terms of their replies to cognitive domain questions. The second question, which asked where malaria breeds, was statistically significant and had a 95% acceptance rate. Where more mosquitoes are found replies to the third question were statistically significant and in the 95% range of acceptance. Although responses to the fifth question about the primary symptom of

Table 1: Socioeconomic status of the participants (n=120)

	M number (%)	F number (%)	Total (in number)
Age group of the patient			
18–35 years	36 (30)	33 9 (27.5)	69
36–50 years	16 (13.33)	21 (17.5)	37
51–65 years	4 (3.33)	9 (7.5)	13
>65 years	1 (0.83)	0 (0)	1
Total	57 (47.5)	63 (52.5)	120
Education			
No formal education	9 (7.5)	14 (11.66)	23
Primary	31 (25.83)	28 (23.33)	59
Secondary	11 (9.16)	19 (15.83)	30
Higher Secondary	5 (4.16)	2 (1.66)	7
Graduate	1 (0.83)	0 (0)	1
Occupation			
Unemployed	16 (13.33)	23 (10.83)	39
Unskilled worker	23 (19.16)	29 (24.16)	52
Skilled worker	11 (9.16)	8 (6.66)	19
Semi-profession	6 (5)	3 (2.5)	9
Profession	1 (0.83)	0 (0)	1
Income of the family (Rs per month)			
<2000	31 (25.83)	38 (31.66)	69
2001–4000	13 (10.83)	15 (12.5)	28
4001–6000	7 (5.83)	5 (4.16)	12
6001–8000	4 (3.33)	3 (2.5)	7
8001–10000	1 (0.83)	2 (1.66)	3
>10000	1 (0.83)	0 (0)	1

malaria were not statistically significant and were not in the 95% range of acceptance, they were statistically significant to the fourth question about the source of information about malaria and were also in the 95% range of acceptance. The sixth question, which asked participants if malaria was curable, had statistically significant responses with a 95% acceptance rate. With a 95% acceptance rate, the responses to the seventh question about the treatment for malaria were statistically significant [Table 2].

The affective and psychomotor domain replies to the eighth question, "What you will do if you encounter someone suffering from Malaria," were statistically significant and had a 95% acceptance rate. With a 95% acceptance rate, the ninth question about malaria prevention received statistically significant responses. The tenth question asked respondents how much time they spent on the malaria prevention program and their replies were statistically significant with a 95% acceptance rate. The eleventh item was a dummy question; hence, the answers on the pre-test and post-test were identical. With a 95% acceptance rate, the responses to the 12th question about malaria detection were statistically significant. The responses on the pre-test and post-test were the same because the thirteenth item was likewise a dummy question. With a 95% acceptance rate, the responses to the fourteenth question addressing the regular usage of bed nets were statistically significant [Table 3].

Table 2: Questions of cognitive domain and responses Correct/Incorrect Answer

	Pre-test (%)			Post-test (%)		
	M	F	Total	M	F	Total
Question 1: How Malaria spreads						
Water	14	13	27	3	4	7
Food	11	19	40	2	3	5
Mosquito	29	27	56	51	55	106
Others	3	4	7	1	1	2
Correct Answer (Mosquito)	29 (24.17)	27 (22.5)	56	51 (42.5)	55 (45.8)	106
Incorrect Answer (Others)	28 (23.33)	36 (30.0)	64	6 (5.00)	8 (6.66)	14
P	5.79436			Statistically non-significant.		
Test statistic Z	5.822587			which is not in the 95% region of acceptance		
Question 2: The breeding place of Malaria						
Drain water	17	24	41	9	7	16
Stagnant water	31	27	58	45	49	94
Others	9	12	21	3	7	10
Correct Answer (Stagnant water)	31 (25.83)	27 (22.5)	58	45 (37.5)	49 (40.83)	94
Incorrect Answer (Other options)	26 (21.66)	36 (30.0)	62	12 (10.0)	14 (11.66)	26
P	0.0000272483			statistically significant		
Test statistic Z	1.195323			which is in the 95% region of acceptance		
Question 3: More number of mosquitoes are found in						
House	23	29	52	21	25	46
Bush	28	26	54	36	37	73
Tree	5	6	11	0	1	1
Others	1	2	3	0	0	0
Correct Answer (Bush)	28 (23.33)	26 (21.66)	54	36 (30.0)	37 (30.83)	73
Incorrect Answer (Other options)	29 (24.14)	37 (30.83)	66	21 (17.5)	26 (21.66)	47
P	0.0432751			statistically significant		
Test statistic Z	0.784492			which is in the 95% region of acceptance		
Question 4: Source of information about Malaria						
Doctor	21	16	37	34	38	72
Nurse	14	29	43	4	9	43
Newspaper	2	1	3	2	1	3
Radio	6	2	8	6	2	8
Television	9	3	12	9	3	12
Others	5	12	17	2	10	12
Correct Answer (Doctor)	21 (17.50)	16 (13.33)	37	34 (28.33)	38 (31.66)	72
Incorrect Answer (Other options)	36 (30.00)	47 (39.16)	83	23 (19.16)	25 (20.83)	48
P	0.0177119			statistically significant		
Test statistic Z	1.349678			which is in the 95% region of acceptance		
Question 5: A main symptom of Malaria						
Vomiting	13	9	22	1	2	3
Diarrhea	18	21	39	2	3	5
Fever	23	29	52	53	56	109
Others	3	4	7	1	2	3
Correct Answer (Fever)	23 (19.16)	29 (24.16)	52	53 (44.16)	56 (46.66)	109
Incorrect Answer (Other options)	34 (28.33)	34 (28.33)	68	4 (3.33)	7 (5.83)	11
P	4.40415			statistically not significant		
Test statistic Z	5.868251			which is not in the 95% region of acceptance		
Question 6: Is Malaria a curable disease?						
Yes (Correct answer)	52943.33)	55 (45.83)	107	54 (45.00)	58 (48.33)	112
No (Incorrect answer)	5 (4.16)	8 (6.67)	13	3 (2.50)	5 (4.16)	8
P	0.000011			statistically significant		
Test statistic Z	1.267392			which is in the 95% region of acceptance		
Question: 7 Name of medicine for Malaria						
Correct answer	27 (22.50)	22 (18.33)	49	49 (40.83)	53 (44.16)	102
Incorrect answer	30 (25.00)	41 (34.16)	71	8 (6.66)	10 (8.33)	18
P	0.00001			statistically significant		
Test statistic Z	1.662742			which is in the 95% region of acceptance		

Table 3: Questions of the affective and psychomotor domain and responses

	Pre-test			Post-test		
	M	F	Total	M	F	Total
Question 8: What you will do if you see someone suffering from Malaria						
Attend hospital (Correct answer)	37 (30.83)	39 (32.5)	76	51 (42.5)	49 (40.83)	100
Apply herbal medicines (Incorrect answer)	20 (16.66)	24 (20.0)	44	6 (5.0)	14 (11.66)	20
<i>P</i>	0.000015			statistically significant		
Test statistic <i>Z</i>	1.316845			which is in the 95% region of acceptance		
Question 9: Which measures are most suitable to prevent Malaria?						
Use mosquito bed nets	31	37	68	53	56	109
Use mosquito repellents	8	7	15	2	4	6
Insecticide spray	12	6	18	1	2	3
Use smoke by burning leaves, cow dung	6	13	19	1	1	2
Correct Answer (Use mosquito bed nets)	31 (25.83)	37 (30.83)	68	53 (44.13)	56 (46.66)	109
Incorrect Answer (Other options)	26 (21.66)	26 (21.66)	52	4 (3.33)	7 (5.83)	11
<i>P</i>	0.000219			statistically significant		
Test statistic <i>Z</i>	1.4158357			which is in the 95% region of acceptance		
Question 10: Can you spend time on a Malaria prevention program?						
Yes (Correct Answer)	14 (11.66)	17 (14.16)	31	52 (43.33)	59 (49.16)	111
No (Incorrect Answer)	43 (35.83)	46 (38.33)	89	5 (4.16)	4 (3.33)	9
<i>P</i>	0.000275			Statistically significant		
Test statistic <i>Z</i>	3.637307			which is not in the 95% region of acceptance		
Question 11: Did anybody in your family suffer from Malaria?						
Yes (Correct Answer)	8 (6.67)	9 (7.50)	17	8 (6.67)	9 (7.50)	17
No (Incorrect Answer)	49 (40.83)	54 (45.00)	103	49 (40.83)	54 (45.00)	103
Question 12: To detect Malaria where do you go?						
Doctor	28	34	62	48	55	103
Nurse	17	16	33	5	6	11
Others	12	13	25	4	2	6
Correct Answer (Doctor)	28 (23.33)	34 (28.33)	62	48 (40.00)	55 (45.83)	103
Incorrect Answer (Other options)	29 (24.16)	29 (24.16)	58	9 (7.50)	8 (6.67)	17
<i>P</i>	2.26104			Statistically not significant		
Test statistic <i>Z</i>	7.246886			which is not in the 95% region of acceptance		
Question 13: Have you ever informed Panchayet members to take necessary measures for the prevention of Malaria						
Yes (Correct Answer)	4 (3.33)	1 (0.83)	5	4 (3.33)	1 (0.83)	5
No (Incorrect Answer)	53 (44.13)	62 (51.66)	115	53 (44.13)	62 (61.66)	115
Question 14: Do you wish to use bed-net regularly						
Yes (Correct Answer)	32 (26.66)	37 (30.83)	69	52 (43.33)	54 (45.00)	106
No (Incorrect Answer)	25 (20.83)	26 (21.66)	51	5 (4.16)	9 (7.50)	14
<i>P</i>	0.033273			Statistically significant		
Test statistic <i>Z</i>	1.328423			which is in the 95% region of acceptance		

Discussion

Despite the availability of efficient prophylactic measures and antimalarial medications, the burden of malaria disease is rising in many nations. One of the key elements of effective malaria control is an awareness of community perceptions and practices. The study's objective was to determine how well the Bedia tribal community members understood how malaria spread and how to prevent it. The primary and most important steps in developing and putting into action a health program at the primary care level are knowledge, attitude, and practice assessment. Additionally, it aids in the creation of community-wide behavioral change strategies for the prevention of malaria that are feasible.^[15,16]

Although the first cognitive domain question on malaria transmission was not statistically significant, the changes regarding malaria breeding places, areas with higher mosquito densities, and the source of information about malaria are statistically significant in the current study. The fifth question on the predominant malaria symptom was not statistically significant, but their understanding of the curability of malaria and the agent used to treat it is statistically significant in the present study. In particular, malaria poses a serious public health threat in India's tribal regions. Malaria is preventable and curable if detected early and given the appropriate care, despite reports of high fatality rates in untreated cases. According to the study's findings, about 40% of respondents knew something about malaria, but even among them, there were muddled about

where the disease breeds, how it spreads, how it may be cured, and how to treat it.^[17-19]

The replies to the affective and psychomotor domain questions “What you will do if you see someone suffering from malaria,” “How much time was spent in the malaria control program,” “Malaria detection,” and “Regular usage of bed-nets” had statistical significance. As a result, it can be claimed that the intervention program, which took the shape of several health education workshops in their area, significantly altered the affective and psychomotor domain of learning of the tribal community.^[17-19]

Misconceptions about malaria vectors, breeding grounds, and transmission patterns have reportedly been documented as a result of misinformation and the improper application of preventive measures, which are indications of socioeconomic situation, a significant risk factor for malaria.^[20-22]

In the early stages of the study, it was not observed that the tribal people were using any kind of protective method to prevent mosquito bites. However, after the intervention phase, most respondents (86%) supported the use of bed nets and were doing so at night. The earlier research reported somewhat comparable results.^[23-25]

Malaria continues to have a significant negative impact on people’s health, well-being, and economy despite several attempts to control it. The main factors influencing the success of mosquito-borne disease control include community knowledge, awareness, and behaviors for prevention as well as an early care-seeking attitude. Concerning mosquito-borne diseases and their control in the community, there is a need to understand and improve current experience and understanding. To improve the cognitive, affective, and psychomotor domain of learning in the tribal society, which will in turn have an impact on the burden of disease, novel interventions such as actively incorporating members of the community in the propagation of health education messages must be considered.

Advantage of the research

The adoption of intervention programs through an interprofessional approach is advocated in this study. This will significantly decrease the workload for primary care physicians who serve as the community’s initial point of contact for ongoing medical care. Primary care physicians are expected to provide treatments, preventive care, and health education in addition to having a broad knowledge of all disciplines. The interdisciplinary cooperation of health and the local population will enhance their work.

In order to address the issues raised in the pre-test assessment’s responses and to improve the cognitive, psychomotor, and affective learning domains of the vulnerable Bedia tribal population, a number of health education workshops that included doctors, nurses, other healthcare professionals, and

tribal members of the community were designed which is unique and novel in this study.

Study limitations

This study’s limitations must be considered when interpreting the findings. First, self-reported data obtained through self-administered questionnaires and subject to bias has been used in our assessments of attitudes and practices concerning malaria.

Second, a specific cohort of tribal people, whose knowledge level is anticipated to be low, has been included in the study. They also receive informal education. As a result, the interpretation cannot be generalized to the wider population because of potential gaps in understanding and awareness.

With our best efforts, we have been able to raise malaria awareness among the tribal population members, especially those who had relatively better literacy levels. It is also challenging to devote more time and effort to this program in order to increase awareness among individuals who do not receive a formal education.

The future direction of the research

The long-term objective of the project is to launch comprehensive activities, such as environmental cleanups, to decrease mosquito breeding grounds by preventing standing water from lingering anywhere in exposed forms for longer than a week. Using mosquito bed nets on a regular basis can also help reduce cases of other mosquito-borne diseases such as dengue, filaria, Japanese encephalitis, etc. We want to proceed gradually in order to have a sustainable impact.

Conclusion

Our study on Malaria awareness intervention in this tribal belt of the northern part of West Bengal in eastern India bordering Bangladesh was reported for the first time to the horizon of our knowledge. It has been observed that a surprisingly high cognitive, psychomotor, and affective learning of malaria in the studied population. In the future, this initiative will receive greater attention and resources in order to raise tribal awareness among people who do not have a formal education.

Author contributions

UP: Subject concept development, Questionnaires development, Data collection, Data analysis, Article review, Article writing, and Editing of the final draft, and PP: Data management. Analysis of data and Editing of the final draft.

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Conflicts of interest

There are no conflicts of interest.

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