VALUABLE OF LONG-LASTING INSECTICIDAL NETS (LLINS) USE AND AWARENESS IN BAIGA TRIBE OF PARTICULARLY VULNERABLE TRIBAL GROUP (PVTG): A CROSS-SECTIONAL STUDY ON LAND AND HILLY VILLAGES OF CENTRAL INDIA

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Abstract

Background & objectives: Although the known valuable of long-lasting insecticidal nets in providing safety against malaria. Just about 3149 LLINs were distributed in 2018 as an intervention implement against malaria spread in 8 villages under sub health centre Chiyadand, primary health centre Chirpani of Pandaria sub-district, Kabirdham district in Chhattisgarh, India. This present study assessed effect of positive cases at two different ecological parts (Hilly and Land) after LLIN distribution, IEC and explanation determinants.

Methods: This study was done to become aware of high risk of malaria in Particularly Vulnerable Baiga Tribe and categorize the geographic risk factors. A cross-sectional village study was in 8 study villages of different locality compare between the years 2017 to 2019. Each village's household surveyed where people suffer to fever using M1, interviewed with travel history of Positive cases using M3 and LLIN monitoring format structured according NVBDCP guidelines.

Results: 738 households of Baiga tribes out of 1131 households were distributed LLIN in 8 villages. Total 65% baiga tribe is live at study villages. In 2017, 785 Malaria positive (499 in hilly villages and 286 in land villages) cases in the households during the survey and in sub health centre while In 2018, only 149 cases founded (43 in hilly villages and 106 in land villages) just about 81% positive cases decreased. In 2019, only 34 positive cases (19 in hilly villages and 15 in land villages) reported just 22.81% positive cases decreased after LLIN distribution.

Interpretation & Conclusion: Health education campaigns and creating awareness about the benefit of sleeping under the LLINs in providing safety all the members of the family to have an epidemiological impact of this intervention at the community level.

Keywords: Long-lasting insecticidal nets (LLINs), Particularly vulnerable tribal group (PVTg), Baiga, Hilly & land villages, NVBDCP, Chhattisgarh, India,

INTRODUCTION

Globally a target of a 90% reduction in malaria incidence and mortality has been set for 2030[21]. Therefore, routine monitoring, surveillance for LLIN use and regular community education and awareness campaigns may be vital to carry on the utilization and to optimize the protective effect of LLINs. Since 2009, India has initiated scaling up of LLIN interventions under the National Vector Borne Disease Control Programme (NVBDCP) to control malaria in endemic state[8]. Focuses on is

amplification surveillance by use of bivalent rapid diagnostic tests (RDT), ACT, positive follow-up, case management, distribution of LLINs, indoor residual spraying (IRS) of insecticide, vector collection and mass screening in the "National Strategic plan Malaria Elimination in India" (2017–2022)[10]. The Government has to abide by the Global Technical Strategy for Malaria (2016–2030) to attain the long-term goal of worldwide malaria elimination and eventual eradication[9]. India has a more complex geographic country with different ecological system and malaria prevalent [21]. Particularly among tribal residents has minor researched for affect LLINs access and use reasons for attrition with malaria. Chhattisgarh is one of the tribal-populated states (33%) in the country, contributing 25% of total reported malaria cases in India[21]. Baiga is a one of the PVT out of 5 PVTg of Chhattisgarh[23]. This study was undertaken to assess the valuable of Long – Lasting Insecticidal Nets (LLINs) use and awareness in Baiga Particularly vulnerable tribal group (PVTg) and investigated their role of use and non use of LLIN and compared malaria positive cases in hilly and land area in the 8 village's population of Chiyadand Sub-health centre, Pandaria sub-district, Chhattisgarh, India. This study was implemented as part of the National Vector Borne Disease Control Porgramme (NVBDCP). Therefore, this study aimed to explore the use of LLINs by Baiga tribe at the hilly and land in 2 malaria-endemic sub district in Kabirdham district.

MATERIAL & METHODS

Study area and population

This study was done to become to get more aware of high risk of malaria in particularly vulnerable Baiga Tribe and categorize the geographic risk factors. The study was conducted in the 8 forested villages (Chiyadand, Guda, Bhinsadabra, Manjholi, Marradabra,Teliapani Ledra, Tingadda, Ajwain Wah) in different locality of one sub health centers Chiyadand under Chirpani Primary Health Centre from sub-district Pandaria, with a total population of 5655 in 1131 households whose covered by LLINs. 4 hilly and 4 land villages out of 8 study villages are predominantly inhabited by the 'Baiga' Primitive Vurnable Tribe (PVTg) 65% population and basic livelihood depends is primarily based on collection and selling of forest products[21].

Data collected by primary health worker showed that the annual parasite incidences (API) more than 15 in all 8 study villages in 2017, with higher API in 4 hilly villages (Marradabra,Teliapani Ledra, Tingadda, Ajwain Wah, above 184 API) compared to other 4 land villages (Chiyadand, Guda, Bhinsadabra, Manjholi). Since 2017, active and passive surveillance for malaria had been conducted every month in all the study villages with public awareness.

DEMOGRAPHIC DATA COLLECTION

A community- wide cross-sectional study for malaria infection was in the whole year 2017 to 2019. Demographic information such fever history, age, gender categories was collected from the head of the family or other members of family at the time of survey on the M1 register and positive cases out of all test recorded on the M3 register[10].

Case definitions

Blood sample collection during the house visit, blood was collected for bivalent rapid diagnostic tests (RDT) (Bio-standard Diagnostic Pvt. Ltd, India) from each suspected person, with a finger prick[9-10,21]. All the RDT positives were treated immediately at the time of collection. Complete treatment of all positive cases was ensured by the mitanin, village health workers and cross-checked by the supervisors and consultant with the following such as LLIN uses, fever and travel history taken of another member of home, observation atmosphere of home, check source of mosquitoes and given information about safety for malaria. Case follow-up is most important factor for decrease positive cases and mortality with community awareness in study villages.

LLINs distribution Three different size (Size 1- white color, size 2- Green color, size 3- Blue color) of LLIN distributed in 8 study villages with packet were provided by the State Health Department for distribution[5-10]. Based survey, household list with total family members was prepared and then

number of nets a household would receive was determined. 3149 nets were distributed in 1131 household covering 5655 of population in all the study villages. 3 LLINs were distributed in each Primitive Vurnable Tribe (PVTg) Baiga family. At the time of net distribution, a printed handbill and monitoring card on use and care of LLINs was provided and study questionnaires adapted from LLIN monitoring card[5-10].

Mosquito Collection

Mosquito collections were made from Malaria Positive member's home, human dwelling, cattle shade and another near home during the field visit or early morning[2,4,10]. Anopheles culicifacies is the primary vector in the study area. Mosquito identified by folding magnifier 10x lens.

Table 1 Year wise Malaria incidence in 4 land study villages

Land Village	Chiyadand			Bhainsadabra			Manjholi			Guda		
Year	2017	2018	2019	2017	2018	2019	2017	2018	2019	2017	2018	2019
Population	797	830	924	523	544	606	1256	1307	1456	560	582	649
BSE	684	400	252	283	151	263	838	1477	259	251	108	273
TPC	148	7	0	21	2	3	107	95	5	10	2	0
Pv	16	0	2	4	1	2	14	22	0	3	0	0
Pf	131	7	3	17	1	0	92	73	3	7	2	0
Mix	1	0	2	0	0	1	1	0	2	0	0	0
TPR	21.64	1.75	2.78	7.42	1.32	1.14	12.77	6.43	1.93	3.98	1.85	0
API	185.6	8.44	7.57	40.17	3.68	4.95	85.2	72.69	3.43	17.87	3.43	0

Table 2 Year wise Malaria incidence in 4 Hilly study villages

Hilly Village	Tingadda			Teliapani Ledra			Marradabra			Ajwain Wah		
Year	2017	2018	2019	2017	2018	2019	2017	2018	2019	2017	2018	2019
Population	352	367	408	590	614	684	471	490	546	551	574	639
BSE	439	73	281	894	569	321	514	186	186	319	104	291
TPC	102	3	3	143	16	11	152	11	1	102	13	4
Pv	4	2	0	12	0	4	8	3	0	7	3	2
Pf	98	1	2	131	16	5	141	8	1	95	10	1
Mix	0	0	1	0	0	2	3	0	0	0	0	1
TPR	23.23	4.11	1.07	16	2.81	3.43	29.57	5.91	0.54	31.97	12.5	1.37
API	289.6	8.18	7.35	242.3	26.05	16.08	322.9	22.46	1.83	185	22.66	6.26

Larvae Source Reduction

Larvae Source reduction activities in study villages with solution of 1.5ml temephoes 50% insecticide include in 10 liter water on store water place container like as cooler, cement plastic water tank at home used by health worker[2,4,9,10].

Larvaeourus Gambusiya Fish release in Ponds

Larvaeourus Gambusiya fish left in ponds of study villages. It controlled source of mosquitoes. VBD Technical Supervisors are monitor at time of field visit[2,4,9,10].

Mass Screening and treatment asymptomatic cases

Mass screening activities was major role for reduce malaria transmission in community in whole year. In Dec 2018, conducted mass screening at one Hilly village Teliapani Ledra and one land village Manjholi only 3 asymptomatic malaria positive cases detected out of 1395 screening[9-10].

STATISTICAL ANALYSIS

All data were entered in Excel sheet for analysis. Chi square (χ^2) test of MEDCLAC statistical table was performed to assess the difference in type of Malaria cases in the study population. Hilly and land villages results were compared[22].

ETHICAL CLEARANCE

Informed consent was obtained to the head of households to take of LLINs before 2-4 days of distribution. This study was undertaken as a part of a NVBDCP and ethical clearance was obtained from the National Health Mission, India[2,5,7,9,10].

RESULTS

Study population demography

The present study was conducted in the whole year by 2017 & 2019. From eight bordering villages under one sub health centre, 738 baiga households from 8 villages were recruited in this study. Nearly 65% baiga household of the total household of 1131 was covered in the survey. The majority of the baiga population in 8 study villages was 3690 population covered, nearly 70-80% households reported LLIN use for sleeping which varied between villages. In 2017, at the time of the survey or clinical test at health centre nearly 51% of the hilly village's individuals were reported fever. 65% positive cases reported out of total positive cases (785 cases) in 4 hilly villages while only 35% reported by 4 land villages. But after distributed LLIN In 2018, 30% of hill village's individuals were reported fever. 21% decrease fever cases as compare between 2017 & 2018. In 2018, 29% positive cases reported out of total positive cases (149 cases) in 4 hilly villages. 36% decrease positive cases in hilly villages as compare between 2017 & 2018. In 2019, total only 34 positive cases (1.59%) reported in all 8 villages out of 2126 screening. LLIN is most effect full tools for decrease Malaria cases with for awareness using LLINs in study village community that was major different between three year report[7,11,12,13,15,16,18,19,21]. 738 baigs families were beneficiaries for 2214 LLINs using. When the number of malaria cases in the four hill villages was very high, there was a cut in awareness of the usefulness of LLINs, prevention of malaria disease in the community of the villages below the hill, due to this, in the year 2018, more malaria cases were found in the land villages than in the hill villages[20]. Rapid action was taken on the awareness of the usefulness of mosquito nets in 8 villages and prevention of malaria, as a result of which only 35 malaria cases were detected in the year 2019. There is significant relation between the type of Malaria in Hilly and Land Villages in all three year malaria cases while no significant different between the type of Malaria and year wise.

Table 3: Socio-demographic, clinical characterstics and Determinants asociated with LLIN use among study population (n=5655) from households with ≥ 1 LLIN (n = 1131) per house

Variable name	Category	Total	Frequency %/ incidence
Household	Baiga	738	738/1131 (65.25)
Population	Baiga	3690	3690/5655 (65.25)
LLIN availability (n=3149)	Size 1	500	15.88
	Size 2	2392	75.96
	Size 3	257	8.16
Number of LLIN per HH		1131	2.78
Number of LLIN per Baiga HH		738	3
LLIN availability in Baiga Population		2214	70.31
Positive Cases (n=968)	Hilly villages	561	58.38
	Land villages	407	42.35
API (Year 2019)	Hilly villages		8.34
	Land villages		2.20
Mean	Hilly villages	19	6.33
	Land villages	15	5.00
Indoor Residual Sprayed (Year 2019)	Home		989/999 (99%)
	Room		3572/ 3996 (89.38%)
Mass Screening	Each Hilly & Land Village		1395/1892 (73.73%)
Gambusiya fish release	Ponds	7	100
Mosquitoes Collection	Positive House/ cattle shade		27/64 (42.18%)

Situation of malaria in the study villages

In three year compile report 968 (10.28%) persons were positive for malaria (either P. falciparum, P. vivax or mix malaria) out of 9416 screening. Distribution of type of malaria was P. vivax 109, P. falciparum 845 and 14 mix infection. Village Manjholi reported 21.38% positive case out of total positive cases while village Guha only 1.23% positive case reported. Nearly overall three year data of the malaria cases were contributed by Hilly villages 13.4% positive case (561) found put of 4177 screening while in land villages 7.77% positive cases (407) found out of 5239 screening.

Table 4 Determined in all three year (2017,2018,2019) data of Malaria cases in Hilly and Land villages

Type of Malaria	Pv	Pf	Mix	df	Chi-square	Significance relation
Hilly Villages	45	509	7	4	$\chi^2 = 3.86$	Null Hypothesis
Land Villages	64	336	7	4	$\chi^2 = 1.14$	Null Hypothesis
Hilly & Land Villages	109	845	14	2	$\chi^2 = 6.75$	Alternative Hypothesis

Null Hypothesis: There is no significant different between the type of Malaria and Year wise Malaria

Alternate Hypothesis: There is significant relation between the type of Malaria in Hilly and Land Villages

df: Degree of Freedom= (columns-1) (rows-1) the number of degrees of freedom is the number of values in the final calculation of a statistic that are free to vary[22]

DISCUSSION

Pandaiya sub-district is a low malaria endemic area but some villages reported more positive cases specially border area of Madhya Pradesh. District health society data showed that API varied from 0 to 154 per 1000 population in 2017 in the 8 study villages (4 Hilly and 4 Land). During the routine surveillance, more malaria positives were detected in the study area; but after LLINs distributed in January 2018 the overall positivity rate ranged only 4.86% (in 2018) to 1.6% (in 2019) in the study villages, which message the presence of utilized LLINs and awareness about malaria prevention in the community. Hence, the present study was undertaken to estimate the proportion of LLINs effect, showing that the burden of Malaria transmission was very low compared to what was reported in routine surveillance of fever cases before LLINs distribution. These individuals constituted a reservoir of parasites and hence a source of malaria transmission but after LLINs used them safe from malaria transmission in community and develops to awareness[5-10]. If a household has an infected member used mosquitoes nets, it is more likely that there will be other persons safe in that home which break of parasite for malaria transmission another person in community[5-10,18]. This study shows that there is a lack of awareness of malaria among the people of the villages of the hill areas and they are not used to using mosquito nets at bedtime, the main reason is that the Baiga tribe adopts their traditional customs; Baiga is a tradition of tattooing by women whom they believe to be their own jewel[11,12,18,19,23]. They believe that these tattoos remain with them till they die. Therefore, tattooing in the form of jewel is performed in the hands, feet, forehead and other parts of the body by performing it[11,23]. At the same time, most of the Baiga men are Dhoti and children live in fewer clothes. These major reasons are more likely to cause malaria. Continuous surveillance by health workers in this area has reduced the incidence of malaria and awareness has been generated about prevention of malaria among people due to which reduction in the status of malaria infection in individuals has been observed[18,19,21]. At the same time, compared to previous years, there has been a small increase in cases in land villages. 0 to eliminate malaria and eliminate immigrant malaria, there is a need for continuous per household surveillance, mosquito nets availability, mass screening, camp and health awareness among the people of such Baiga tribes and other Particularly Vulnerable Tribe in hilly and land areas; so that they themselves will be vigilant towards their health in times to come[1,2,5,7-10,20]. Also, there will be a need for transportation and telephone network in these places so that the patient can be reached at the health center on time in severe cases.

LIMITATIONS

This limited study on Baiga tribe settled in hilly and land villages with high parasitic incidence can bring awareness to other tribes in Indian Territory, focus on malaria prevention without losing their tradition in Particularly Vulnerable Tribe group (PVTg) and in future, India can play an important role in freeing us from malaria. Nonetheless, results are relevant in Indian context.

CONCLUSIONS

Malaria is still present in that region due to lack of awareness among the Particularly Vulnerable Tribe group (PVTg) and adoption of traditional custom. Elimination of malaria in such hilly and inaccessible tribe villages in the country is a challenge. Malaria eradication is likely to be carried out continuously in these areas by doing various activities.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study purpose was explained in the local language to all study participants and study related queries such as routine surveillance procedures etc. were addressed. This study was undertaken as a part of a NHM and ethical clearance was obtained from the National Vector Borne Disease Control Programme, Raipur

FUNDING

Funding was provided by the National Health Mission, which has no role in the planning, study design, data collection or writes up. This research forms part of district health society study coordinated by the National Vector Borne Disease Control Programme of Department of Health & Family welfare.

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Fig 1: The map showing the location of study villages.

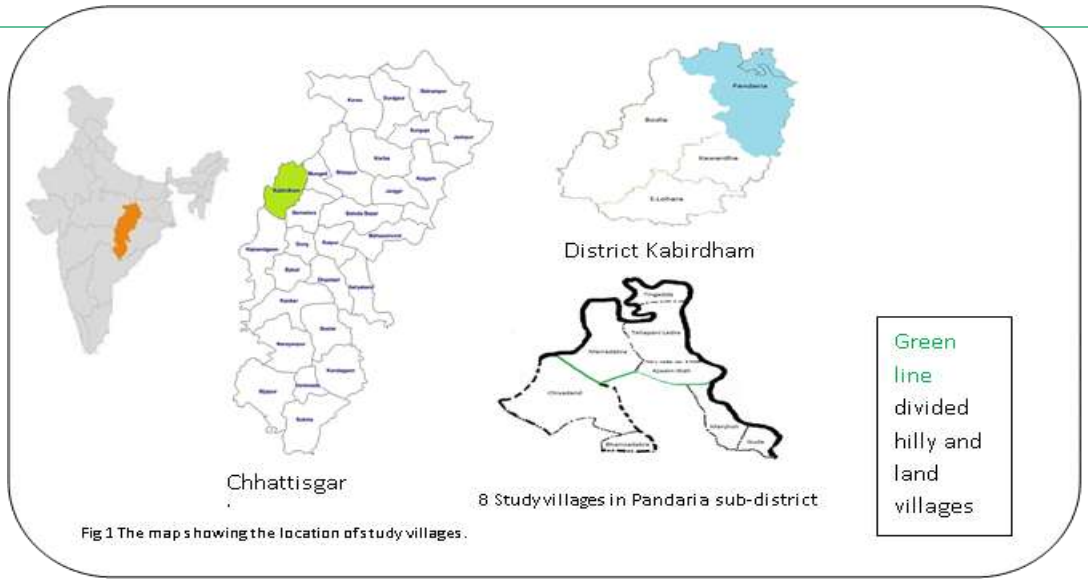

Fig.2: Folding Magnifier lens 10x

Fig.3: Mosquitoes catched at study villages by VBD technical Supervisor and Rural Health Organizer

Fig 4. Larvaeourus Gambusiya fish carry in plastic packet before to put in ponds.

Fig.5: Indoor residual sprayed at study villages