

An Epidemiological Investigation Report of Suspected Malarial Deaths in Two Blocks of District Garhwa, Jharkhand

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ABSTRACT

Background: Health care problems faced by migrant construction workers are always neglected. Seventeen patients were death due to malaria and complain of fever attributed in daily newspaper. **Objectives:** To find out more number of cases, the source of infection and to recommend necessary actions to control the outbreak. **Materials and Methods:** An epidemiological investigation and verbal autopsy of suspected deaths was conducted on 9th and 10th August 2017 in Ramkanda and Bhandariya blocks respectively. Sanitary survey and assessment of ecological correlation was also done. **Results:** Out of 13 deaths most were in the village Ramakanda, followed by Kurumdari in Block Ramkaand while four deaths were from village Gadhiya from Block Bhandariya is having an approximate population 72,637. In block Ramkanda, whereas in 6 days of August 2017 alone (including active surveillance), there were total 571 fever cases and Pf +ve and PV +ve were 42 and 25 respectively. So it's obvious that in such a short period of time i.e. 6 days, there is remarkable high number of Falciparum malaria cases. In Bhandariya block after the deaths were not available but on desk review of the available reports it was seen that in the last six months out of 3881 slides collected and tested for Plasmodium presence there were 29 Pf +ve slides and 155 Pv +ve slides. **Conclusion:** On client interview it was evident that most of the residents were reluctant to seek health care services from the HSCS or to reach the government system facility. They were more reliant on Quacks.

Key words: Malaria, Verbal autopsy, Sanitary survey, Pf, Pv.

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History

- Submission Date: 11-07-2018;
- Revised Date: 09-09-2018;
- Accepted Date: 06-02-2019.

DOI : 10.5530/ijmedph.2019.1.5

Article Available online

<http://www.ijmedph.org/v9/i1>

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INTRODUCTION

Malaria is a major global health problem and one of the most important infectious diseases in tropical and subtropical regions. In 2016, there were an estimated 216 million cases of malaria, an increase of about 5 million cases over 2015. Deaths reached 445 000, According to the World health report 2017, fewer than half of the 91 malaria-affected countries and territories are on track to achieve the 2020 milestone of a 40% reduction in case of incidence and mortality.¹ Malaria is a potential medical emergency and should be treated accordingly. Delays in diagnosis and treatment are leading causes of death in many countries.² In India about 21.98 percent population lives in malaria high transmission (>1/1000population) area and about 67 percent in low transmission (0 – 1 case/1000 population) area.³

According to NVBDCP report 2016 in India, out of total blood slide examined (121347618) total malarial cases were 840838 which included Pf cases 533481. In Jharkhand, total blood slide examination was done of 10163735 and Pf cases were 1118, out of total malarial cases 6529. Death due to malaria was 103 in India.⁴

Malaria is an arthropod vector borne disease. It is caused by different species of Plasmodium and transmitted by Anopheline mosquito. In India, 50% of infection due to *P. falciparum* and rest due to *P. vivax*,

P. ovale, *P. malariae*. Falciparum malariae is more complicated and leads to fatal conditions. Transmission is seasonal with increased intensity related to rains.⁵ The need for effective and practical diagnostics for global malaria control is increasing, since effective diagnosis reduces both complications and mortality from malaria. Differentiation of clinical diagnoses from other tropical infections, based on patients' signs and symptoms or physicians' findings, may be difficult. Therefore, confirmatory diagnoses using laboratory technologies are urgently needed. Many a times due to lack of reliable diagnostic modalities deaths unrelated to malaria are assigned to malaria giving fodder for media and other local bodies to raise their concerns about malaria being on rise.⁶

One such incident happened in state of Jharkhand district of Garhwa, in the month of July 2017, local dailies e.g. Hindustan and Prabhatkhabar attributed about 19 deaths of which majority were in villages Ramkanda and Bhandariya of Garhwa district due to malaria. Following this, state health department came into action and ordered for epidemiological investigation of these suspected deaths due to malaria. An epidemiological investigation team was formed under the Jharkhand NVBDCP comprising of state

Cite this article : Rana RK, Kumar R, Kashyap V, Karn P, Kumar S. An Epidemiological Investigation Report of Suspected Malarial Deaths in Two Blocks of District Garhwa, Jharkhand. Int J Med Public Health. 2019;9(1):20-3.

consultant and public health experts from RIMS Ranchi to investigate the disease outbreak and suspected deaths.

MATERIAL AND METHODS

Table Exercise

Mobile communication with Civil Surgeon and NVDCP District Consultant was done prior to the visit. On day one of visit (09th August), the team decided to move straight to the field prepared with all relevant epidemiological indices like past trend of Malaria in the Ramkanda block, ABER, API index etc. collected from relevant block officials and other personnel. Ramkanda block of Garhwa District comes under CHC Ranka and is an additional PHC, having 3 HSCs namely Ramkanda, Gobardaha and Udaipur. The estimated population of Ramkanda is 55000 with about 9000 households. On reaching PHC Ramkanda we found a camp running in the PHC and fever cases were investigated using RDTK.

After meeting with local PRI members, MPW workers, MOIC in Charge, Local Medical Officer and other members we went to the Tolas where deaths were reported.

Visit to Bhandariya Block was done on day two of the visit i.e. 10th of August where desk review of the important indicators was done with Medical Officer in Charge. After this we moved to the affected village Gadhiya. The affected village was about 20 kms from the CHC Bhandariya and nearest HSC was also at a distance of 10kms amidst dense forestation. Local SAHIYA helped us to reach one of the deceased house. There we also saw the camp being organized with collection of slides for Fever cases.

An epidemiological investigation and verbal autopsy of suspected deaths was conducted on 9th and 10th August 2017 in Ramkanda and Bhandariya blocks respectively.

The steps taken during the epidemiological investigation were

1. Identify investigation team and resources
2. Establish existence of an outbreak
3. Verify the diagnosis
4. Construct case definition
5. Find cases systematically and develop line listing
6. Perform descriptive epidemiology/develop hypotheses
7. Evaluate hypotheses/perform additional studies as necessary
8. Implement control measures
9. Communicate findings
10. Maintain surveillance.

Verbal autopsy was done to know the cause of deaths in the area from the family members of deceased ones or treating physician or health workers in the community.

Key-interviews of community leaders, local media and frontline health workers regarding malaria or related diseases which may have been the cause of deaths.

RESULTS

Out of 13 deaths most were in the village Ramakanda, followed by Kurumdari in Block Ranka and while four deaths were from village Gadhiya from Block Bhandariya. Block Bhandariya is having an approximate population 72,637. All affected villages were more than 40 kms. approx. from District Headquarters. All the affected villages are primarily inhabited by primitive tribal groups and underprivileged communities. The inhabitants were largely uneducated and lacked awareness about the diseases and their genesis. The area is having dense vegetations and water bodies in the form of ponds and shallow wells which serve as potential sources of breeding sites for mosquitoes. Team was also able to find active source of breeding in the NADIYA, Open Pots and pooled water in open man-made drains, etc. In the village of Gadhiya which is about 15 kms from the CHC Bhandariya and is in between dense jungle, the inhabitants don't want to go far for health treatment, being more dependent on the Sahiya and local quacks. They

primarily depend on local aid for cutting on out of pocket expenses incurred during travelling to their health facilities. During the verbal autopsy one name earlier listed as female was changed to male. In most cases, inappropriate management of disease like Snake Bite, Malnutrition, Pain Abdomen etc have resulted in mortalities. (Table 1) The frontline line health workers of the affected villages "SAHIYA" were given training for IRS(Indoor Residual Spray) and were instructed to perform the IRS activity but during monitoring by the team it was found that the houses were not having line listing on the walls, interiors were not having visible signs of IRS in the village of Ramkanda. While same activity done in the village of Gadhiya was found as per norms.

Also, of note is the fact that though investigation of fever cases using RDTs were done in Ramkanda but no slides were being made. The active surveillance in the area of maximum death Ramkanda village depicts the following situation.

Details of the Slides collected and their results.				
S.no	Dates	No. of patients fulfilling case definition	PF +ve	PV +ve
1.	02/08/17	26	01	02
2.	03/08/17	51	05	00
3.	04/08/17	10	00	02
4.	05/08/17	57	10	05
5.	06/08/17	167	13	02
6.	07/08/17	260	13	14
Total		571	42	25

Case definition for Rapid Diagnostic Kit

Any person having fever in the last 15 months or the family members where death has occurred.

Note PF: *Plasmodium falciparum*, PV: *Plasmodium vivax*.

Tests were done using Rapid Diagnostic Kit (RDK).

On analyzing the data of CHC Ranka, it was found that out of total fever cases (8893) during Jan-June 2017, Pf +ve and Pv +ve were 39 and 472 respectively. Whereas in 6 days of August 2017 alone (including active surveillance), there were total 571 fever cases and Pf +ve and Pv +ve were 42 and 25 respectively. So, it's obvious that in such a short period of time i.e. 6 days, there is remarkable high number of Falciparum malaria cases as evident in the above table.

The data of slides result conducted in Bhandariya after the deaths were not available but on desk review of the available reports it was seen that in the last six months out of 3881 slides collected and tested for Plasmodium presence there were 29 Pf +ve slides and 155 Pv +ve slides.

The verbal autopsy of the suspected deaths due to malaria of Ranka and Bhandariya block:

DISCUSSION

A report of outbreak investigation by Dr. Ragini and et.al, investigate 3 block of Gaya district Tekari, Town block and Paraiya block. Highest slide positive rate was in Tekariblock (79.76%) And also slide falciparum index (8.13%) and slide vivax rate (69.9%) was highest in Tekari block. Case of falciparum malaria were 10.20%, 3.97% and 1.28% in block Tekari, Town and Pariaya respectively.⁷

Outbreak investigation by Dr. Dewesh Kumar in two district of Jharkhand (west Singhbhum and Garhwa), 338 case out of 1002 patient were positive for *Plasmodium falciparum* positive (Pf +ve) and 12 patients were *Plasmodium vivax* positive (Pv +ve), in the affected areas of Khuntpani block of west Singhbhum. In Dhurki block of Garhwa district, 65 cases

Table 1: Line Listing of Patients along with details of the diseases.

Sl. No.	Age (year)	Gender	CHC	HSC	Village	Complain	Fever	RDT	Name of Hospital where treated	Remarks
1	60	M	Ranka	Ramkanda	Ramkanda	Abdomen pain, Fever, Yellowish eye	yes	no		treatment under Quack Practitioner
2	46	F	Ranka	Ramkanda	Abdomen pain, Vomiting, Yellowish eye	No	no			treatment under Quack Practitioner
3	46	M	Ranka	Ramkanda	Weakness, Abdomen pain, low blood	No	no			treatment under Quack Practitioner and Plasmodium antigen raport positive by Medal lab on date 29/7/2017
4	6	M	Ranka	Ramkanda	Abdomen pain, Fever, weakness	yes	no			treatment under Quack Practitioner
5	68	F	Ranka	Ramkanda	fever, weakness, Headache	yes	no	Sadar hospital, Daltonganj		Plasmodium antigen raport positive and STFOH positive by Medalabon date 25/7/2017 , Death certificate From Tumbagarh on date @/7/2017
6	60	F	Ranka	Ramkanda	Fever, Weakness	yes	no			treatment under Quack Practitioner
7	1	F	Ranka	Ramkanda	Bodyache , Cough and Cold	yes	no			treatment under Quack Practitioner
8	60	M	Ranka	Ramkanda	sudden pain i n Chest	No	no			De a that Home
9	62	M	Ranka	Gobardaha	sudden pain i n Chest	No	no			De a that Home
10	6	M	Ranka	Gobardaha	Fever, Bodyache, cough and cold	yes	no			treatment under Quack Practitioner
11	9	M	Ranka	Udaipur	Abdomen pain, Fever, Yellowish eye, cough and	yes	no			treatment under Quack Practitioner
12	5	M	Ranka	Udaipur	Abdomen pain, Fever, Yellowish eye, cough and	yes	no			treatment under Quack Practitioner
13	22	F	Ranka	Bandu	Fever, Vomiting, yellowish eye, weakness,	yes	no			treatment under Quack Practitioner
14	55	M	Bhandariya	Madgarhi	Abdomen pain, Vomiting, Yellowish	No	No			De a that Home
15	14	M	Bhandariya	Madgarhi	weakness, cough and cold, diabe tes	No	No			treatment under quack practitioner
16	13	M	Bhandariya	Madgarhi						snake Bite
17	10 mnth	F	Bhandariya	Madgarhi	fever, cough and cold, Breathlessness	yes	no			treatment under quack practitioner

out of the total of 631 patients were PF +ve and 23 patient were Plasmodium vivax positive.⁸

CONCLUSION

From the line list of the deaths it can be said none of the death were solely due to malaria while out of 17 deaths only two had a rapid diagnostic test done that too without *Plasmodium falciparum* or *Plasmodium vivax* classification. On client interview it was evident that most of the residents were reluctant to seek health care services from the HSCs or to reach the government system facility. They were more reliant on Quacks. IEC activities like posters, Micing for making residents aware about the malaria and its occurrence was not seen. LLINs were still not made available to all the residents of the affected village of Ramkanda. Till date in Ramkanda no slides were being collected somehow shows laxness in the approach. Based on these we recommend the following

1. Surveillance must be continued to control the situation without any complacency.
2. LLINs use should be strongly implemented and awareness must be spread to check any misuse of these LLINs.
3. Follow-up of patients undergoing treatment to monitor the condition of patients, observe the compliance and ensure the effectiveness of the treatment.
4. Active steps must be taken for environmental manipulation of the potential breeding sites along with educating the locals about keeping their surroundings free from mosquito breeding sites.
5. Advocacy must be done for biological control of vectors.
6. Deployment of health workers from different areas to tackle the situation more efficiently provided the work in the high-risk areas is not affected.
7. Travelling history is significant, hence the health officials of the area travelled by the deceased population must be informed to take appropriate steps which will help them to avert similar situation.
8. Provision should be made for insect collection to find out the mosquito type prevalent in the area.
9. National Institute of Malaria Research may be involved to find any new species of Plasmodium (*P. knowlesi*) outbreak or any change in genetic variation.
10. Involvement of medical colleges to provide their technical expertise in such situations and a follow up visit of this area to get more insight of the situation.
11. Systems thinking Approach for Logistics arrangement and other necessities right from including the condition of the travel vehicle to hotel stay etc need to be taken care before planning a visit.
12. Local Team Coordination in the wake of various programs simultaneously needs to be done.

ACKNOWLEDGEMENT

We thanks director-in-chief of health services of Jharkhand, district civil surgeon and local people for support in investigation.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ABBREVIATIONS

NVBDCP: National vector Borne Disease Control Programme; **Pf**: *Plasmodium falciparum*; **Pv**: *Plasmodium vivax*; **RIMS**: Rajendra Institute of Medical sciences; **ABER**: Annual Blood Examination Rate; **API**: Annual Parasite Incidence; **HSC**: Health Subcentres; **PHC**: Primary Health Centre; **CHC**: Community Health Centre; **RDTK**: Rapid Diagnostic Test Kit; **PRI**: Panchayati Raj Institution; **MOIC**: Medical Officer in Charge; **MPW**: Multi Purpose Worker; **IRS**: Indoor Residual Spray; **LLIN**: Long Lasting Insecticidal Net.

SUMMARY

The study was done to find out the death due to suspected malaria in two block of Garhwa district. Total 13 death in Ramkanda block and 4 death in Bhandariya block. An epidemiological investigation and verbal autopsy of suspected deaths to know the cause of deaths in the area from the family members of deceased ones or treating physician or health workers in the community. Only two had a rapid diagnostic test done that too without *plasmodium falciparum* or *plasmodium vivax* classification. All the affected villages are explore and the inhabitants are uneducated and lack awareness about the diseases and their health. The area is having dense vegetations and water bodies in the form of ponds and shallow wells which are potential sources of breeding sites for mosquitoes. Team was also able to find active source of breeding in the NADIYA, Open Pots, Pooled water in open man made drains etc.

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