वार्षिक प्रतिवेदन
Annual Report
2017-18

आई.सी.एम.आर.–राष्ट्रीय जनजाति स्वास्थ्य अनुसंधान संस्थान
जबलपुर (म.प्र.)

ICMR-National Institute of Research in Tribal Health
Jabalpur (M.P.)

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Nagpur Road, Garha, Jabalpur 480 003

Preface

It gives me immense pleasure to present the Annual Report of NIRTH for the period 2017-18. I express my pleasure to lead this ICMR institute which is working among the tribal population since last 34 years. Though tribal population accounts for only 8.6 percent of the national population, however, I have a strong realization that their lifestyle, belief system, practices and place of residence makes it difficult to work among this section of the population. So, working among them brings both opportunity and challenges. I express my gratitude to the team of dedicated scientists, officials, technical, non-technical staff of NIRTH for their hard work under all odds, which makes it possible for any leader to steer the institute to success.

NIRTH has initiated a quite a number of promising research projects during this period in the greater interest of the tribal population in particular and also strengthen its association with Tribal and Health Department of State and Central Government.

The scientists of the institute are recognized to guide both masters and Ph.D scholars from various reputed national and international universities. Accordingly many scholars are pursuing their M.Sc and Ph.D dissertation work. During this period a good number of publications are made by the scientists and the students in highly peered reviewed journals. Besides its research and academic activities, NIRTH from time to time organizes various meetings and workshops for capacity building for doctors, paramedicals, scholars, scientists, staff, etc. with an intend to serve the tribal population better.

I place on record my sincere gratitude to the SAC members of NIRTH and Dr. Soumya Swaminathan, former Secretary, DHR & DG, ICMR for their constant support and guidance. I am overhelmed to mention the support, guidance and encouragement received from our present Secretary, DHR & DG, ICMR, Prof (Dr.) Balram Bhargava, which has raised our moral up to take up challenging tasks with ease.

Dr. Aparup Das
Director

CONTENTS

1. COMMUNICABLE DISEASES

1.1.TARGETED INTERVENTION TO EXPAND AND STRENGTHEN TB CONTROL IN TRIBAL POPULATIONS UNDER THE REVISED NATIONAL TUBERCULOSIS CONTROL PROGRAMME, INDIA (THE TIE-TB PROJECT)

Principal Investigator	**:**	**Dr. V.G. Rao**
Status of the study	**:**	**Completed**
Funding source	**:**	**GFATM through Central TB Division, Govt. of India & ICMR**

This project was undertaken to improve access to TB care services and the health seeking behavior of the tribal populations through structured interventions comprising of community engagement, focused involvement of traditional healers, and targeted usage of Mobile TB Diagnostic Vans (MTDV) equipped with Digital X-ray and sputum microscopy services in remote tribal areas. The study also aimed to promote early case detection and treatment adherence in the tribal population with overall improvement in the quality of the services and improved awareness on TB-RNTCP services through community based ACSM activities.

The project was implemented in five states by various ICMR institutes and coordinated by the National JALMA Institute of Leprosy & Other Mycobacterial Diseases, Agra. The National Institute of Research for Tribal Health (NIRTH), Jabalpur was working in four selected districts of Madhya Pradesh with a total tribal population of 29.6 lacks and three of Chhattisgarh with a total tribal population of 12.9 lacks (total seven districts). The selected districts in Madhya Pradesh were Dindori, Alirajpur, Barwani, Jhabua where as in Chhattisgarh, districts Sarguja, Surajpur & Balrampur, were selected. These districts have been selected on the basis of the high concentration of tribal population in the district (more than 50% of the total population). The Project was implemented in three phases:

Phase I– Comprising of preparatory activities such as recruitment and training of the project staff on RNTCP, procurement of MTDV etc and situational analysis to identify the remote locations for visit of MTDV, planning the fixed tour schedule for MTDV and other such aspects. It also comprise of the baseline study during the initial six to eight months.

Phase II– Intervention using Mobile TB Diagnostic Vans (MTDV) equipped with Digital X-ray and sputum microscopy services in remote tribal areas for early detection of cases were done. All the detected cases were treated by the as per RNTCP programme guidelines.

Phase III– Comprises of end line survey in the covered tribal population in selected districts. Village volunteers (1/1000 population) were identified and trained to create TB awareness and also to identify TB suspected cases in the community.

Table 1.1.1: Tribal population in selected districts of Madhya Pradesh and Chhattisgarh

States	District	District Population	Tribal Population	% Tribal Population
Madhya Pradesh	Jhabua	1025048	891818	87%
	Alirajpur	728999	648638	89%
	Barwani	1385881	962145	69%
	Dindori	704524	455789	65%
Chhattisgarh	Sarguja	833335	458334	55%
	Surajpur	782461	430354	55%
	Balrampur	724398	398419	55%

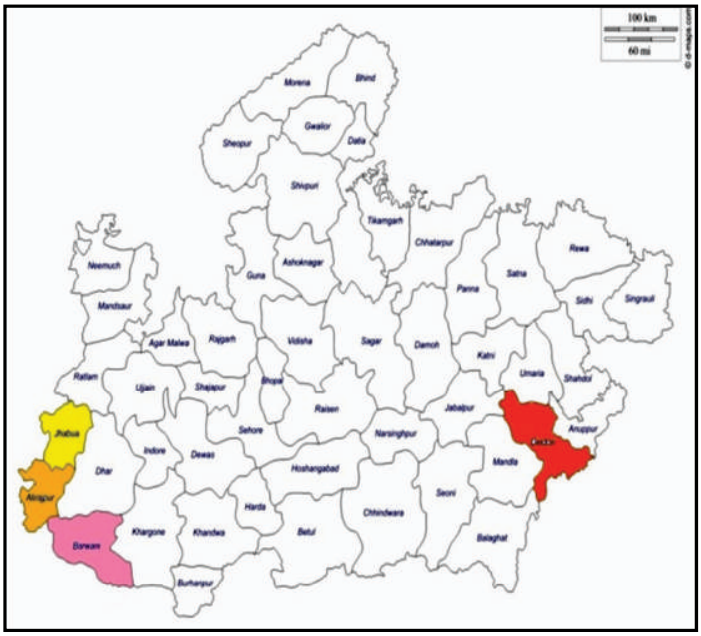


Fig. 1.1.1: a. Selected districts in Madhya Pradesh

b. Selected districts in Chhattisgarh

Table 1.1.2: District wise coverage smear screened and X-rays done in M.P.

District Name	Coverage								
	No. of camps organized	No. of village screened	No. of Symptomatic screened/ sample collected	Sample tested at van	Smear Positive	X-ray Done	X-ray Positive	MDR	Total cases
Dindori	323	402	3620	3620	201	3247	374	2	516
Alirajpur	322	422	2838	2838	233	1718	75	6	310
Barwani	247	325	1954	1954	89	1149	232	0	209
Jhabua	334	423	2925	2925	138	1187	242	7	174
Total	**1226**	**1572**	**11337**	**11337**	**661**	**7301**	**923**	**15**	**1209**

Table 1.1.3: District wise coverage smear screened and X-rays done in C.G.

Block Name	Coverage								
	No. of camps organized	No. of village screened	No. of Symptomatic screened/ sample collected	Sample tested at van	Smear Positive	X-ray Done	X-ray Positive	MDR	Total cases
Balrampur	302	406	4559	4559	131	3254	799	0	283
Surajpur	278	352	3388	3388	57	2611	595	01	112
Surguja	320	422	4222	4222	121	3697	271	02	212
Total	**900**	**1180**	**12169**	**12169**	**309**	**9562**	**1665**	**03**	**607**

Fig. 1.1.2: Screeing of suspect in Mobile van

1.2. COMPARATIVE STUDY OF LINE PROBE ASSAY AND XPERT MTB/RIF FOR DETECTION OF MDR

Principal Investigator	**:**	**Dr. Jyothi Bhat**
Status of the study	**:**	**Ongoing**
Funding source	**:**	**ICMR**

The aim of the study is to compare the performance of Xpert MTB/RIF with Genotype® on *TBDR* plus for detection of rifampicin resistant TB in smear positive and negative retreatment TB cases and also to study the mutation patterns associated with rpoB, katG and inhA genes in this area.

Sputum samples from confirmed cases of tuberculosis were received from District TB Center, Jabalpur M.P. India. The selection criterion includes smear positives in follow up, retreatment cases and HIV positive cases. The sputum samples were screened for detection of Mycobacterium tuberculosis and rifampicin sensitivity by Gene Xpert (Cepheid, Germany) and Line Probe Assay (Hainslifesciences) as per manufacturer protocol. Samples were also decontaminated by NalcNaOH method and inoculated on solid Lowenstein Jensen (LJ) medium for culture. Drug susceptibility testing was done by indirect proportion method. Results of all the methods were compared and samples with discordant results among methodologies were further processed for sequencing.

This year a total of 625 specimens were tested. Of these 29 were found negative for *M. tuberculosis*, 23 specimens were resistant to both Isoniazide and Rifampicin where as 17 specimens were resistant to rifampicin alone (Table 1).

Table 1.2.1: Results of Line Probe assay

Total	Sensitive	R to Rif	R to INH	R to Rif & INH
625	303	17	44	23

More number of specimens were resistant by Gene Xpert rather than LPA and overall 29 specimens had discordant results (Table 2). The discordant samples are subjected to sequencing. The study is in progress.

Table 1.2.2: Comparison of Rifampicin resistance in LPA and Gene Xpert

CBNAAT	LPA		
		Sensitive	**Resistant**
	Sensitive	262	8
	Resistant	21	32

1.3. DESIGNING A IMMUNOVISUAL ASSAY FOR EARLY DETECTION OF *M.TUBERCULOSIS* FROM CULTURE

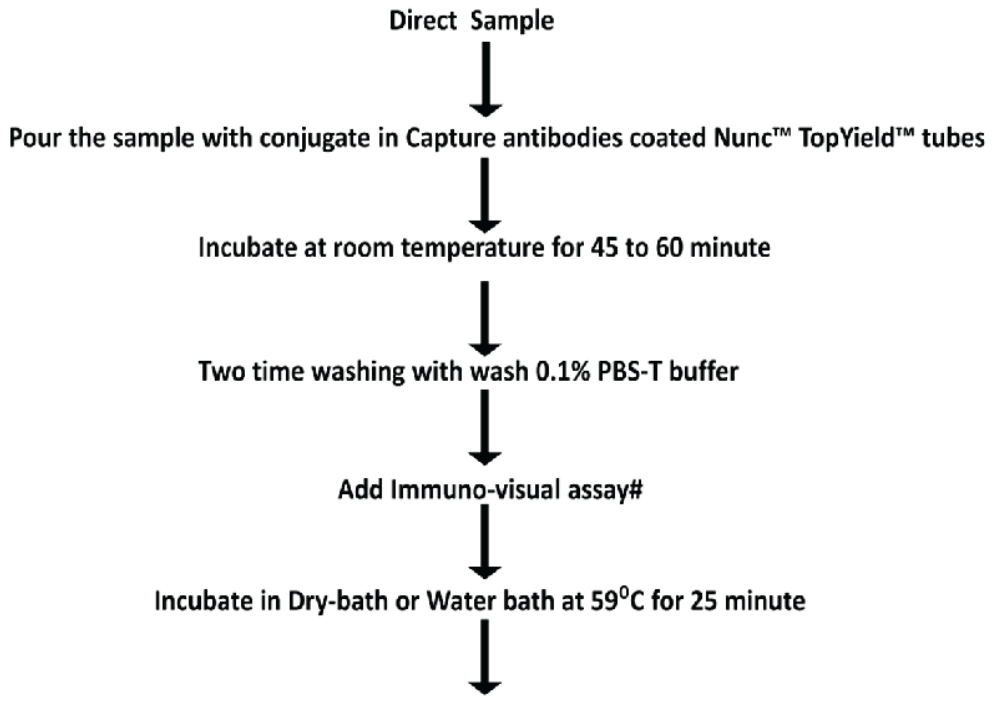
Principal Investigator	**:**	**Dr Jyothi Bhat**
Status	**:**	**Ongoing**
Funding	**:**	**TATA Trusts**

The available tools for diagnosis of tuberculosis have their own limitations; in terms of late result, sensitivity and cost. Thus there is space for development of a rapid and cost effective test for detection and drug susceptible test of *Mycobacterium tuberculosis*.

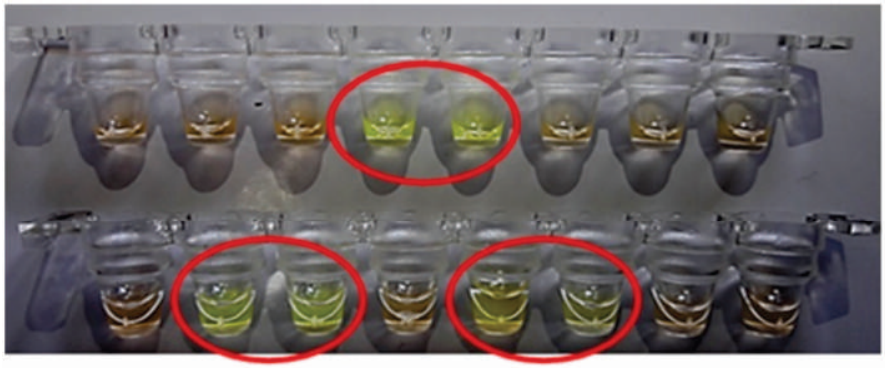
The objective of the project is to develop a sensitive and specific immuno visual assay for early detection of *M.tuberculosis*from culture and to check the feasibility of test.

Firstly the protein was identified, isolated, purified and expressed in cloning vector. The purity of the protein was confirmed by sequencing. LAMP primers were designed and synthesized for reporter DNA fragment. The Isothermal amplification assay was standardized.

Flowchart of Immono-LAMP protocol for detection of *Mycobacterium tuberculosis* form direct sample



The developed assay has successfully determined the negative and positive samples through colour differentiation. The standardization of Immuno-LAMP is under process.



Visual detection by color change using the SYBR Green dye under daylight. Samples in circle are positive.

Visual detection by color change using the SYBR Green dye under UV light. Samples in circle are positive.

2. GENETIC DISORDER

2.1. SCREENING FOR G6PD DEFICIENCY AMONG THE TRIBAL POPULATIONS LIVING IN MALARIA ENDEMIC ZONES AND ITS CORRELATION WITH ANTI-MALARIAL THERAPY

Principal Investigator	**:**	**Dr. S. Rajasubramaniam**
Status	**:**	**Completed**
Funding	**:**	**LivoLink Foundation (TATA Trust)**

Glucose-6-phosphate dehydrogenase (G6PD) deficiency is a X-chromosomally transmitted disorder of the erythrocyte that affects 400 million people worldwide. G6PD deficiency is mainly found in areas where malaria is or has been endemic. In these areas, malaria is treated with drugs that can cause (severe) hemolysis in G6PD-deficient individuals. Thus to avoid haemolytic reactions in G6PD deficient individuals, a cheap and reliable test is used for screening deficient individuals when treating malaria. The present study was carried out in (i) Biswanathpur CHC in Lanjigarh block of Kalahandi district of Odisha (High malaria incidence), (ii) patients attending Christian Medical Hospital, Bissamcuttack, Rayagada (iii) residents of village "Paiko Dakalguda and (iv) residents of Kachapaju with the objectives to screen for G6PD enzyme deficiency in different tribal population groups of India, quantitate the level of enzyme deficiency, to evaluate the clinical manifestations in the G6PD deficient individuals, characterize the mutations underlying G6PD deficiency and determine their distribution in different tribal population groups and to correlate the clinical findings with the type of mutations present.

In Kalahandi District, 930 individuals attending Biswanathpur CHC (Table 2.1.1; Fig 2.1.1 &2.1.2) for fever were screened, among them 502 were positive for malaria and only four individual were found to be deficient for this enzyme. These four individuals did not show any symptoms associated with G6PD deficiency and were negative for malaria. In Rayagada district, screenings in 3 sites were carried out i.e., in Christian Hospital, Bissumcuttack (OPD patients and Staff), Village Paiko Dakalguda and Village Kajapachu (Community Screening) (Fig. 2.1.3 & 2.1.4). A total of 1056 individuals were screened, details of community groups screened are given in Table 1.G6PD deficiency was encountered among 54 individuals. Among these 54 individuals, 14 belonged to 4 families.

Table 2.1.1: Distribution of various communities screened in Kalahandi District and Rayagada Districts

Communities Screened	Kalahandi	Rayagada
General	37	107
OBC	290	277
SC	376	405
ST	227	267
Total individuals Screened	930	1056

Fig. 2.1.1: Biswanathpur CHC, District Kalahandi

Fig. 2.1.2. ICMR-NIRTH team at work

Fig. 2.1.3. Screening at village Kacahapaju, Rayagada District

Fig. 2.1.4. Screening at village Paiko Dakalguda, Rayagada District

Communities in Odisha state are reported to suffer from various hemoglobinopathies. Therefore, efforts were also made to ascertain whether the screened individuals carried any haemoglobin disorder. Table 2.1.2 and 2.1.3 shows the status of various hemoglobinopathies found in Kalahandi and Rayagada District.

Table 2.1.2: Status of Hemoglobinopathies among residents of Kalahandi District

Gender	Sickle cell Trait	Sickle cell Disease	Beta Thalassemia Trait	Others (DD, AD, AE)	Normal	Total
Female	105	6	8	2	407	528
Male	52	7	2	3	255	319
Total	157	13	10	5	662	847*

Screening could not be done in 83 samples.

Table 2.1.3: Status of Hemoglobinopathies among Residents of Rayagada District

Gender	Sickle cell Trait	Sickle cell Disease	Beta thalassemia trait	Normal	Total
Female	123	11	3	501	638
Male	72	8	3	335	418
Total	195	19	6	836	1056

Comprehensive analysis for 2 study sites was done. Among 1986 individuals screened, information on age was not available for 18 subjects. Majority of the subjects screened were below the age of 30 years with mean age being 25.6±15.6 years (Fig. 2.1.5) and mainly females (1195/1986=60.1%).

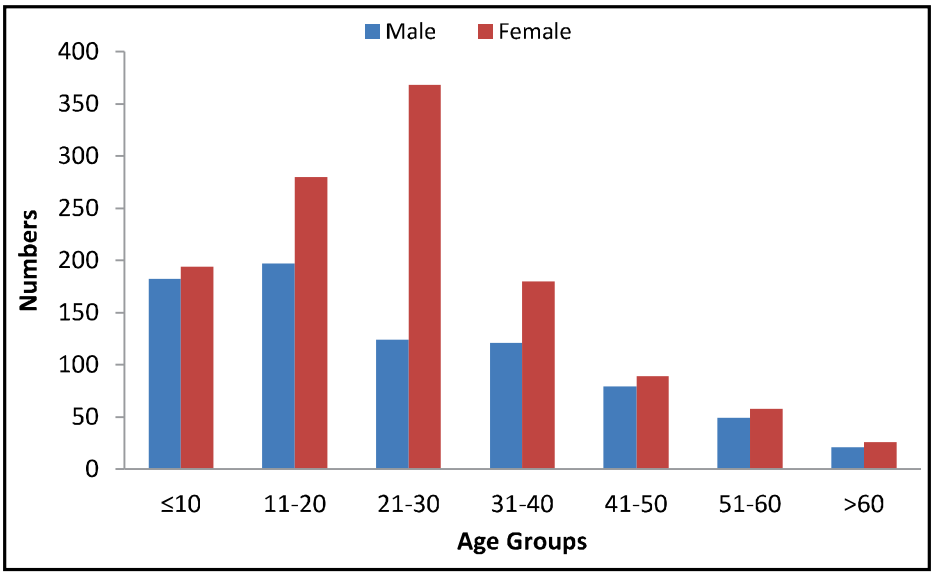


Fig.2.1.5: Distribution of individuals screened according to different age groups and gender

All the individuals screened were grouped according to WHO classification for severity of anemia. It was observed around 40% of individual were normal for haemoglobin levels. Severity of anemia in relation to age of individuals was also determined. There was no association between age and anemia severity (p-value= 0.334), indicating that anemia prevalence was uniform across all age groups (Fig. 2.1.6).

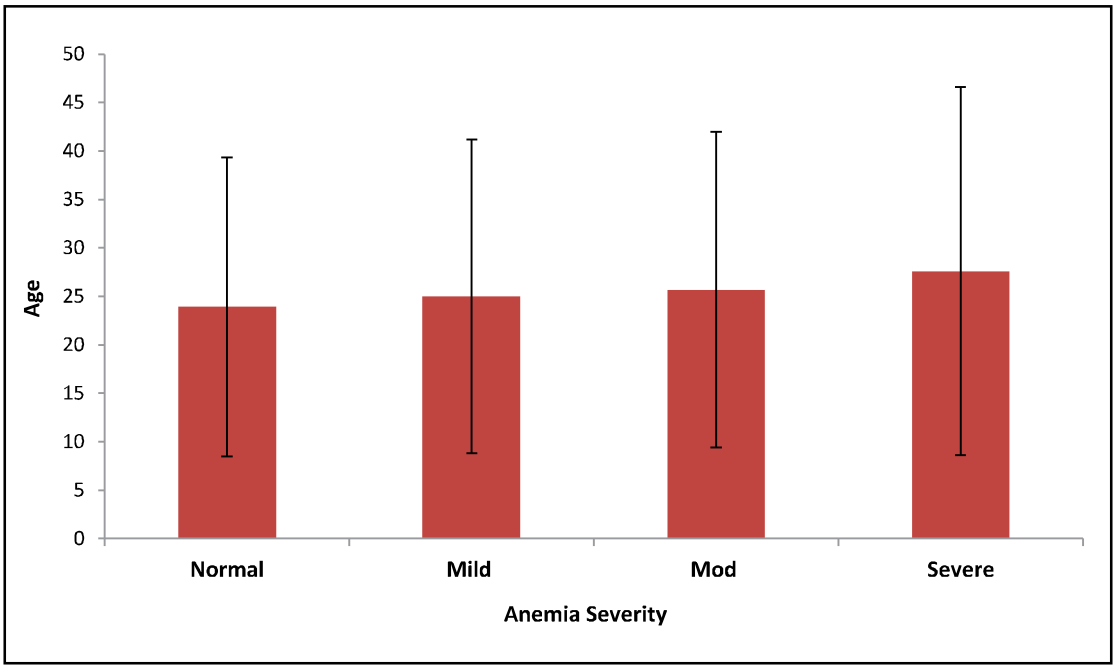


Fig. 2.1.6: Anemia severity according to age

A total of 59 individuals (31 Male and 28 Female) were found deficient for G6PD enzyme. G6PD deficient individuals were having significantly higher history of blood transfusion as compared to G6PD normal individuals (P=0.027). There was no association of history of malaria positivity with G6PD deficiency (P=0.894) (Table 2.1.4).

Table 2.1.4: G6PD versus clinical history

Category	Deficient N (%)	Normal N (%)	P value
History of anemia	13 (22)	260 (13.5)	0.081
History of BT	4 (6.8)	46 (2.4)	0.027
History of malaria	26 (44.1)	817 (42.5)	0.894

BT=Blood transfusion

Table 2.1.5 shows the RDT positivity for malaria in screened individuals. At the time of screening a total of 254 samples were found positive for malaria. There was no association of malaria positivity and gender.

Table 2.1.5: Malaria Positivity

Positivity	Gender		Total
	Female	Male	
Normal	1056(87.3)	676(87.1)	1732(87.2)
PF	145(12)	92(11.9)	237(11.9)
PV	8(0.7)	7(0.9)	15(0.8)
PF & PV	1(0.1)	1(0.1)	2(0.1)

All screened individuals were provided health card indicating their G6PD and Hemoglobinopathy status. All affected individuals were provided counselling regarding prevention of disease precipitating causes. Genetic counselling was also offered to affected individuals. These individuals were also provided essential precautions in the form of concise booklet in the local language. A general health awareness campaign was also done in the study areas.

2.2. MICRO MAPPING OF G6PD DEFICIENCY AMONG THE TRIBALS OF INDIA AND ITS IMPORTANCE FOR ANTI-MALARIAL THERAPY

Principal Investigator	**:**	**Dr. S. Rajasubramaniam**
Status of the Study	**:**	**Ongoing**
Funding	**:**	**ICMR**

Multi-centric study on "Micro mapping of G6PD deficiency among the tribals of India and its importance for anti-malarial therapy" was initiated in January 2015. The clinical outcome of this study is expected to help in determining whether the routine G6PD screening is necessary in some of the tribal areas before giving the anti-malarial therapy. The molecular characterization of this gene is also necessary to determine the genotype – phenotype correlation. Samples received for malaria testing and samples suspected for G6PD deficiency received from NSCB Medical College were included in the study. Field trips were undertaken in two of the 5 districts included in the study i.e. Dindori and Chhindwara Districts. After obtaining requisite permission and consent from the district authorities, screening was conducted in 8 tribal schools in the 2 districts. G6PD deficiency was done by DPIP decolourization method. Quantization of G6PD enzyme activity was done by measuring the change in OD at 340 nm using a spectrophotometer over a time period of 10 minutes.

During period (April 2017 till March 2018), 1311 tribals including school children were screened. Among 1311 subjects screened, 74 were found to be G6PD deficient. All G6PD deficient samples were tested for various mutations at ICMR-NIRTH, Jabalpur. Figure 2.2.1 depicts the prevalence of various hemoglobinopathies detected among tribal school children.

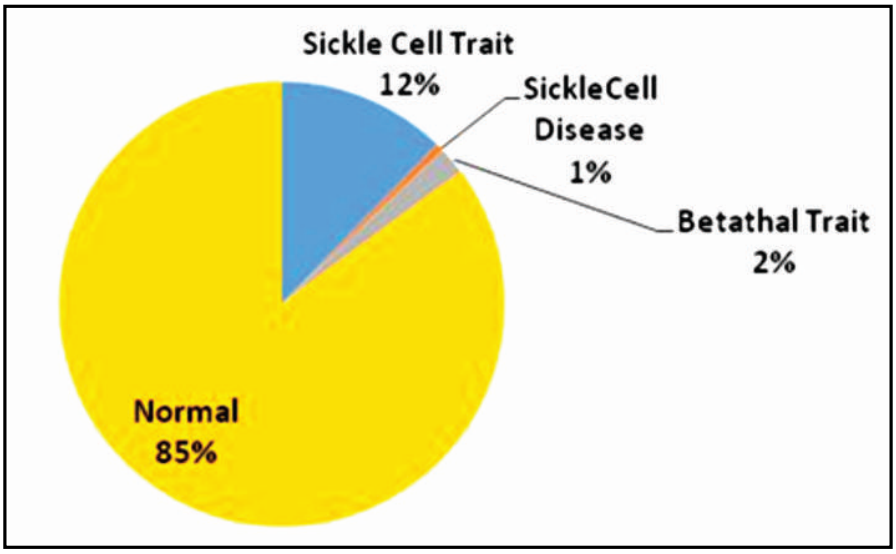


Fig. 2.2.1: Prevalence of Hemoglobinopathies among tribal school Children

Mutational analysis of 61 samples was carried out. Figure 2.2.2 shows G6PD mutations detected among 54 samples. Twenty samples are under process for sequencing

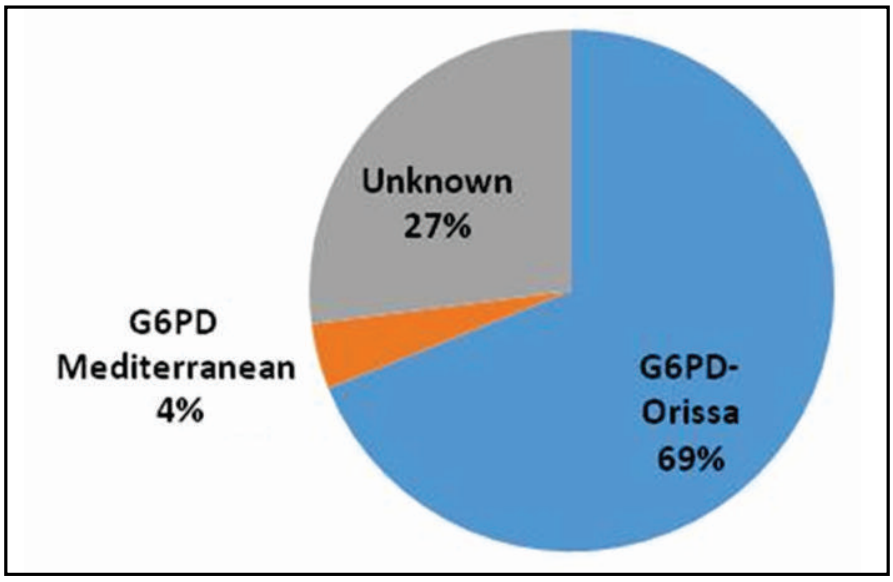


Fig. 2.2.2: Spectrum of G6PD mutations

Molecular Analysis for a-thalassemia:

A total of 1264 samples were screened for a gene deletions (Table 1). Among these, 135 (10.7%) were wild type, 201 (15.9%) were homozygous for -a-3.7 deletion, 168 (13.3%) were -a-4.2 homozygous deletion, 238 (18.8%) were heterozygous for -a-3.7 deletion, 234 were heterozygous for -a-4.2 (18.5%) deletion, and 288 (22.8%) were double heterozygote for a-3.7/-a-4.2 deletion.

Table 1: Prevalence of α-thalassemia among tribal school children of Dindori and Chhindwara Districts.

Districts	N	αα/αα	$-\alpha^{3.7}/-\alpha^{3.7}$	$-\alpha^{4.2}/-\alpha^{4.2}$	$-\alpha^{3.7}/\alpha\alpha$	$\alpha\alpha/-\alpha^{4.2}$	$-\alpha^{3.7}/-\alpha^{4.2}$
DINDORI	**544**	72 (13.2%)	72 (13.2%)	68 (12.5%)	104 (19.1%)	110 (20.2%)	118 (21.7%)
CHINDWARA	**720**	63 (8.8%)	129 (17.9%)	100 (13.9)	134 (18.6%)	124 (17.2%)	170 (23.6%)
TOTAL	**1264**	**135 (10.7%)**	**201 (15.9%)**	**168 (13.3%)**	**238 (18.8%)**	**234 (18.5%)**	**288 (22.8%)**

All the samples were also tested for malaria; only 2 samples among 1311 samples were malaria positive. Further, the family study on deficient samples is being carried out along with screening in Mandla and Damoh districts for representative samples as per project proposal.

2.3. EVALUATION OF PAPER BASED SCREENING TEST FOR SICKLE CELL ANEMIA

Principal Investigator	**:**	**Dr. Ravindra Kumar**
Status	**:**	**Ongoing**
Funding	**:**	**Intramural**

Sickle cell anemia (SCA) is a genetic blood disorder that is particularly lethal in early childhood. Universal newborn screening program and subsequent early treatment are known to drastically reduce under five SCA mortality. However, in resource limited settings, cost and infrastructure constraints limit the effectiveness of laboratory based SCA screening program. To address this limitation accuracy of paper based solubility test using 15% sodium metabisulfite (MS) is tested and compared with the Hb electrophoresis/HPLC data .The study is undertaken with objectives to identify the sensitivity and specificity of paper based screening test for sickle cell anemia and to study the effect of temperature and storage conditions on paper based test.

After approval from institute's SAC and Ethical committees the standardization of the method has been initiated. The study is in progress.

2.4. MORBIDITY PROFILE OF SICKLE CELL DISEASE IN CENTRAL INDIA

Principal Investigator	**:**	**Dr. Rajiv Yadav**
Status	**:**	**Ongoing**
Funding	**:**	**Intramural**
Date of Initiation	**:**	**2001**

Sickle cell disease (SCD) is ahomozygous condition of a hemoglobin disorder that results in anemia in affected individual and it inherits in Mendelian fashion. It has been reported mainly in tribal populations of central and southern parts of India. Chronic anaemia, painful crisis and bacterial infections are common in SCD children and these are responsible for early mortality. The environmental, psychological and socio-economical factors influence the clinical presentations. The main objectives of the study are to study the clinical and hematological profile of the sickle cell disease patients and to develop strategies for management and prevention of the sickle cell disease in context to Central India.

All the registered patients were referred patients from various OPD's of NSCB Medical College, Jabalpur and various district hospitals of the state to genetics laboratory of NIRTH for the diagnosis of haemoglobinopathies. Patients with sickle cell disease were registered in sickle cell clinic for detail clinical assessment and follow up. The clinical history, clinical findings and various investigations were recorded in structural proforma and advised to come for follow-up every three months.

Seventy three sickle cell disease patients were registered in the Sickle cell clinic (in collaboration with Government Medical College, Jabalpur) during April 2017-March 2018. These patients were from Anooppur, Dindori, Jabalpur, Katni, Panna, Narsingpur, Seoni and Umaria districts. About 47% were male and 53% were female. About 65.8% of patients were in the age group of below 15 years. Majority (58.9%) of the patients belonged to scheduled caste mainly Basod, Chadar, Choudhari, Dahiya, Jharia, Katiya, Mahar, Mehra and Vanshkar and 9.6% were from other tribal communities such as Gond and Pradhan (Fig 1.4.1). About 26.0% were Other backward class (mainly Patel, Panika, Razak, Sen, Sony and Yadav) and 5.5% were from Brahmin & Rajpoot etc. About 15.1% of patients had history of multiple blood transfusions (blood transfusions of more than 2 times) and 50.7% of patients had no history of blood transfusion. About 78.1% of the patients had their onset of the disease before 5 years of age followed by 5-10 yrs age (17.8%). Pallor (98.6%), joint pains (94.5%), fever (93.2%), Icterus (80.8%), abdominal pain (46.6%) and fatigue (35.6%) were major sign and symptoms observed in these patients. Other sign and symptoms

include bony pain (75.3%), chest pain (46.6%), joint swelling (11.0%) and dactylitis(1.4%). Splenomegaly was observed in half of the patients.

A total of 1029 SCD patients were registered in the SCD clinic up to March 2018. All the patients and their parents were advised to avoid disease precipitating or aggravating factors like exposure to extreme climate, hard work, dehydration etc. and also advised to seek appropriate medical intervention quickly upon any minor ailment. They were given folic acid (5 mg) to be taken daily. The anti-pyretic and anti-inflammatory drugs were also given to take on emergency. Up to March 2018, a total of 581 SCD patients regularly attended for follow-up. Severity index was calculated by converting the clinical observations into numerical value in these patients. After intervention, the percentage of severe and moderate cases have been reduced and shifted to mild category. It was observed that supplementation with folic acid and quick administration of anti-pyretic/anti-inflammatory drugs along with health education to avoid disease precipitating factors have shown positive effect to decrease the severity of the disease. A total of 123 registered SCD patients died up to March 2017 and their mean age was 14.4±8.8.

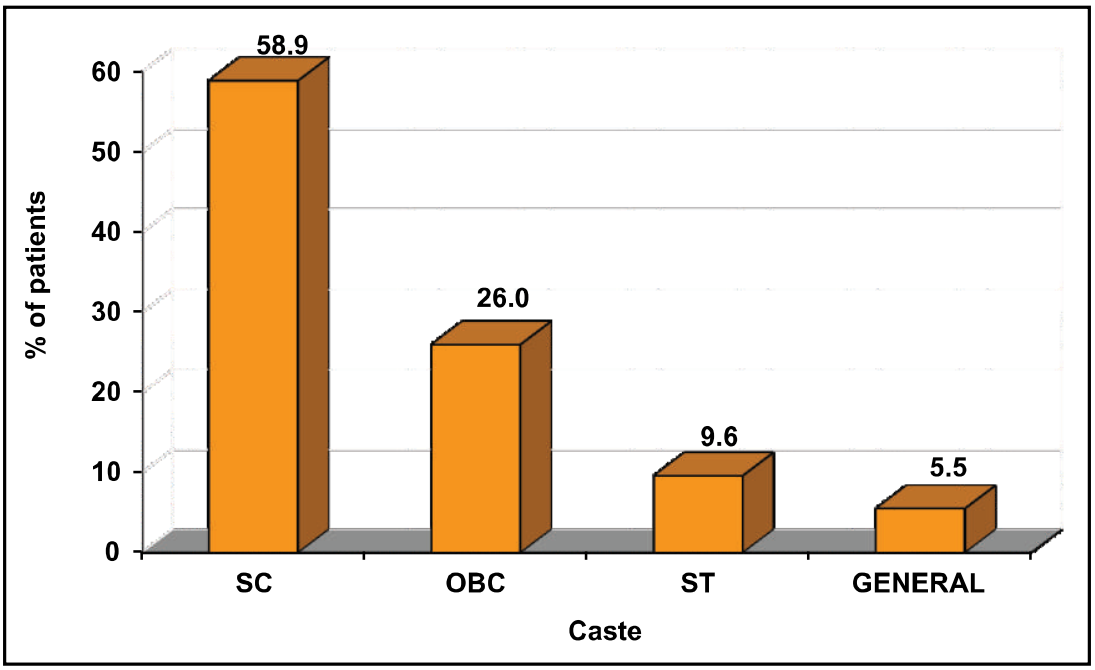


Fig.2.4.1 Caste wise profile of registered SCD patients

3. VECTOR BORNE DISEASES

3.1. Malaria diagnosis by PCR revealed differential distribution of mono and mixed species infections by *Plasmodium falciparum* and *P. vivax* in India

Principal investigator	**:**	**Dr. Aparup Das**
Status	**:**	**Completed**
Funding	**:**	**Intramural**

Malaria is a vector-borne infectious disease, caused by five different species of the genus Plasmodium, and is endemic to many tropical and sub-tropical countries of the globe. At present, malaria diagnosis at the primary health care level in India is conducted by either microscopy or rapid diagnostic test (RDT). In recent years, molecular diagnosis (by PCR assay), has emerged as the most sensitive method for malaria diagnosis. India is highly endemic to malaria and shoulders the burden of two major malaria parasites, *Plasmodium falciparum* and *P. vivax*. Previous studies using PCR diagnostic assay had unraveled several interesting facts on distribution of malaria parasites in India. However, these studies had several limitations from small sample size to limited geographical areas of sampling. In order to mitigate these limitations, we have collected finger-prick blood samples from 2,333 malaria symptomatic individuals in nine states from 11 geographic locations, covering almost the entire malaria endemic regions of India (Figure 3.1.1) and performed all the three diagnostic tests (microscopy, RDT and PCR assay) and also have conducted comparative assessment on the performance of the three diagnostic tests. Since PCR assay (Figure 3.1.2) turned out to be highly sensitive (827 malaria positive cases) among the three types of tests, we have utilized data from PCR diagnostic assay for analyses and inferences. The results indicate varied distributional prevalence of *P. vivax* and *P. falciparum* according to locations in India, and also the mixed species infection due to these two species. The proportion of *P. falciparum* to *P. vivax* was found to be 49:51, and percentage of mixed species infections due to these two para- sites was found to be 13% of total infections (Figure 3.1.3). Considering India is set for malaria elimination by 2030, the present malaria epidemiological information is of high importance.

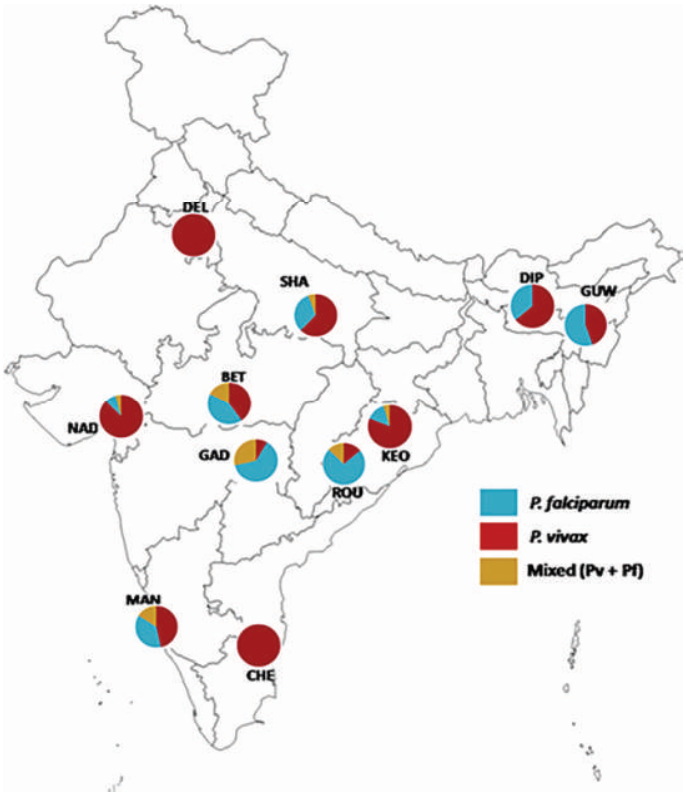


Figure 3.1.1. Map of India showing malaria sample collection site.Each site is represented by a pie-chart three different kinds of infection (two types of mono infections and a mixed species infection due to *P. falciparum* and *P. vivax*). To be noted here that locations in all the four directions (peripheral populations) (north, east, west and south) are majorly dominated by *P. vivax*, but in northeast, south-west and middle Indian locations *P. falciparum* was found to be in higher abundance than *P. vivax*. Mixed parasitic infections majorly are restricted to middle of India.

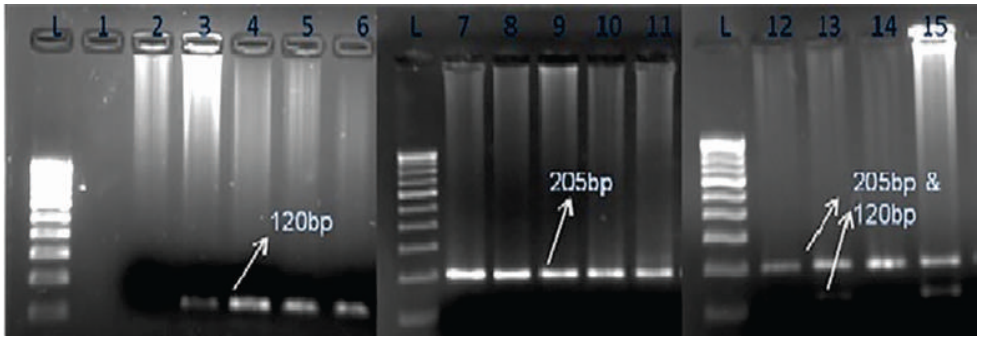


Figure 3.1.2. Agarose gel electrophoresis pictures showing bands of 15 representative PCR products.The first lane (lane L) contains ladder (100 bp marker) for comparison of PCR products and for determination of product size. The second lane (Lane 1) contains PCR products from negative control, lane 2 contains product of negative control with human DNA. Lanes 3–6 display 120 bp PCR product signifying *P. vivax* mono infection and lanes 7–11 show 205 bp PCR product testifying mono infection of *P. falciparum*. Lanes 12–13 and 15 present both the bands of 120 bp (*P. vivax*) and 205 bp (*P. falciparum*) size in a single sample, indicating mixed species infections due these two species of malaria parasites.

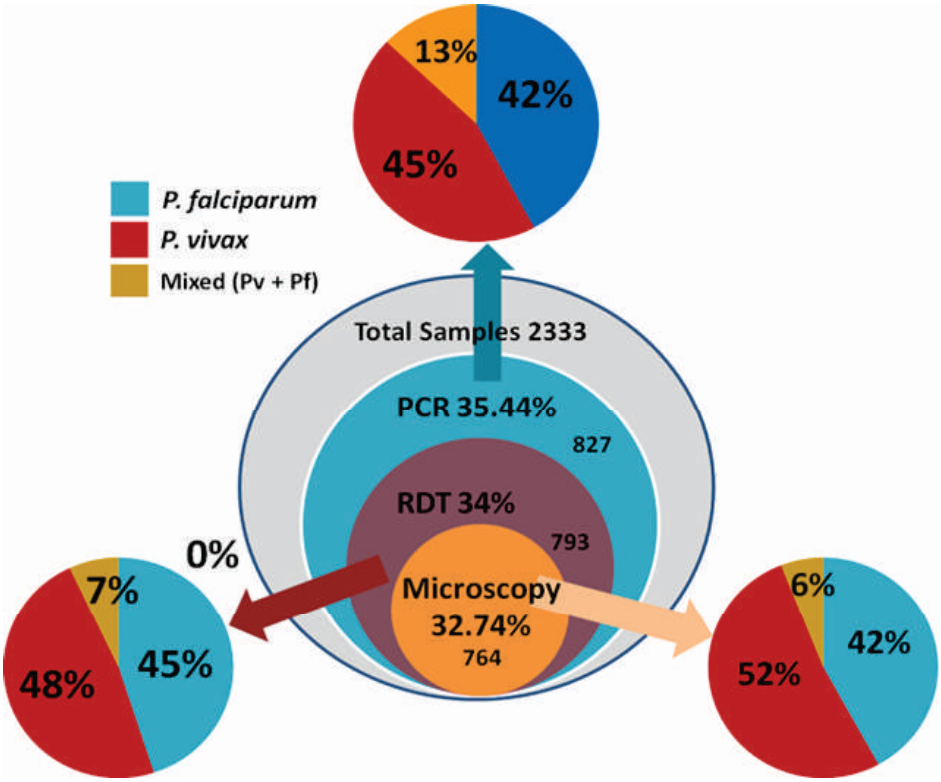


Figure 3.1.3. Visual representation on the comparative assessment (in number and percentage) of efficacy of three different malaria diagnostic methods (microscopy, RDT and PCR assay). To be noted that out of the total 2333 collected malaria-symptomatic individuals (outer-most circle of the middle circles, in grey), PCR assay could identify 827 (35.44%) as positive for malaria parasite infection out of which 42% was *P. vivax*, 45% *P. falciparum* and 12.69% mixed infection due to these two species. In comparison, the RDT (third circle from out) and microscopy (4th circle from out) could identify less number of infections.

3.2. Status of artemisinin resistance in malaria parasite *Plasmodium falciparum* from molecular analyses of the *Kelch13* gene in southwestern Nigeria

Principal investigator	**:**	**Dr Aparup Das**
Status	**:**	**Completed**
Funding	**:**	**Intramural**

Evolution and spread of malaria parasite *Plasmodium falciparum* capable of evading antimalarials are the prime concern to malaria control. The currently effective drug, artemisinin (ART), is under threat due to detection of ART-resistant *P. falciparum* parasites in the Southeast Asian countries. It has been shown that amino acid (AA) mutations at the *P. falciparum Kelch13* (Pfk13) gene (Figure 3.2.1) provide resistance to ART. Nigeria, a part of the Sub-Saharan Africa, is highly endemic to malaria, contributing quite significantly to malaria, and resistance to chloroquine (CQ) and sulfadoxine-pyrimethamine (SP) combination drugs has already been reported. Since artemisinin combined therapy (ACT) is the first-line drug for treatment of uncomplicated malaria in Nigeria and five amino acid mutations have been validated in the *Pfk13* gene alongside with candidate mutations for ART resistance, we performed molecular surveillance for mutations (following PCR and DNA sequence analyses) in this gene from two southwestern states of Nigeria. Statistical analyses of DNA sequences were also performed following different evolutionary models. None of the different validated and candidate AA mutations of *Pfk13* gene conferring resistance to ART could be detected in P. falciparum sampled in the two southwestern states of Nigeria. In addition, DNA sequencing and sequence analyses indicated neither evolutionary selection pressure on the *Pfk13* gene nor association of mutations in *Pfk13* gene with mutations of other three genes conferring resistance to CQ and SP (Figure 3.2.2). Therefore, based on the monomorphism at the *Pfk13* gene and non-association of mutations of this gene with mutations in three other drug-resistant genes in malaria parasite P. falciparum, it can be proposed that malaria public health is not under immediate threat in southwestern Nigeria concerning ART resistance.

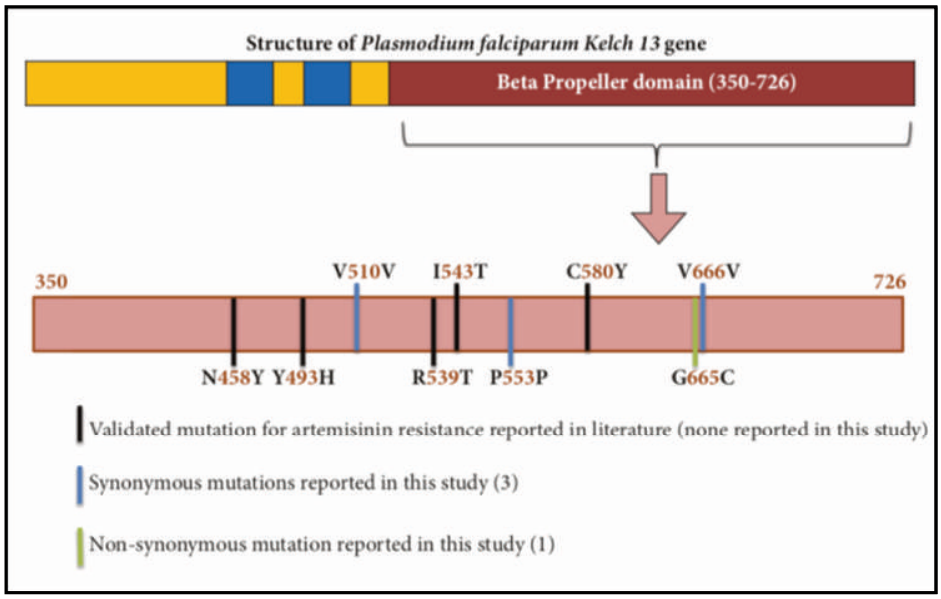


Figure 3.2.1. Schematic representation of the *Kelch13* gene of *P. falciparum* and validated mutations reported in the beta propeller domain of *Kelch13* gene of *P. falciparum* isolates from Nigeria.

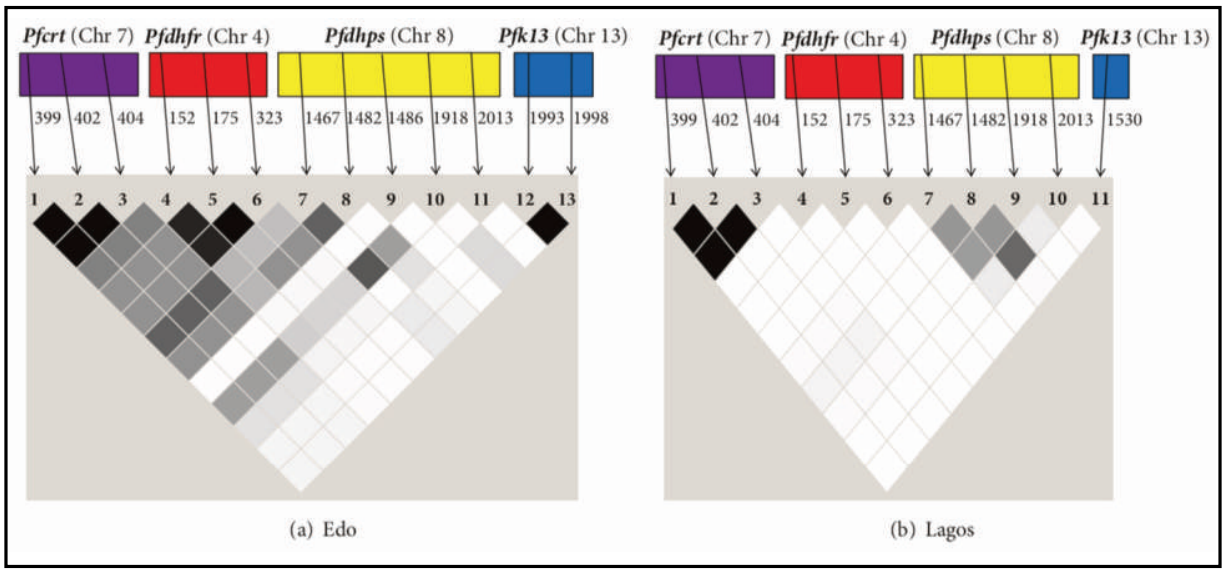


Figure 3.2.2. Linkage disequilibrium (LD) plots describing possible association between two different single nucleotide polymorphisms (SNPs) present either intra- or inter-genetically in (a) Edo and (b) Lagos.

3.3. Molecular epidemiology and evolution of drug-resistant genes in the malaria parasite *Plasmodium falciparum* in southwestern Nigeria

Principal investigator	**:**	**Dr. Aparup Das**
Status	**:**	**Completed**
Funding	**:**	**Intramural**

Malaria is an age-old disease of human kind living in the tropical and sub-tropical regions of the globe, with Africa contributing the highest incidence of morbidity and mortality. Among many hurdles, evolution and spread of drug-resistant Plasmodium falciparum parasites constitute major challenges to malaria control and elimination. Information on molecular epidemiology and pattern of evolution of genes conferring resistance to different antimalarials are needed to track the route of the spread of resistant parasites and also to inform if the drug- resistant genes are adapted in the population following the Darwinian model of evolution. In the present study, we have followed molecular methods to detect both the known and emerging mutations in three genes (*Pfcrt, Pfdhfr and Pfdhps*) of *P. falciparum* conferring resistance to chloroquine and sulfadoxine-pyrimethamine from two different states (Edo: meso-endemic and Lagos: hypo-endemic) in southwestern Nigeria. High diversities in haplotypes and nucleotides in genes responsible for chloroquine (*Pfcrt*) and sulfadoxine (*Pfdhps*) resistance are recorded (Figure 3.3.1). About 96% of *Pfdhfr* and *Pfdhps* gene in both the meso- and hypo- endemic areas were mutant type, followed by 61% in Pfcrt gene (Figure 3.3.2). Many unique haplotypes of *Pfdhps* and *Pfcrt* were found to be segregated in these two populations. One particular mutant haplotype of *Pfdhfr* (AIRNI) was found to be in very high frequency in both Lagos and Edo. While the net haplotype diversity was highest in Pfdhps (0.81 in Lagos, 0.87 in Edo), followed by *Pfcrt* (0.69 in Lagos, 0.65 in Edo); highest number of haplotype was found in *Pfdhps* with 13 distinct haplotypes, followed by seven in *Pfcrt* and four in Pfdhfr gene. Moreover, detection of strong linkage among mutations of *Pfcrt* and *Pfdhfr* and feeble evidence for balancing selection in *Pfdhps* are indicative of evolutionary potential of mutation in genes responsible for drug resistance in Nigerian populations of *P. falciparum*.

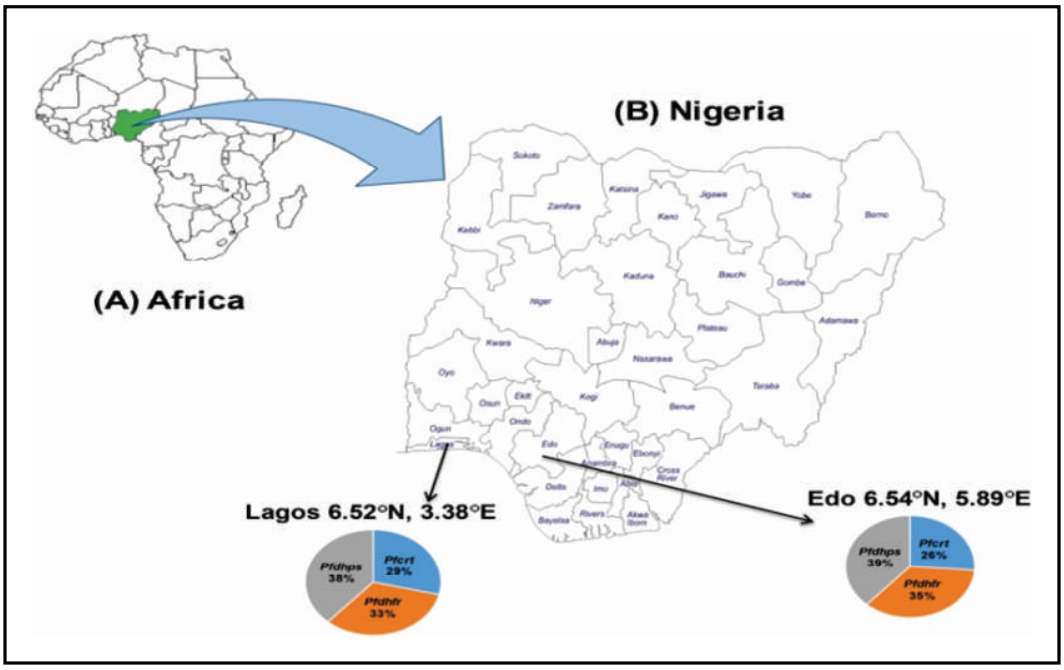


Figure 3.3.1. (A) Map showing location of Nigeria in the African continent. (B) Distribution of drug resistance *P. falciparum* molecular markers of three genes in Edo and Lagos state. Edo state showed a characteristically high degree of mutation in *Pfdhfr* and *Pfdhps* genes while higher mutations in the *Pfcrt* gene was observed in Lagos state as compared to Edo state.

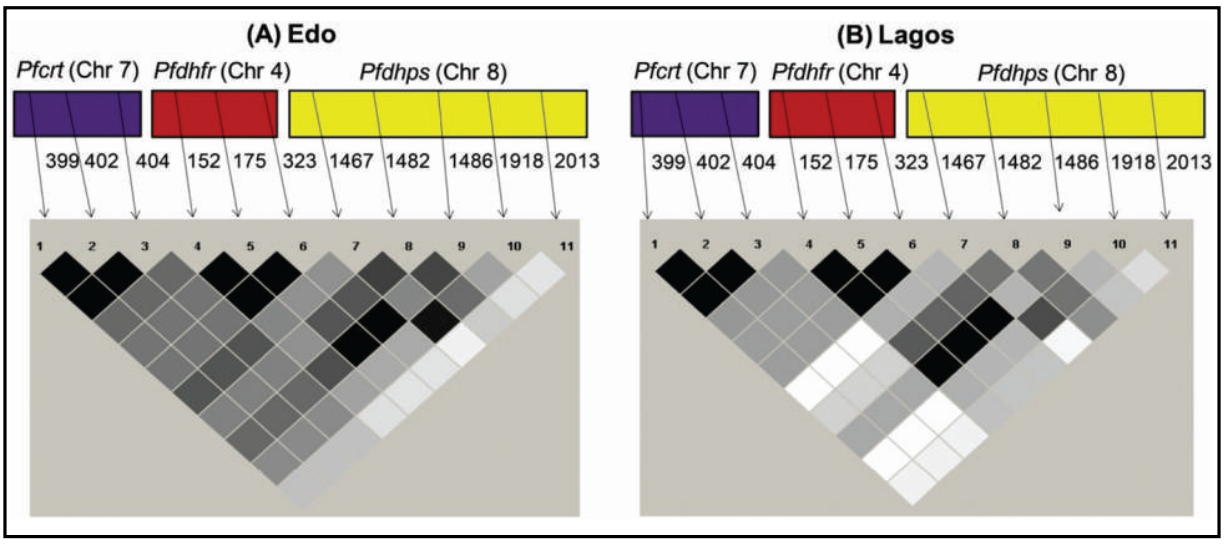


Figure 3.3.2. Linkage disequilibrium plot between SNPs of *Pfcrt*, *Pfdhfr* and *Pfdhps* in *P. falciparum* isolates from Nigeria. The intra and inter-genic association between genes for the isolates collected from (A) Edo and (B) Lagos state were determined using the LD plot. The strength of the association between SNPs was determined by the association of statistical significance by calculating the r^2 value and denoted by the intensity of the colours of the boxes.

3.4. BIONOMICS OF MALARIA VECTOR(S), SIBLING SPECIES AND TO ESTABLISH THEIR ROLE IN TRANSMISSION IN GADCHIROLI, MAHARASHTRA, INDIA

Principal investigator	**:**	**Dr. Gyan Chand**
Status	**:**	**On going**
Funding	**:**	**ICMR**

Vector control is one of the major components of malaria control under the National Vector Borne Disease Control Programme (NVBDCP). To plan an effective vector control strategy there is a need to have information on prevalence of vector species and on their biological characteristics and bionomics. Therefore, a study is planned and being carried out in district Gadchiroli of Maharashtra state. Two community health centers (CHC) namely Dhanora and Ahiri have been selected (Fig. 3.4.1). In each CHC, 5 villages representing different kind of topography have been selected. This study is being carried out with the cooperation of Society for Education Action and Research in Community Health (SEARCH). The objectives of the study are 1. To assess the indoor and outdoor resting proportions of vector species during different seasons; 2. To assess host biting preference, biting rhythm and peak biting activity of vector species during different seasons; to identify breeding habitats of vectors and their association with other anophelines; to identify the sibling species of all known malaria vectors using molecular techniques; 3. To determine the plasmodium specific sporozoite rate of different vectors by molecular techniques and sites of transmission, and to assess the susceptibility status of vectors against different insecticides.

Resting collections

A total of 1986 and 2003 Anopheline mosquitoes were collected from the study villages of Ahiri and Dhanora CHCs by spending 80 and 106 hours respectively. Six and ten Anopheline species were found in Ahiri and Dhanora CHCs. Overall man hour density of *An. culicifacies* was 9.6 and 9.5 and anophelines were 24.8 and 18.9 in these two CHCs respectively. Only three specimens of *An. fluviatilis* were found in the resting collection in the month of November and January in Dhanora . Over all proportion of *An. culicifacies* was 38.7 and 50.5 % in the resting collections. Maximum density of anphelines and *An. culicifacies* was recorded in month of August followed by July.

In light trap catches, only 5 anopheline species were found in Ahiri and nine species were found in Dhanora CHCs. Proportion of *An. culicifacies* was only 4.5% and 4.4 % .*An. subpictus* was the predominant species trapped in both the CHCs (proportion 84.5% and 67.4% respectively) followed by *An. annularis*. In Ahiri, *An. culicifacies* was not found in Light trap installed outdoor and in field. In Dhanora CHC, *An culicifacies* was found throughout the night while in Ahiri the species was trapped in early hours. Only two specimens of *An. fluviatilis* were found in light trap catches.

A total of 302 and 473 anophelines were collected from animal bait collections. *An. culicifacies* constitute only 6.9% and 8.7% of total anophelines while *An. subpictus* constitutes 51% and 48 % respectively. *An. culicifacies* was found biting throughout the night in both the areas and is similar as in the light trap catches

An culicifacies was found resistant to DDT, Malathion, Cyfluthrin, Alphacypermethrin Deltamentrin and Lambada cyhalothrin but verification for resistant status is required for Permethrin. In Ahiri CHC, susceptibility status of *An. culicifacies* was assessed against DDT, Malathion, Lambda cyhalothrin, Alpha cypermethrin and Deltamethern. *An. culicifacies* was found resistant to all the insecticides except Deltamethrin which falls in the category of verification required (Table 3.4.1).

Table: 3.4.1: Susceptibility status of *Anopheles culicifacies*

Insecticide	No. exposed		Mortality in 24 hrs		% mortality		Corrected mortality	Status
	EXP	Cont	EXP	Cont	EXP	Cont		
DDT	45	20	12	1	44.4	8.6	39.2	R
Lambda cyhalothrin	54	16	38	1	70.4	6.3	68.4	R
Cyfluthrin	57	20	49	3	86	15	83.5	R
Malathion	45	20	30	2	44.4	6.7	40.4	R
Deltametherin	20	10	19	1	95	10	94.4	VR
Alph cypermethrin	20	10	18	0	90	0	90.0	R
Lambda cyhalothrin	20	10	17	1	85	10	83.3	R

Sibling species composition: During the report period, 170 specimens of *An. culicifacies* were analyzed for sibling species composition using molecular tools. Thirty nine specimens belong to group A (A/D) and 101 were group B (B/C/E). Further analysis of group B reveals that species C is the predominant sibling species.

Sporozoite incrimination: Total 1475 specimens of An. culicifacies were analyzed by PCR method. None was found positive for plasmodium genus.

Study is ongoing.

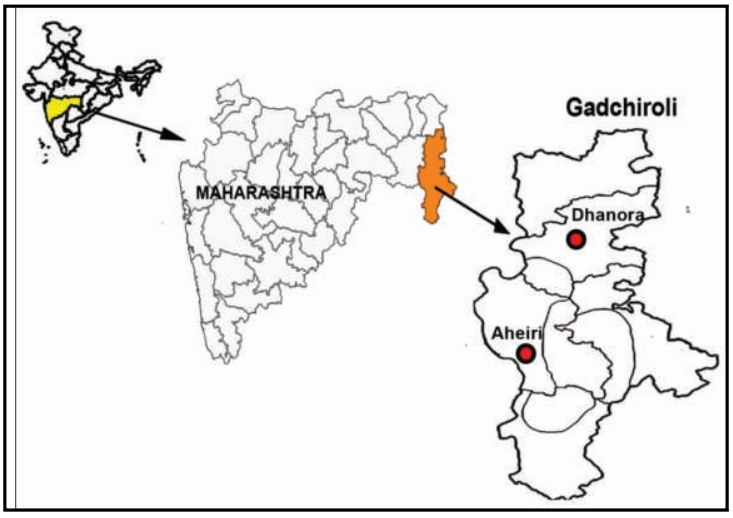


Fig. 3.4.1: Map showing location of district Gadchiroli and study CHC there inA pond in Mahavada village Dhanora CHC Gadchiroli

3.5. BIONOMICS OF MALARIA VECTORS, SIBLING SPECIES COMPOSITION AND TO ESTABLISH THEIR ROLE IN MALARIA TRANSMISSION IN MADHYA PRADESH

Principal Investigator	**:**	**Dr. A. K. Mishra**
Status	**:**	**Ongoing**
Funding	**:**	**ICMR**

Control of malaria vectors in India is major component among the tools used to combat malaria. Indoor spraying of residual insecticides and LLINs are the vector control tools used in the programme. With these strategies, and effective species specific drugs, malaria has been reduced in many parts of the country. For further improvement in results in malaria control the existing strategies are to be used effectively and also there is a need to assess whether these strategies are effective to address biological variations of vector species that are prevalent in different areas. This protocol has been developed to generate data on biological variations of vector species which would be useful in the planning of suitable vector control strategies.

The study was proposed to be conducted in a malarious district Sidhi in Madhya Pradesh state, where almost nothing is known about the vector and their bionomics, with the overall objective to study the bionomics of prevalent malaria vectors and their role in malaria transmission for development of evidence based sustainable malaria control strategy with special reference to vector control. The specific objectives are to assess susceptibility status, indoor and outdoor resting proportions and biting preference of vector species and to identify the sibling species of known malaria vectors and to determine the plasmodium specific sporozoite rate and sites of transmission. This study was initiated from June 2017 in 8 villages of different terrain of 2 CHCs viz. Semaria and Kusumi of Sidhi. Three villages in forest, 3 in foothill and 2 in plain area were selected for the study. Surveys were carried out monthly to cover pre monsoon, monsoon, post monsoon and winter seasons.

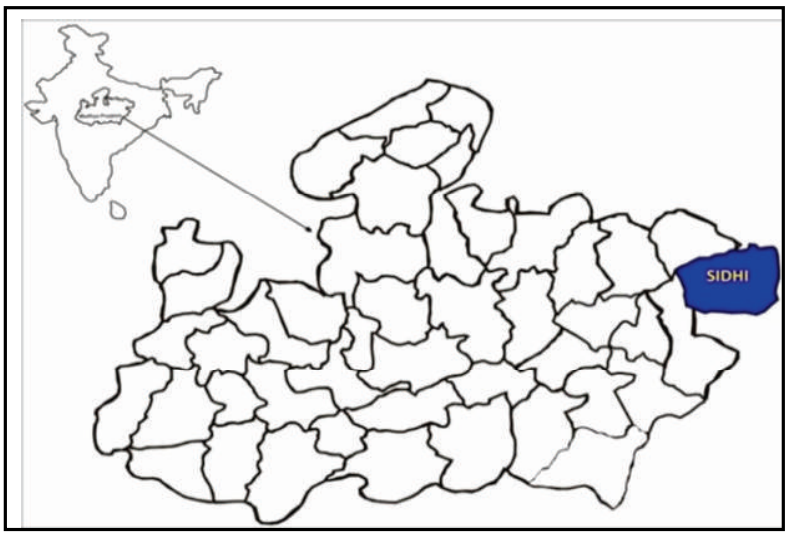


Fig. 3.5.1: Map of Madhya Pradesh showing Sidhi district

For monthly entomological surveillance, indoor resting collections and pyrethrum spray catches were done in all 8 villages (4 in Semaria CHC and 4 in Kusumi CHC) covering all 3 ecotypes. Light trap catches, human landing and animal bait catches were done in 3 villages every month (one village of each ecotype). Abdominal condition of all vector mosquitoes was recorded. *An. culicifacies* and *An. fluviatilis* collected from different collections, were stored for vector incrimination and sibling species determination by PCR. For blood meal preferences, blood elute were collected on Whatman filter paper No. 1 from the stomach of wild caught vector species. Breeding site surveys were carried out in all villages covering all water bodies (streams, pools, seepages, ditches, wells, ponds, rice fields etc) in the radius of 500 meters of the villages. Larvae were collected and held for emergence up to adult stage and identified. Susceptibility status of *An. culicifacies* to diagnostic dose of insecticides was done before initiation of the study.

The average indoor resting per man hour anopheline density (MHD) was 16.4 during the months from June 17 to March 18 of which 64 % were vector *Anopheles culicifacies* and *An. fluviatilis* followed by *An. subpictus* and *An. annularis*. Other anophelines viz. *An. vagus, An. splendidus, An. barbirostris*, *An. tessellatus, An. jamasi, An. nigerrimus and An. pallidus were caught in very few numbers*. The proportion of vector species is almost same in both CHCs. Ecotype wise MHD data showed that the anopheline density was slightly higher in forest (18.0) and foothill (16.0) villages as compared to plain (12.8), however, the vector proportion was also higher (> 66%) in forest and foothill (Figure **3.5.3**). Ten months data revealed that the higher anopheline and vector density was observed in July and August (Figure **3.5.2**). It was also observed that the density inside the human dwelling was very low, as most of the *An. culicifacies* and *An. fluviatilis* (74%) were caught from outside the houses (cattle shades).

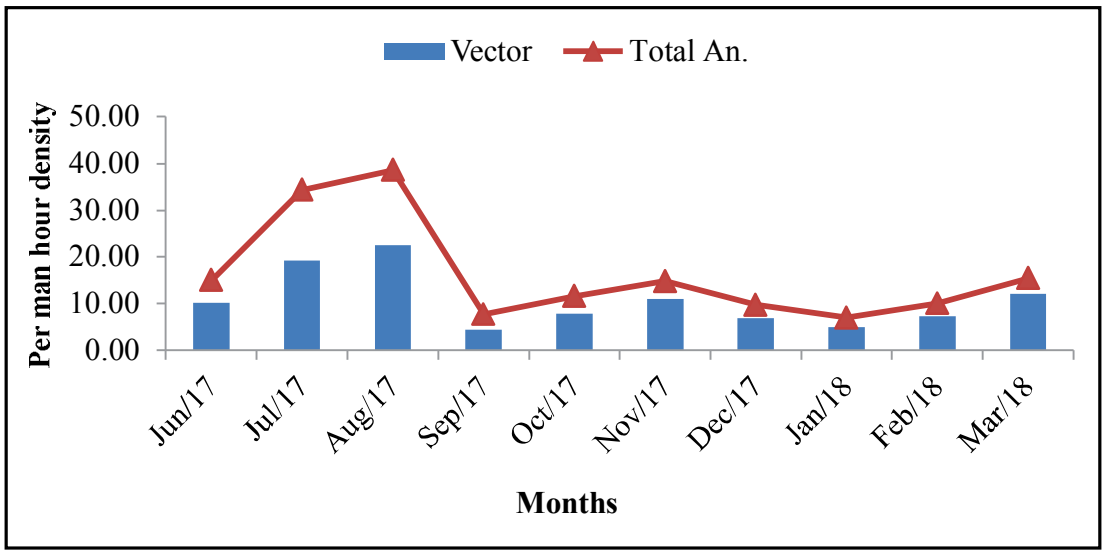


Fig. 3.5.2: Indoor resting collection

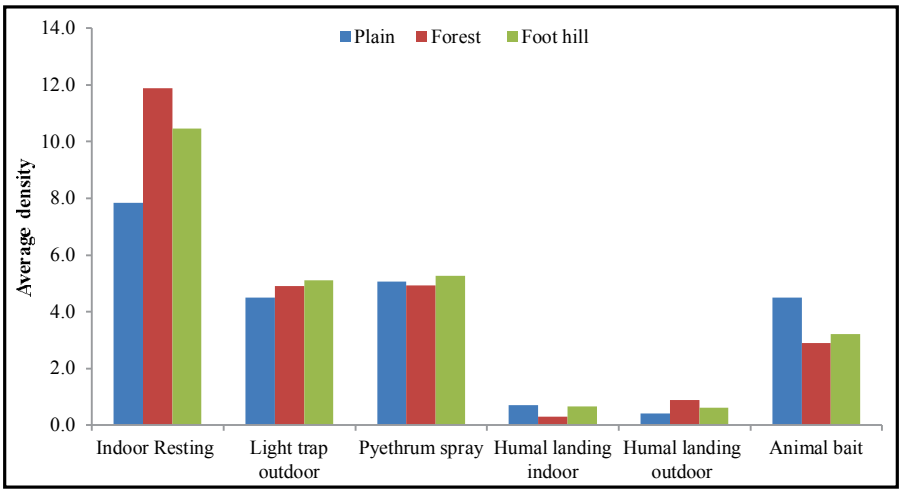


Fig. 3.5.3: Proportion of vector (*An. culicifacies* and *An. fluviatilis*) in different ecotypes

In outdoor light trap catches, the per trap per night catch of anophelines was 8.5 of which vector proportion was about 58%. The other anophelines viz. *An. annularis, An. subpictus, An. splendidus, An. tessellatus*, An. *nigerrimus, An. pallidus. An. psendojemesai and An. theobaldy were caught in few numbers.* Most of the mosquitoes were trapped in June, August and November months (Figure **3.2.4**). The proportion of vector species is almost same in both CHCs. Almost equal anophelines catch per night was observed in all ecotypes (Figure **3.5.3**); however, vector proportion was higher in forest (64%) and foothill (61%) villages as compared to plain villages (46%).

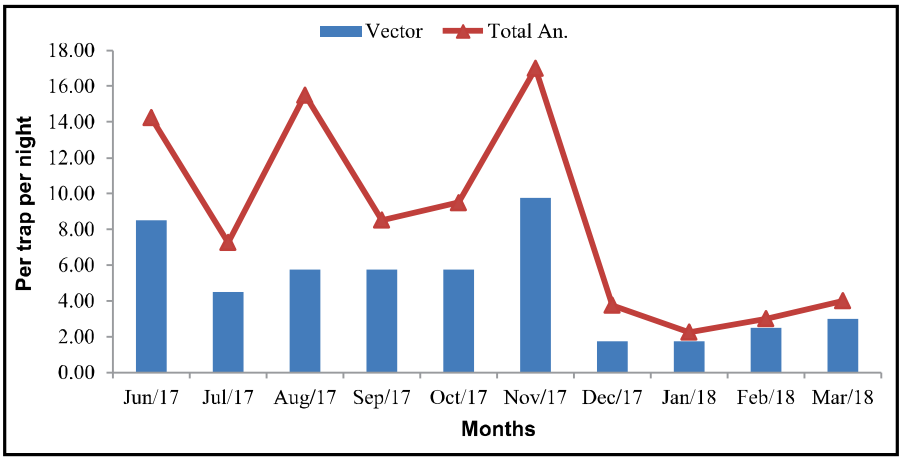


Fig. 3.5.4: Light Trap Outdoor catch

During pyrethrum spray catches, the numbers per room of anophelines was 8.9 of which vector species *An. culicifacies* and *An. fluviatilis* proportion was about 57% (Figure 3.5.4), which was higher in forest (60%) and foothill (61%) villages as compared to plain (47%, Figure:**3.5.3**). The other species caught were *An. subpictus, An. annularis*, *An. barbirostris*, *An. splendidus*, *An. tessellatus*. *An. maculatus* An. *jamesi,* An. *nigerrimus, and An. pallidus*The highest anopheline catch was observed in August month.

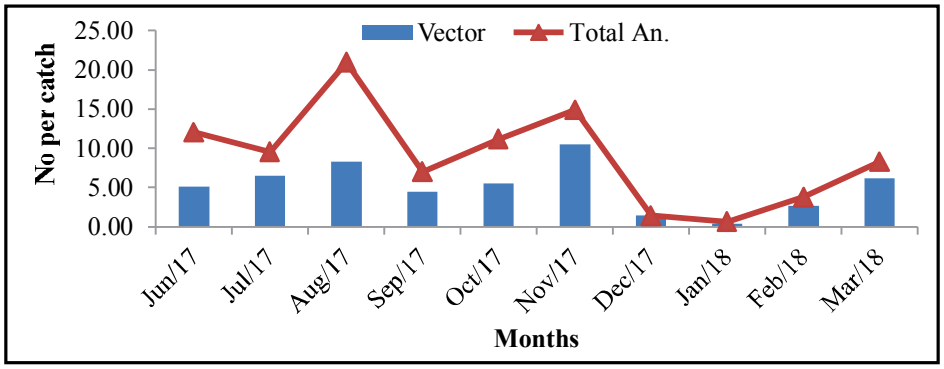


Fig. 3.2.5: Pyrethrum Spray Sheet Collection

The per man per night catch of anophelines was very low in both indoor (0.6) and outdoor (0.8, however; proportion of *An.culicifacies*was > 80% in both. Month wise data revealed that highest catch was observed in June and July months in outdoors whereas in indoors higher numbers were caught in November (Fig. 3.5.6A and B). The catch in indoor was comparatively higher in plain and foothill area and in outdoor in forest area (Fig. 2). Most of the human landing catch (> 75%) was observed during early hours of night (before midnight).

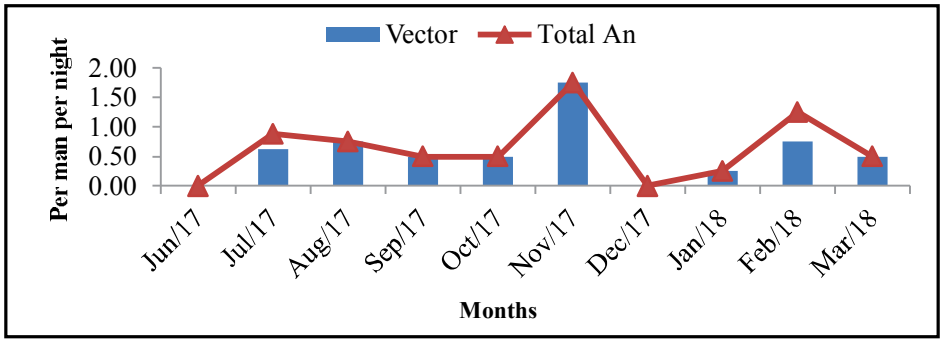


Fig. 3.5.6A: Human Landing

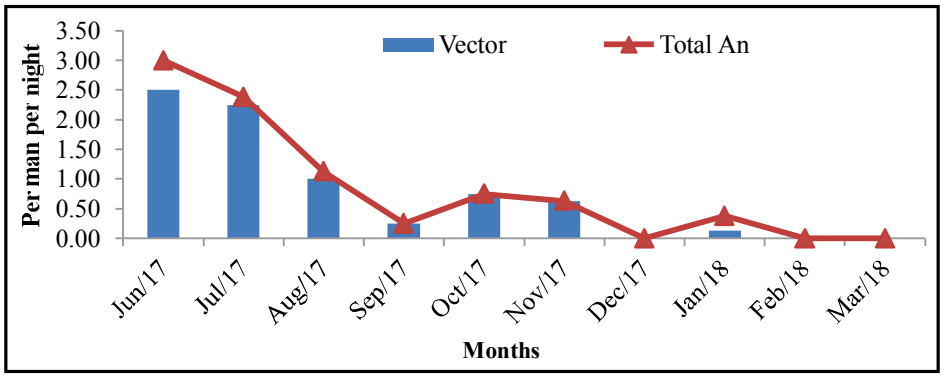


Fig. 3.5.6B: Human Landing Outdoor

Animal bait collections revealed 4.6 per bait density of anophelines of which more than 75% were *An. culicifacies* and *An. fluviatilis.* Month wise data revealed that highest catch was observed in June and July months (Figure 3.5.7). The density of total anopheline and vectors was almost same in both CHC in all ecotype. However, vector proportion was higher in plain (Figure **3.5.3**).

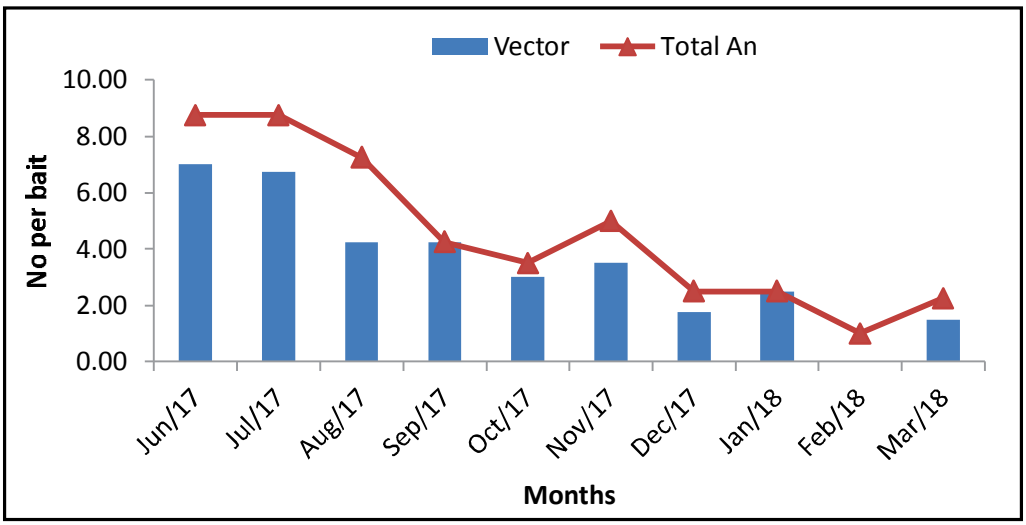


Fig. 3.5.7: Animal Bait Collection

During the period, a total of 10 anopheline species emerged from different water bodies of which proportion of vector species *An. culicifacies* and *An. fluviatilis* was 61% (Table 3.5.1). *An. culicifacies* emerged mainly from stream and rocky pits where as *An. fluviatilis* emerged mainly from running water, streams and rocky pits. The emergence was found almost same in each ecotype.

Table 3.5.1. Larval emergence in different breeding sites

Species	Stream	Pond	Rain water pool	Pool	Hoof Prints	Rice field	Ditch	Rocky pits	Seepage water	Hand Pump water	Running water	Total
An. culicifacies	110	0	2	4	30	10	12	87	21	0	5	**281**
An. fluviatilis	6	0	0	0	0	0	0	13	0	0	5	**24**
An. annularis	5	21	3	4	0	0	9	5	3	0	0	**50**
An. barbirostris	4	0	0	0	0	0	0	0	0	0	0	**4**
An. nigerrimus	0	3	0	0	0	0	2	1	0	0	0	**6**
An. pallidus	0	0	0	0	0	4	2	0	2	0	0	**8**
An. splendidus	8	0	0	0	0	0	0	5	4	0	0	**17**
An. subpictus	21	8	4	9	1	3	29	7	0	3	1	**86**
An. theobaldi	6	0	0	1	0	0	0	3	5	0	0	**15**
An. vagus	0	0	0	0	2	2	8	0	0	0	0	**12**
Total	**160**	**32**	**9**	**18**	**33**	**19**	**62**	**121**	**35**	**3**	**11**	**503**

Susceptibility status of *An. culicifacies* to diagnostic dose of insecticides revealed DDT and Malathion resistance in the district. The corrected percent mortality (CPM), observed in DDT 4% and Malathion 5% was 27.6 and 63.7% respectively. The vector was found susceptible to Deltamethrin 0.05% with 98.8% CPM where as varying level of resistance was observed in Alphacypermethrin 0.1% with 96.5% CPM (Table 3.5.2).

Table 3.5.2: Insecticide susceptibility test

Insecticidal / Control	Corrected % mortality
DDT 4%	27.62
Malathion 5%	63.72
Alphacypermethrin 0.1%	96.52
Deltamethrin 0.05%	98.84

3.6. VECTOR SURVEILLANCE FOR ZIKV IN SELECTED HIGH RISK AREAS IN INDIA

Principle investigator	**:**	**Dr. P. Jambulingam, Director, VCRC**
PI at NIRTH	**:**	**Dr. Gyan Chand**
Status	**:**	**On going**
Funding	**:**	**ICMR**

Zika virus (ZIKV) is a new threat to public health. Following the reporting of two ZIKA positive cases from Ahmedabad (Gujarat) and one from Tamil Nadu, the study was planned and being carried out at six places across the nation. Since Jabalpur and its surrounding districts are known for dengue and chikungunya outbreaks and perennial prevalence of vector *Aedes aegypti* mosquito, the area is at potential risk of ZIKV transmission.

Overall objective of the study is to assess whether Zika is in circulation in selected high risk states of India and the specific objectives are to create a vector surveillance network for early detection and monitoring of ZIKV in different geographical regions of the country, to monitor the risk of ZIKV transmission in districts with high risk of dengue transmission and to standardize Aedes vector surveillance system for monitoring ZIKV.

The study is being carried out in Jabalpur city and villages of Narsighpur district. Both the district (areas) has witnessed outbreaks of dengue and/or chikungunya in recent past. In Jabalpur five colonies located 4-5 km. away from each other have been selected keeping in view to represent different type of communities. While in Narsinghpur six villages were selected that has reported dengue and chikungunya cases. Number of houses in villages varied from 150 to 1000 in villages of Narsinghpur

Mosquitoes were collected twice in a month from each selected area between 8.00 AM to 1.00 PM using aspirator and torch. Collected mosquitoes were sorted out species wise, sex wise and specimens of *Ae. aegypti*, *Ae. albopictus* and *Ae. vittatus* were stored in vials containing 50 microlitre TRI reagents separately. Total 200 and 280 specimens of *Ae. aegypti* has been collected from Jabalpur and Narsinghpur.

Aedes larval survey was also carried out every month and 80 to 100 households were surveyed from each selected area/village. All possible water holding containers were searched for immature stages of Aedes genera following standard practices. Till March 2018, 1800 and 2700 households from Jabalpur and Narsinghpur were covered having 12300 and 16600 water holding containers. Overall House index, container index and breteau index in these two areas were 7.8, 1.2 and 8.4 in Jabalpur and 6.5, 1.1 and 6.7 in Narsingpur. Analysis of collected samples for ZIKV, DENV is in progress

3.7. PHASE III EVALUATION OF DELTAMETHRIN 62.5 SC-PE LONG LASTING INDOOR RESIDUAL SPRAYING AGAINST *AN. CULICIFACIES*, THE VECTOR OF MALARIAIN INDIA (MULTICENTRIC)

Principal Investigator	:	**Dr. A. K. Mishra**
Status	:	**Ongoing**
Funding	:	**Bayer Crop science**

Vector control intervention in India is mainly based on chemical control, using insecticides of different groups. One of the long-term intervention measures being used for malaria control by the NVBDCP is Indoor residual spraying (IRS) with insecticides mainly synthetic pyrethroids (SP). The conventional formulations of SP offer protective efficacy for a period of around three months, necessitating increased frequency of spraying to cover longer transmission seasons. One such newer formulation Deltamethrin 62.5 polymer-enhanced suspension concentrate (SC-PE) (K-Othrine Polyzone, Bayer Crop Sciences, Germany) is an adjuvanted aqueous suspension concentrate formulation containing 62.5 g of active ingredient per liter intended for extended residual activity on treated surfaces due to the addition of a specific polymer. Therefore, it was proposed to evaluate the efficacy of Deltamethrin 62.5 SC-PE in *Plasmodiumfalciparum* endemic villages of Dindori district of Madhya Pradesh State, India against *An. culicifacies* following the common protocol with the objectives to assess its efficacy against *An. fluviatilis* and *An. culicifacies*, the residual activity, impact on disease incidence/ prevalence and to assess community acceptability, side effects etc.

The study was initiated in May 2017 in Dindori district (Fig: 3.7.1)which is one of the most malarious district in Madhya Pradesh contributing 12% of the total malaria cases in the state with only 1 % of the state's population. Both *Plasmodium falciparaum* and *P. vivax* are the common infections and prevalent in all age groups. *An. culicifacies* is the major malaria vector responsible for perennial transmission of the disease and its density is very high throughout the year. Another efficient vector is *An. fluviatilis* in the district, but its density is very low. Annually, two rounds of IRS with Alphacypermethrin 5% WP (synthetic pyrethroid) are being done in the district.

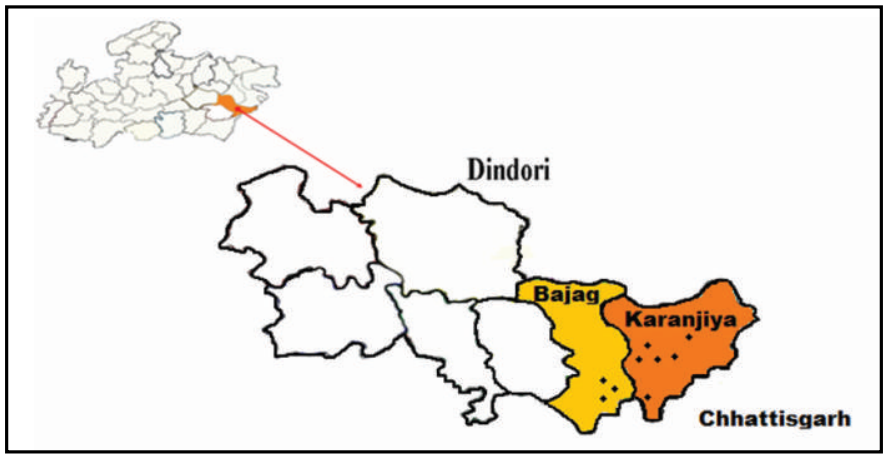


Fig. 3.7.1: Map of Madhya Pradesh showing Dindori district and study villages

The district has seven CHCs. The worst affected villages of the district are mainly those having ethnic group of Baiga (PVTG) in three CHCs viz., Bajag, Samnapur and Karanjia. Of the three CHCs, Bajag and Karanjia CHCs were selected for the trial. Villages in two subcentres i.e. Chara of Bajag CHC (Arm I) covering 3 villages of 3085 population and Tharpathra of Karanjia CHC (Arm II) covering 6 villages of 3269 population of the district were selected. The Deltamethrin 62.5 was sprayed in Arm I and Deltamethrin 2.5 in Arm II in July 2017 by DMO staff under strict supervision of NIRTH. Before spray, in the month of May, June and some part of July, the base line data on all activities i. e. malaria prevalence, vector density, bioassays etc was collected.

Prior to the trial, vector susceptibility to the conventional insecticides including deltamethrin was determined using the WHO tube method. Census and House hold survey for collection of baseline data was done. Necessary ethical clearance was obtained from Human Ethical Committee of the institute. For assessment of spray quality, Whatman® No. 1 filter papers were fixed on the walls of the houses selected randomly and these filter paper samples were sent to a government recognized laboratory for insecticidal content analysis. Surveys were carried out at fortnightly intervals in 60 households of each village to assess the percentage of houses mud-plastered. Residual activity of both the deltamethrin were determined fortnightly through cone bioassays on different sprayed surfaces in the villages. Entomological evaluation was done at fortnightly interval. For entomological evaluation, indoor-resting collections, light trap outdoor catches, human landing and animal bait catches were performed in both sites. Daily survival of the vector species was calculated from proportion of parous mosquitoes. The blood meals from fully fed females of *An. culicifacies* and *An. fluviatilis* speciescollected from all collections from each arm per month were squashed and dried onto what man filter paper no. 1 for host source identification. Heads and thoraces of *An. culicifacies* and *An. fluviatilis* collected from all collections were stored in micro centrifuse tubes separately and assayed for the presence of malaria parasite by employing diagnostic PCR using the nested PCR protocol.

Fig. 3.7.2: Mosquito collection by different methods

For parasitological evaluation, fever surveys were done in all villages of both arms after spraying, at fortnightly interval for malaria incidence. Malaria prevalence before spray was carried out as sample blood survey. All malaria positive cases were administered anti-malarial drugs following the NVBDCP guidelines. Community acceptability, perceived benefits/side effects were assessed by interviewing the inhabitants of the study villages using a structured questionnaire.

Fig. 3.7.3: Fever survey in villages

Susceptibility status of *An. culicifacies* the main known malaria vector carried out prior to the trial in both study area, revealed DDT and Malathion resistance and Aplhacypermethrin 0.1% and Deltamethrin 0.05% showed varying level of resistance (Table 3.7.1).

Table 3.7.1: Susceptibility of *An. culicifacies* to different insecticide

Period	Insecticide	Corrected % Mortality
Before spray	DDT 4%	28.9
	Malathion 5%	65.8
	Alphacypermethrin 0.1%	93.0
	Deltamethrine 0.05%	95.2

During spraying about 90% houses and rooms were sprayed covering about 90% population. Some consecutive surveys carried out after spray by NIRTH team which revealed that out of 43.0 % houses surveyed, 76.0% were found sprayed completely and 24.0% partially. Room coverage was 90% out of 49% surveyed rooms. A total of 63.0 % houses with cattle shades were also sprayed. After spraying, only 2 and 4% houses were mud plastered in one and two months (August and September) respectively. About 42% houses were mud plastered up to November (after 4 months of spray) and till March/April, all 1075 houses were plastered. The highest number of houses was plastered in the months of October and November may be due to Diwali festival celebration. The results of the assessment of residual activity performed by Cone Bioassay tests in each arm before and after spray revealed that the corrected % mortality (CPM) of *An. culicifacies* was only 3.3 and 2.2 in Arm I and Arm II respectively before spray and after spray it was 100% on day 1 in both the arms then after from day 7 to day 195, it was between 81 to 98% in Arm I. In Arm II, the mortality observed was 80 to 88% from day 7 to day 45.

The density of vector mosquitoes (*An. culicifacies* and *An. fluviatilis*) measured by hand in indoor during base line survey revealed that in Arm I and Arm II, the density was 26.3 and 18.9 PMH respectively. After spray, the vector density was some high in 1st fortnight of August month may be due to peak mosquito density period and rains but then after from 2nd fortnight of August 17, vector density came down up to March 2018 in both the arms but the reduction rate in Arm I was higher as compared to that in Arm II. The reduction in vector density was seen in both human dwellings and cattle shades but it was higher in human dwellings in each month in both areas (Fig. 3.7.4).

The per trap per night catch of vectors measured by light trap in outdoor during base line survey revealed that the catch was almost same in both arm (6.7 in Arm I and 7.0 in Arm II). After spray, the vector density decreased in both arms till March 2018 (Fig. 3.7.4).

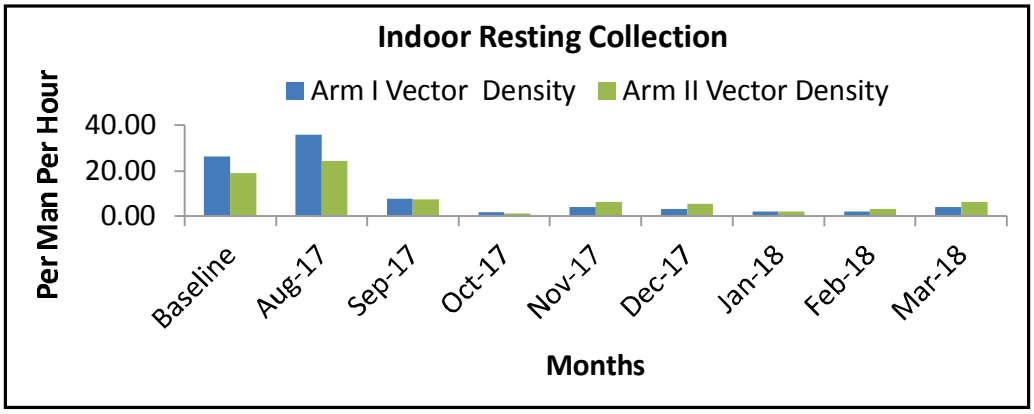


Fig. 3.7.4: Monthly indoor resting collection

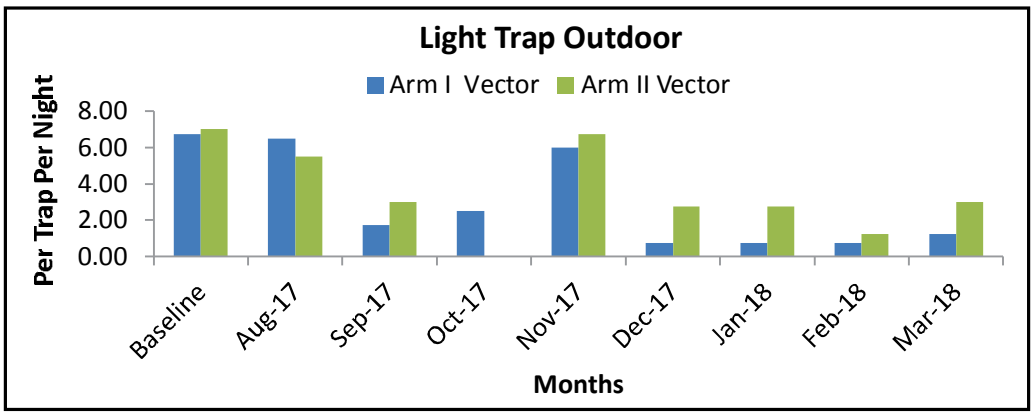


Fig. 3.7.5: Monthly light trap catches

In indoor human landing collections, the per man per night catch of vectors measured during base line survey was 1.63 in Arm I and 2.75 in Arm II. After the spray, density highly decreased in Arm I as no mosquito was caught in 6 months from October 2017 to March 2018. However, in Arm II, the density decreased but the reduction rate is less than observed in Arm I. Almost every month (except February 2018) we caught mosquito in Arm II (Fig. 3.7.5). In outdoor human landing collections, the per man per night catch of vectors measured during base line survey was 1.13 in Arm I and 0.75 in Arm II. After the spray, the catch was high in Arm I (2.25) and Arm II (2.4) in August just after few days of spray but after that density reduced but the reduction was not much as observed in indoor collections in both arms (Fig. 3.7.6). Hourly collections revealed that more than 75% mosquitoes were caught between 8 pm to 12 midnight in all collections.

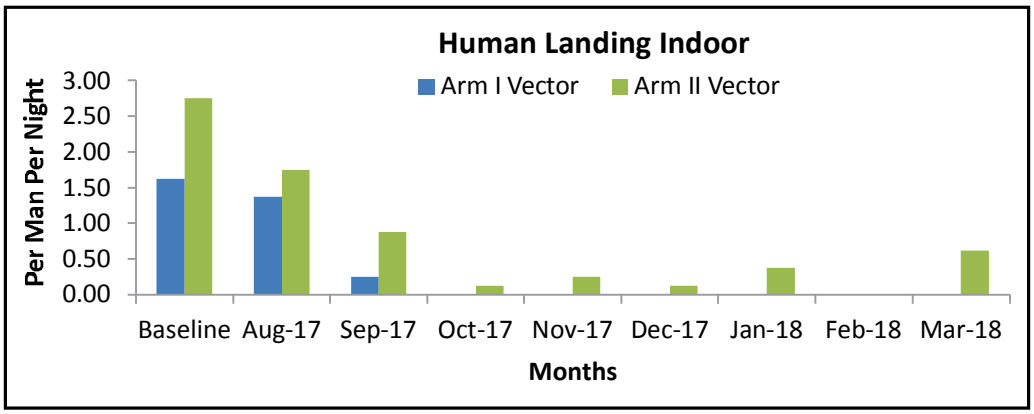


Fig. 3.7.6: Monthly indoor human landing catches

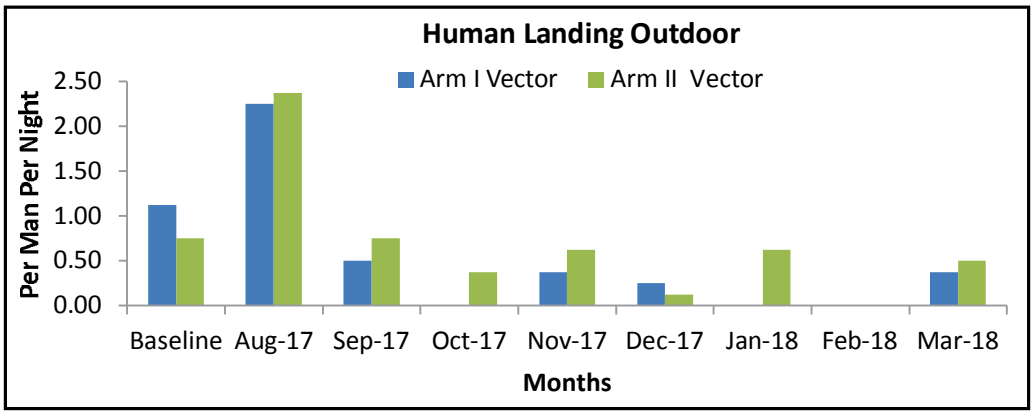


Fig.3.7.7: Monthly outdoor human landing Catches

During mosquito landing collections on animal, the number of vectors per bait per night during base line survey was 4.2 in Arm I and 9.0 in Arm II. It was increased in August then after reduced in both the arms (Fig. 3.7.8).

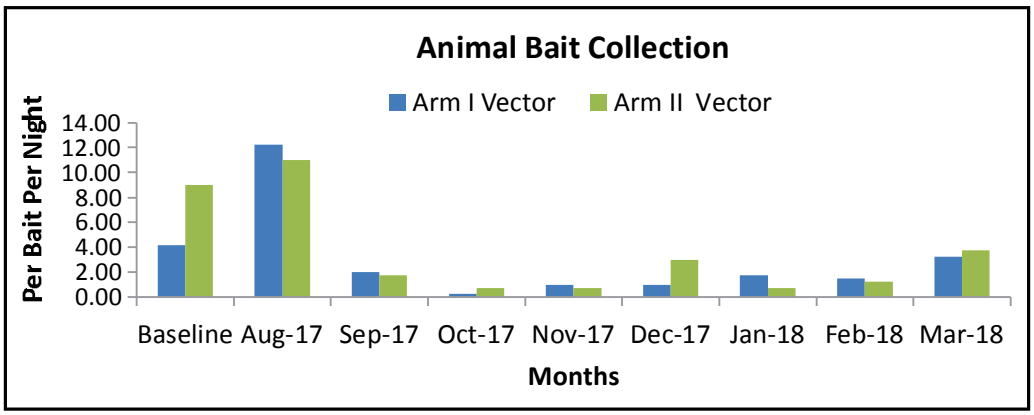


Fig. 3.7.8: Monthly mosquito landing collection on animal

Parity determination carried out by counting dilatation during base line surveys, it was found that the parity rate of *An.culicifacies* was 20.2 (out of 129 dissected) and 14.1% (out of 142 dissected) in Arm I and Arm II respectively then after spray, the parous rate was 15.0 and 11.9 in Arm I and Arm II respectively in August. After that very few parous *An.culicifacies* were detected in Arm I up to March where as in Arm II, the parity rate did not show any significant reduction (Fig. 3.7.9).

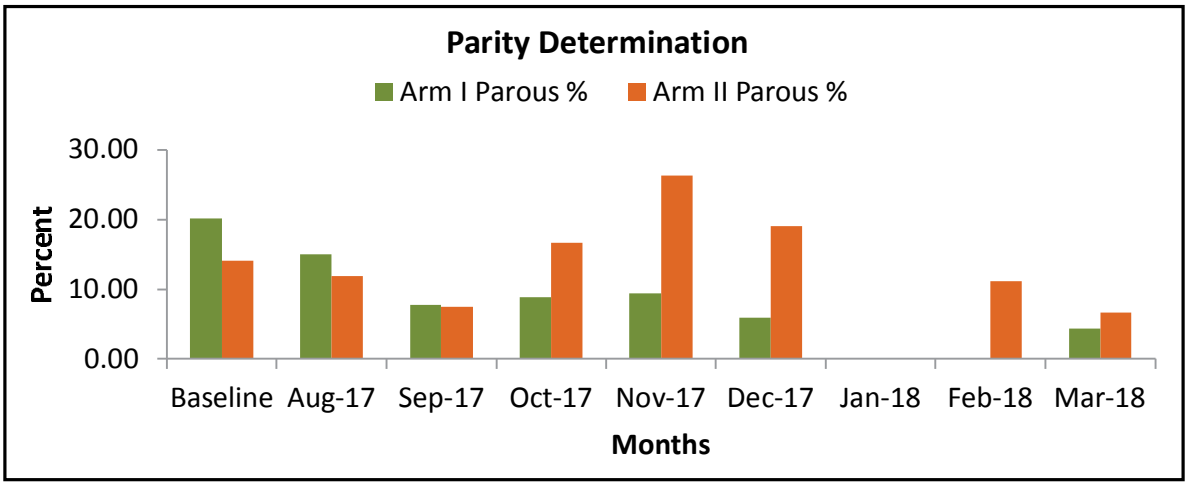


Fig. 3.7.9: Parity determination of *An. culicifacies*

A total of 1210 *An. culicifacies* (655 from Arm I and 555 from Arm II) and 94 *An. fluviatilis* (49 from Arm I and 45 from Arm II) could be assayed and out of that two *An. culicifacies,* collected from human dwellings of Arm I during base line survey (in the month of June 2017), were found sporozoite positive for Pf strain. After the spraying, no mosquito was found positive collected from August 17 to March 18.

During Parasitological evaluation, the Malaria Prevalence before spray observed by sample blood survey revealed a total of 22 malaria positives (1 Pv and 21 Pf) out of 382 screened (SPR 5.7) in Arm I and 21 (Pf) out of 485 screened in Arm II (SPR 4.3). During survey for malaria incidence after spray, only few malaria positive cases were found in Arm I in every month showing a total of 21 positive (1 *Pv* and 20 *Pf*) out of 927 screened (SPR 2.2) from August 2017 to March 2018, however in Arm II, many cases of malaria positive (12 Pv and 59 Pf out of 1350 screened) showing SPR about 4.5 % (Table 3.7.2).

Table 3.7.2. Epidemiological evaluation

Survey Type	Months	Arm I					Arm II				
		BSE	+ve	Pv	Pf	SPR	BSE	+ve	Pv	Pf	SPR
Malaria Prevalence	Before spray (Baseline)	382	22	1	21	5.76	485	21	0	21	4.33
Malaria Incidence fortnightly (After spray)	August	85	2	0	2	2.35	81	6	0	6	7.41
	September	120	4	0	4	3.33	164	5	2	3	3.05
	October	111	3	0	3	2.70	225	17	4	13	7.56
	November	265	6	0	6	2.26	231	19	2	17	8.23
	December	124	4	0	4	3.23	287	12	4	8	4.18
	January	81	0	0	0	0.00	109	1	0	1	0.92
	February	75	1	1	0	1.33	124	0	0	0	0.00
	March	66	1	0	1	1.52	129	1	0	1	0.78

House hold surveys carried out for community acceptability, perceived benefits/adverse effects etc, out of total of 246 householders (139 in Arm I and 107 in Arm II) about 70% know that insect transmit disease is malaria, 83% are using indigenous methods of protecting the disease. Almost 100% householders slept in sprayed rooms without any fear of poisoning, however, 2% told about smell of the insecticide. All the inhabitants agreed to use the insecticide spray in future. Householders and the spray workers were asked about any side effects of insecticide i.e. itching, tingling sensation, headache, eye irritation, tears, rashes, facial burning or sneezing, of which only 2.0 % household heads complaint for only face burning and sneezing. Five spray workers were also asked for any side effects, of which only two complained for face burning, itching and eye irritation.

Overall, the evaluation revealed that the insecticide Deltamethrin 62.5 SCPE has shown the longer efficacy as well as good impact on reduction of malaria incidence and vector density.These results would facilitate making decision on possibility of inclusion of deltamethrin 62.5 insecticide for Indoor Residual Spray in Govt. programme.

3.8. MONITORING OF INSECTICIDE RESISTANCE IN MALARIA VECTORS IN MADHYA PRADESH STATE

PI at NIRTH	**:**	**Dr. A. K. Mishra**
Status	**:**	**Ongoing**
Funding	**:**	**ICMR Task Force**

Malaria vector control intervention in India with the use of insecticides being used by the NVBDCP is Indoor residual spraying (IRS) and insecticide-treated bed nets. The major impediment for effective vector control is the development of resistance in vectors to the insecticides. It is quite important to follow over time and space the development of insecticide resistance. Absence of regular monitoring of insecticide resistance in vector mosquitoes results in lack of contemporary database on resistance leading to lack of evidence based suggestions for implementing appropriate strategies for effective vector management. In Madhya Pradesh, transmission of malaria has been perennial in many districts, and multiple vectors are involved in the disease transmission, although *Anopheles culicifacies* is the main vector and responsible for perennial transmission. The current study is therefore proposed to generate data on insecticide resistance in malaria vectors by insecticide susceptibility tests using different insecticide papers in 12 districts of the state as suggested by NVBDCP with the objectives to monitor and update database on insecticide resistance in malaria vectors in M.P. and to review and strengthen the capacity in monitoring and mapping of vector resistance to insecticides

Out of 12 districts suggested by NVBDCP, we have carried out susceptibility tests in 5 districts viz. Umaria, Singrauli, Anuppur, Panna and Tikamgarh. In each district, two CHCs and about 5/6 villages (about 1% of total villages in the district) in different terrains i.e. hilltop, plain, foothill and forest etc., were selected for susceptibility tests in consultation with the respective State/ District Health Departments. Out of these 5 districts, Anuppur and Umaria are under DDT spray for routine IRS under the programme and Panna and Singrauli are under Synthetic pyrethroids mainly Alphacypermethrin 5% spray. In Tikamgarh, no routine spray was done for the last 24 years.

Susceptibility test against *An.culicifacies* adults were conducted according to WHO standard guidelines. Wild caught mosquitoes; preferably blood-fed female mosquitoes were collected from different resting sites (human dwellings/ cattle sheds) in the selected villages and brought to the field laboratory for testing. Female mosquitoes were exposed in 4 or 5 replicates on each occasion, releasing 15 mosquitoes in each replicate to the discriminating dosages of the insecticides (DDT: 4%, Malathion: 5%, Deltamethrin: 0.05% and Alphacypermethrin 0.1% that are in use in the respective study site), with parallel controls for one hour and mortality recorded after 24-hour holding. Necessary precautions were taken to conduct the tests at the ambient temperature of 26$\pm$2°C and RH of 70-80% (using wet cartoons and wet towels). Number of females knocked down after the exposure period of one hour and mortality after 24 hrs of holding period

following the exposure to insecticide were recorded. From the total number of alive and dead mosquitoes in the replicates, percent mortality was calculated separately for the test and control.

The results of the susceptibility status revealed that resistance to DDT and Malathion was found in all the districts. The mortality observed in DDT was 12.0 to 20.0 and in Malathion it was 64.8 to 84.0. The vector was susceptible to both pyrethroids viz. Alphacypermethrin 0.1% and Deltamethrin 0.05% in 3 districts i.e., Anuppur, Panna and Tikamgarh as the mortality of *An. culicifacies* was found between 98.1 to 100.0% in these districts. Varying level of resistance was observed in two districts viz. Singrauli and Umaria where mortality of *An. culicifacies* was found between 90.0 to 96.0% in both Deltamethrin 0.05% and Aplhacypermethrin 0.1% (Table 3.8.1).

The terrain wise susceptibility status was almost same. DDT and Malathion resistance was observed in plain, foothill, hilltop and forest villages of all districts. The mortality of *An. culicifacies* in DDT was 8.9 to 20 % in Plain villages, 20.0 to 23.0 in foothill, 20.0 to 21.4 in hilltop and 2.2 to 13.3% in forest villages where as in Malathion it was 64.4 to 86.7 in plain, 63.3 to 70.0% in foothill, 64.3 to 73.3% in hilltop and 64.4 to 90.0% in forest villages. Pyrethroids showed varying type of susceptibility status in different types of villages. In plain villages, in both Deltamethrin 0.05% and Aplhacypermethrin 0.1%, 100% mortality of *An. culicifacies* was seen in Panna and Tikamgarh showing susceptible status and varying level of resistance was observed in Anuppur, Singrauli and Umaria districts.

Table 3.8.1. District wise Susceptibility Test Report

District	Area Type	DDT 4%	Malathion 5%	Aplhacypermethrin 0.01%	Deltamethrin 0.05%
Anuppur	Plain	8.9	64.4	97.8	97.8
	Foothill	23.3	63.3	96.7	100.0
	Hilltop	20.0	64.3	100.0	96.7
Panna	Plain	13.3	86.7	100.0	100.0
	Forest	2.2	64.4	100.0	97.8
	Hilltop	21.4	73.3	96.7	100.0
Singrauli	Plain	20.0	67.8	93.3	100.0
	Foothill	20.0	70.0	93.3	90.0
	Hilltop	20.0	67.8	83.3	86.7
Tikamgarh	Plain	20.0	80.0	100.0	100.0
	Forest	13.3	90.0	100.0	100.0
Umaria	Plain	15.6	68.9	95.8	97.8
	Forest	6.7	76.7	96.7	90.0

In foothill terrain, varying level of resistance was observed in Anuppur and Singrauli with Aplhacypermethrin 0.1% where as in deltamethrin, 100% mortality was in Anuppur and 88.9% in Singrauli. No foothill villages could be tested in other 3 districts. In hilltop villages, in Alphacypermethrin, varying level of resistance was observed in Panna, susceptible in Anuppur and resistance in Singrauli, where as in deltamethrin, varying level of resistance was observed in Anuppur, susceptible in Panna and resistance in Singrauli. No hilltop villages were seen in Tikamgarh and Umaria. Few forest villages were also surveyed for susceptibility tests where susceptible status was observed with Alphacypermethrin in Panna and Tikamgarh and varying level of resistance in Umaria where as with Deltamethrin, susceptible status in Tikamgarh and varying level of resistance was observed in Panna and Umaria. No forest villages could be surveyed in Anuppur and Singrauli districts.

Overall, *An. culicifacies* the main malaria vector was found resistant to DDT 4% and Malathion 5% in all 5 districts of Madhya Pradesh surveyed. This vector was found susceptible to Deltamethrin 0.05% and Aplhacypermethrin 0.1%, in 3 districts and varying level of resistance in 2 districts.

3.9. EFFICACY AND SAFETY OF ARTEMETHER-LUMEFANTRINE (AL) COMBINATION THERAPY FOR THE TREATMENT OF UNCOMPLICATED *PLASMODIUM FALCIPARUM* MALARIA IN 4 TRIBAL DOMINATING STATES IN INDIA: MADHYA PRADESH, MAHARASHTRA, CHHATTISGARH AND ODISHA

Principal Investigator	**:**	**Dr. Praveen K. Bharti**
Status of the study	**:**	**Competed**
Funding Source	**:**	**WHO, Country office, India**

Treatment of *P. falciparum* malaria is complicated due to the emergence and spread of drug resistant parasite. Therefore, combination therapies are better alternative for the treatment of uncomplicated malaria which has been recommended by World Health Organization (WHO). In India, Artesunate+Sulfadoxine-Pyrimethamine (AS+SP) is being used for the treatment of *P. falciparum* except in north eastern states where it has been replaced by artemether-lumefantrine (AL)due to complete resistance against SP. Molecular surveillance along with therapeutic efficacy study is a key approach in monitoring resistance to antimalarial drugs. Therefore, to assess the efficacy and safety of the AL for the treatment of uncomplicated *P. falciparum* malaria infections, a study was conducted in 4 states of India i.e., Odisha, Chhattisgarh, Madhya Pradesh and Maharashtra (Fig. 3.9.1). The main objectives of the study were to measure the clinical and parasitological efficacy of artemether-lumefantrine in uncomplicated falciparum malaria, by determining the proportion with early treatment failure, late clinical failure, late parasitological failure or an adequate clinical and parasitological response as indicators of efficacy; and to differentiate recrudescence from new infection by polymerase chain reaction (PCR) analysis.

Febrile patients aged between 6 months and 60 years of age were screened for malaria parasite by microscopy and confirmed uncomplicated *P. falciparum* infection was asked to participate in the study. Artemether-lumefantrine tablets were administered according to body weight, twice a day over 3 days. Clinical and parasitological parameters were monitored over a 28-day follow-up period to evaluate drug efficacy. Patients presenting with fever or history of fever and symptoms of malaria were screened for malaria parasites by microscopy.

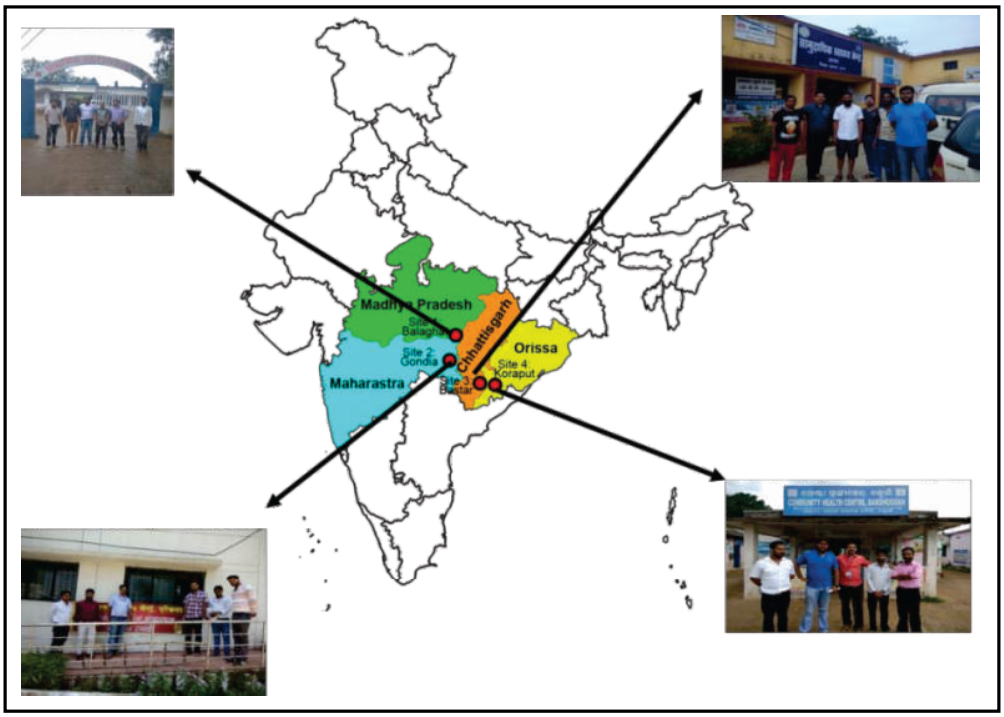


Fig. 3.9.1: Map showing the study sites i.e. district Koraput (Odisha) district, district Baster (Chhattisgarh) Balaghat (Madhya Pradesh) and district Gondia (Maharashtra).

Peripheral smear positive for *P. falciparum* malaria and fulfilling the enrollment criteria were enrolled in the study. The demographic information (age, gender, body temperature) were recorded. ACT (AL) was given orally over a three-day period as per national guideline and therapeutic efficacy was determined following standard protocol. Two to three drops of finger prick blood was also blotted on to 3 MM filter paper (Whatman International Ltd., Maidstone, United Kingdom) at the time of enrollment and during the follow-up for molecular study.

Overall, 10712 patients from 1 to 59 years were screened for malaria parasite during the study period. Malaria positivity rate was 17.9% (1915/10712) with 84% (1602/1915) *P. falciparum* mono infection. A total 12% (224/1915) case of *P. vivax* and 4% (86/1915) mix infection of *P. falciparum* and *P. vivax* was recorded. Out of 1602 mono *P. falciparum* cases, a total 376 malaria patients who fulfilled the enrolment criteria as well as consented for the study were enrolled. Therapeutic efficacy was determined in 356 (94.7%) patients who had completed their 28 days follow-up while 20 patients were either withdrawn from the study or loss to follow up due to various reasons.

Adequate clinical and parasitological response (ACPR) was 98.9% with four cases (1.1%) of late parasitological failure (LPF). Kaplan-Meier survival curve of cumulative incidence of success with and without PCR correction at study site CG is shown in figure 3.9.2. Neither early treatment failure (ETF) nor late clinical failure (LCF) was observed in this study. Site wise treatment outcomes

Samples from 0 day and day of late parasitological failure (LPF) were analyzed for Plasmodium species by species specific nested PCR (Fig.3.9.3). All the four cases were found positive for *P. falciparum* on both days (0 day and day of failure).

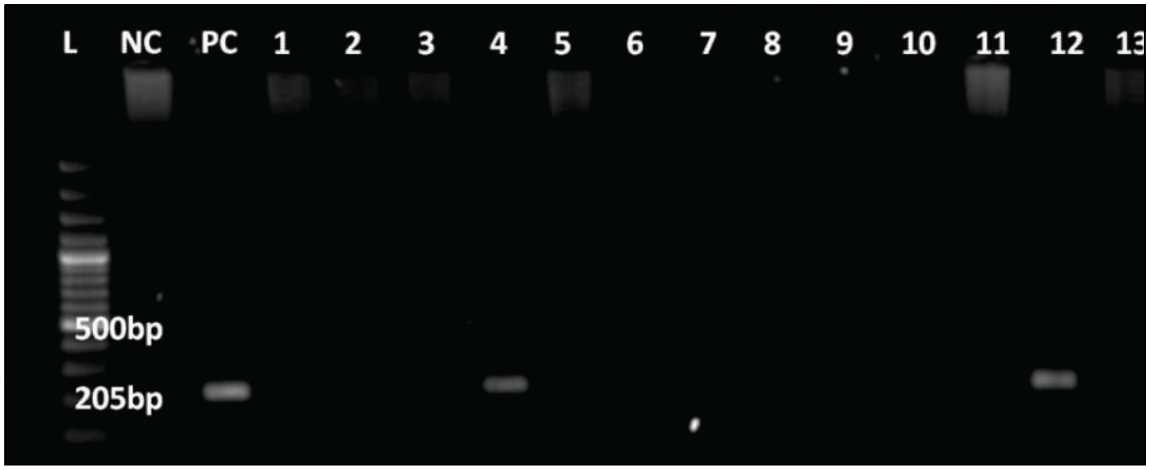


Fig. 3.9.3: Polymerase chain reaction (PCR) amplified fragments of *Plasmodium falciparum* (205bp). (Isolates DNA from 1-13, L=100 bp molecular marker, NC= negative control, PC= positive control)

To understand whether treatment failures were recrudescence or reinfection, DNA samples were sequenced for *P. falciparum* merozoite surface protein 1 & 2. Out of four cases, two contain the same allele for both the genes *msp1* and *msp2*, whereas other two patients had re-infection in which *msp1* and *msp2* allele were different at the time of treatment failure (Fig. 3.9.4-7).

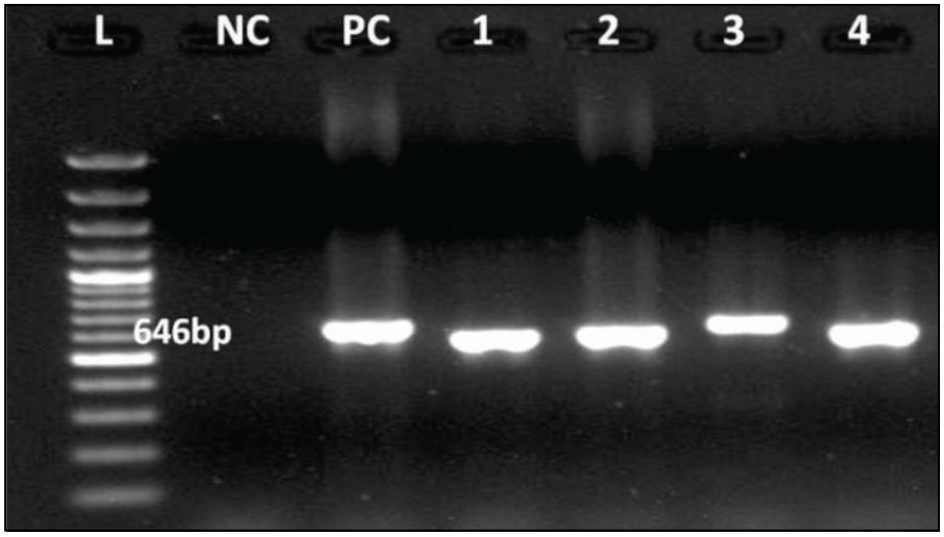


Fig.3.9.4: Polymerase chain reaction (PCR) amplified fragments of *P. falciparum* merozoites surface protein 1. (Isolates DNA from 1-4, L=100 bp molecular marker, NC= negative control, PC= positive control).

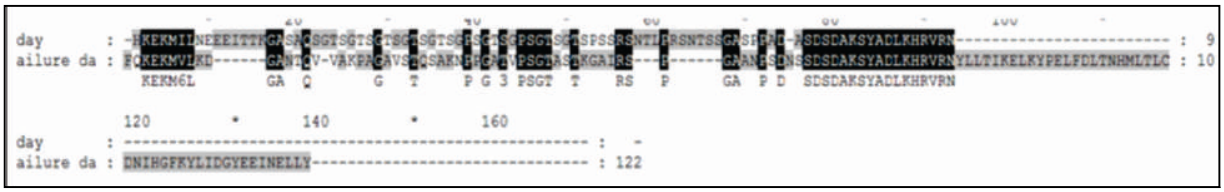


Fig.3.9.5: Amino acid alignment of merozoite surface protein 1 showing genotyping of Day 0 and Day 28.

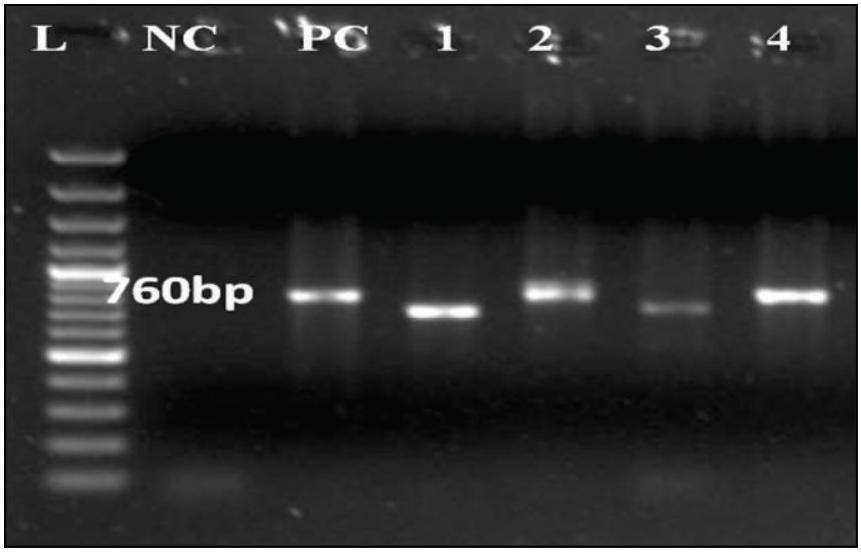


Fig. 3.9.6: Polymerase chain reaction (PCR) amplified fragments of *P. falciparum* merozoites surface protein 2. (Isolates DNA from 1-4, L=100 bp molecular marker, NC= negative control, PC= positive control).

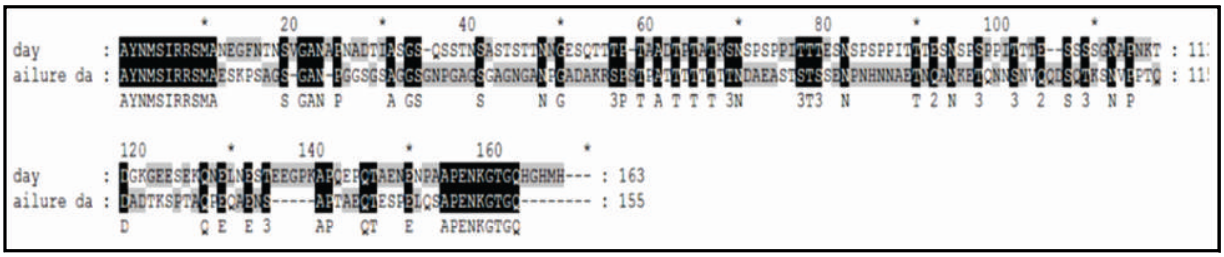


Fig. 3.9.7: Amino acid alignment of merozoite surface protein 2 showing genotyping of Day 0 and Day 28.

3.10. STUDY ON HRP2 AND HRP3 GENE IN *P. FALCIPARUM* PARASITES FROM ODISHA STATE, INDIA: A PROSPECTIVE EVALUATION

Principal Investigator	:	**Dr. Praveen K Bharti**
Status	:	**Completed**
Funding	:	**Livo-Link Foundation (Tata Trust)**

The objective of the project was to evaluate the presence or absence of *pfhrp2* and/or *pfhrp3* gene (based on gene deletion), of *P. falciparum* parasite samples from a malaria-endemic site of Odisha, India to guide Malaria Control Programme for procurement and implementation of appropriate malaria rapid diagnostic tests (RDTs). The Biswanathpur Community Health Centre (CHC) at Lanjigarh block of Kalahandi district of Odisha was selected as field site for HRP-2 study. Biswanathpur Community Health Centre (CHC) is located about 43 km away from the Bhawanipatna, district head quarter of Kalahandi, Odisha (Fig. 3.10.1).

Fig. 3.10.1. Map showing study sites in Chhattisgarh state

Febrile Patients attending the participating clinics were recruited for the study. After informed consent blood sample was collected from Patients who met the eligibility criteria of the study. Thick and thin film blood smear slides were prepared from blood sample obtained by finger pricked method for microscopy. Parasite counts were done on JSB-stained thick films and the numbers of parasites per 200 white blood cells (WBCs) were counted by light microscopy. SD BIO LINE Ag Pf/Pv (Alere medical Pvt. Ltd.) bivalent RDTs was used for malaria diagnosis. It is based on HRP-2 and pLDH antigen for detection of *P. falciparum* and *P. vivax* respectively.

Molecular diagnosis and PCR amplification of the pfhrp2/*3*gene

The Nested PCR reactions were conducted to diagnose plasmodium genus and species. Species specific nested PCR targeting 18 SrRNA gene identified four malaria parasite species (i.e., *P. falciparum, P. vivax, P. malariae P. oval*). Resulting PCR product was run on 1.2% agarose gel and analyzed.

Exon-2 region of *pfhrp2/3*gene was amplified by using the primers PfHRP2-and PfHRP-3. *Pfhrp2/3* amplified PCR product was sequenced and obtained nucleotide sequences were analyzed using the BioEdit and DNASTAR software.

A total of 4515 febrile patients from 1 to 60 years were screened for malaria parasite using microscopy and RDT visiting Biswanathpur CHC during June 2017 to December 2017. Malaria positivity rate varied from June 2017 (26.8%)) to December 2017 (2.6%). The overall and month wise data of screening and diagnosis by microscopy of febrile cases at the study sites is shown in Fig.3.10.2.

Out of total 4515 samples screened, a total of 354 samples were found to be microscopically positive for malaria parasite *P. falciparum* whereas 361 samples were positive with RDTs. A total number of 7 samples were found to be RDT negative and microscopy positive for *P. falciparum*. The microscopy and RDT results were further confirmed by the genus and species specific PCR (Fig 3.10.3).

RDT negative and microscopy positive samples were further analyzed for the absence of *pfhrp-2* gene along with suitable controls (Fig 3.10.4.). Out of seven (7) samples, six were found to be *pfhrp-2* negative. The sequencing and analysis of PCR product from positive samples validated the correct detection of *pfhrp-2* gene. The prevalence of *pfhrp-2* deletion was found to be 2.2 % (6/278).

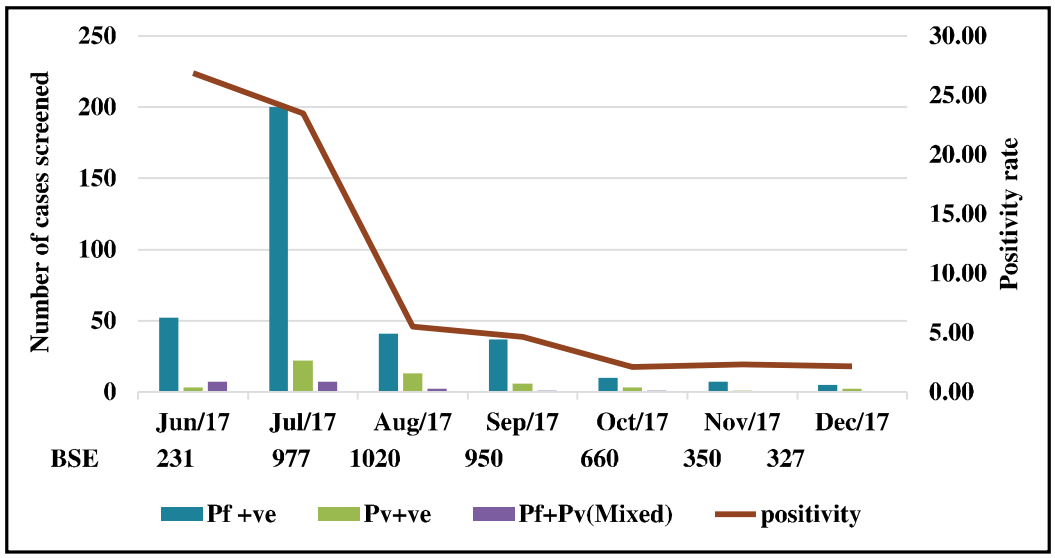


Fig. 3.10.2: Month wise data of malaria diagnosis of febrile patients by microscopy at CHC Biswanathpur, Kalahandi, Odisha

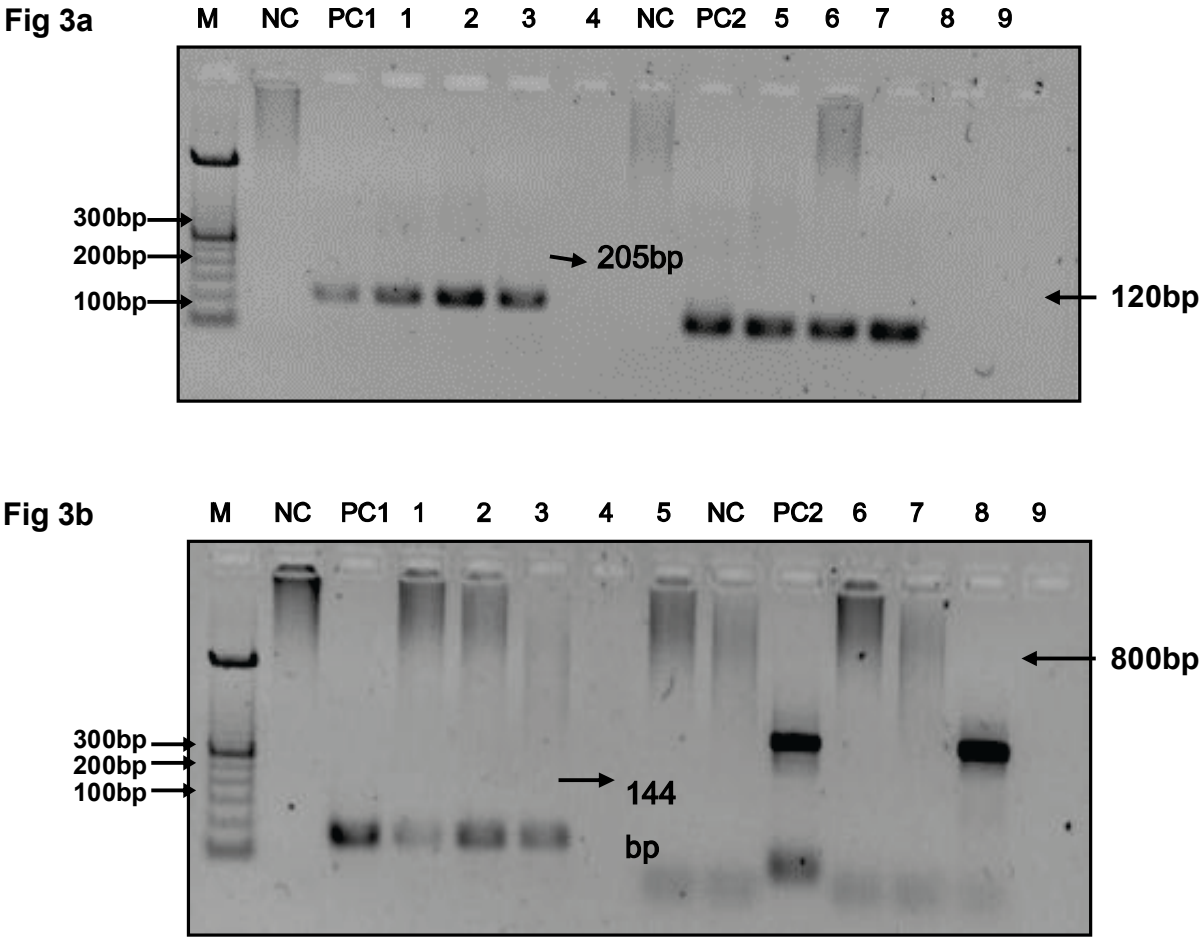
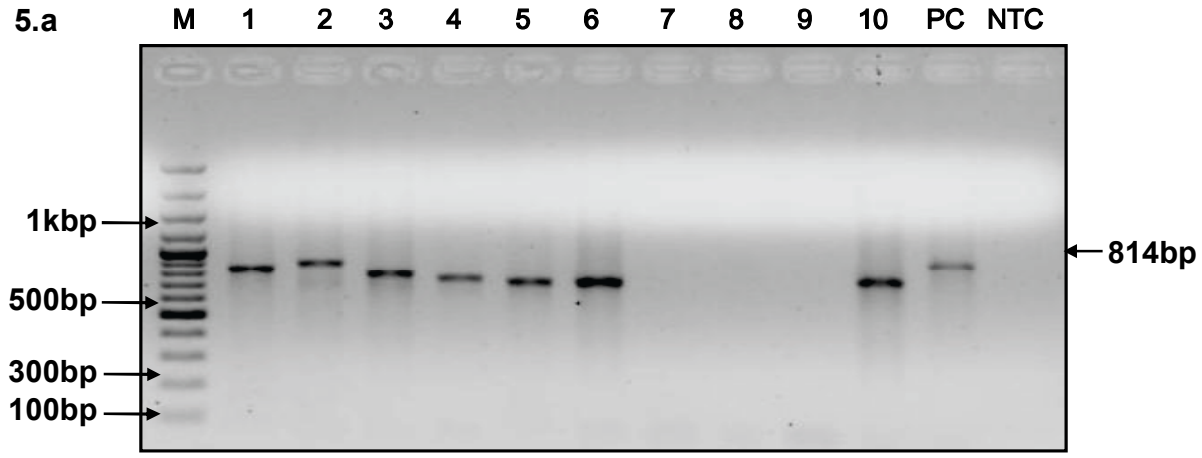


Fig. 3.10.3: Representative gel image showing diagnosis of 4 *P.* species. (4.a: Lane M= 100bp marker, NC= Negative control, PC1= *P. falciparum* DNA as positive control, Lane 1-4 samples, PC2 = *P. vivax,* Lane 5-7 = samples 4.b: Lane M= 100bp marker, NC= Negative control, PC1= *P. malariae* DNA as positive control, Lane 1-4 samples, PC2 = *P. ovale,* Lane 5-7 = samples).



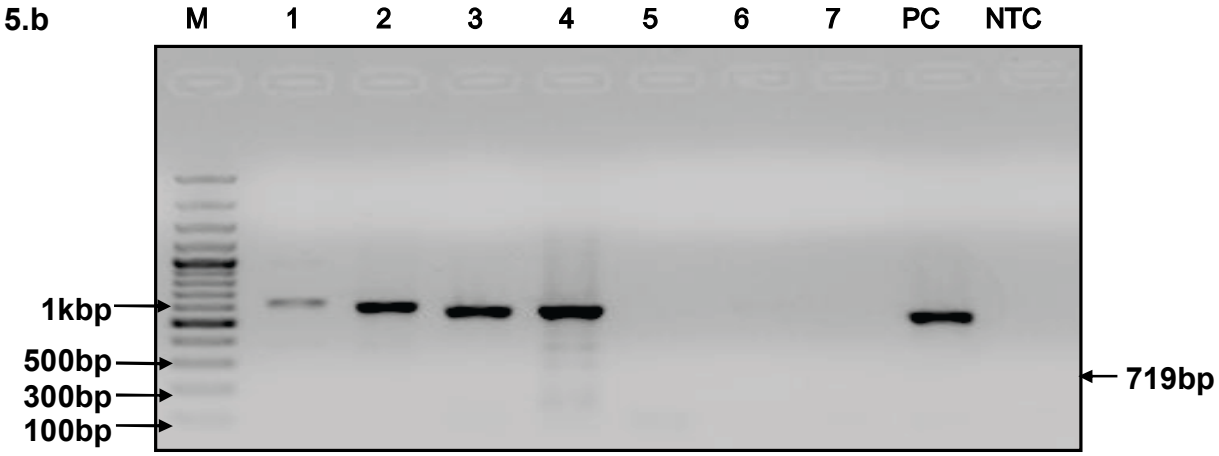


Fig 3.10.4: Molecular detection of HRP-2/3 gene deletion in *P. falciparum by* PCRfrom DNA isolated form blood samples of malaria patients.

Fig. 3.10.4 a). PCR amplification of *Pfhrp-2 gene,* Expected product size = 814bp, Lane M= 100bp marker, Lane 1-6 and 10 = M+R positive (Pf), Lane 7-9= M+R Negative (Pf), Lane PC=Positive control (Pf3D7), Lane NTC= No template control and *Pfhrp3* gene

4(b). PCR amplification of *Pfhrp-3 gene,* Expected product size = 719 bp, Lane M= 100bp marker, Lane 1-4 = M+R positive (Pf), Lane 5-7= M+R Negative (Pf), Lane PC=Positive control (Pf3D7), Lane NTC= No template control.

This study validated the prevalence (2.2%) of *Pfhrp-2/3*gene deleted *P. falciparum* in Kalahandi, Odisha. The results of our study suggest that though the prevalence of the pfhrp-2/3 deleted parasite is low, we need be cautious in use of pfHRP-2 based RDT in areas where there is presence of mutated parasite.

3.11. AN ASSESSMENT OF INTERVENTION MEASURES FOR PREVENTION OF MALARIA IN PREGNANCY: A PROSPECTIVE LONGITUDINAL STUDY IN CENTRAL INDIA

Principal Investigator	:	**Dr. Praveen K Bharti**
Status	:	**Completed**
Funding	:	**ICMR**

Malaria and pregnancy both are mutually aggravating factors and the clinical presentation of malaria in pregnancy depends on the intensity of transmission and immunity of pregnant women Pregnant women are at greater risk of malaria as compared to non-pregnant women. Malaria during pregnancy poses substantial risk to the maternal and fetal health by increasing the risk of fetal death, premature delivery, low birth weight (LBW) and maternal anaemia. The main objective of the study was to determine the effect of intermittent preventive screening and treatment (IST) strategy on malaria in pregnancy and its effects on outcome.

The study was carried out in Jhabua district of Madhya Pradesh. Two Community Health Centre (CHC) Meghnagar for symptomatic group (SMT) and Ranapur for Intermittent Preventive Screening and Treatment (IST) group, of district Jhabua, Madhya Pradesh were selected for the study. Pregnant women under the enrollment criteria were interviewed by the trained personnel and their socio-demographic profile and their pregnancy related data were obtained. In IST group, all the enrolled pregnant women were tested for malaria and in SMT group only symptomatic pregnant women were tested for malaria by bivalent RDT and blood smear was prepared by finger prick method. If the pregnant women were found malaria positive, women were treated according to parasite species (AS+SP or CQ) per NVBDCP guidelines.

Enrolled pregnant women were tested for their haemoglobin profile. On every antenatal visit all pregnant women were tested by bivalent RDT and blood smear examination and haemoglobin was estimated when found positive treated as per NVBDCP guidelines. On every antenatal visit all pregnant women were tested by bivalent RDT and blood smear examination and haemoglobin was estimated when found positive treated as per NVBDCP guidelines.

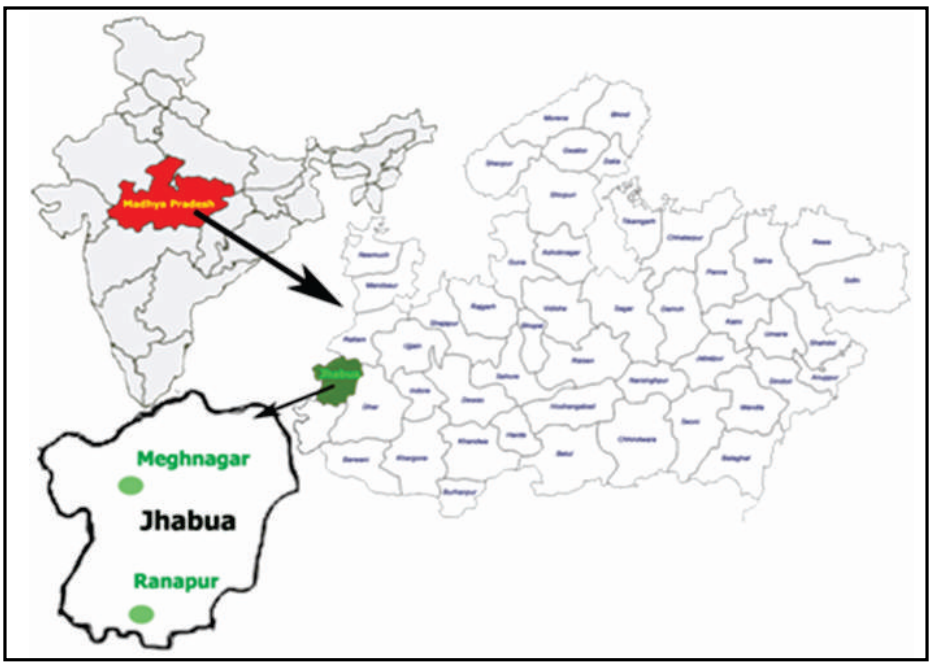


Fig.3.11.1: Map showing Study Site, Jhabua District, Madhya Pradesh

Photograph of the Ranapur, CHC, Jhabua showing study procedures (Clinical and laboratory examination)

Photograph of the Meghnagar, CHC, Jhabua showing study procedures (Clinical and laboratory examination)

Axillary temperature, Height, Weight, Arm length and fundal height was measured at time of delivery. Blood examination was done by bivalent RDT and blood smear was prepared for diagnosis of malaria and haemoglobin was estimated. Placenta processing was carried out and diagnosed for malaria positivity. After delivery, baby was examined properly and weight of the baby was recorded. After delivery (Post partum) both mother and baby were followed up for next two months. Mother and baby's weight, haemoglobin and diagnosis for malaria (bivalent RDT) were done for clinical examination. When they found to be anaemic or positive for malaria treatment were provided as per the NVBCDP guidelines. Low birth weight baby's were suggested for medical officer for further consideration.

In Ranapur CHC, selected as IST group, a total of 1318 pregnant women were enrolled in the study during the study period from April 17 to December 18. Total Slide Positivity Rate (SPR) was 0.8 (11/1318) during the period, of which 73% (8/11) were positive for *P. falciparum*, 27% (3/11) with *P. vivax*. All the enrolled pregnant women were followed up every next month of enrollment during their antenatal care visits. A total of 652 follow up were done during the routine antenatal check up and out of which only one woman was found to be positive for malaria. Haemoglobin (Hb) profiling was done during the enrollment and the subsequent follow up until the delivery. At the time of enrollment majority of pregnant women were under moderate anaemic condition 67% (850/1268) and mild by anaemic 10% (133/1268) severe anaemia was found in very few enrolment 7% (84/1268) and 16% (201/1268) of women having their Hb in normal range. At the time of delivery, 75% (702/942) women were having moderate anaemic condition, 10% (92/942) mild anaemia and only 1% were recorded to have severe anaemia and rest (14%) of the women were having normal Hb range (Table 3.11.1). A total of 942 deliveries were recorded, out of which only 84% (791/942) deliveries were attended in hospital and rest 16% (151/942) were unattended. At the time of delivery 29 women were found positive for malaria, out of which 21% (6/29) were positive for *P. falciparum*, 69% (20/29) were infected with *P. vivax* and only three women were having mix infection of *P. falciparum* & *P. vivax.* Eighteen placentas were positive for malaria, 6% (1/18) of which were infected with *P. falciparum*, 88% (16/18) with *P. vivax* and one was having mix infection (*P. falciparum* & *P. vivax*). Total of five still births were recorded and none of them were from positive mother and 234 babies with low birth weight. A total of 97 post partum follow up was successfully achieved. No mother was found positive for malaria and only one child was positive for *P. vivax* parasite species.

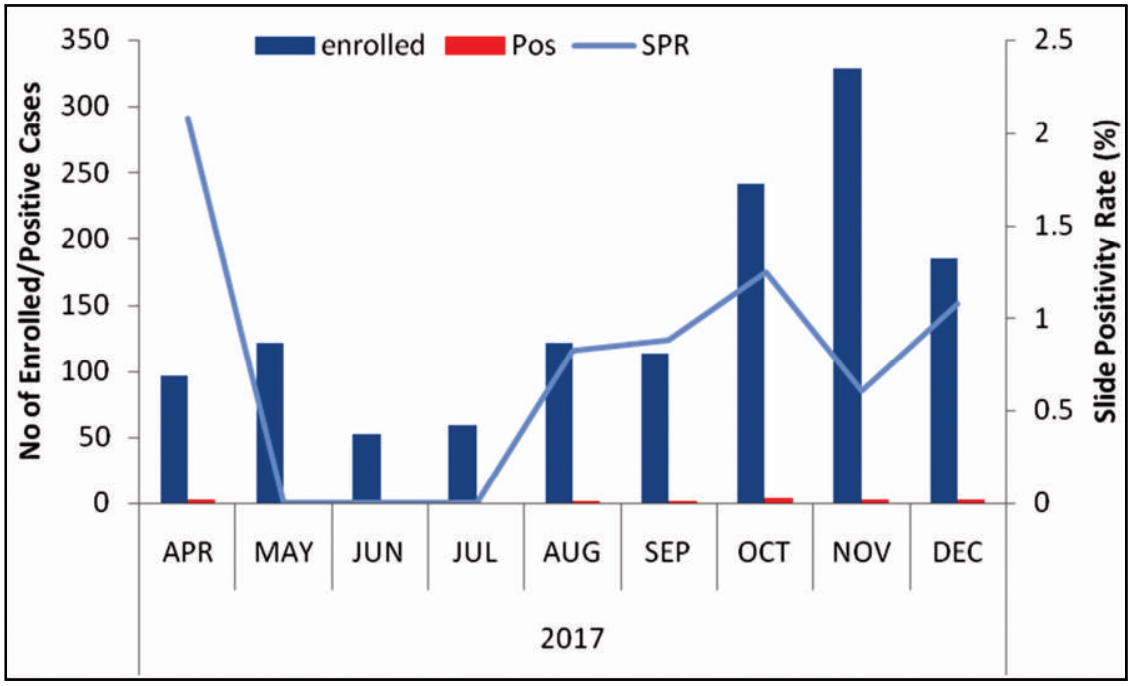


Fig. 3.11.2: Showing total number of enrolment and Slide positivity rate in Ranapur CHC, Jhabua

Table 3.11.1: Anaemia profile at time of enrollment and delivery from April -17 to Dec -17, Ranapur, Jhabua

Anaemia Profile	Ranapur	
	At time of Enrolment (n=1268)	At time of Delivery (n=942)
Non Anaemic	16% (201/1268)	14% (143/942)
Mild Anaemia (Hb :10-11g/dL)	10% (133/1268)	10% (92/942)
Moderate Anaemia (Hb : 7-10g/dL)	67% (850/1268)	75% (702/942)
Severe Anaemia (Hb :4 -7g/dL)	7% (84/1268)	1% (5/942)

In SMT group site, Meghnagar, CHC, a total of 1097 pregnant women were enrolled during the study period. Out of 1097, 11 women were having fever or history of fever for last 14 days; they were subjected to test for malaria parasite. A total of twelve pregnant women were found positive for malaria, of which 92% (11/12) were *P. falciparum*, 8% (1/12) *P. vivax*. During follow up, 611

pregnant women were successfully followed up. Out of 2266, 34 pregnant women were symptomatic, 9% (3/34) of them were found to be positive for malaria. Haemoglobin profiling was done as the routine clinical procedure, at the time of enrollment, most of the pregnant women were having moderate anaemia 82% (890/1085), 10% (112/1085) mild anaemia, 7% (75/1085) had severe anaemic condition and 1% (8/1085) were non anaemic. At the time of delivery 83% (570/686) of women were under moderate anaemic condition and approximately one percent (8/686) were categorized under severe anaemic condition (Table 3.11.2). A total of 686 deliveries had been recorded in the CHC, out of which 88% (606/686) deliveries have been successfully attended in the hospitals and rest 12% were unattended. Four pregnant women at the time of delivery were found to be positive for malaria, three positive for *P. falciparum* and one positive for *P. vivax*. Three placentas were found to be positive for malaria and all the three were infected with *P. falciparum.* No mix infection cases with *P. falciparum* and *P. vivax* was found either in mother or in placenta. Six still births were recorded from the total delivery outcome and 207 babies were having low birth weight. All the still births were from malaria negative women and no other complications were observed for the negative birth outcome of deliveries. A total of 82 postpartum follow up have been successfully done, only one women and child was found to be positive for malaria and both were infected with the *P. vivax* parasite species.

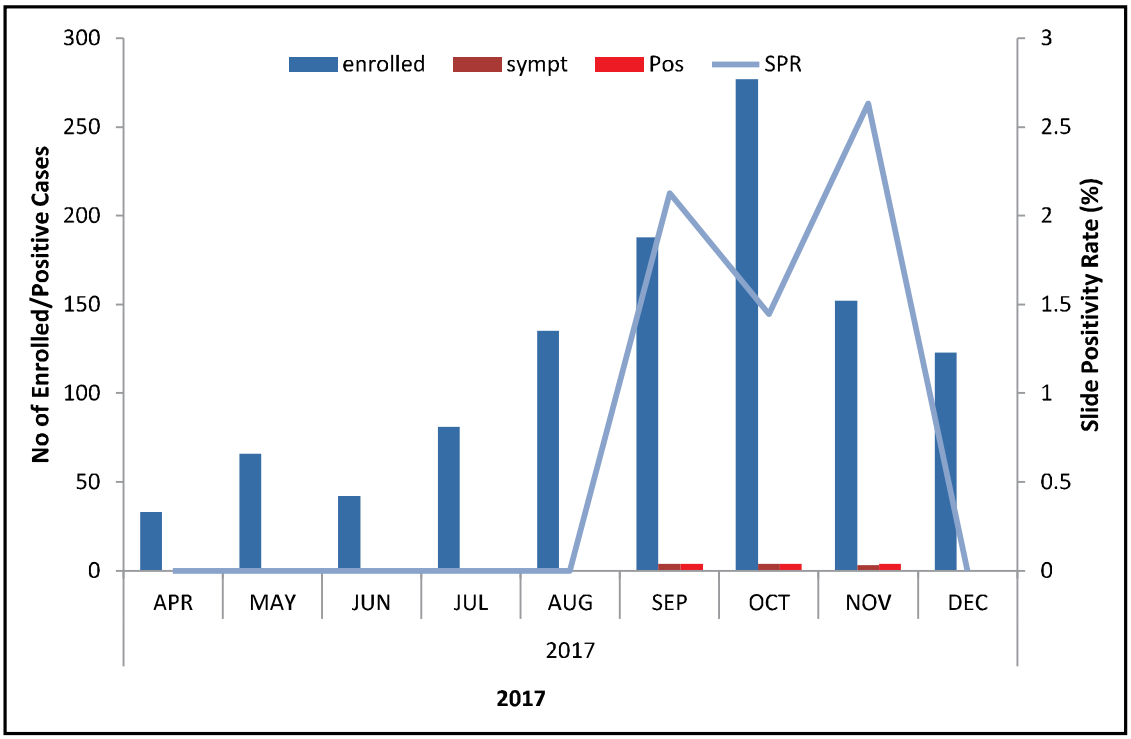


Fig.3.11.3: Showing month wise enrolment, symptomatic group screening and slide positivity rate from Meghnagar CHC, Jhabua

Table 3.11.2: Anaemia profile at time of enrollment and delivery From April -17 to Dec -17 Meghnagar, Jhabua

Anaemia Profile	Meghnagar	
	At time of Enrolment (n=1085)	At time of Delivery (n=686)
Non Anaemic	1% (8/1085)	3% (22/686)
Mild Anaemia (Hb :10-11g/dL)	10% (112/1085)	13% (86/686)
Moderate Anaemia (Hb : 7-10g/dL)	82% (890/1085)	83% (570/686)
Severe Anaemia (Hb :4 -7g/dL)	7% (75/1085)	1% (8/686)

This study showed that in both the, IST and SMT, groups the malaria positivity rate was same, therefore screening only symptomatic cases will reduce the extra burden of the routine ANC test. Also the study provided the data regarding anaemia profile of the pregnant women in the area and it is indicated that the nutritional status of the pregnant women needs to be taken seriously for the improvement.

4. VIROLOGY

4.1. ESTABLISHMENT OF GRADE II VIRAL RESEARCH AND DIAGNOSTIC LABORATORY

Principal Investigator	**:**	**Dr. Pradip V. Barde**
Status	**:**	**Ongoing**
Funding	**:**	**ICMR**

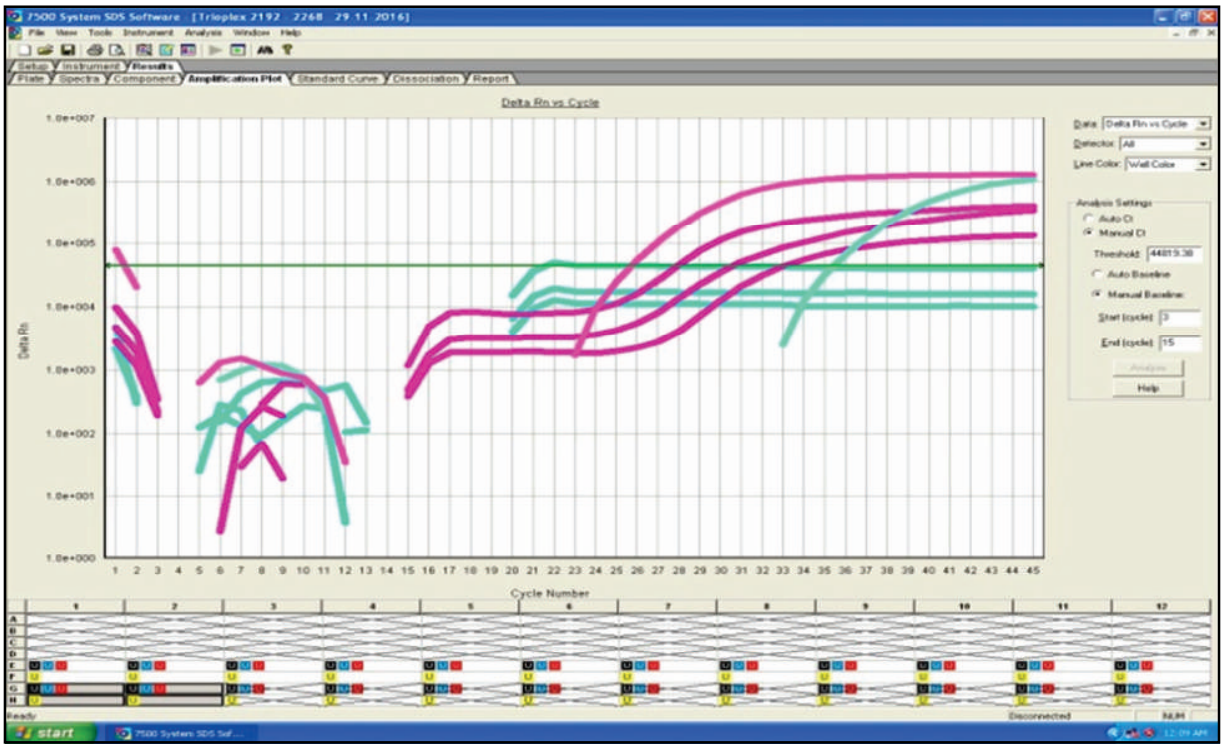


Fig. 4.1.1: Amplification plot of Trioplex RT-PCR Showing Positive-Negative control and samples

Dengue virus serotyping results showed that all four serotypes were circulating in central India with dominance of dengue virus 3. Chikungunya positivity was noted on rise in comparison to earlier years.

Viruses causing Hepatic diseases: Patients with symptoms of fever with yellowing of skin, mucous membrane, sclera and urine, loss of appetite and abdominal pain are tested for the hepatitis panel including Hepatitis A, Hepatitis E, Hepatitis B and Hepatitis C. Hepatitis A and Hepatitis E are transmitted by feco-oral route and can cause outbreaks, whereas Hepatitis B and Hepatitis C are blood/body fluid borne infections. This year a total of 1770 samples were tested for Hepatitis A and 1786 for Hepatitis E diagnosis out of which 89 (5.02%) and 245 (13.71 %) were diagnosed positive respectively. 1777 samples were received for the diagnosis of Hepatitis B surface antigen (HBsAg) and among them 189 (10.63 %) were found positive. One thousand seven hundred and eighty five samples were tested for Hepatitis C infection and 26 (1.45%) were found positive.

Molecular Characterization of Hepatitis B Virus:

Hepatitis B virus (HBV) infection is a significant global public health problem. It causes chronic hepatitis, liver cirrhosis and hepatocellular carcinoma (HCC). According to WHO report, estimated 257 million people are living with HBV infection and 887 000 deaths were recorded in 2015. Ten genotypes of hepatitis B virus (A, B, C, D, E, F, G, H, I and J) are known to circulate in

different zones of the world. Genotype determination is important in the case of chronic Hepatitis B infection for estimation of disease progression and optimal antiviral therapy. The sequence of surface antigen gene (S-gene) and complete genome sequence are used to determine the genotype and subgenotype of HBV. To evaluate the genotype distribution of hepatitis B virus (HBV) in Central India, Hepatitis B virus surface antigen (HBsAg) ELISA positive samples of 2012-16 were randomly selected and partial gene amplification was carried out using gene specific primers (Gandhe et al., 2003). Total 50 PCR products (ten from each year) were sequenced, and among them 31 gave good sequencing results. On the basis of partial S-gene sequences, it was found that only genotype D and sub-genotypes D1, D2, D3 and D5 have been circulating in Madhya Pradesh. Six sets of PCR primers were used to sequence (Fig. 4.1.2) whole genome of 15 HBV samples, but complete set of PCR products were attained only with 10 samples. These amplicons were sequenced and sequence analysis is being carried out.

Overlap DNA sequences will be assembled and mutational amino acid profiling will be done. This work is in progress.

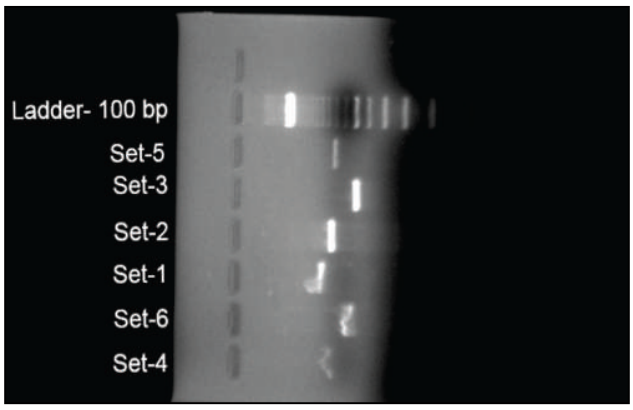


Fig. 4.1.2: PCR amplicons of complete sets of whole genome sequence. L1: Set-4 (865 bp); L2: set-6 (625 bp); L3: set-1 (972 bp); L4: set-2 (836 bp); L5: set-3 (571 bp); L6: set-5 (788) and L7- 100 bp ladder

Respiratory Virus Infections: Influenza like illness (ILI) caused by viruses is a major public health problem. VRDL was already providing diagnosis for Influenza A, B and Respiratory Syncytial virus. This year we have added few more viruses, such as Rhinovirus, Coronavirus, Parainfluenza, *etc* into the panel for children so that accurate diagnosis of ILI can be achieved. This year we have received 866 samples for the diagnosis of ILI out of which 229 (26.44%) were diagnosed positive for Influenza A H1N1pdm09, whereas 38 were positive for seasonal Influenza A (H3N3) viruses. Among 866 samples, 109 samples belonged to the patients of age group between 1-14 years which were further tested for respiratory virus panel and among them 40(36.7%) were found Rhinovirus positive, 3(2.7%) (Fig. 4.1.3) were Coronavirus positive, 1(1%) was positive for Respiratory Syncytial virus infection while none was positive for Parainfluenza and Metapneumovirus infection.

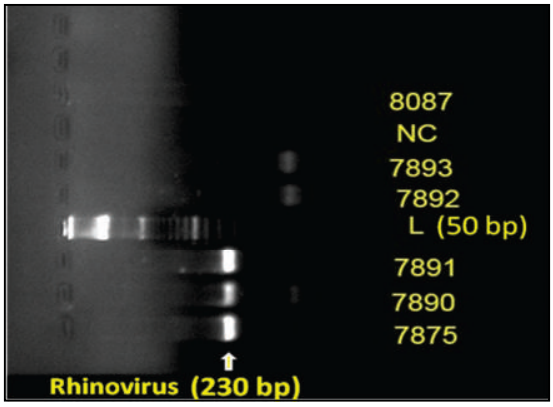


Fig. 4.1.3: Showing PCR product of 230 bp Rhinovirus in human samples

Vaccine preventable and other viral diseases: Diagnosis for five viral infections namely Measles, Mumps, Rubella, Varicella Zoster virus and Human Papilloma virus which are preventable through vaccination is provided by VRDL. Rubella being a component of TORCH testing panel tops the score with maximum number (n=86) of samples referred under this category and 18 (21%) were found positive. For Measles and VZV diagnosis simultaneously, 3 and 2 samples were referred but none was found positive, while no sample was referred for Mumps diagnosis.

HPV, which is a common sexually transmitted virus and its spectrum of illness ranges from benign papillomatous disease to malignant manifestations as cancer of cervix, anorectal cancer etc., cervical biopsy specimens of 17 suspected individuals were referred from the Oncology unit of NSCB Medical college, Jabalpur out of which 7 (41%) were found harboring HPV strain 16 and 6 (35%) patients were found positive with HPV strain 18 (Fig. 4.1.4).

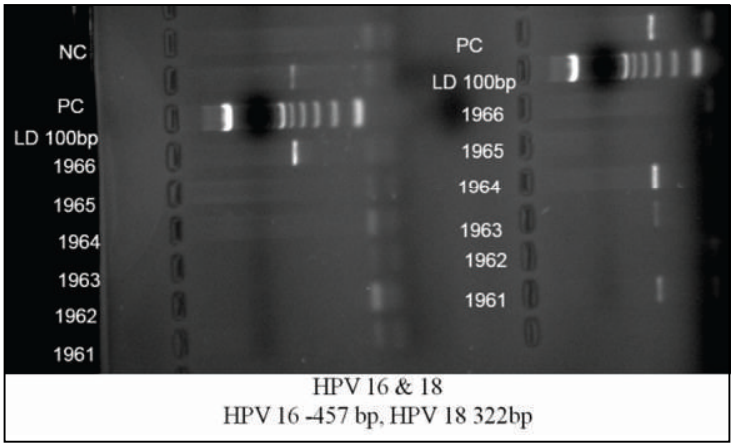


Fig. 4.1.4: Gel picture showing PCR product of HPV-16 and HPV 18 virus positive samples

Herpes simplex virus and Cytomegalovirus both from family Herpesviridae have opposite clinical presentations, on one hand HSV is easily diagnosable due to its pathognomonic skin lesions and their specific location while CMV infection totally goes asymptomatic in most cases. So, a laboratory test is not requested in both of them, although due to their teratogenic effects

confirmatory diagnosis becomes mandatory in high risk cases and suspected cases among pregnant women and neonates. Mostly as a component of TORCH panel testing as well as few CSF and blood samples from symptomatic cases, we have received total 126 samples for HSV diagnosis out of which 17(13.5%) were found positive. Also 22(25.6%) out of 86 samples were diagnosed positive for CMV infection.

Developed Virology Lab Management System

VRDL Jabalpur developed a Virology Lab Management Software for better management of VRDL laboratory (Fig. 4.1.5). This software is helpful in data entry, laboratory testing, reporting and data management. The presently developed software can be used for entering the VRDL forms for data management and reporting. It is customized to conduct Dengue, Chikungunya, JE IgM tests (NIV, Pune), NS1 Pan Bio ELISA, Hepatitis A, B, C and E tests. One can also add new tests as per her/ his need and demand further. It can generate reports for patients, programme L form, P form and most importantly one can upload the file generated by the software directly to the NIE software which is used by all VRDLs. Thus the software will save time, reduce errors and in turn help in more reliable and timely reporting. This software is freely available for downloading and installing on institute's website.

Fig. 4.1.5: Screen shot of the login page of the software

Overall, dengue virus 3 was the major serotype detected in the area. Chikungunya infection was noted to be rising in central India. Amongviral hepatitis infections HEV was the major cause of hepatitis. The molecular studies conducted on HBV showed that genotype D and sub-genotypes D1, D2, D3 and D5 are circulating in Madhya Pradesh.

4.2. PILOT STUDY ON EVALUATION OF RAPID DIAGNOSTIC TEST KIT FOR DENGUE IN TRIBAL- RURAL AREAS OF MADHYA PRADESH

Principal Investigator	:	**Dr. Pradip V. Barde**
Status	:	**On going**
Funding	:	**GoMP under Vanbandhu Yojana**

The project aims to perform a field and laboratory trial and evaluation of commercially available rapid diagnostic test kits for dengue, in tribal and rural areas of MP. Total of 164 serum samples were included in the study during period of report. These samples were from 19 districts Of these, 48 were found qRT PCR positive, 83 IgM ELISA positive and 41 were found positive with NS1 ELISA. DENV positive specimens included patients with primary and secondary DENV infections and represented all 4 DENV serotypes. Later, the samples were tested by Rapid diagnostic test (RDT) kit to evaluate its diagnostic capacity in terms of specificity and sensitivity. Three RDT kits were selected for the field and laboratory test for the diagnosis of dengue infections (acute and chronic phase). Selected RDT kits were stored at three different temperatures i.e. 4°C, 37°C and 45°C for one month before testing (Fig. 4.2.1). The sensitivity (SE) and specificity (SP) were calculated using standard tools. The results are given in Table 4.2.1 and 4.2.2.

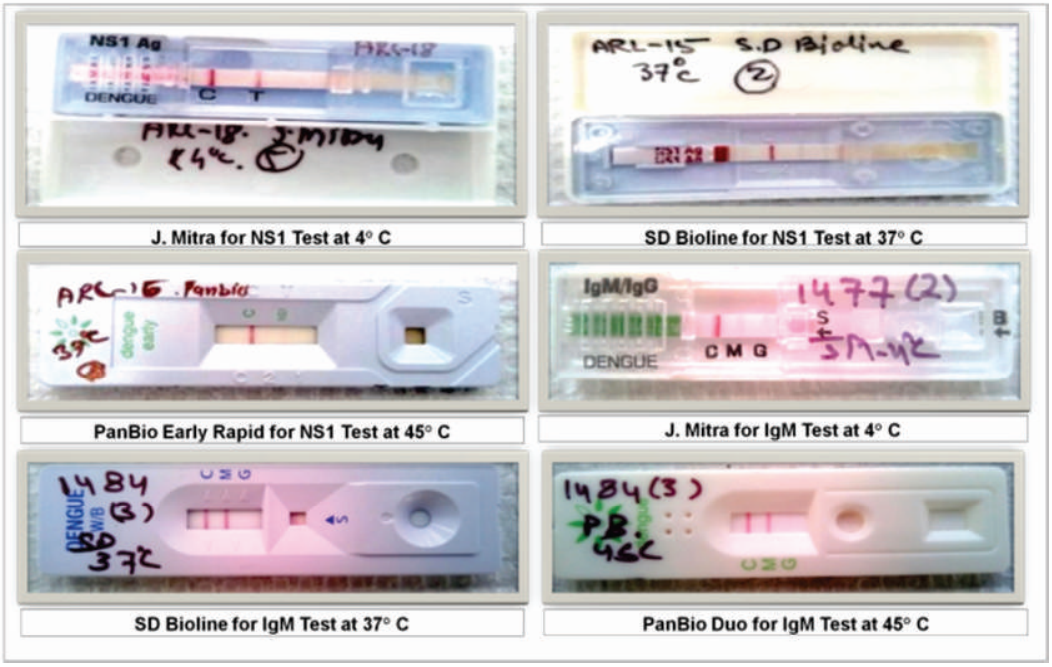


Fig. 4.2.1: RDT cassettes showing the result at different temperature

Table 4.2.1: Sensitivity and specificity of three RDTs after storing at different temps compared with NS1 ELISA and qRT-PCR

NS1 RDT WITH NS1 ELISA																	
RDT -1						RDT -2						RDT -3					
4°C		37°C		45°C		4°C		37°C		45°C		4°C		37°C		45°C	
SE	SP	SE	SP	SE	SP	SE	SP	SE	SP	SE	SP	SE	SP	SE	SP	SE	SP
91%	98%	91%	98%	91%	98%	93%	98%	95%	98%	91%	98%	100%	98%	100%	98%	100%	98%
NS1 RDT WITH qRT-PCR																	
RDT -1						RDT -2						RDT -3					
4°C		37°C		45°C		4°C		37°C		45°C		4°C		37°C		45°C	
SE	SP	SE	SP	SE	SP	SE	SP	SE	SP	SE	SP	SE	SP	SE	SP	SE	SP
76%	97%	76%	97%	76%	97%	78%	97%	80%	97%	75%	97%	84%	97%	84%	97%	84%	97

Table 4.2.2: Sensitivity and specificity of three RDTs after storing at different temps compared with IgM ELISA

IgM RDT WITH IgM ELISA																	
RDT -1						RDT -2						RDT -3					
4°C		37°C		45°C		4°C		37°C		45°C		4°C		37°C		45°C	
SE	SP	SE	SP	SE	SP	SE	SP	SE	SP	SE	SP	SE	SP	SE	SP	SE	SP
72%	92%	74%	92%	72%	93%	69%	98%	70%	98%	59%	96%	46%	84%	46%	82%	38%	89%

Overall few RDTs in the study are performing better in comparison to other RDTs however more samples are being tested. Moreover we aim to study serotype specific specificity and sensitivity of these RDTs, the work is in progress.

4.3. ENHANCING BIORISK MITIGATION AWARENESS IN PUBLIC HEALTH COMMUNITY AND CREATING LABORATORY NETWORKS FOR ENHANCED DIAGNOSTIC CAPABILITIES TO DEAL WITH SURVEILLANCE AND OUTBREAKS OF HIGH-RISK GROUP VIRAL PATHOGENS CAUSING VIRAL HEMORRHAGIC FEVERS AND RESPIRATORY INFECTIONS.

Principal Investigator	**:**	**Dr. D. T. Mourya, Director, NIV, Pune**
PI at NIRTH	**:**	**Dr. Pradip V Barde**
Status	**:**	**Ongoing**
Funding	**:**	**CDC, Atlanta through NIV Pune**

The project aims to establish diagnostic network for high-risk group viral pathogens causing viral hemorrhagic fevers and to enhance biorisk mitigation awareness in public health community. The emerging and re-emerging viral infections especially resulting in hemorrhagic fevers causing serious morbidities and high mortality are public health concerns. Most of these viruses are vector borne and are capable of causing outbreaks of high magnitude. Viruses such as Dengue, Chikungunya, Kyasanur forest disease virus, Crimean Congo hemorrhagic Fever virus are detected in the country. More recently, Zika Virus too has marked its presence in the country. It is very important to diagnose these viruses as early as possible to prevent them to cause serious dent in public health. Diagnosis of Dengue, Chikungunya and Zika virus in hospitalised patients by collecting detailed clinical information was initiated as first phase of the project. As per the inclusion criteria, patients having symptoms such as fever with more than one of following symptoms that is joint pain, headache, retro-orbital pain/ pain behind eyes, abdominal pain, vomiting, jaundice, skin rash, muscle pain, nausea, hemorrhage *etc.* and admitted to hospital were included in the study. The serum samples were collected at the hospital and transferred to the laboratory in cold chain. The serum samples were tested by CDC developed Trioplex qRT-PCR for presence of RNA of Dengue, Chikungunya and Zika Viruses, or for presence of IgM by NIVs IgM capture ELISAs for Dengue and Chikungunya. Clinical and demographical data was collected from hospital in the format by interviewing patients which is cross-checked by corresponding physicians. In this year total 1744 samples from suspected hospitalized patients were tested. Total 761 samples which were collected during acute phase of illness from patients (between 0 to 5 days of illness) were tested using CDC Trioplex qRT-PCR kit and 983 Samples which were collected after 5 days of illness were subjected to Dengue IgM ELISA and Chikungunya IgM ELISA.

Out of total 1744 patients who were admitted to hospital under suspicion of hemorrhagic fever, 220 (12.6%) were found positive for either etiologies. One hundred and twenty two (6.9%)

samples were positive for Dengue either by molecular or serological tests; whereas 77 (4.4%) samples were positive for Chikungunya, 21 (1.2%) samples were found positive for both Dengue and Chikungunya by IgM ELISA. It is worth to note that and none was positive for Zika virus infection. We also tested Dengue, Chikungunya and Zika negative 371 samples collected in acute phase of illness for presence of CCHF and KFD however, all were negative. Gender wise positivity for dengue showed that 61.48 males and 38.52 female were affected; where as 57.14% males and 42.86 females were positive for Chikungunya. More males were positive for both the diseases compared to females. The age wise data showed that most affected age group was 16 to 45 years while 0-5 year's age group was least affected.

Clinical picture of the positive patients is described as- fever was the most common complaint by the patients of all the three types of infections, whereas muscle pain (46.2%), joint pain (46.2%), cough (6.29%) and sore throat (6.29%) were observed more in Dengue, and haemorrhagic manifestations were also observed in six cases of Dengue. In Chikungunya, nausea (22.4%), abdominal pain (18.36%) and jaundice (18.36%) were more common.

Lymphocyte count, Platelet Count, Serum Bilirubin, SGPT and Serum Protein were affected more in Dengue infected patients whereas Haemoglobin, Total Leukocyte count, Serum Globulin, Creatinine and Blood Urea were affected more in Chikungunya infected patients, while in patients with dual infection having Dengue and Chikungunya, SGOT and Serum Albumin were observed to be affected more.

This year the testing for other viruses responsible for causing respiratory infections like Influenza A virus, Influenza B, Human Respiratory Syncytial Virus A and B , Parainfluenza 1-4, Adenovirus, Rhinovirus1-3, Pandemic H1N1(pdmH1N1 09), Influenza A H3N2, Influenza B Yamagata and Victoria was initiated. We also standardized qRT-PCR assay. Trainings on Biosafety and waste management were also conducted at NSCB medical college and other degree colleges in Jabalpur.

Overall this project is helping in building diagnostic capacity of the VRDL and is also aiding in collection and analysis of clinical data in detail. Biosafety trainings held in different institutes should aid in improving safe handling and disposal of infectious material.

4.4. A MULTI-CENTRIC STUDY TO ESTIMATE THE SERO-PREVALENCE OF DENGUE VIRUS INFECTION IN INDIA

Principal Investigator	:	**Dr. Manoj Murhekar, Director, NIE**
PI at NIRTH	:	**Dr. Pradip V. Barde**
Status	:	**Ongoing**
Funding	:	**ICMR through NIE Chennai**

Dengue fever is endemic in India, reliable estimate of nationwide sero-prevalence of dengue fever is not available. The data about dengue sero-prevalence is necessary to take a decision about introduction of dengue vaccine. First Dengue vaccine, CYD-TDV (Dengvaxia®), a live attenuated vaccine, has now been licensed in several dengue –endemic countries in Asia and Latin America for use among persons aged 9-45 or 9-60 years.

Based on the mathematical modeling of the potential public health impact of CYD-TDV introduction, WHO recommend countries should consider introduction of CYD-TDV only in geographic settings (national or sub national) with high endemicity, as indicated by Sero-prevalence of approximately 70% or greater in the age group targeted for vaccination. Information about endemicity of dengue virus infection is therefore necessary for policy makers to decide if the introduction of the vaccine would have public health impact as well as to decide upon the target age for dengue vaccination. With this background, the Indian Council of Medical Research planned for a nationwide (covered samples from 60 districts across 15 states) sero-survey. In Madhya pradesh state the study was coordinated by ICMR-NIRTH with the objective to collect the samples to estimate the age specific sero-prevalence of dengue virus infection in India. The institute's responsibility was to collect samples from different clusters namely: Ashoknagar, Tikamgarh, Sehore, and Shajapur; four clusters (two rural and two urban) of Madhya Pradesh. At each cluster, on the first day, enumeration was done in which 120 households were surveyed, subjects in the age group of 5- 45 years were enrolled with their names in the Dengue survey app (Designed by NIE Chennai) in the tablet. From each cluster 120 households were approached (Fig. 4.4.1) as per the sampling technique and 75 participants were shortlisted randomly for blood collection, 3 to 5 ml of blood sample was taken with proper aseptic precaution(Fig. 4.4.2), followed by serum separation; two aliquots of about 1ml each for ELISA and quality control were prepared. All the aliquots were stored at -20°C in district/CHC hospitals till those were transferred to ICMR-NIRTH. Detail of the samples collected from different clusters is given in table 4.4.1. Serum samples will be tested at NIE Chennai and NIV, Pune for the presence of IgG type of antibodies against dengue, chikungunya and JE viruses.

The study is in progress.

Table 4.4.1: Samples were collected from the districts

S. No.	District	Cluster name (ID)	Enumeration (House Hold)	People Surveyed	Selected Individual	Blood Sample Taken
1.	Sehore	Sehore (171)	120	267	75	55
		Nasrullaganj (172)	120	323	75	42
		Dolatpur (170)	120	441	75	54
		Naihedi (169)	120	312	75	42
2.	Shajapur & Agar-Malwa	Lolaki (165)	120	269	75	52
		Jamuniya (166)	120	265	75	51
		Agar (167)	120	331	75	65
		Polaykalan (168)	120	280	75	49
3.	Tikamgarh	Bhelsi Khurd (161)	120	291	75	40
		Kotra (162)	120	283	75	48
		Lidhora Khas (163)	120	287	75	44
		Baldeogarh (164)	120	374	75	43
4.	Ashok Nagar	Narsu Khedi (173)	120	305	75	61
		Aspat Khedi (174)	120	271	75	61
		Chanderi (175)	120	280	75	52
		Ashok Nagar (176)	120	328	75	43
Total	**4**	**16 Clusters**	**1920**	**4907**	**1200**	**802**

Fig. 4.4.1: Photographs of the team in the field during Enumeration

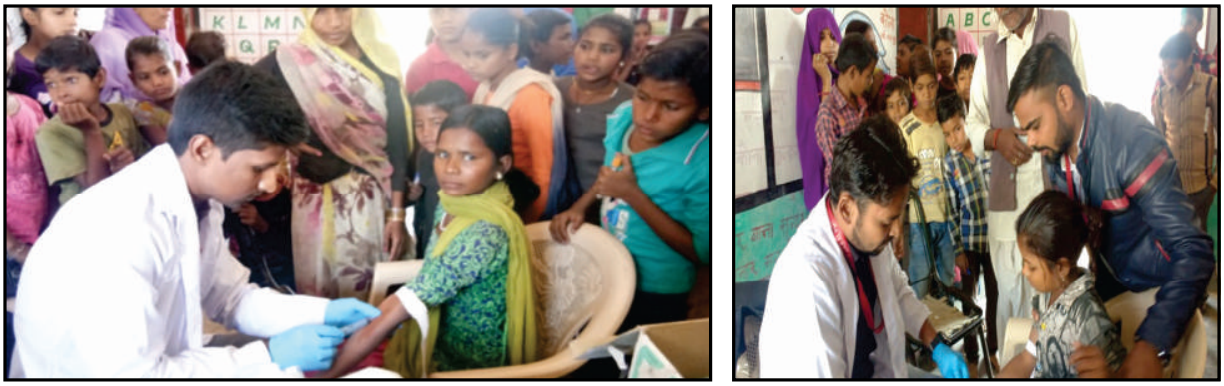


Fig. 4.4.2: Photographs of the team in the field during Blood collection

5. ZOONOTIC DISEASES

5.1. SERO-SURVEY OF CRIMEAN CONGO HEMORRHAGIC FEVER VIRUS IN LIVESTOCK'S OF JABALPUR

Principal Investigator	:	**Dr. Manjunathachar HV**
Status	:	**Ongoing**
Funding	:	**Intramural**

Crimean Congo hemorrhagic fever (CCHF) is a tick borne zoonotic viral disease reported from different parts of the world. Recently, the incidence of CCHF has increased rapidly in many countries including India with significant case fatality rate in humans. Recently, scattered geographic survey was conducted among domestic animals and recorded 5.43% and 10.99% samples positivity for CCHFV IgG antibodies in bovine and sheep/goat sera, respectively from 22 states and 1 union territory. Despite rapidly growing incidence of the disease, there are no current active entomological and serological surveillance data for strategic planning and monitoring of disease in India. The Jabalpur district of Madhya Pradesh has humid subtropical climate, temperature varied between 15 to 45 °C with rich bio-diversity and tribal populations.

Moreover Madhya Pradesh is adjoining with three states which have experienced deadly effects of this diseases in the past and give warning to establish an screening system to find out if CCHF is cause for viral hemorrhagic cases and hiding/unnoticed with dengue with established cycle or imported cases from endemic states. The study was designed to record the CCHF sero-prevalence status in livestock's population and in high risk human population of Jabalpur. The cross sectional field based study was conducted in and around Jabalpur (around 50-70 Km radius). The Sample size was determined based on different animal population of study area, reported sero-positivity and the level of confidence as 95 percent and accordingly, 70 and 64 small and large ruminants samples were collected and subjected to CCHF IgG ELISA by following biosafety norms (Fig.5.1.1). While collecting samples, a questionnaire was also filled to get some basic information about the owner, Socio-economic status, occupation, the animal age, health, tick infestation status etc (Fig. 5.1.2). We have recorded 18.5 % and 14% CCHF IgG positivity in small and large ruminants, respectively. The study shows that CCHF virus is circulating in unnoticed manner and need further holistic investigation to develop health strategies. However, the collection of desired number of animal samples is in progress.

Fig. 5.1.1: Discussion with the villagers, examination of animals and sample collection

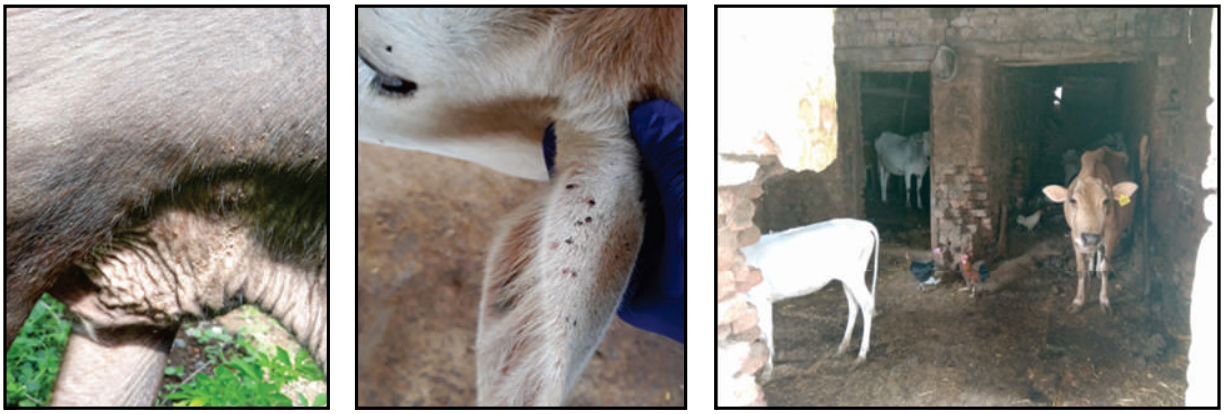


Fig. 5.1.2: Tick infestation on animals and co-habitat of humans with different species of animals

5.2. SERO-EPIDEMIOLOGY AND MOLECULAR CHARACTERIZATION OF SCRUB TYPHUS AND LEPTOSPIROSIS IN JABALPUR

Principal Investigator	**:**	**Dr. Manjunathachar HV**
Status	**:**	**Ongoing**
Funding	**:**	**Intramural**

6. NON COMMUNICABLE DISEASES

6.1. PREVALENCE OF FLUOROSIS IN THE COMMUNITY OF SELECTED DISTRICTS OF INDIA AND DEVELOPMENT OF AN APPROPRIATE INTERVENTION MODEL FOR PREVENTION AND CONTROL OF FLUOROSIS (A MULTICENTRIC STUDY)

Principal Investigator	:	**Dr G S Toteja**
PI at NIRTH	:	**Dr Tapas Chakma**
Status	:	**Ongoing**
Funding	:	**ICMR Task Force for Fluorosis**

This is the first multicentric study launched in India in seven endemic statesaimed at estimating the burden of fluorosis. The study aims to assess the prevalence of dental, skeletal and non skeletal fluorosis in the community of selected districts in the country and to find out the severity of dental fluorosis among areas with different fluoride levels in potable water. The study will also assess the fluoride level in potable water and urine samples and develop an appropriate intervention model for prevention and control of fluorosis together with its feasibility of adoption with local stakeholders.

So far, in Madhya Pradesh state, 17 villages out of 33 target villages in Chhindwara district have been covered in the study. From these villages 36051individuals were screened from 7782 households. Apart from this, 443 urine samples were collected for fluoride and Iodine estimation. Fluoride estimation has been completed. Iodine estimation is being done by Central Nutrition Division, ICMR. Diet survey has been done in 353 households and 40 different food staff samples have been collected and sent to NIN Hyderabad for analysis. We have also collected 628 water samples from different water sources and screened for fluoride estimation. The age-sex distribution of the study population is shown in table 6.1.1.We have also tested 2217 water samples from other states and are shown below in table 6.1.2.

Apart from the water samples we also tested 1294 urine samples for fluoride from seven states.

Table 6.1.1: Age and Sex Distribution of study population covered in Chhindwara, M.P.

Age group in Years	MALE	FEMALE	TOTAL
<3	564	539	1103
3-15	3926	3637	7563
>15	13925	13460	27385
TOTAL	18415	17636	36051

Table 6.1.2: State wise distribution of water and urine samples received and tested at NIRTH, Jabalpur

State Name	Water Samples Received For Fluoride	Water Samples Tested For Fluoride	Urine Samples Received For Fluoride	Urine Samples Tested For Fluoride
Madhya Pradesh	628	628	443	443
Telangana	382	382	180	179
Bihar	396	396	160	154
Rajasthan	296	295	82	66
Odisha	530	530	121	121
Punjab	418	387	339	214
Assam	227	227	156	117
Total	2877	2845	1481	1294

6.2. INTERVENTION PROGRAMME FOR THE MANAGEMENT OF SCABIES - BAIGA TRIBE OF DINDORI DISTRICT OF MADHYA PRADESH

P.I. of the study	:	**Dr. Tapas Chakma**
Status	:	**Ongoing**
Funding	:	**Govt. of Madhya Pradesh**

Scabies is a important public health problem because of it high prevalence and serious complications. Children appear to be more commonly affected and at a significant risk of streptococcal super infection. The earlier studies carried out among different tribes of Central India showed the gravity of the problem. Hence, the present study was designed with the objectives to control scabies infection through regular intervention by GB lotion and Ivermectin Tablet and to create awareness about personal hygiene among Ashram school going children through IEC.

The study was carried out in Dindori district covering 7 blocks viz. Dindori, Amarpur, Karanjia, Samnapur, Bajag, Mehandwani and Shahpura blocks. A total of 201 baiga dominated villages were identified and 20428 households were surveyed. A total of 913161 individuals were interviewed for the screening of scabies. A total 1052 individuals were observed as infected i.e. positive cases which were randomly allocated to two groups i.e. Group A (n=389) who were treated with Ivermectin and GB Lotion and Group B (n=663) treated with only GBH Lotion.

Results showed that cured rate in group A was 34.4% and in 11.8% in group B cases on 3rd day and 95.6% and 81.1% respectively for Group A & Group B. On 5th day and 7thday 98.8% and 99.5% cure rate was observed. The cumulative cure rate in Group A showed significant reduction in the scabies from day 3 onwards (P<0.0001).

6.3. A THREE STEP APPROACH ABC (ASK, BRIEF ADVICE, CESSATION SUPPORT) TO HELP TRIBAL POPULATION TO QUIT TOBACCO USE AND TO MAKE THEIR HOME TOBACCO FREE

Principal Investigator	**:**	**Dr Surendra Kumar**
Status	**:**	**Ongoing**
Funding	**:**	**Govt. of Madhya Pradesh**

The main objective of the study is to develop a comprehensive model, combining three elements of individualized approaches to quit tobacco use within existing health and non-health services.The study is being carried out in three phases. First phase was the baseline to find out the addiction rate using FTND scale and in the second phase interventions is being introduced (three steps tobacco control cessation). A three step approach ABC (Ask, Brief advice, Cessation support) is adopted to help tribal population to quit tobacco use and to make their home tobacco free. In the third phase impact of the interventions will be assessed.

In the baseline survey, a total of 4360 population is covered from Kundam block (Male 2207, Female 2153) from 20 selected villages in Kundam Block of Jabalpur districts. Tobacco users were found 2075 (47.6%). A total of 1568 individuals were clinical examined and leukoplakia is observed in 7.6%. According to FTND Scale, out of 1113 individuals examined, low dependency is observed in 26.9%. Low to moderate dependency 49.8% and moderate 22.6% and high dependency was found in 0.8% individuals.

The baseline survey shows that 47.6% are current tobacco users. The tobacco use was higher among males compared to female. About 8% clinically examined individuals had leukoplakia. According to FTND Scale about 50% has low to moderate tobacco dependency, 22.6% moderate 0.8% individuals has high tobacco dependency.In the second phase, all these low to moderate and moderate tobacco users are enrolled for the IEC and cessation support.

A total of 731 tobacco user are enrolled for ABC (Ask Brief advise and cessation) intervention. The 731 users are periodically given brief advise and counseling to quit tobacco use. The community level IEC activities, such as poster distribution, slogan writing, rallies, community meetings are carried out to create awareness about the side effect of tobacco uses. The IEC activities were also carried out in schools and Adivashi hostels in these villages. The movies about side effect of tobacco uses were also played in the intervention villages/schools. The study is in progress.

Oral examination

Community meetings

Interpersonal counseling

IEC activities in schools

7. SOCIAL SCIENCE AND ETHNOMEDICINE

7.1. BASELINE SURVEY ON KNOWLEDGE, PREVALENCE AND TREATMENT SEEKING ON MALARIA IN INACCESSIBLE TRIBAL AREAS OF KALAHANDI, RAYAGADA AND KANDHAMAL DISTRICTS OF SOUTH ODISHA: A MALARIA CONTROL INTERVENTION SITE OF TATA TRUSTS AND PARTNERS

Principle Investigator	**:**	**Dr. K.B. Saha**
Co. P.I	**:**	**Dr. R.K. Sharma**
Status	**:**	**Completed**
Funding	**:**	**TATA Trusts**

Malaria is a serious public health concern in Odisha particularly in three south districts- Kalahandi, Rayagada and Kandhamal. Malaria control activities get defeated due to locations of the villages in difficult terrains and forest areas, innumerable vector breeding sources, mass illiteracy, misconception on the disease transmission, non availability of health workers or they are not properly equipped coupled with strong insurgency problem. This makes malaria control in the area a challenge challenging affair. Tata Trusts has taken up this ardous task of controlling malaria in this KBK region by selective need based intervention in collaboration with Odisha State Government and local partner NGOs. Keeping in view to evaluate the effectiveness of the intervention, the Trust has entrusted ICMR- National Institute of Research in Tribal Health (NIRTH), Jabalpur to generate baseline data on knowledge, prevalence and treatment seeking on malaria in inaccessible tribal areas in their intervention site in the above districts. Accordingly NIRTH has recruited local field investigators and after training in the month of March 2017 the cross sectional survey was initiated immediately and completed by the end of April 2018. The study was conducted in five blocks- Lanjigarh, Th. Rampur (in Kalahandi), Bissamcuttack, Muniguda (in Rayagada) and Kothgarh (in Kandhamal). 149 villages located in these five blocks were surveyed.

Fig. 7.1.1: Map of Odisha showing the study area

A total of 4373 households were covered against the estimated minimum sample size of 4332. A total of 20258 household populations were covered in the survey. Caste/tribe wise distribution reveals most of the households belong to Scheduled Tribes(65%).

The households ever done IRS were highest among the OBC's (81%) and lowest among the Scheduled Tribes(64%). It is evident that 84% respondents in the households were aware of indoor bed nets used for avoiding mosquitoes. The availability of bed nets in good condition was highest in the district Rayagada (64%) and lowest in Kandhamal (36%). Main source of procurement of the nets (LLIN/ITN) were from programme. Regarding ownership of the bed net is concerned, the scheduled castes had lowest proportions of bed nets (42%), followed by Scheduled Tribes (48%). Almost 75% of the households were aware of malaria. Awareness on malaria was highest in the block Bissamcuttack (81%) and lowest in Muniguda (69%). It is observed that awareness on malaria was highest among the household belonging to OBC (82%) and lowest among the Scheduled Tribes (72%). The total fever two weeks reported during the survey was 276 and was 1.4% of the household population (20368) covered in the survey. Only 45% had gone for blood testing and this shows the ignorance towards the disease.

Among these who had done blood test most of them get it done from PHC (38.2%) and also from private doctors (27%). Very few visited ASHA (8%) for blood examinations. The NVBDCP focus on prompt diagnosis and treatment was to a great extent missing in the area. From the fever cases on the day of survey or for last two days, malaria positivity rate was calculated to be 35.4% (Pf rate 31%, Pv 4% and mixed infection rate 0.6%) of the total malaria positive cases (N=111). The % distribution of malaria parasite is shown in fig.7.1.1.

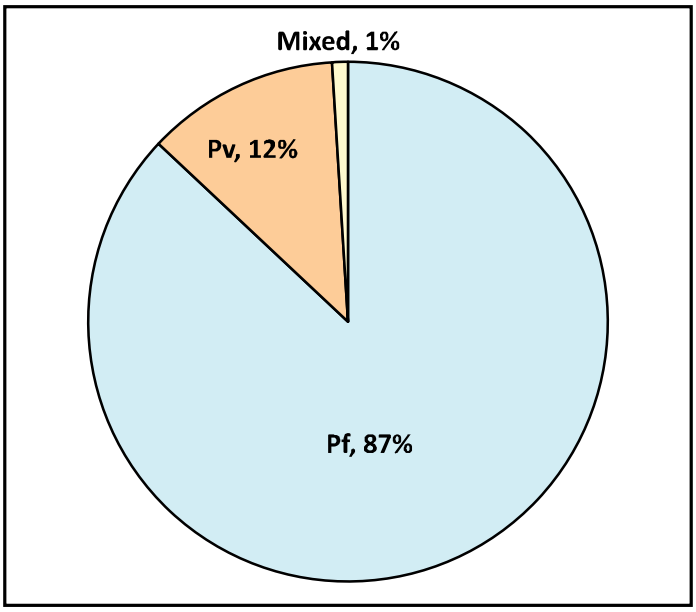


Fig. 7.1.1: The percent distribution of malaria parasite

As regarding services for fever/malaria is concerned only 48% ASHA ranked it as first priority work, while 16% ranked it as second priority work and 12% as third priority work, etc. To control malaria in the area there is a need for mass sensitization on malaria along with distribution of sufficient LLIN with monitoring. The existing IRS need to be planned and make it convenient to the villages while spraying. There is also a need to strengthen the anti-malarial services in the villages, particularly the capacity of ASHA to serve the area better.

The overall baseline data generated will help TATA Trusts in formulation of appropriate intervention strategy for control of malaria in the study area.

Training of field staff

Survey in progress

The study area

7.2. ANTI-MALARIAL DRUG USE PRACTICES AMONG TRIBAL POPULATION : A STUDY IN MADHYA PRADESH

Principle Investigator	:	**Dr. K.B. Saha**
Status	:	**Ongoing**
Funding	:	**Govt. of Madhya Pradesh**

The study was initiated with qualitative survey by undertaking 12 focus group discussions among the common people in 12 tribal dominated villages located in Ranapur block of district Jhabua in the month of July 2017 and few personal interviews among the health providers in district Shahdol. These helped in design survey instrument for quantitative survey.

The main tribe residing in the study area of Jhabua was Bhil. Educationally they are very poor. As reported here people prefer to stay in joint families. People mostly work as labourer in agricultural and other developmental work in the area. People were aware of malaria and they mentioned that people may die, if malaria is not treated. People were aware of the symptoms of malaria, however type of malaria is known to very few. Most of them mentioned that malaria spreads through mosquito and it breeds in dirty places around the houses, places of urinal and in cow dung. Some of the participants also mentioned that mosquito breeds in accumulated water, particularly in ditches. It was mentioned that during fever, they visit doctors and even ASHA as first line for diagnosis and treatment. It was mentioned that blood test is the main source to identify malaria and in villages it is done by ASHA by use of RDT. At the same time they also mentioned about the insufficiency of drugs and diagnostic kits with ASHA and health posts are located in inaccessible areas without proper source of transportation. Most of the participants could name the drugs but when shown to them both drugs and diagnostic kits, they could recognize. The source of knowledge of malaria is mostly from health workers in the villages.

It was also learned that tribes have faith on traditional healers (*Barwa*). Many of them will consult traditional healers first and if not cured visit ASHA or health post leading to delay in treatment. In many occasions if they are not satisfied with the treatment from health posts or from frontline health workers, they prefer to visit local traditional healer. However, It was mentioned by many that traditional healers cannot diagnose and cure malaria but quakes can do it.

Quakes also provide injections during fever. Most of them were unable to name the anti-malarial drugs. But they mentioned that these drugs could not be consumed in empty stomach. The usefulness of bed net was known to the participants, but very few of them reported to have

these nets. They are not properly aware of insecticide treated nets. Those who were aware of LLIN and possess it most of them did not mention any specific adverse effect of these nets. However, some of them mentioned that it is better to use these nets after washing, so that it will have minimum effect. The participants mentioned that they allow IRS, but not in kitchen or in room where grains are stored. Some of them also mentioned about smoke formation for driving mosquitoes by burning of dry Neem (*Azadirachta indica*) leaves. They also mentioned that traditional healers and ASHA/ANM may be trained further to provide better services. They also demanded distribution of bed nets.

Based on the qualitative information survey instrument for quantitative survey is prepared and the survey will be initiated soon.

7.3. SOCIO-ECONOMIC DEVELOPMENT AMONG TRIBES OF INDIA: ANALYSIS OF 2001 AND 2011 CENSUSES

Principle Investigator	**:**	**Dr. R. K. Sharma**
Status	**:**	**Ongoing**
Funding	**:**	**Intra-mural**

Government of India collects data on different demographic and socio-economic indicators every ten year through population census from all the Indian states and union territories. However, this data set is largely under-utilized or un-explored on one hand, where there is no authentic information available on basic characteristics of tribes residing in different parts of the country. Further, no systematic study is available which provide comparative information on tribes residing in a state or across the states. Therefore, this study was undertaken with an overall objective to provide comparative analyses of all Scheduled Tribes of India enumerated in 2001 and 2011 censuses.

The tribes residing within the state are compared based on 16 socio-economic indicators including population growth rate, sex ratio and child sex ratio (0-6 years), male and female literacy rates and work participation rates. The basic data for the present study is taken from the scheduled tribes' specific publication of census of India 2001 and 2011. The data analyses are primarily carried out the help of MS-Excel software and maps prepared using GIS software.

The study is recently initiated and the tribes residing in Himalayan Region are studied so far. The tribes of Jammu & Kashmir, Himachal Pradesh, Uttrakhand, Sikkam are analysed and compared on various socio-economic indicators. In 2011 census, 12 tribes were enumerated in the Jammu & Kashmir, 10 tribes in Himachal Pradesh, 5 tribes in Uttrakhand state.

Tribes of Jammu & Kashmir: Jammu and Kashmir State of India is home to about 1.5 million Scheduled Tribe population, constituting 11.9% of the total population. Twelve tribal communities enumerated in Census 2011 are mostly living in rural areas (94.2%) and scattered in almost all districts and valleys of the state. Tribal communities are at different stages of social, economic and educational development and are unevenly distributed in valleys/ districts of the state. The analysis reveals that the proportion of tribal population in the state increased from 10.9% in 2001 to 11.9% in 2011. Among the tribal communities, Gujjar is the largest tribal group in the state constituting 65.7 % of the tribal population followed by Bakarwal (7.6%) while Beda is the smallest

tribal group preceded by Garra (0.03% each). The tribal population increased by 35% against 23.6% growth rate of overall population of the state during 2001-11. The literacy rate among tribal population increased by 13.1 percentage points from 37.5% in 2001 to 50.6% in 2011. Among tribal groups, the highest increase in literacy rate was in Sippi (19.4%) and the lowest increase in Purigpa (6.6%). However, the work participation rate (WPR) among tribal population decreased from 43.9% in 2001 to 35.7% in 2011. Among tribal groups, the highest decline in WPR was in Tue (19%) and the lowest in Bot, Boto (1%). The work participation rate increased in the case of Changpa tribe. Overall, the Beda tribe is the best perforating tribe and ranked one among all twelve tribes of Jammu & Kashmir followed by Changpa and Bot/Boto, whereas the three most socio-economically backward tribal communities are Brokpa/Drokpa/Dard/Shin, Bakarwal and Gujjar. As per 2011 census data the most populated tribal community Gujjar is the least developed tribal community of Jammu & Kashmir.

Tribes of Himachal Pradesh: About 0.4 million Scheduled Tribe population reside in Himachal Pradesh state, constituting 5.7% of the total state's population, with 10 tribal communities mostly living in rural areas (95.5%) and scattered in all three different regions Trans-Himalayan, Central and Southern region. Among the tribal communities, Gaddi is the most populated tribal group in the state constituting 45.4% of the tribal population followed by Gujjar (23.6%) and Kanaura/Kinnara (13.0%), while Beta/Beda is the smallest tribal group preceded by Domba/Gara/Zoba (0.1% each). The tribal population had increased by 60% against 12.9% growth rate of overall population of the state during 2001-11. The growth rate was as high as 160% among Gujjars, but a negative growth of 17% was observed among Kanaura/Kinnara tribal community during 2001-11. The sex ratio among tribes of HP is much better compared to most of northern states of India and an improvement in the sex ratio among many tribal groups over the period has also been marked. Further, the literacy rate among tribal population of the state is much better than the national average for tribal population and it increased by 8.1% points during 2001-11. Among tribal groups, the highest improvement in literacy rate was found among Gaddis (13.5%) and the lowest among Swangla (4.1%). The WPR among tribal population of the state is also higher than national average for tribes, but it had decreased marginally during the last decade. The highest decline in work participation rate was found among Swangla and the lowest is among Gujjar. Nevertheless, the WPR among Pangwala, Kanaura/Kinnara, Lahaula and Bhot/Bodh had improved during this period. Overall, the Kinnaura, Kinnara tribe is relatively best performing tribal community and Pangwala is the most backward tribe of the state.

Tribes of Uttarkhand: Five tribes are notified as Scheduled Tribes in the Uttarakhand state and all these were enumerated in Census 2001 and 2011. Out of 10.1 million population of the state in

2011, about 3% of them are Scheduled Tribes. The decadal growth rate during 2001-11 for ST population was only 14.0% compared to 18.8% for total population. Hardwar, Dehradun and Udham Singh Nagar districts constitute more than half of the state population in 2011, whereas, Udham Singh Nagar and Dehradun districts comprised more than 80% of state's ST population. As per 2011 census, more than 90% tribal population was residing in rural areas. Among these five tribal groups, Tharus are the most populous tribe (31.3% of state ST population) followed by Jaunsari (30.4%), whereas Raji is smallest tribe with 690 persons in 2011. The overall sex ratio in tribal communities was lower than the national average for STs and it was lowest among Raji tribe (885). Similarly, the child sex ratio in STs was 929 in 2011, which was considerably lower than the national average for STs. Moreover, a substantial decline (-26% points) in child sex ratio among STs population was also observed during 2001-2011. The overall literacy rate among STs was 73.9% in 2011 and it was considerably higher than the national level (59.0%). Among the tribal communities, Bhotias had overall literacy of 86.5%, and a huge gap in literacy among tribal communities was observed. The work participation rate (WPR) among the STs was 45.5% in 2011, which was lower than the national average of 48.7% for STs. The WPR varied from 49.2% among Tharu to 39.3% in Buksa tribe. The study shows that the Jannsaris and Tharus are two major landholding tribes (cultivators) in the state, but Bhotias had higher participation in non-agricultural sectors (household industries or other activities). Overall, the analysis show that Bhotias are socially, and economically more advantageous tribal group among all five tribal groups, and both Raji and Buksa PVTGs are the most backward and deprived tribes of the Uttarakhand state.

7.4. REVITALIZING ETHNOMEDICINE AMONG BAIGA OF MP- AN EXPLORATORY RESEARCH

Principal Investigator	**:**	**Dr. Nishant Saxena**
Status	**:**	**Ongoing**
Funding	**:**	**Intramural**

Tribes usually live away from the mainstream human habitation and maintain their own unique way of life, socio-cultural traditions and practices. Health of community and individual, which is one of the most essential aspects for survival and sustenance, is a by-product of tribal lifestyle and culture. Ethnomedicinal practices are the core of their health culture. In the present study the goal of was to identify the pockets where ethnomedical practitioners (EMPs) are located in the Baiga community, reach out to them, enlist them, establish contact and understand their treatment methods and expertise offered to the community at large. The ultimate aim was to explore the possibility of converting viable solutions in ethnomedicine as marketable products which could be beneficial and sustainable for the Baiga community also.

After the approval of the 30th SAC in December, 2017 the endorsement from Institutional Ethics Committee was obtained in March, 2018. In the first leg of field work, enlisting of the EMPs in the remotest and inaccessible areas of *'Baiga-chak'* i.e. *'abode of Baiga'* comprising of Bajag, Samnapur and Karanjia tehsils of Dindori district was proposed. *Baiga-chak* is recognized as the hub of Baiga culture, history and tradition. Baiga is one of the three Particularly Vulnerable Tribal Groups (PVTGs) in the state of Madhya Pradesh (the other two being Bharia and Saharia) with population of more than 40,000 in Dindori ditrict as per Census, 2011. Genetically, it appears Baiga are linked to the Indo-Australian aboriginal group. They spoke a tongue in the past which was Indo-Australian. However, over the last few centuries, the usage of this language has dwindled and the dialect currently spoken by them is a form of Hindi. Baigas are fierce protectors and worshippers of the forest and mother nature having tremendous knowledge about the medicinal values of plants.

A preliminary field visit to the *Baiga-chak* was undertaken for establishing rapport with the community, especially the EMPs. Their method of treatment was also observed and audio-visual documentation was made. The study is ongoing.

Also, to further research in the area of traditional medicine a Medicinal Plants Garden is proposed in the campus. The possibility of collaborations with other institutes working on similar theme is also being worked out to enable scientific documentation and evaluation of herbal remedies. Overall, the study of traditional medicine system of tribes is a new domain being explored in the institute. The study aims to make health research more participatory which can have far reaching implications for improving the overall health of tribes.

A Baiga house-hold having both male and female traditional healers

Various plant parts having medicinal value being used by Baigas for treatment

8. TRIBAL HEALTH RESEARCH UNIT

The tribal health research unit was established with the primary research objective to improve of tribal health by enhanced diagnosis of disease and efficient management of the affected patients. The secondary objective is proper documentation of the generated data to help in the overall enhancement and betterment of tribals belonging to a particular area.

Tribal health research unit at NIRTH was established at Jagdalpur, district headquarter of Bastar, Chhattisgarh. The region is one of the highest malaria endemic areas of the state. The district has 54% area under forest cover and the total population is 14, 13,199 with predominant tribal population (65%). Gond, Halba, Dhurvaa, Muria and Bison Hon Maria are the main tribes in this area. This district is also under serious threat of Naxal/Maoist attack (Fig. 8.1.1).

Fig. 8.1.1: Map of India showing Chhattisgarh state, Jagdalpur district and Field clinic at Government Maharani Medical College & Hospital (GMMCH), Jagdalpur

A. Epidemiological situation of Malaria in Jagdalpur District, Chhattisgarh

Tribal Health Research Unit of NIRTH operates 24 hours malaria clinic for prompt diagnosis and treatment of the indoor patient from various departments such as Medicine, Paediatric, Gynaecology and outdoor patients.

During the report year (Apr 2017- Mar 2018), all enrolled symptomatic cases of malaria were screened by microscopy using JSB (Jaswant-Singh-Bhattacherji) stained blood smear. A total of 15746 patients were screened for malaria, among these 685 patients were found to be positive

for malaria with *P. falciparum* (87.4%) as major infection. Overall, 111 severe malaria (SM) and 64cerebral malaria (CM) cases due to *P. falciparum* were admitted to the hospital and 21 deaths were also recorded among the severe and cerebral malaria cases (Table 8.1.1).

Fig.8.1.2: Screening of patient for malaria diagnosis, blood smear preparation and examination

Table.8.1.1: Months wise Malaria positivity in Maharani Hospital Jagdalpur (April 2016 - March 2017)

Year	Month	BSE	Malaria Positive	Pf	Pv	CM	SM	Death	SPR	Pf%
2016	Apr	1195	64	59	5	8	5	6	5.4	92.2
	May	1209	41	37	4	0	1	1	3.4	90.2
	Jun	1138	70	63	7	0	6	0	6.2	90.0
	Jul	1474	95	83	12	7	24	0	6.4	87.4
	Aug	1550	54	47	7	2	18	0	3.5	87.0
	Sep	1536	46	39	7	4	8	0	3.0	84.8
	Oct	1464	72	60	12	5	9	2	4.9	83.3
	Nov	1266	83	76	7	14	15	3	6.6	91.6
	Dec	1214	82	76	6	15	15	7	6.8	92.7
2017	Jan	1121	37	30	7	6	4	2	3.3	81.1
	Feb	1165	15	8	7	3	1	0	1.3	53.3
	Mar	1414	26	21	5	0	5	0	1.8	80.8
Total		15746	685	599	86	64	111	21	4.4	87.4

BSE: Blood slide examination; Pos: Positive for malaria; Pf: *Plasmodium falciparum*; Pv: *Plasmodium vivax; CM: cerebral malaria; SM: Severe malaria; SPR: Slide positivity rate*

B. Haemoglobinopathies

Under the Tribal Health Research Unit activities, efforts were made to determine the prevalence of sickle cell anaemia and other Haemoglobin variants using Haemoglobin electrophoresis. All enrolled patients for sickle cell anaemia test were subjected to the electrophoresis. The tribal health research unit also provided the laboratory support for confirmation of sickle cell anaemia among pre-diagnosed children by solubility test under the Rashtriya Bal Swasthya Karyakram (RBSK), CHIRAYU programme of NHM & Department of Health and Family Welfare of district Bastar, Chhattisgarh. The complete blood count was performed among the positive samples and all the sickle cell disease as well as trait patients were also counselled regarding disease preventions.

Sample process for Sickle cell analysis

Overall 14,772 individuals (11,690 patients from hospital, 320 individuals through counselling and 2778 children of RBSK programme) were screened for sickle cell anaemia and other haemoglobin variants. Out of them 33.2% patients were found as HbAS trait and 4.8% of patients were diagnosed as sickle cell disease (HbSS) (Fig.8.1.2).

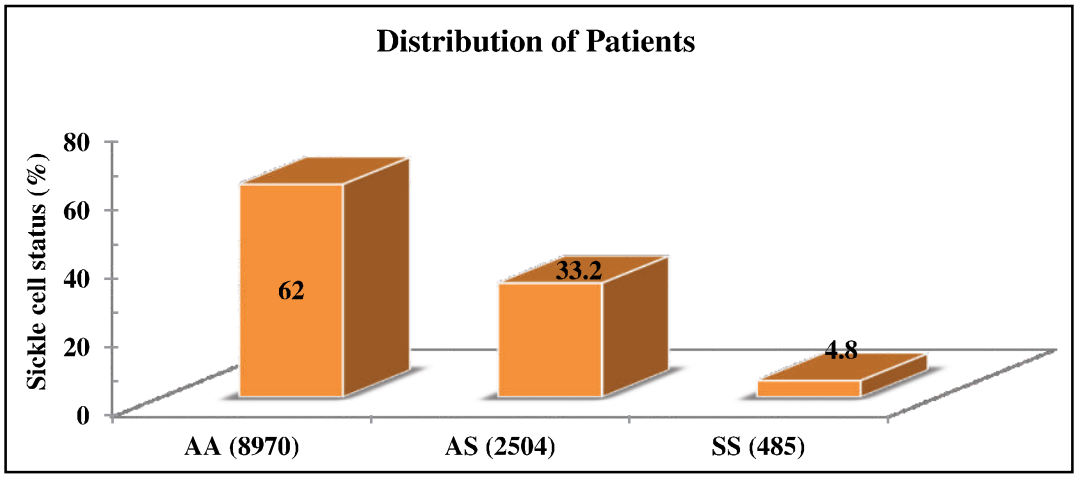


Fig. 8.1.2: Distribution of Sickle cell status among patients

Among the sickle solubility test, positive cases (2778) done by state RBSK program were further confirmed by Haemoglobin electrophoresis. Out of these 85.7 % were found as HbAS, 7.3% HbSS disease while 7% having normal haemoglobin HbAA.

Further social group wise analysis revealed that 43.3 % of Schedule Caste were found to be carriers of sickle cell HbAS followed by Schedule Tribe patients (35.5 %), OBC (25.7 %) and 12.7 % of General population. Among the diseased, 7.3 % were Schedule Caste patients by OBC patient (4.3%), Schedule Tribe (4.2%) and 2.4% of General population (Fig.8.1.3).

Further, the chi-square test shows that the prevalence of HbASwas statistically higher in Madiya tribe i.e. 53.9 % followed by Muria, Gond, Bhatra, Dhurwa and Halba tribe, whereas the prevalence of HbSS disease was statistically higher in Gond tribe i.e. 5.5% followed by Madiya, Muria, Bhatra, Halba and Dhurwa tribe (Fig. 8.1.4).

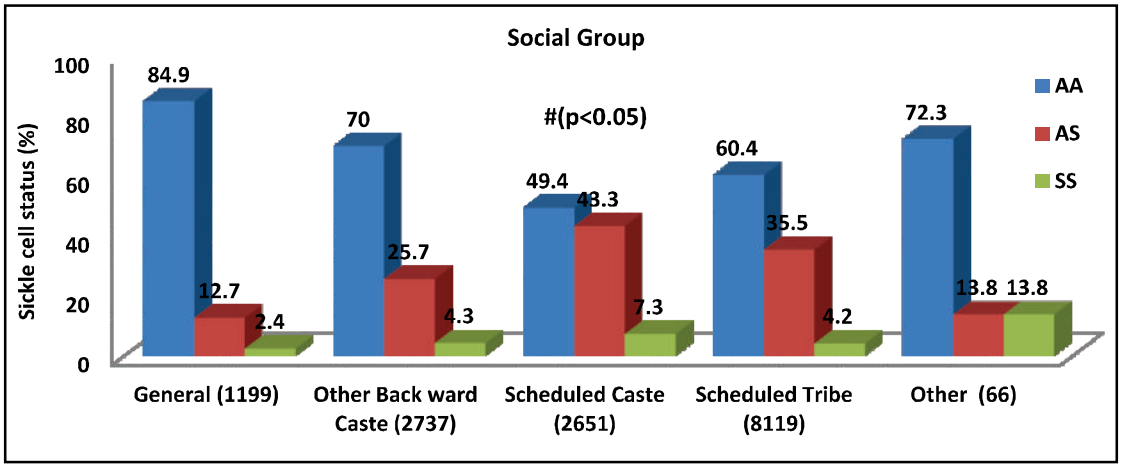


Fig. 8.1.3: Sickle cell status among screened patients of different social group

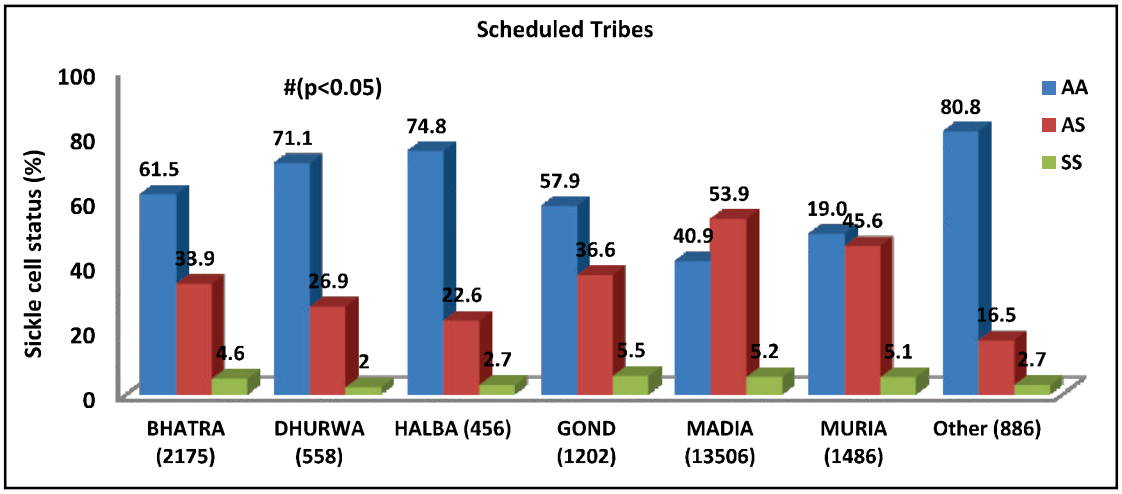


Fig. 8.1.4: Sickle cell status among screened patient for different schedule tribes

C. Pedigree analysis for sickle cell anaemia among patients family member's

As sickle cell anaemia is a hereditary disease, efforts were made to screen the parents and siblings of the diseased individuals for confirmation and detection of other related family members. Overall 377 individuals out of 107 families were screened for sickle cell anaemia. Out of these, 55.5% were found as HbAS, 28.7% HbSS disease while 15.8% having normal haemoglobin HbAA (Fig.8.1.5).

Further pedigree analysis reveals that nearly 30% of parents (32.5% of father and 29.7% mother) were pass HbAS genotype to their offspring. Similarly, 2.8% mothers were HbSS disease genotype. Analysis, revealed that among the prevalence of sickle cell disease HbSS was higher in sisters (12%) as compared to brothers 2.8% (Table 8.1.2).

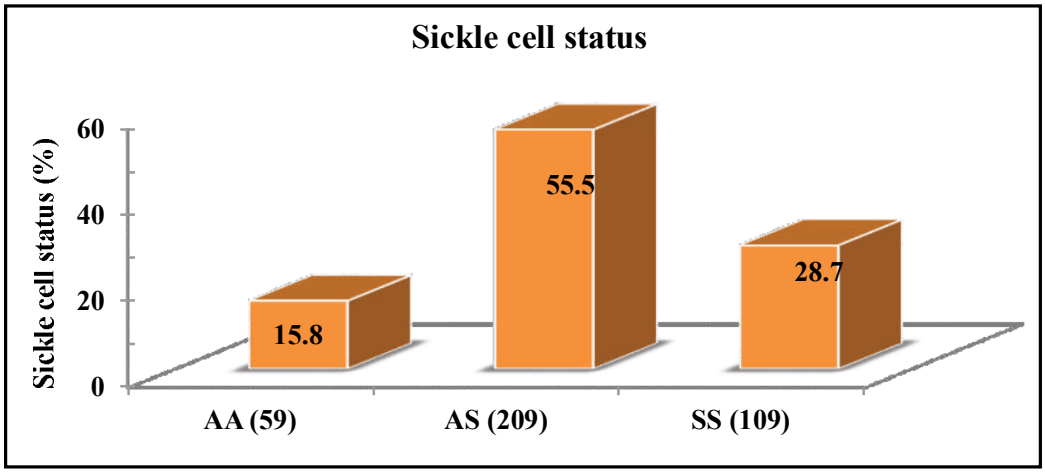


Fig. 8.1.5: Distribution of sickle cell status among patient's family members

Table 8.1.2: Pedigree wise distribution of sickle cell status among patient's family members

Relationship with Patients	AA (59)%	AS (209)%	SS (109)%	Total
Self (107)	-	9.6	80.6	28.5
Brother (51)	30.5	14.4	2.8	13.6
Sister (48)	25.4	9.6	12	12.8
Father (77)	13.6	32.5	0.9	20.5
Mother (74)	15.3	29.7	2.8	19.7
Daughter (2)	1.7	0.5		0.5
Son (4)	1.7	1	0.9	1.1
Wife (2)		1		0.5
Husband (9)	11.9	1		2.4
Grandfather (1)		0.5		0.3
Grandmother (2)		0.5		0.3

D. Association between Sickle cell and Malaria

Among the 640 malaria positive patients, 57 (2.3%) were found to be sickle cell carriers and 7 (1.44%) were sickle cell disease patients. The malaria positivity rate was 6.4 % in the non sicklers (HbAA) whereas among HbAS and HbSSmalaria positivity rate was 2.3 % and 1.44 % respectively. The *P.falciparum* was predominant as compared to *P. vivax* in all groups. Malaria prevalence was higher among HbAA individuals as compared to HbAS ($p<0.0001$) and HbAA&HbSS patients ($p<0.0001$). Similarly, the percentage of *P. falciparum* species infection was higher ($p<0.05$) in HbAA patients as compared to HbAS patients (Table 8.1.3).

Further, the value of mean parasite density in HbAS patients (9578.53±1460.7) compared to HbSS patients (3276.7±1337.7). The mean haemoglobin level was also found higher (9.673± 2.9 gm/dl) in HbAS patients as compared to HbSS patient 7.602±2.6 gm/dl.

Age-wise analysis of anaemia status among sickle cell disease patients revealed thatnearly 40% patients in all age groups were found to be moderately anaemic except <2 years of aged children while severe anaemia was higher among patients of < 2 years of age i.e. 70% (Fig. 8.1.6).

Table 8.1.3: Associations between sickle cell status and Malaria species

Sickle Cell	Total screens	Malaria +ve		Pf		Pv		Mix	
Status	Patients (%)	N	%	N	%	N	%	N	%
AA	8970 (62)	576	6.4*	522	5.88**	53	0.6	1	0.01
AS	2504 (33.2)	57	2.3*	36	1.4**	20	0.8	1	0.01
SS	485 (4.8)	7	1.44	6	1.2	1	0.2		
Total	**11959**	**640**	**5.4**	**564**	**4.8**	**74**	**0.62**	**2**	**0.1**

*+ve: Positive; Pf: *P falcifarum* ; Pv*: P vivax* and Mix: Mixed infection

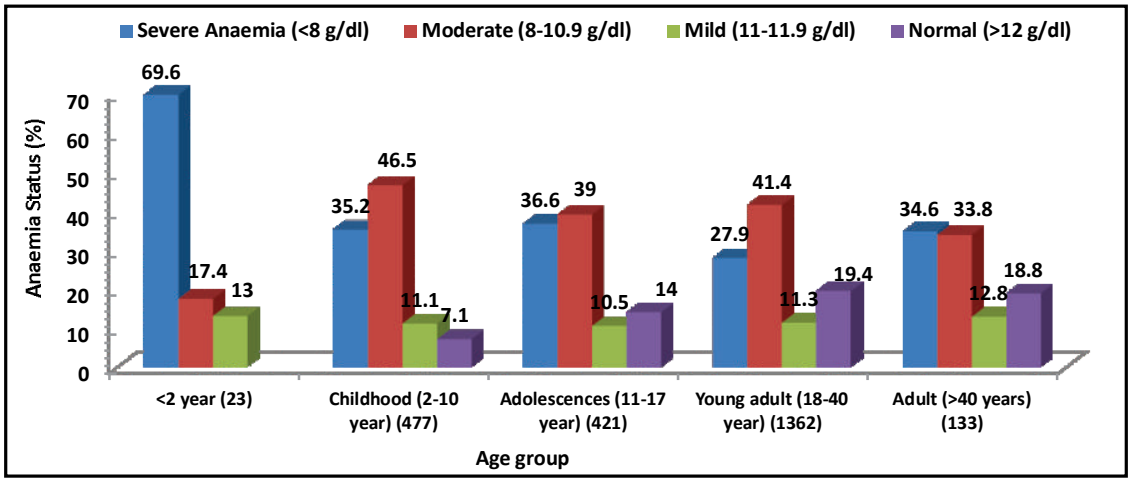


Fig. 8.1.6: Age group wise distribution of anaemia status among Sickle cell and Malaria positive patients

9. FIELD STATION KEYLONG

NIRTH (ICMR) Field Station was established in June 2015 at Keylong and is currently working from Regional Hospital Building, Keylong. The Institute is running with 15 staff in total of 3 Scientists (2 Microbiologists + 1 Social Scientist), 1 Section Officer, 4 Technnical Staff, 2 Data Entry Operators, 4 Field Workers, 1 Driver. The microbiology laboratory is equipped with biosafety cabinet, CBC analyzer, centrifuge, ELISA reader, bio-chemistry analyzer, autoclave, distillation unit, electrophoresis unit, lab. incubator and deep-freezer. A total of six bigha area of land was alloted by Govt. of H.P for construction of a building for ICMR-NIRTH FS at Vill. Guskyar (Keylong) and the matter is pursuing by Executive Engineer, H.P.P.W.D, Keylong Division Distt. L&S (H.P) to produce detailed estimate and detailed drwaings/plans.

RESEARCH ACTIVITIES TILL MARCH 2018 are presented below:

9.1. SCREEN THE RESIDENT TRIBE OF DISTT. LAHAUL & SPITI (H.P) FOR G6PD DEFICIENCY, SICKLE CELL ANAEMIA AND OTHER ABNORMAL VARIANTS OF HEMOGLOBIN

Principal Investigators	**:**	**Dr. S. Rajasubramanium**
Status	**:**	**Ongoing**
Funding	**:**	**Intramural**

Hemoglobinopathies are among the most common inherited diseases around the world with 7% of theglobal population being carriers. In India, it was first reported in 1952 among tribal of Nilgiris in Southern India. Subsequently, it has been shown to be present various tribes residing in Central and Eastern India. As it has been predominantly seen among tribes efforts are being made it identify whether Sickle Cell Disease (SCD) and other hemoglobinopathies are present in Hilly tribes of Himachal Pradesh.

The objective if the study is to determine the presence of various hemoglobinopathies tribes of Lahaul & Spiti, Kinnaur and Chamba (Bharmour) in 3 tribal districts of Himachal Pradesh.To identify the clinical profile of patients suffering from hemoglobinopathies such as SCD, thalassemia and G6PD deficiency.

BRIEF METHODOLOGY:

Blood sample collected from patient

↓

Processed in CBC analyzer to count Hb%, MCV, MCH values and other parameters

Identification tests for SCA

- Solubility test: for preliminary screening of SCD patient.
- Hb Electrophoresis: to know the normal haemoglobin pattern.
- HPLC

Identification tests for G6PD deficiency

- G6PD deficiency test: for screening of patients with deficient glucose-6- phosphate dehydrogenase enzyme.

NIRTH FS Keylong team collecting blood samples for Sickle cell anaemia

9.2. STUDIES ON PREVALENCE AND RISK FACTORS ASSOCIATED WITH HEPATITIS "B" INFECTION IN LAHAUL AND SPITI, HIMACHAL PRADESH

Principal Investigators	:	**Dr. Pradip V. Barde**
		Dr. Ravindra K. Sharme
Co-PI	:	**Mr. Mohan Shukla**
Status	:	**Completed**
Funding	:	**Intramural**

The study aims to find out sero-prevalence of HBV and HCV and the risk factors for HBV in the difficult to reach Lahaul and Spiti district of Himachal Pradesh. This study was initiated in January, 2017 during peak winter season, due heavy snowfall and temperature around -35°C with oxygen depleting environment till March 2017, only 211 samples from Keylong and Sissu (Lahaul Valley) were collected, subsequently as part of the cross sectional field a sample size of 1300 was determined. Finally, 1336 samples were collected in the ensuing summer season after taking informed consent/assent of the participant, the information on demographic, clinical details and risk factors were collected through a well-designed, pre tested interview schedule. Two ml intravenous blood was taken from each participant following medical and ethical guidelines. All the samples were tested for Hepatitis B surface antigen (HBsAg) and antibodies for HCV (total antibody) by ELISAs at Keylong. All the data collected in the form of hard copies during field visits was entered in to MS excel and is being analysed for risk factors using SPSS 25.

The results of the samples collected and tested for HBsAg by ELISA are given in table 9.2.1.

Table 9.2.1. HBS Ag positivity among Lahaul and Spiti study participants

Area	Tested	Positive (%)	Equivocal
Lahaul	623	19 (3.04)	7
Spiti	713	122 (17.11)	2
Total	1336	141 (10.55)	9

The results of ELISA show that the sero- prevalence in Lahaul was low (3%), however Spiti valley showed very high sero- prevalence. Further stratification of data showed that both the sexes were almost equally affected with about 11% males and 10.2% females showing HBsAg positivity. The adults in the age group of 15-60 years were more affected in comparison to age group of less than 15 and more than 60 years. However further classification of adults such in age groups with 15 years each (0-15, 16-30, 31-45 and 46-60 years) showed that the there is no significant difference among them as far as HBsAg positivity is concerned. The data related to risk factor is being analysed.

Photographs showing field staff doing data and sample collection in Lahaul and Spiti

9.3. A PILOT STUDY ON REPORTED REPRODUCTIVE TRACT INFECTION (RTI) AMONG WOMEN AT LAHAUL AND SPITI, HIMACHAL PRADESH

Principal Investigators	**:**	**Dr. K. B. Saha**
		Dr. Vandhu Parihar, FS Keylong
Status	**:**	**Completed**
Funding	**:**	**Intramural**

In developing countries, women are high risk for several reproductive health problems especially reproductive tract infection/sexual transmitted infection (RTI/STI). The problem of RTI/STI morbidity in women is largely due to ignorance, low level of awareness regarding sexual and reproductive health and other social factors like low female literacy, cultural factors. Social taboos and stigma also persist within the society related to health problem which is also a barrier to seek medical help to women. Women are the most affected from such infection since the disease may often go unnoticed in them and also often neglect their health issues. The health problems of the tribal's need special attention because the tribal people have distinctive health problem, which are mainly governed by their traditional beliefs, practices and ecological conditions. Due to extreme cold climate and scarcity of water, the personal hygiene is not properly maintained in tribal areas of the region. This situation may promote reproductive tract infections (RTI) among the local people. The objective of the study was to understand the knowledge, self reported symptoms and treatment seeking behavioural related to RTI in the area.

The study was carried out in Lahual & Spiti at an altitude of 3,080 mts. and cut from rest of the world from October-end to mid May due to heavy snowfall particularly at Rohtang Pass that closes the road during winter. The climate is generally cold and dry and in winter temperature drops to -35°C. Study population includes 494 women in the reproductive age 15-49 years who were the resident of valley and had consented to participate from 19 villages that were randomly selected. Door to door survey was conducted by canvassing predesigned interview schedule.

Thesocio-demographic profile of participants in the study revealed that women were mostly in age group of 30-39 years(mean 32.6±9.2). Around 70% (347/494) were ever married women with the mean age at the marriage was 22.3± 4.5 and mean number of children born and living was 1.85±0.92. Most of them were from Schedule Tribe (86%). Overall 52.6% women did not practice any kind of contraception whereas 20.9% women reported that their partners used condoms regularly.

Only 25.7% (127) women aware of symptoms of RTI and 55% (272) women consider vaginal discharge as normal body function. While 25.5% (126) women had reported at least one of the symptoms of RTI during three months preceding the survey. The main symptoms reported are shown in figure 9.3.1. The study reveals that only 34.1% (43/126) seek treatment.

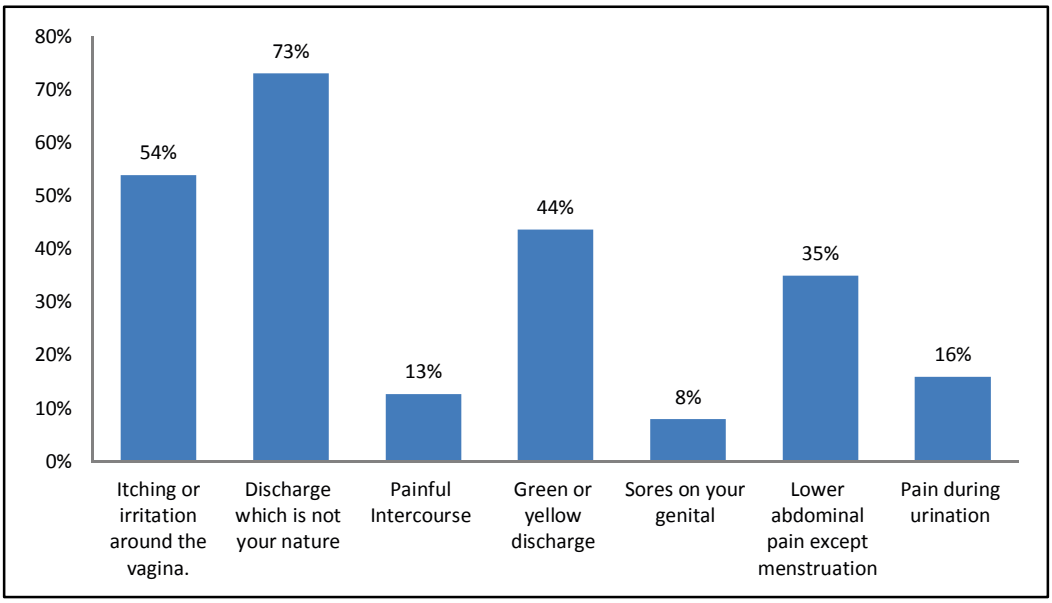


Fig. 9.3.1: The reported symptoms of RTI

Approaching the village for survey

Motivating the target women for interview

Taking signature on consent form

Interviewing the subject

10. TECHNICAL SUPPORT TO MALARIA ELIMINATION AND DEMONSTRATION PROJECT (MEDP) MANDLA

Malaria Elimination and demonstration project (MEDP) is continuing in Mandla district with the goal to demonstrate elimination of malaria and prevention of re-establishment of malaria in all 1233 villages of this district.

Technical support in desiging IEC/BCC

NIRTH has extended support in desiging appropriate tools of communication and also impart training to develope trainers for IEC/BCC activites in the study area. Time to time NIRTH also extend refresher training on IEC/BCC to field staff of MEDP project.

Evaluation of Health workers, LLIN and IRS

As part of the project NIRTH has helped MEDP in desiging survey insturments for assessment of knolwedge and funtioning of ASHA in the study villages and also provided support in data collection, data entry and analysis. NIRTH hasalso been supporting the project in desiging the tools for assessment of LLIN and IRS and extend analytical support.

Entomological surveillance and monitoring

As per plan of the project entomological surveillance and monitoring by NIRTH in every 3rd months in different intervention group of villages to assess the impact of intervention on mosquito vector population.

The NIRTH teams visited Mandla for entomological investigation in October 2017 and February 18.Villages for entomological monitoring were selected in three areas on basis of API i.e., >5.0, 1.0 to 4.99 and <1.0 in consultation with District officer, MEDP, Mandla. 2/3 villages in each area were selected for this purpose. In each selected village, *Anopheles* resting inside four designated houses located in different parts of the village (two human dwellings and two cattle sheds) were sampled (per man per hour) during early morning (0600-0800 h) for 15 min each by a team of two insect collectors with flashlights and mouth aspirators following standard WHO techniques. Mosquitoes collected were placed in separate test tubes and clearly labeled with location, village name, Date and time of collection and brought to field laboratory for identification.

The average anopheline density (PMH) observed in 9 villages of different CHCs of Mandla district was 36.6 in October and 16.5 in February of which *An. culicifacies* and *An. fluviatilis* proportion was 21 to 39% in October and 42 to 83% in February. The other anopheline species collected were *An. subpictus, An. annularis, An. vagus, An. splendidus, An. pallidus, An. nigerrimus* and *An. barbirostris*. The site wise density of anophelines and vectors was almost equal in all 3 categories.

An. culicifacies and *An. fluviatilis* collected during resting collections have been stored which will be assayed for the presence of malaria parasites by employing diagnostic PCR described by Snounou and for sibling species determination. The tests are in progress.

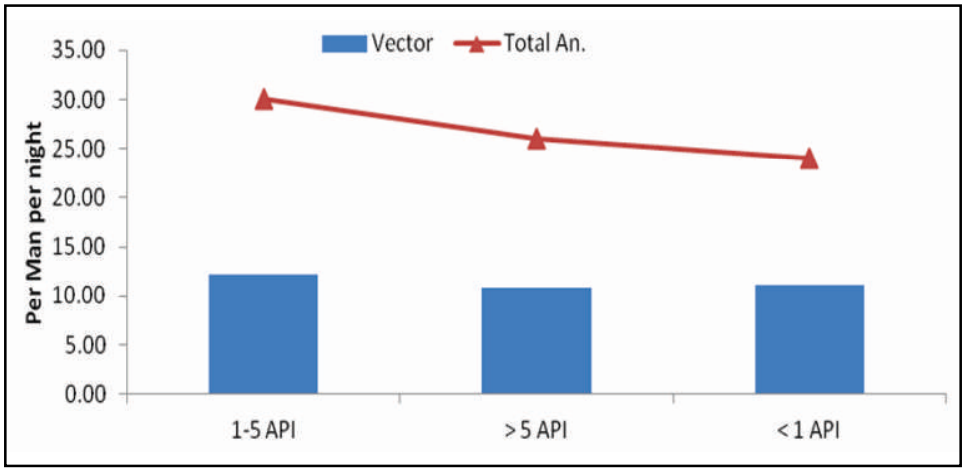


Fig.10.1.1: Indoor resting collection in Mandla

Susceptibility test against adult *An.culicifacies* mosquitoes was conducted according to WHO standard guidelines to ascertain the present susceptibility status. The mixed age population collected from different unsprayed villages were exposed to the WHO impregnated papers of diagnostic concentrations of the candidate insecticides used in vector control programme (DDT 4.0%, Malathion 5.0%, respective doses of different synthetic pyrethroids i. e. Alphacypermethrin 0.1% and Deltamethrin 0.05%) using WHO insecticide susceptibility test kit. A minimum of 15 mosquitoes /replicate for test control were used. Investigations were conducted in an unsprayed room maintained at 26± 2°C and RH of 70-80% both during exposure and during 24 hrs holding period. Percent mortality was determined post 24 hrs of holding period from the total number of alive and dead mosquitoes in the replicates by using the Abbott's formula.

Results of the susceptibility tests carried out by NIRTH in the month of October 2017, revealed that the *An. culicifacies* the vector mosquito of this area is not resistant to the synthetic pyrethroids insecticide which is being used in IRS operation in Mandla. *An. culicifacies* was found resistant to DDT and Malathion, varying level of resistance to Alphacypermethrin and susceptible to Deltamethrin. Corrected % mortality of *An.culicifacies* was found 28, 84, 95 and 98% against DDT, Malathion, Alphacypermethrin and Deltamethrin respectively (Table 10.1.1).

Table 10.1.1: Susceptibility of *An.culicifacies* carried out by NIRTH in Mandla

Insecticide	% Mortality
DDT 4%	28.0
Mal athion5%	84.0
Alphacypermethrin 0.1%	95.0
Deltamethrin 0.05%	98.3

Cone bioassays were carried out in October to assess the efficacy of insecticide used in IRS program and also to assess the quality of IRS on different sprayed surfaces in the villages. The houses having different sprayed surfaces were selected for cone bioassays. At least 2 unsprayed houses were selected for control. The bioassays were done on day 1 and 30 post-spraying using WHO cones. Wild caught An. culicifacies were used for surface cone-bioassays. Ten blood-fed wild caught female mosquitoes were exposed to the surfaces for 30 minutes. After theexposure, the mosquitoes were carefully removed and placed in paper cups covered with nylon net fastened with rubber band. Mosquitoes were provided with 10% sucrose solution soaked in cotton wool and maintained in a climatic chamber for 24 hours at 26± 2°C and RH of 70-80%. After 24 h of holding, percent mortalities was computed from the total number of alive and dead mosquitoes. The treated mortality was corrected to the control mortality using Abbott's formula. The bioassays carried out in 3 villages on one day post spraying revealed that the average corrected % mortality of An.culicifacies was 99% (Fig.10.1.2). The tests carried out in 3 villages on day 30 after spraying in which the mortality observed was only 40.6%. This poor mortality indicates that the spraying was not done properly.

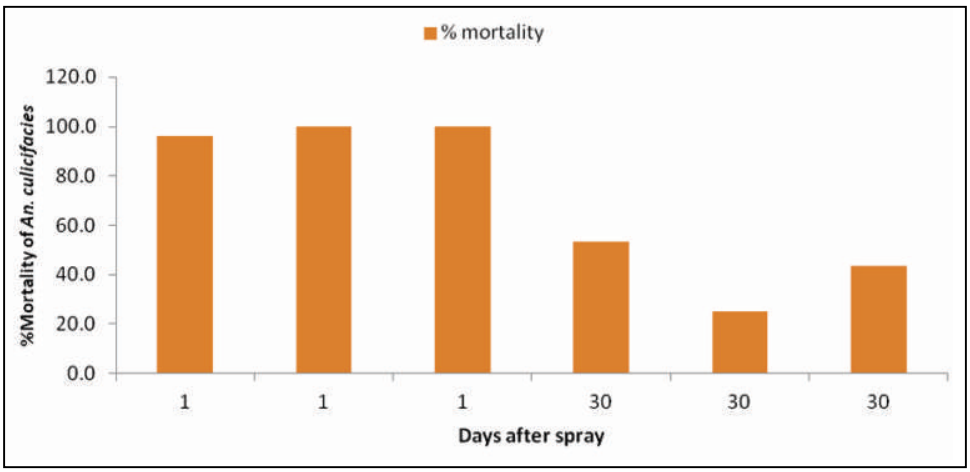


Fig. 10.1.2: Cone Bioassay in sprayed villages of Mandla by NIRTH

The MEDP staff is already preparing the checklist of IRS and LLIN hence NIRTH team only monitored spray operation randomly by conducting concurrent and consecutive surveys in some villages to know the spray quality and coverage. A total of 33 sprayed houses of 6 IRS villages were surveyed of which only 3 houses were found completely sprayed, 24 partially sprayed (either 1 or 2 rooms or only outer side) and 6 houses were not sprayed only stencil was made. No prior information of spray was given to villagers for spraying. No proper supervision was done.

IRS part done by the State Govt. needs strict supervision for proper coverage and quality. The bioassays carried out by NIRTH confirm the poor quality of spray as only 40% *An.culicifacies* died in one month after the spray.

11. NEW INITIATIVE

11.1. CENTRAL ANIMAL FACILITY AND ESTABLISHMENT OF IN-VIVO RESEARCH FACILITY

The central animal facility at the institute is recently takeover by the NIRTH and all necessary appovals from various regulatory authorities has been obtained. Recently Institute has received 49 rodents (mice & rats) from AIIMS, Bhopal.

Five projects involving in-vivo research got approved from IAEC.

11.2. LIQUID CULTURE

A TB containment laboratory, especially for liquid culture and DST facility was established and validated with support from FIND and Central TB Division.

11.3. TRIBAL HEALTH GARDEN

A space of about 2 acres of land inside the campus has been recently cleaned up and developed as tribal garden by planting of different plants commonly used by tribes for healthy living. In future it is planned to have separate small area dedicated for a particular disease commonly prevalent in tribes of Madhya Pradesh and Chhattisgarh and Rajasthan.

Medicinal plant garden at NIRTH

12. REGULAR ACTIVITIES

12.1. INTERMEDIATE REFERENCE LABORATORY FOR RNTCP

The TB laboratory of the institute is functioning as IRL for RNTCP and provides support to RNTCP using various tests like, culture, microscopy and CBNAAT. Recently the laboratory is certified for first and second line Line Probe assay by Central TB division. This year total of 4289 tests was performed by CBNAAT. Of these 1336 were positive for *M. tuberculosis* and 168 were resistant to rifampicin. This included 1656 samples of extrapulmonary TB. Of 1656, 228 were *M. tuberculosis* positive and 26 were rifampicin resistant. Laboratory also processed more than 3000 specimens for culture on solid LJ media for follow up of MDR TB and CBNAAT negative specimens.

12.2. STATE REFERENCE LABORATORY

HIV laboratory of the institute is a NABL accredited facility and functions as ICTC and State Reference laboratory for M.P. State AIDS Control Society under NACO. The laboratory is linked to 62 ICTC and 29 Blood Banks for External Quality Assurance Scheme which includes retesting and proficiency testing. This year total of about 1200 samples were tested under the scheme.

12.3. HUMAN RECOURSE DEVELOPMENT

During this year about 14 MSc students from various universities completed their dissertations. The details of students enrolled/submitted/awarded PhD thesis under the scientsit of the institute are given below

Guide	No. of Students			University
	Enrolled	Submitted	Awarded	
Dr. Aparup Das	1	1	--	Kumaun University
Dr. Neeru Singh *	1	3	--	Rani Durgawati Univ. Jabalpur
	--	--	1	Rajiv Gandhi Tech. Univ. Bhopal
	--	1	--	Symbiosis Univ. Pune
Dr. K.B. Saha	2	1		Rani Durgawati Univ. Jabalpur
Dr. P.V. Barde	--	1	1	Rani Durgawati Univ. Jabalpur
Dr. Praveen K. Bharti	2	--	--	Rajiv Gandhi Tech. Univ. Bhopal
Dr. S. Rajasubramaniam	--	--	1	Andhra Univ. Vishakhapatnam

***Decesed on 19th August 2017**

12.4. Library

Library and Information Centre at the institute continues to support and cater the documentation and information needs of the scientists, staff and researchers of the centre as well as other academic institutes in Jabalpur like Netaji Subhash Chandra Bose Medical College, Veterinary College, Home Science College, Rani Durgavati Vishwavidyalaya, etc. It also extends services to research personnel from other universities/institutes in the country.

Library is equipped with modern furniture, air conditioner, compactors and display racks for displaying of latest arrivals, i.e books and periodicals for its readers. Meeting the challenges posed by technology driven world, it exemplifies the use of digital environment for creating, applying and utilizing information with its automated library collection online databases/e-resources etc. The objective of these e-resources is to provide/retrieve full text of online articles and conduct specific searches relevant to the users from multiple publishers. Alert messages regarding new developments and recent arrivals in library are provided through e-mails from time to time. Photocopies of available literature are provided for research use.

The library has the following resources:

New additions

Journals subscribed Periodicals	57
1. International Periodicals	39
2. Indian Periodicals	18
Books	1,432
WHO Publications	813
Bound Foreign Journals	1,480
Bound Indian Journals	863
MEDLINE CDs	21
Census + Other CDs	07
Census Floppies	60
CDs on Other Subjects	162
Total Library Collection	4,895

Besides above facilities, Library also provides information regarding various links as below for open access journals to its user.

Providers:-	No. of E-Journals/Access links
ICMR e-Consortia	
Science	http://science.sciencemag.org/
NEJM	http://content.nejm.org/
Lancet	http://www.sciencedirect.com/
NATURE	http://www.nature.com/
JGATEPLUS (Open access)	24,084 Journals & http://jgateplus.com/search/
Directory of other Open Access Journals	No. of Journals
http://www.doaj.org/doaj?func=home&uiLanguage=en	10,486 journals searchable at article & 2,72,5680 articles listed
BioMed Central's Open Access Journals	1,053 total open access journals listed & 3,28,031
http://www.biomedcentral.com/content	articles listed
Free Medical Journals	5,088 Journals
http://www.freemedicaljournals.com/index.htm	
Bentham Science Publishers	3,30 Journals
http://www.benthamscience.com/	

12.5. NIRTH publications

Tribal Health Bulletin/ NIRTH update

12.6. REVIEW OF MANUSCRIPTS FOR SCIENTIFIC JOURNALS

The scientists of this institute are members of review board of various prestigious journals of national and international repute viz. The Lancent, The Lancent Global Health, WHO Bulletin, Malaria Journal, PLOS One, Journal of Parasitology, Journal of Infectious Diseases, Indian Journal of Medical Research, Current Science, etc.

13. PUBLICATION OF RESEARCH PAPERS

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7. Bhat J, Rao VG, Sharma RK, Muniyandi M, Yadav R, Bhondley MK. (2017). Investigation of the risk factors for pulmonary tuberculosis: A case–control study among Saharia tribe in Gwalior district, Madhya Pradesh, India. *Indian J Med Res*. 146:97-104. (IF-1.508)

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14. CONFERENCE / TRAINING/MEETINGS/AWARDS

14.1: CONFERENCE / TRAINING/MEETINGS ATTENDED

Dr. Aparup Das, Director

- Meeting with scientists and researchers from USA, DBT representatives on use of wolbachia for malaria control.
- Meeting with Dr. Jane Carlton and other scientist from USA and India (Ispat general hospital) under the project entitled “Centre for study of complex malaria in India” funded by NIH, USA (R01 grant) for mosquito biosphere project 27th Nov. - 1st Dec. 2017.
- Meeting with Prof Suresh Subramani, Distinguished Professor of Molecular Biology, USA - to discuss caged and open field trials on 5th Dec. 2017.
- Meeting with Mrs. Gauri Singh, Principal Secretary (Public Health & Family Welfare), Govt. of MP and other State Govt. Officials of M.P. on 16th March - funded projects on Tuberculosis in four Saharia dominated districts and haemoglobinopathies at ICMR-NIRTH on 16th March, 2018.
- 2nd Malaria Elimination Advisory Group (MEAG) Meeting for Mandla Malaria Elimination Demonstration Project (M-MEDP) on 23-24 March, 2018.

Dr. V.G. Rao, Scientist 'G'

- Attended workshop on “Working Towards Tribal Health: present status and way forward” organized by ICMR - National Institute for Research in Tribal Health at NIRTH Jabalpur on 16 August 2017.
- Attended workshop on “Writing Policy Briefs” organized by ICMR - National Institute for Research in Tribal Health at NIRTH Jabalpur on 18 August 2017.
- Attended Workshop on 'Tuberculosis among Saharia: Contemporary issues and way forward' organized by ICMR - NIRTH, Jabalpur in collaboration with the International Union against tuberculosis & Lung Diseases (THE UNION) at Gwalior on 4th October, 2017.
- Attended 48th Union World Conference on Lung Health held at Guadalajara, Mexico during 11 to 14 October 2017.
- Attended 62nd Annual National Conference of Indian Public Health Association (IPHACON 2018) held at Scientific Convention Centre, King George's Medical University, Lucknow, UP during 09-11th Feb. 2018.

Dr. Tapas Chakma, Scientist 'G'

- Participated in a "Workshop on Naturally Occurring Pollutants affecting Water Quality in India" Organized by Divecha Centre for Climate Change Indian Institute of Science, Bangaluru and delivered a lecture on "Health Effects and Ways to Mitigate the Fluorosis".
- Nominated as member of the advisory group Divecha Centre for Climate Change, Indian Institute of Science, Bangalorein India and attended its 1st meeting on 19th June, 2018 on 'Skype'.
- Attended training workshop as a resource person under the IHMI project at Bathinda (Punjab) during 17–19 July 2018.
- Attended Endocrinology Update as Faculty on 14th October, 2018 at Jabalpur.
- Attended 63rd Annual Conference of IMA MP Chapter on 27th and 28th October 2018 and delivered a guest lecture titled: Fluorosis: An important emerging Public Health Problem".

Dr. M.M. Shukla, Scientsit 'F'

- Participated in the Review meeting of M-MEDP along with stakeholders from F-DEC and Sun Pharma on 24th April 2017.
- Attended a community participation and malaria awareness event at Kalpi (Mandla) on 25th April, 2017 and advised the villagers to participate in Malaria Elimination Demonstration Project.
- Attended 2nd Malaria Elimination Advisory Group (MEAG) meeting for Mandla Malaria Elimination Demonstration Project (MEDP) on 23rd and 24th March, 2018 at ICMR-NIRTH Jabalpur.

Dr. C.G. Raut, Scientist 'F'

- Being a Nominee of CPCSEA, MoEF&CC, GOI, the expertise is provided to the nation for planning, designing, execution, establishment, functioning, troubleshooting to the "In- vivo research facilities".
- Nominated as a member secretary for Institutional Biosafety Committee of ICMR-NIRTH, Jabalpur by RCGM-DBT, MoST, GOI.
- Invited as the ICMR-NIRTH representative to attend a high level meeting of Department of Animal Husbandry, State Govt MP at Commissionerate Bhopal for OIE-PVS evaluation.

Dr. A.K. Mishra, Scientist 'E'

- Attended a community participation and malaria awareness event at Kalpi (Mandla) on 25th April, 2017 and advised the villagers to participate in Malaria Elimination Demonstration Project.

- Attended meeting with CMHO, DMO Dindori and BMO Bajag CHC at CHC Bajag on 7th July 2017 regarding initiation of ICMR project on "Phase III evaluation of Deltamethrin 62.5 SC-PE" in villages of 2 subcentres, selection of spray squad, training and briefing about the project.
- Attended meetings with DMO Umaria on 25th July, DMO Singrauli on 27th July, and DMO Anuppur on 30th August regarding initiation of ICMR project on "Monitoring of insecticide resistance in Madhya Pradesh". Selections of villages and CHCs to carry out susceptibility tests were discussed.
- Visited Mandla district for entomological surveillance and monitoring under Malaria Elimination Demonstration Project (MEDP) from 3rd-7th October 2017. The 2nd round indoor residual spray was supervised during the period.
- Attended meeting with DMO Dindori at Dindori on 13th October 2017 regarding briefing of progress of ICMR project "Phase III evaluation of Deltamethrin 62.5 SC-PE".
- Attended meetings with DMO Panna on 23rd October and with DMO Tikamgarh on 26th October 2017 regarding ICMR project on "Monitoring of insecticide resistance in Madhya Pradesh". Selections of villages and CHCs to carry out susceptibility tests were discussed.
- Attended meeting on Introduction of Long Lasting Insecticidal Mosquito Nets in the Open Market held at ICMR New Delhi on 16th December 2017.
- Visited Mahyco, Jalna, and attended meeting with Dr. Char, Lead Biotechnology and Dr. Prabhakar Patil on 21st December 2017 regarding the open cage facility for genetically modified mosquitoes.
- Visited Mandla district for entomological surveillance and monitoring under Malaria Elimination Demonstration Project (MEDP) from 21st to 25th February 2018. Attended a meeting with DMO Mandla and Programme Officer MEDP regarding progress of vector control activities in Mandla.
- Attended 2nd Malaria Elimination Advisory Group (MEAG) meeting for Mandla Malaria Elimination Demonstration Project (MEDP) on 23rd and 24th March, 2018 at ICMR-NIRTH Jabalpur and presented the progress of entomological surveillance and monitoring activities.
- Attended 2 Malariology training workshops for Medical Officers of various districts of Madhya Pradesh from 31st January to 2nd February and 20th February to 22nd March 2018 organized by NIMR Field Unit Jabalpur in which training was imparted to them on 'Planning of intervention measures to control malaria transmission'.

Dr. Gyan Chand, Scientist 'E'

- Attended workshop on Malaria Control in Gadchiroli district of Maharashtra on 17th July 2017 at Society for Education, Action and Research in Community Health (SEARCH), Gadchiroli. Dr. M. M. Shukla, Scientist F and Dr. K. B. Saha, Scientist E were also attended the workshop.
- Attended meeting regarding the marketing of LLIN in the country organized jointly by ICMR and National Academy of Vectors and Vector Borne Diseases at ICMR, New Delhi on 16th December 2017.
- Attended meeting as member of ICMR-NIRTH delegation authorized for making MOU with Indira Gandhi National Tribal University Amarakantak for collaboration in teaching courses on tribal health on 24th and 25th January 2018.
- Attended workshop in Zoomania (Society for zoology Jabalpur) and delivered a talk on the importance of Entomology in public Health on 17th February 2018 at St. Aloysius College, Jabalpur.
- Attended three dayMalaria Elimination Advisory Group meeting of Malaria Elimination Demonstration Project Mandla under public private partnership from 23rd to 25th March 2018.
- Delivered lectures on Filariasis and dengue vector in the training work shop on vector and vector borne disease organized for Medical Doctors in the months of January and February 2018 at NIMR field unit Jabalpur.

Dr. Kalyan B. Saha, Scientist 'E'

- Participated in the Review meeting of M-MEDP along with stakeholders from F-DEC and Sun Pharma on 24th April 2017.
- Attended the Malaria awareness programme organized by F-Dec & Sun Pharma at village Kalpi, Mandla district of MP on 25th April 2017 (World Malaria Day).
- Attended the review meeting at Jabalpur and briefed the Principal Secretary, Tribal Welfare, Govt of Madhya Pradesh, Shri Ashok Shah, (IAS) on the project Antimalarial Drug use in tribal areas funded by Tribal Welfare Dept., Govt of M.P.
- Attended and presented the progress on the project “Anti-malarial drug use practices in tribal areas in MP” in the review meeting chaired by Dr. Pallavi Jain Govil (IAS), Commissioner, Dept of Health, Govt of MP on 29th April 2017.
- Attended and also made presentation of the KAP preparatory study at the Workshop on finalization of protocol on malaria control strategy for Gadchiroli, held at SEARCH, Gadchiroli, Maharashtra on 7th July 2017.

- Attended and help the institute in organizing workshop on "Working Towards Tribal Health: Present and way forward" on 16th August 2017 and also the Annual Tribal Health Research Forum (THRF) meeting on 17th August 2017.
- Attended a training workshop on "How to Write Policy Brief" on 18th August 2017.
- Attended a training workshop on ICMR Media Communication for Nodal Officers at NIOP, New Delhi on 2nd November 2017.
- Attended as a resource person for TOT workshop for F-DEC field supervisors on IEC/ BCC tools and strategy, organized by F-DEC as part of MEDP at Mandla on 9-10th November 2017.
- Attended BSNL Madhya Pradesh Circle Enterprise Business Meet at Hotel Jackson, Jabalpur on 21st November 2017.
- Attended a meeting on 18th January 2018 and discussed with Vice Chancellor, Dean and various Faculty at Indira Gandhi National Tribal University (IGNTU), Amarkantak, Madhya Pradesh regarding initiation of a integrated Masters programme on Community Health (2 years) followed by 3 years PhD programme as part of joint initiative of NIRTH and IGNTU.
- Attended a meeting with Prof. Y.K.Gupta, Dr. Mathur from AIIMS, New Delhi and others representatives from ICMR to improve upon the draft Bio Medical Ethics Guideline on Tribal Health Research, organized at Pharmacology Department of AIIMS, New Delhi on 29th January 2018.
- Attended and also presented the progress/ my role related to MEDP at its Annual board meeting held at NIRTH, Jabalpur on 22-23rd March 2018.

Dr. Jyoti Bhatt, Scientist 'E'

- Attended SAARC Regional Training on TB for Microbiologists on Culture & DST, GeneXpert/NAAT, LPA and Maintenance of Laboratory equipments held at National Institute of TB & Respiratory Diseases, New Delhi during 10th-14th July 2017
- Attended workshop on "Working Towards Tribal Health: present status and way forward" organized by ICMR - National Institute for Research in Tribal Health at NIRTH Jabalpur on 16 August 2017.
- Attended workshop on "Writing Policy Briefs" organized by ICMR - National Institute for Research in Tribal Health at NIRTH Jabalpur on 18 August 2017.
- Attended Workshop on 'Tuberculosis among Saharia: Contemporary issues and way forward' organized by ICMR - NIRTH, Jabalpur in collaboration with the International Union against tuberculosis & Lung Diseases (THE UNION) at Gwalior on 4th October, 2017

- Attended Training for Trainers on Programmatic Management of Drug Resistant TB (PMDT) at Bhopal during 23rd & 24th January 2018
- Attended project review workshop of India Health Fund on 26th February 2018.

Dr. Raja Subramanium, Scientist 'E'

- Attended Thalassemia patients advisory group meeting on 16th September 2017 at New Delhi.
- Participated in Sickle Cell Brain Storming meeting on 3rd December 2017 at DMRC, Jodhpur.
- Attended a meeting with Commissioner Health, MP State and Mission Director NHM for finalization and intiation of Sickle cell screening and control program in 22 tribal Districts of Madhya Pradesh on 19th February 2018.
- Attended a meeting with CMHO, Civil Surgeon and Medical Officers of Datia Medical College to identify health issues of Datia district towards initiating studies in those areas at the Model Rural Health Research Unit at Datia on 15-16 February 2018.
- Presented a talk on "Clinical Profile of Sickle Cell Disease in Madhya Pradesh" at the Symposium on Hemoglobinopathies organized by CSIR-Institute of Genomics and Integrative Biology, New Delhi on 23rd March 2018.

Dr. Dinesh Kumar, Scientist 'D'

- Attended in 35th Annual National Conference of Indian Society for Medical Statistics (ISMS) from 2-4 Nov. 2017, at Department of Biostatistics, SPGI Lucknow and presented article 'Pregnancy related complications and its association with socio-demographic factors in Central India: A logistic regression hypothesis'.
- Attended meeting with Director Indira Gandhi Rastriya Manav Sangrahalaya, (IGRMS) at Bhopal on 21st February 2018 for developing Tribal Habitats in ICMR-NIRTH campus.
- Attended meeting with Dr Biswajit Maji, Asstt Prof. in Indra Gandhi National Tribal University (IGNTU) Amarkantak on 16th February 2018 for developing Harbal Garden in ICMR-NIRTH.

Dr. R.K. Sharma, Scientist 'D'

- Participated in the Review meeting of M-MEDP along with stakeholders from F-DEC and Sun Pharma on 24th April 2017.
- Attended a workshop on "Working Towards Tribal Health: Present and way forward" on 16th August 2017.

- Attended a workshop on "Writing Policy Briefs" organized by ICMR - National Institute for Research in Tribal Health at NIRTH Jabalpur on 18 August 2017.
- Attended Workshop on 'Tuberculosis among Saharia: Contemporary issues and way forward' organized by ICMR - NIRTH, Jabalpur in collaboration with the International Union against tuberculosis & Lung Diseases (THE UNION) at Gwalior on 4th October, 2017.
- Attended as a resource person for TOT workshop for F-DEC field supervisors on IEC/ BCC tools and strategy, organized by F-DEC as part of MEDP at Mandla on 9-10th November 2017.
- Presented paper on Major Health Problem of Tribal Dominated areas of India: Some observations from IDSP data, paper presented at 35th Annual Conference of ISMS, held at SGPGIMS Lucknow during 2nd - 4th Nov. 2017.
- Attended a meeting on 18th January 2018 and discussed with Vice Chancellor, Dean and various Faculty at Indira Gandhi National Tribal University (IGNTU), Amarkantak, Madhya Pradesh regarding initiation of a integrated Masters programme on Community Health as part of joint initiative of NIRTH and IGNTU.

Dr. Pradip V. Barde, Scientist 'D'

- Conducted trainings on Dengue and Chikungunya diagnosis by ELISA for participants from State Health Authorities. Doctors and technicians from Annuppur, Damoh, Hoshangabad, Jabalpur Devas, Tikamgadrh and Mandla were trained on IgM and NS1 ELISA.

Dr. Praveen K. Bharti, Scientist 'D'

- Training workshop on "Therapeutic efficacy of antimalarial combination therapy for the treatment of uncomplicated Plasmodium falciparum malaria" organized on 18th – 19th September, 2017 at ICMR-NIRTH, Jabalpur (M.P.).
- Attended "Launch of National Strategic Plan for Malaria Elimination (2017-22) by Hon'ble Health and Family Welfare Minister, Govt. Of India Shri J.P.Nadda on 12th July, 2017 at Hotel Le Meridien, New Delhi.
- Attended the fifth meeting of Greater Mekong subregion Therapeutic Efficacy Study Network in HoChin Minh City, VietNam on 28-29 September 2017.
- Attended workshop on "Working towards Tribal Health: present status and way forward" on 16th August, 2017 and 7th Annual meeting of ICMR - Tribal Health Research Forum (THRF) at ICMR- NIRTH Jabalpur.
- Attended a two days workshop to finalize the ethical guidelines for biomedical research on tribal population was held on 21st – 22nd May, 2017 at ICMR-NIRTH, Jabalpur.
- Attended a training workshop on 'Policy Brief Writing' was organized at ICMR-NIRTH, Jabalpur on 18th August 2017.

- Attended the 2nd Malaria Elimination Advisory Group (MEAG) meeting from 23 -24th March 2017 at NIRTH Jabalpur

Dr. Rajeev Yadav, Scientsit 'D'

- Attended workshop on "Working towards Tribal Health: present status and way forward" on 16th August, 2017 and 7th Annual meeting of ICMR - Tribal Health Research Forum (THRF) at ICMR- NIRTH Jabalpur.

Dr. Vidhan Jain, Scientsit 'C'

- Attended workshop on "Working towards Tribal Health: present status and way forward" on 16th August, 2017 and 7th Annual meeting of ICMR - Tribal Health Research Forum (THRF) at ICMR- NIRTH Jabalpur.
- A two days workshop to finalize theethical guidelines for biomedical research on tribal population was held on 21st – 22nd May, 2017 at ICMR-NIRTH, Jabalpur.
- A training workshop on 'Policy Brief Writing' was organized at ICMR-NIRTH, Jabalpur on 18th August 2017.

Dr. Manjunathachar HV, Scientsit 'B'

- Attended Ad-hoc training on ''current regulations, handling, breeding, maintenance and techniques in laboratory animal experiments from June 15-30, 2017 at NIN, Hyderabad.
- Attended 2nd induction programme cum workshop conducted by ICMR-NIE from July 10, 2017 to July 14, 2017
- Attended workshop on ''Care, Management and Experimentation of laboratory animals from May 15-19, 2017 at NIV, Pune
- Attended seminar and delivered lecture on "TORCH diagnosis and management in pregnant woman" at NSCB Medical college on September 19, 2017.
- Attended Pre-conference Workshop On "Experimental Design" By NC3Rs, UK & "Hygiene in Laboratory Animal Facilities" By Tecniplast, Italy On 24th November 2017, CSIR-IGIB, Mathura Road, New Delhi.
- Attended 8th International Conference cum workshop of Laboratory Animal Scientist's Association (LASA), India on "Recent Advances in 3R's and Laboratory Animal Science" from 25th - 26th November 2017 at Jawaharlal Nehru University, New Delhi.
- Attended one day National Conference of CPCSEA on "Welfare of Laboratory Animals" on 9th January, 2018 at Ganga Auditorium, Indira Paryavaran Bhawan, New Delhi.
- Attended meeting with Director, Indira Gandhi Rashtriya Manav Sangrahalaya (IGRMS), Bhopal for developing Tribal Habitat in NIRTH campus.

- Meeting with Dr. Biswajit Maji, Asst. Professor, Indra Gandhi National Tribal University, Amarkantak for developing traditional medicinal garden and testing anti-microbial properties of plants in NIRTH campus.
- Attended one day seminar has an Invited Speaker “National Symposium on Dendritic Cells based Immunotherapy: A Harnessing Immune Responses to Cancer”. On 10th March 2018 in ADINA Institute of Pharmaceutical Sciences, Sagar, (M.P.) sponsored by Indian Council of Medical Research (ICMR), New Delhi.

Dr. Nishant Saxena, Scientsit 'B’

- Presented paper (oral) in International Conference on "Indigenous people, human security and sustainable development: Emerging challenges in the present global context", 19-21 January, 2018 jointly organized by International Union of Anthropological and Ethnological Sciences and Dept. of Anthropology, West Bengal State University, Kolkata in collaboration with and ICMR.
- Participated in First Dissemination Programme of National Ethical Guidelines for Biomedical and Health Research Involving Human Participants organized by ICMR at AIIMS, New Delhi on 16.11.17.
- Participated in training imparted on GeM at NIRTH on 8.9.17 by outside experts.
- For developing the Medicinal Plants Garden in NIRTH campus visited the following institutes and met Faculty/Scientists for collaboration:
- Tropical Forest Research Institute, Jabalpur.
- Department of Plant Physiology, Jawaharlal Nehru Krishi Vishwavidalaya, Jabalpur.
- Department of Chemistry, Indira Gandhi National Tribal University, Amarkantak.
- For developing Tribal Habitat in NIRTH campus visited Indira Gandhi Rashtriya Manav Sangrahalaya, Bhopal which has an extensive gallery of Tribal Habitats.

Dr. Ravindra Chhabra, Scientsit 'B’

- Attended workshop on “Working Towards Tribal Health: Present Status and Way Forward” on 16th and 17th Aug 2017 at ICMR-NIRTH.
- Attended the “Training Programme on Policy Brief Writing” at ICMR-NIRTH on 18th Aug 2018.
- Attended seminar on Policy intervention for the evolving needs of Thalassemics in India' held on 16th Sep 2017 at New Delhi.
- Presented a poster entitled “A Rare Hemoglobin Variant: Hemoglobin O Indonesia” in 58th Annual Conference of the Indian Society of Hematology and Blood Transfusion” Hematocon 2017 at Guwahati, Assam during 2nd -5th Nov 2017.

- Deliver a lecture on Thalassemia prevention at Govt. Nursing college, Elgin Hospital Campus on 9th May 2018.
- Attended the brainstorming session on "Consultation on Sickle Cell Anemia" on 17th and 18th Aug 2018 at Khargone, M.P.

Dr. Suyesh Shrivastav, Scientsit 'B'

- Principles and Practice of Clinical Research' to be held at Hotel Sheraton, Hyderabad from April 16 – 21, 2018 jointly conducted by National Institutes of Health (NIH) U. S. , Dept of Biotechnology (Ministry of Science & Technology, Govt. of India) and ICMR (Ministry of Health & Research , Govt. of India).

Dr. Anil Verma, Scientsit 'B'

- Attended workshop on "Working towards Tribal Health: present status and way forward" organized by ICMR - National Institute for Research in Tribal Health at NIRTH Jabalpur on 16 August 2017.
- Attended workshop on "Writing Policy Briefs" organized by ICMR - National Institute for Research in Tribal Health at NIRTH Jabalpur on 18 August 2017.
- Training workshop on "Therapeutic efficacy of antimalarial combination therapy for the treatment of uncomplicated Plasmodium falciparum malaria" organized on 18 – 19th September, 2017 at ICMR-NIRTH, Jabalpur (M.P.).
- A two days workshop to finalize the ethical guidelines for biomedical research on tribal population was held on 21st – 22nd May, 2017 at ICMR-NIRTH, Jabalpur.

Mr. Lalit Sahare, STO-1 and Mr. M.J. Ukey STO-1 underwent training on Measles and Rubella diagnosis by ELISA and RTPCR at NIV, Mumbai Unit.

Miss. Salonee Pandey TA (R) underwent training on Respiratory virus diagnosis by real time RT-PCR at NIV, Pune.

14.2: NIRTH ORGANIZED CONFERENCES, MEETINGS, SYMPOSIUM, WORKSHOP, TRAINING

Workshop on "Working towards Tribal Health: Present Status and Way Forward" on 16th August, 2017 and 7th Annual meeting of ICMR - Tribal Health Research Forum (THRF) at ICMR- NIRTH Jabalpur.

A two days workshop to finalize the ethical guidelines for biomedical research on tribal population was held on 21st & 22nd May, 2017 at ICMR-NIRTH, Jabalpur.

A training workshop on 'Policy Brief Writing' was organized at ICMR-NIRTH, Jabalpur on 18th August 2017.

Workshop on 'Tuberculosis among Saharia: Contemporary issues and way forward' organized by ICMR - NIRTH, Jabalpur in collaboration with the International Union against tuberculosis & Lung Diseases (THE UNION) at Gwalior on 4th October, 2017.

30th Scientific Advisory Committee (SAC) meeting of ICMR-NIRTH was held on 6th & 7th Dec. 2017.

Prof. Jane M. Carlton, Dr. Samuel Wassmer, Dr. Anna Maria Van Eijk, Dr. Catherine Walton visited to ICMR-NIRTH, Jabalpur in r/o HMSC approved collaborative project entitled “Centre for Study of Complex Malaria in India (CSCMI 2.0)" from 10th-12th January, 2018.

The VRDL conducted trainings on Dengue and Chikungunya diagnosis by ELISA for participants from State Health Authorities, doctors and technicians.

Institute Ethic Committee meeting during 6th July 2017 and 5th March 2018.

Institutional Animal Ethics Committee (IAEC) meetings was held on 31st January 2018 and projects related to in-vivo research activities of CAF were approved.

The 7th Annual meeting of ICMR-Tribal Health Research Fourm was organized at the institute on 17th August 2017.

2nd review meeting of Malaria elimination demonstration project was organized at ICMR-NIRTH on 23rd and 24th March 2018.

15. EVENTS

International day of Yoga was celebrated on 21st June 2017.

The 71st Independence day celebrated on 15 th August 2017 with zeal and enthusiasm at NIRTH, Jabalpur.

संस्थान में हिन्दी पखवाड़ा दिनांक 14 – 18 सितंबर 2017 को उत्साहपूर्वक मनाया गया।

Vigilance awareness week, 2017 was observed duirng 30th Oct. - 4th Nov. 2017. The director and all staff members of NIRTH pledged to maintain transparency and integraty in all spheres of the activities.

National Unity Day (*Rashtriya Ekta Diwas*) was celebrated on 31st October 2017. The director and staff members of ICMR-NIRTH took a pledge to preserve the *unity*, integrity and security of the nation and also strive hard to spread this message among my fellow countrymen.

The 69th republic day was celebrated with great enthusiasm on 26th January 2018.

The 35th foundation day of ICMR-NIRTH, Jabalpur was celebrated on 1st March 2018 at Auditorium of the centre.

Internationl Women's Day was observed on 8th March 2018. All female employees of the institute were facilitated on this occassion.

A cafeteria at the institute was inaugurated on 23rd March 2018 by Dr. AP Dash, Hon'ble Vice Chancellor, Central University of Tamil Nadu.

A drawing competition was organized on 25th March 2018 for the children of the institute's employees.

16. APPENDICES

16.1. PROMOTION / RETIREMENT / TRANSFER

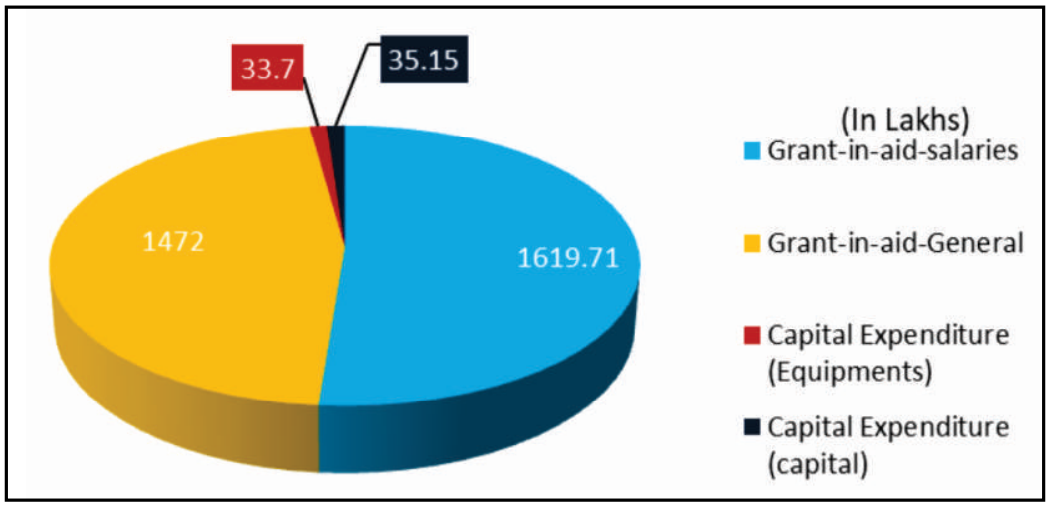
RETIREMENT

- Dr. R.C. Mishra, Principal Technical Officer retired on 31st May 2017.
- Sh. P.K. Shrivastava, Assistant retired on 31st May 2017.
- Sh. Raghubir Prasad, Upper Division Clerk retired on 31st May 2017.
- Sh. S.B. Barman, Scientist-B retired on 6th October 2017.
- Sh. Ravindra Kumar Katraha, Senior Technician(1) retired on 31st Jan., 2018.
- Sh. Sheikh Saleem, Laboratory Assistant on 31st Jan, 2018
- Dr. Narendra K. Choudhari, Principal Technical Officer retired on 31st March, 2018.

TRANSFER

- Dr. Aparup Das, Director transferred from CRME Madurai to ICMR-NIRTH Jabalpur (DOJ : 28.08.2017)
- Dr. C.G. Raut, Scientist-F transferred from NIV Pune to ICMR-NIRTH Jabalpur (DOJ : 18.12.2017)
- Sh. Satish Kumar Vinodia transferred from NIRI Bhopal to ICMR-NIRTH Jabalpur (DOJ : 04.12.2017)

16.2. BUDGET (2017-2018)



16.3. INFORMATION ON RTI & VIGILANCE CASES

During the period under report 23 RTI applications were received and all applications had been replied. No vigilance case had been registered during the period.

16.4. COMMITTEES

16.4.1: Scientific Advisory Committee

Lt. Gen. (Dr.) D. Raghunath	Ex-Director General, Armed Forces Medical Services	Chairman
Director	NVBDCP, New Delhi	Member
Dr. S.C. Dubey	Ex-Joint Director, HSADL, Bhopal	Member
Dr. A.P. Dash	Vice Chancellor, Central University, Tamil Nadu	Member
Dr. Ganga Khedkar	Head, ECD, ICMR, New Delhi	Member
Dr. John Oommen	Head, Community Health Dept. Christian Hospital, Rayagada, Odisha	Member
Dr. P. Gunasekaran	King Institute of Preventive Medicine & Research, Guindy, Chennai	Member
Dr. Abhay Bang	Director , SEARCH, Gadchiroli, Maharashtra	Member
Dr. Dipika Mohanty	Appolo Hospital, Bhubaneswar	Member
Prof. P.C. Joshi	Dept of Anthropology,University of Delhi	Member
Dr. B. Ravindran	Former Director & Emeritus Professor, ILS, Bhubaneswar	Member
Dr. Sunil Khaparde	Dy. Director General, RNTCP, New Delhi	Member
Shri P. Subramaniam	Director, TRI, Tamil Nadu	Member
Dr. P. Narainan	Former Director, NIRT, Chennai	Memeber
Dr. Harpreet Kaur	Scientist-E, ICMR, New Delhi	Programme Officer & ICMR Representative
Dr. Aparup Das	Director, NIRTH, Jabalpur	Member Secretary

16.4.2: Institutional Ethics Committee (IEC)

Sl. No.	Name of Existing Member and Affiliation	Designation	Discipline
1.	Dr. Shashi Khare Retd. Prof Gynecology and Ex-Dean, NSCB Medical College, Jabalpur	Chairperson	Medical (Gynecology)
2.	Dr. Sharad Jain Prof. of Pathology, NSCB Medical College, Jabalpur	Member	Medical (Pathology)
3.	Dr. Rajesh Sharma Prof. and Head, Dept. of Pharmacology and Toxicology College of Veterinary Science and Animal Husbandry, NDVSU, Jabalpur	Member	Pharmacology
4.	Dr. Uma C. Saha Prof. General Management and Development, XIDAS, Jabalpur	Member	Social Science
5.	Mr. Jamal Akhtar Baig Director, ENFORCE (NGO) Area Colony, Bhopal (M.P.)	Member	NGO Representative
6.	Mr. Sankalp Sanghi Advocate, High Court of Madhya Pradesh, Jabalpur	Member	Law
7.	Shri Komal Prasad Vishwakarma Vill.-Mukunwara, Post - Ghatpipaliya Dist: Jabalpur	Member	Community Leader
8.	Dr. Avyakt Agarwal Asst. Prof (Pediatrics), NSCB Medical College Jabalpur	Member	Medical (Pediatrics)
9.	Dr. Riti Seth Asst. Prof (Microbiology), NSCB Medical College Jabalpur	Member	Microbiology (Basic Science)
10.	Dr. Rajiv Yadav Scientist 'D', ICMR-NIRTH, Jabalpur	Member	Medical (Pharmacology)
11.	Dr. Tapas Chakma Scientist 'G' ICMR-NIRTH, Jabalpur	Member Secretary	Medical (Epidemiology)

16.4.3: CPCSEA - Institutional Animal Ethics Committee

Sl. No.	Name of Existing Member and Affiliation	Designation	Discipline
1.	Dr. Aparup Das, Scientist- G and Director, ICMR, NIRTH, Jabalpur	Chairperson	
2.	Dr. Jyothi Bhat, Scientist – E, ICMR-NIRTH, Jabalpur	Member	Scientist from different discipline
3.	Dr. S. Rajasubramaniam, Scientist – E, ICMR-NIRTH, Jabalpur	Member	Biological Scientist
4.	Dr. S. Sambath, Scientist-C, Zoological Survey of India, Jabalpur	Member	Scientist from different discipline
5.	Dr. Prateek Kumar Jain, Adina Institute of Pharmaceutical Sciences, Sagar, MP	Member	CPCSEA Main Nominee
6.	Dr. Surendra Jain, Sagar Institute of Research and Technology – Pharmacy, Bhopal, MP	Member	Scientist from outside the institute (Nominated by CPCSEA)
7.	Shri. Rakesh Kumar Gawaly, RKDF College of Pharmacy, Bhopal, MP.	Member	Socially Aware Member (Nominated by CPCSEA)
8.	Dr. Manjunathachar H.V. , Scientist – B, ICMR-NIRTH, Jabalpur	Member Secretary	Veterinarian and Member Secretary

16.4.4: Institutional Biosafety Committee

Sl. No.	Name of Existing Member and Affiliation	Designation
1.	Dr. Aparup Das Scientist- G and Director ICMR- NIRTH, Jabalpur	Chairman
2.	Dr. YK Bansal Plant Tissue Culture Lab. Deptt of Biosciences, RDVV, Jabalpur	DBT Nominee

3.	Dr. Riti Jain Seth Associate Professor Deptt of Microbiology NSCB Medical College, Jabalpur	External Expert
4.	Dr. Tapas Chakma Scientist- G ICMR- NIRTH, Jabalpur	Biosafety Officer
5.	Dr. S. Rajasubramaniam Scientist – E ICMR-NIRTH, Jabalpur	Internal Member
6.	Dr. Pradip V. Barde Scientist-D, ICMR- NIRTH, Jabalpur	Internal Member
7.	Dr. Praveen Kumar Bharti Scientist-D ICMR- NIRTH, Jabalpur	Internal Member
8.	Dr. Chandrashekhar G Raut Scientist- F DIVR, ICMR- NIRTH, Jabalpur	Member Secretary

16.4.5: Institute Local Building Monitoring Committee- (Capital Works)

Shri A.K. Soni	Superintendent Engineer (Elect.) (Retd.)	Member (Outsidexpert)
Shri S.S. Mehta	Superintendent Engineer (Civil) (Retd.), MPPWD JBP	Member (Outside, Expert)
Sh. Gyan Chand Jain	Admn. Officer, NIRTH, JBP	Member
Sh. Pramod Kumar	Accounts Officer, NIRTH, JBP	Member

16.4.6: Dissemination of Information Committee

Dr. Jyothi Bhat	Scientist-E, NIRTH, JBP	Chairperson
Dr. Ravendra K. Sharma	Scientist-D, NIRTH, JBP	Member
Dr. Pradip Barde	Scientist-D, NIRTH, JBP	Member
Dr. Arvind Verma	PTO, NIRTH, JBP	Member
Sh. Avinash Dubey	Technician-A, NIRTH, JBP	Member

16.4.7: Rapid Response Team

Dr. Tapas Chakma	Scientist-G, NIRTH, JBP	Chairman
Dr. Jyothi Bhat	Scientist-E, NIRTH, JBP	Member
Dr. Pradip Barde	Scientist-D, NIRTH, JBP	Member
Seven supporting staff (Technical/others)		

16.4.8: Library Committee

Dr. V.G. Rao	Scientist-G, NIRTH, JBP	Chairman
Dr. K.B. Saha	Scientist-E, NIRTH, JBP	Member
Dr. Jyothi Bhat	Scientist-E, NIRTH, JBP	Member
Dr. S. Rajasubramaniam	Scientist-E, NIRTH, JBP	Member
Dr. Ravendra K. Sharma	Scientist-D, NIRTH, JBP	Member
Sh.Gyan Chand Jain	Admn. Officer, NIRTH, JBP	Member
Sh. Pramod Kumar	Accounts Officer, NIRTH, JBP	Member
Sh. S.N. Singh	TO(A), NIRTH, JBP	Member Secretary

16.4.9: Staff Grievance Committee

Dr. V. G. Rao	Scientist-G, NIRTH, JBP	Chairman
Dr. Dinesh Kumar	Scientist-D, NIRTH, JBP	Member
Sh. Gyan Chand Jain	Admn. Officer, NIRTH, JBP	Member
Sh. Pramod Kumar	Accounts Officer, NIRTH, JBP	Member
One representative of TEWA	--	Member
Sh. R.K. Thakur	Section Officer, NIRTH, JBP	Member

16.4.10: Anti-sexual Harassment Committee

Dr. Jyothi Bhat	Scientist-E, NIRTH, JBP	Chairperson
Dr. Uma C. Saha	Prof. & Dean, XIDAS, JBP	Member
Mr. L.S. Kaushal	STO(2), NIRTH, JBP	Member
Dr. Alpana Abbad	PTO, NIRTH, JBP	Member
Smt. Nazia Anwar Ali	Technical Officer, NIRTH, JBP	Member

16.4.11: Annual Report Committee

Dr. K.B. Saha	Scientist-E, NIRTH, JBP	Chairperson
Dr. Jyothi T. Bhat	Scientist-E, NIRTH, JBP	Member
Dr. P.V. Barde	Scientist-D, NIRTH, JBP	Member
Dr. Ravendra K. Sharma	Scientist-D, NIRTH, JBP	Member
Dr. Vidhan Jain	Scientist-C, NIRTH, JBP	Member
Dr. Nishant Saxena	Scientist-B, NIRTH, JBP	Member
Dr. Manjunathachar H V	Scientist-B, NIRTH, JBP	Member
Dr, Anil Verma	Scientist-B, NIRTH, JBP	Member
Dr. Arvind Verma	PTO, NIRTH, JBP	Member
Ms. Bharti Rai	Editorial Consultant	Member

16.5 राजभाषा नीति के कार्यान्वयन एवं अनुपालन से संबंधित प्रगति रिपोर्ट

आईसीएमआर–राष्ट्रीय जनजाति स्वास्थ्य अनुसंधान संस्थान, जबलपुर में भारत सरकार, गृह मंत्रालय, राजभाषा विभाग की राजभाषा नीति के समुचित कार्यान्वयन एवं अनुपालन के लिए सतत प्रयास किए जा रहे हैं। प्रतिवेदन अवधि के दौरान इस संस्थान में हिंदी के प्रगामी प्रयोग एवं सरकारी कामकाज में हिंदी के प्रयोग को बढ़ावा देने हेतु किए गए प्रयासों का संक्षिप्त विवरण इस प्रकार है :–

1. राजभाषा कार्यान्वयन समिति

राजभाषा विभाग के आदेशानुसार इस अनुसंधान संस्थान में 'राजभाषा कार्यान्वयन समिति' गठित है :–

1. डॉ. अपरूप दास, निदेशक – अध्यक्ष
2. डॉ. मनमोहन शुक्ला, वैज्ञानिक 'एफ' – सदस्य
3. श्री ज्ञानचंद जैन, प्रशासनिक अधिकारी – सदस्य
4. श्री प्रमोद कुमार, लेखा अधिकारी – सदस्य
5. श्री द्वारका प्रसाद लोधी, अनुभाग अधिकारी, (स्थापना) – सदस्य
6. श्री राजेन्द्र कुमार ठाकुर, अनुभाग अधिकारी (भंडार) – सदस्य
7. श्री हाकिम सिंह ठाकुर, कनिष्ठ हिंदी अनुवादक – सदस्य

प्रत्येक तीन माह में इस समिति की बैठक होती है, जिसमें इस अनुसंधान संस्थान में राजभाषा कार्यान्वयन एवं अनुपालन की स्थिति की समीक्षा की जाती है तथा सरकार द्वारा निर्धारित लक्ष्यों को प्राप्त करने हेतु आवश्यक उपायों की संस्तुति की जाती है। अभी तक इस समिति की कुल 86 तिमाही बैठकें आयोजित की जा चुकी हैं।

2. हिंदी पत्राचार एवं टिप्पणी–लेखन

प्रतिवेदन अवधि के दौरान इस केन्द्र द्वारा 'क' क्षेत्र को मूलतः हिंदी में लगभग 50: और उससे अधिक पत्राचार किया गया। साथ ही सरकार द्वारा निर्धारित लक्ष्य के अनुरूप हिंदी पत्राचार को 'क' क्षेत्र के अलावा 'ख' एवं

'ग' क्षेत्रों के साथ भी मूल हिंदी पत्राचार को बढ़ाने के लिए प्रयास किए जा रहे हैं। अधिकांश फाइलों पर भी हिंदी में टिप्पणियां लिखी जाती हैं।

3. धारा 3(3) एवं राजभाषा नियम – 5 का अनुपालन

राजभाषा अधिनियम, 1963 (यथासंशोधित 1967) की धारा 3(3) के अनुपालन में सामान्य–आदेश, परिपत्र, निविदा सूचना एवं निविदा प्रपत्र आदि निर्दिष्ट दस्तावेजों के अतिरिक्त रिक्त पदों के विज्ञापन आदि भी हिंदी/द्विभाषी रूप में जारी किए जाते हैं।

4. प्रशिक्षण

इस संस्थान के अधिकांश अधिकारियों एवं कर्मचारियों को हिंदी का कार्यसाधक ज्ञान/प्रवीणता प्राप्त है और यह केन्द्र राजभाषा नियम 10.4 के अंतर्गत अधिसूचित है।

राजभाषा विभाग के निर्देशों के अनुसार जिन कर्मचारियों को हिंदी टंकण एवं हिंदी आशुलिपि के सेवाकालीन प्रशिक्षण की आवश्यकता थी, उन सभी को हिंदी शिक्षण योजना, राजभाषा विभाग, जबलपुर कार्यालय से हिंदी टंकण/हिंदी आशुलिपि का प्रशिक्षण दिलाया गया है। पूर्व में आशुलिपिक पद पर कार्यरत रहीं एक महिला कर्मचारी, जिन्हें हिंदी शिक्षण योजना, जबलपुर से हिंदी आशुलिपि प्रशिक्षण दिलाया गया है, अब वह सहायक पद पर पदोन्नत हो गई हैं। नवनियुक्त आशुलिपिक, जो अभी परिवीक्षाधीन हैं, को शीघ्र ही हिंदी आशुलिपि का प्रशिक्षण दिलाया जाएगा।

5. विभागीय परीक्षाओं में द्विभाषी प्रश्न–पत्र उपलब्ध कराना – सरकार द्वारा जारी निर्देशों के अनुसार इस केंद्र में अधीनस्थ सेवाओं की भर्ती परीक्षा एवं विभागीय परीक्षाओं में द्विभाषी प्रश्न–पत्र उपलबध कराए जा रहे हैं।

6. प्रशिक्षण कार्यक्रमों एवं वैज्ञानिक विषयों पर व्याख्यानों में हिंदी को प्रमुखता – इस संस्थान में अनुसंधान कार्य से संबंधित प्रशिक्षण कार्यक्रमों और वैज्ञानिक व्याख्यानों आदि में हिंदी को प्रमुखता प्रदान की जाती है, जिससे अधिक से अधिक लोगों तक इसका लाभ पहुँच सके।

7. हिंदी–दिवस/हिंदी–पखवाड़ा

राजभाषा विभाग के निर्देशों के अनुसार हिंदी के प्रचार–प्रसार एवं मूलतः हिंदी में सरकारी कार्य करने को बढ़ावा देने के उद्देश्य से संस्थान में प्रति वर्ष हिंदी–दिवस एवं हिंदी–पखवाड़ा मनाया जाता है। इस दौरान निदेशक महोदय द्वारा सभी अधिकारियों एवं कर्मचारियों से सरकारी कामकाज अधिकाधिक हिंदी में करने की अपील की जाती है एवं अधिकारियों व कर्मचारियों के लिए हिंदी की विभिन्न प्रतियोगिताएँ आयोजित की
जाती हैं।

प्रतिवेदन अवधि के दौरान, राष्ट्रीय जनजाति स्वास्थ्य अनुसंधान संस्थान, जबलपुर में हिंदी–पखवाड़े (14–28 सितम्बर, 2017) के अंतर्गत विभिन्न हिंदी प्रतियोगिताएं आयोजित की गईं तथा विजेताओं को 28–09–2017 को 'राजभाषा पुरस्कार वितरण समारोह' में निदेशक महोदया द्वारा नकद पुरस्कार और प्रमाण–पत्र प्रदान किए गए।

हिंदी प्रतियोगिताओं के विजेता अधिकारी एवं कर्मचारी तथा उन्हें प्रदान किए गए नकद पुरस्कारों की सूची इस प्रकार है :–

क्रम.सं.	प्रतियोगिता	पुरस्कार प्राप्त करने वाले अधि. / कर्म.	नकद पुरस्कार
1.	**हिंदी टंकण**		
	प्रथम	श्री राहुल कोष्टा, अवर श्रेणी लिपिक	रु. 5000 / –
	द्वितीय	श्री शरद कुमार कोष्टा, अवर श्रेणी लिपिक	रु. 3000 / –
	तृतीय	कु. संध्या शर्मा, सहायक	रु. 2000 / –
	सांत्वना (I)	श्री सुबाष चंद्र मुदुलि, निजी सहायक	रु. 1000 / –
2.	**हिंदी श्रुतलेखन (केवल एम.टी.एस. स्टाफ हेतु)**		
	प्रथम	श्री मलिखान सिंह, एम.टी.एस.	रु. 5000 / –
	द्वितीय	श्री विनय कुमार बाल्मीकि, एम.टी.एस.	रु. 3000 / –
	तृतीय	श्री संतोष कोल, एम.टी.एस.	रु. 2000 / –
	सांत्वना (I)	श्री संतोष कुमार मरावी, एम.टी.एस.	रु. 1000 / –
	सांत्वना (II)	श्री रमेश कुमार मरावी, एम.टी.एस.	रु. 1000 / –
3.	**तात्कालिक हिंदी निबंध–लेखन (वैज्ञानिक / अधि. समूह)**		
	प्रथम	डॉ. बालकृष्ण तिवारी, वरि. तकनीकी अधि. (1)	रु. 5000 / –
	द्वितीय	श्री एल.एस. कौशल, वरि. तकनीकी अधि. (1)	रु. 3000 / –
	तृतीय	श्रीमती नाजिया अली, तकनीकी अधिकारी	रु. 2000 / –
	सांत्वना (I)	श्री अजय कुमार गोयल, वरि. तकनीकी अधि. (1)	रु. 1000 / –
	सांत्वना (II)	डॉ. अशोक कुमार मिश्र, वैज्ञानिक 'ई'	रु. 1000 / –
4.	**तात्कालिक हिंदी निबंध–लेखन (कर्मचारी समूह)**		
	प्रथम	कु. संध्या शर्मा, सहायक	रु. 5000 / –
	द्वितीय	श्री एस. के. सिंह, वरिष्ठ तकनीशियन	रु. 3000 / –
	तृतीय	श्री रोहित अग्रवाल, सहायक	रु. 2000 / –
	सांत्वना (I)	श्री विवेक कुमार चौकसे, तकनीकी सहायक	रु. 1000 / –
	सांत्वना (II)	श्री राहुल कोष्टा, अवर श्रेणी लिपिक	रु. 1000 / –
5.	**हिंदी कविता–पाठ (वैज्ञानिक / अधिकारी समूह)**		
	प्रथम	श्रीमती रीना सोम, तकनीकी अधिकारी (1)	रु. 5000 / –
	द्वितीय	श्रीमती नाजिया अली, तकनीकी अधिकारी	रु. 3000 / –
	तृतीय	डॉ. बालकृष्ण तिवारी, वरि. तकनीकी अधि. (1)	रु. 2000 / –
	सांत्वना (I)	श्री एल.एस. कौशल, वरि. तकनीकी अधि. (1)	रु. 1000 / –
	सांत्वना (II)	डॉ. निशांत सक्सेना, वैज्ञानिक 'बी'	रु. 1000 / –

6.	**हिंदी कविता–पाठ (कर्मचारी समूह)**		
	प्रथम	श्री विवेक कुमार चौकसे, तकनीकी सहायक	रु. 5000/–
	द्वितीय	श्री दीपचंद खातरकर, वरिष्ठ तकनीशियन (1)	रु. 3000/–
	तृतीय	श्री प्रेम सिंह, प्रयोगशाला सहायक	रु. 2000/–
	सांत्वना (I)	श्री सुरेश कुमार परेहा, प्रयोगशाला सहायक	रु. 1000/–
	सांत्वना (II)	श्री राजेन्द्र प्रसाद गोंड़, प्रयोगशाला सहायक	रु. 1000/–
		योग–	**रु. 71,000/–**

(कुल राशि – इकहत्तर हजार रुपए मात्र)

16.6. STAFF LIST

Dr. Aparup Das, MSc, PhD	Director	Joined on 28th August 2017
Scientist Cadre		
Dr. V.G.Rao, MBBS, MD	Scientist `G'	Community Medicine
Retired on 30th June, 2018		
Dr. Tapas Chakma, MBBS, MAE	Scientist `G'	Community Medicine
Dr. Man Mohan Shukla, MBBS	Scientist `F'	Community Medicine
Dr. C.G.Raut, B.V.Sc. & A.H., M.V.Sc.	Scientist 'F'	Veterinary sciences
Dr. K.B.Saha, MSc, MPS, PhD, PGDBE	Scientist `F'	Demography
Dr. Gyan Chand, MSc, PhD	Scientist `F'	Entomology
Dr. Ashok Kumar Mishra, MSc, MA, Ph.D	Scientist `E'	Entomology
Dr. Jyothi T. Bhat, MBBS, MD	Scientist `E'	Microbiology
Dr. S. Rajasubramaniam, MSc, PhD	Scientist `E'	Biotechnology
Dr. Dinesh Kumar, MSc, PhD	Scientist `D'	Statistics
Dr. Surendra Kumar, MBBS	Scientist `D'	Community Medicine
Dr. Ravendra K. Sharma, MPhil, PhD	Scientist `D'	Statistics
Dr. Pradip Vijay Barde, MSc, PhD	Scientist `D'	Microbiology
Dr. Praveen Kumar Bharti, MSc, PhD	Scientist `D'	Biotechnology
Dr. Rajiv Yadav, MBBS, MD	Scientist `D'	Community Medicine
Dr. Vidhan Jain, MSc, PhD	Scientist `C'	Microbiology
Sh. S.B. Barman, MSc, M.Phil	Scientist `B'	Social & Behavioural Science
		Retired (VRS) on 6th Oct,2017
Dr. Manjunathachar H.V., MVSc., PhD., PGDRD	Scientist `B'	Veterinary sciences
Dr. Nishant Saxena, MSc, D.Phil.	Scientist `B'	Social Behavioural Sciences
Dr. Ravindra Kumar, MSc, PhD	Scientist `B'	Genetics
Dr. Anil Kumar Verma, MSc, M.Phil,PhD	Scientist `B'	Life Sciences
Dr. Suyesh Shrivastava, MBBS, MD	Scientist `B'	Community Medicine

Administration		
Sh. Gyan Chand Jain, B.A.	Administrative Officer	
Sh. Pramod Kumar, MCom, MBA(Finance),	Accounts Officer	ICWA(Final Stage-III),
Sh. D.P. Lodhi, MA,LLB, PGDCA	Section Officer (Estt)	
Sh. R.K.Thakur, BSc	Section Officer(Store)	
Library		
Sh. S.N.Singh, MA, MLib	Principal Technical Officer	
Technical Cadre		
Sh. V. Soan, MSc	Principal Technical Officer	
Dr. N.K.Choudhari, MA, PhD	Principal Technical Officer	Retired on 31st March, 2018
Dr. R.C.Mishra, MA,PhD	Principal Technical Officer	Retired on 31st May, 2017
Sh. Arvind Kavishwar, MSc, PGDCA	Principal Technical Officer	
Dr. Arvind Verma, MSc,PhD	Principal Technical Officer	
Dr. B.K.Tiwari,MA, PhD	Principal Technical Officer	
Dr. Smt.Alpana Abbad, MA,PhD	Principal Technical Officer	
Sh. Ajay Kumar Goel, MA	Principal Technical Officer	
Sh. Praval Shrivastava, MA	Senior Technical Officer (3)	
Sh. M.P.S.S. Singh, MSc	Senior Technical Officer (3)	
Dr. M.K. Bhondeley, MSc, MPhil, PhD	Senior Technical Officer (3)	
Sh. Mohan Lal Kori, MA	Senior Technical Officer (3)	Passed away on 24th March, 2018.
Sh. R.K. Minocha, HSc, CMLT	Senior Technical Officer (1)	
Sh. Chandan Karforma, BSc, DMLT	Senior Technical Officer (2)	
Sh. Subhash Godbole, BSc, DMLT, MSc	Principal Technical Officer	
Sh. L.S.Kaushal, BSc, CMLT	Senior Technical Officer (2)	
Sh. A.K. Gupta, BA, CMLT	Senior Technical Officer (1)	
Mrs. Reena Shome	Senior Technical Officer (2)	
Sh. Anil Gwal	Senior Technical Officer (1)	
Sh. Lalit K. Sahare	Senior Technical Officer (1)	
Sh. Mahendra Jaidev Ukey	Senior Technical Officer (1)	
Sh. Prakash C. Srivastava	Senior Technical Officer (2)	
Mrs. Nazia Anwar Ali, HSc, DMLT, MSc	Technical Officer	
Mrs. Maya Pandey, MA	Senior Technical Officer (1)	
Sh. Vivek Kumar Chouksey, BSc, DMLT, PGDCA	Technical Assistant	
Ms. Sneha Bhandari	Technical Assistant	
Sh. Nitish Singh Parihar	Technical Assistant	
Sh. Sri Krishna	Technical Assistant	
Ms. Sweta Mishra	Technical Assistant	

Dr. Prakash Tiwari, MSc, Ph.D., PGDCA	Technical Assistant	
Mrs. Canina Luke	Senior Technical Officer (1)	
Sh. Purushottam Patel	Senior Technician (3)	
Sh. C.P. Vishwakarma	Senior Technician (3)	
Sh. Subhash Kumbhare	Senior Technician (3)	
Sh. B.S.Patel	Senior Technician (3)	
Sh. D.C.Khatarkar	Senior Technician (3)	
Sh. D.K. Mishra	Senior Technician (3)	
Sh. S.R.Mishra	Senior Technician (3)	
Sh. M.P. Tiwari	Senior Technician (3)	
Sh. Ram Kumar Verma	Senior Technician (3)	
Sh. Rakesh Kumar Jaiswal	Senior Technician (2)	Retired on 31st Aug, 2018
Sh. Ajesh Kumar Dubey	Senior Technician (2)	
Sh. Ghanshyam Ahirwar	Senior Technician (2)	
Sh. Mahendra Kumar Jain	Senior Technician (2)	
Dr. Shiv Kumar Singh	Senior Technician (2)	
Sh. Jagdish Prasad Mishra	Senior Technician (2)	
Sh. Vijay Kumar Kachhi	Senior Technician (2)	
Sh. Ashok Kumar Saini	Senior Technician (3)	
Sh. Paramjeet Singh	Senior Technician (3)	Retired on 30th April, 2018
Sh. Ramesh Kumar Gond	Senior Technician (2)	
Sh. Genda Lal Gond	Senior Technician (2)	
Sh. Pradeep Kumar Namdeo	Senior Technician (2)	
Sh. Ravindra Kumar Katraha	Senior Technician (1)	Retired on 31st Jan., 2018
Sh. Santosh Kumar Patkar	Technician-C	
Sh. Hari Barman	Technician-C	
Sh. Neelu Mishra	Technician-C	Transferred to NIMR on 8th June, 2018
Sh. Rameshwar P.Khedekar	Technician-C	Transferred to NIV Kerala Unit on 30th June, 2018
Sh. Pradeep Kumar Tiwari	Technician-C	
Sh. Surendra Kumar Jhariya	Technician-C	
Sh. Shashikant Tiwari	Technician-C	
Sh. Avinash Dubey	Technician-A	
Sh. Prakash Sangle	Technician-A	
Sh. Shashi Bhushan Dubey	Technician-A	
Sh. Anoop Kumar Vishwakarma	Technician-A	
Sh. Surendra Singh Mehra	Technician-A	

Sh. Ramswaroop Uikey	Technician-A	
Ms. Mala Prajapati	Technician-A	
Sh. Sheikh Saleem	Laboratory Assistant	Retired (VRS) on 31st Jan, 2018
Sh. Sukhlal Vishwakarma	Laboratory Assistant	
Sh. K. Venu Gopal Rao	Laboratory Assistant	
Sh. Jagdish Prasad Thakur	Laboratory Assistant	
Sh. Suresh Kumar Burman	Laboratory Assistant	
Sh. Rajendra Prasad Gond	Laboratory Assistant	
Sh. Shankar Lal Jha	Laboratory Assistant	
Sh. Kamta Prasad Jaiswal	Laboratory Assistant	
Sh. Laxman Prasad	Laboratory Assistant	
Sh. Baidhraj Kachhi	Laboratory Assistant	
Sh. Madan Singh Maravi	Laboratory Assistant	
Sh. Pritam Lal Gond	Laboratory Assistant	
Sh. Suresh Kumar Pareha	Laboratory Assistant	
Sh. Ramesh Kumar Ahirwar	Laboratory Assistant	
Sh. Suresh Kumar Jaiswal	Laboratory Assistant	
Sh. Umesh Prasad Gautam	Laboratory Assistant	
Sh. Anil Kumar Vinodia	Laboratory Assistant	
Sh. Malikhan Singh	Laboratory Assistant	
Sh. Ajay Kumar Soni	Laboratory Assistant	
Sh. Santosh Kumar Kol	Laboratory Assistant	
Sh. Prem Singh Gond	Laboratory Assistant	
Sh. Ram Kumar Mehra	Laboratory Assistant	
Sh. Summat Singh Maravi	Laboratory Assistant	
Sh. Ganga Bahadur	Laboratory Assistant	
Sh. Arakh Chand Malik	Laboratory Assistant	
Sh. Vishnoo Prasad	Laboratory Assistant	
Sh. Sone Lal Dumar	Laboratory Assistant	
Sh. Pappu Lal Dumar	Laboratory Assistant	,
Sh. Munnalal	Laboratory Attendant (2)	
Mrs. Shashi Prabha Mishra	Laboratory Attendant (2)	
Sh. Shamshad Ali Ansari	Laboratory Attendant (2)	
Sh. Vinay Kumar Balmik	Laboratory Attendant (2)	
Sh. Santosh Kumar Haldkar	Laboratory Attendant (2)	

Administrative Staff		
Sh. Hakim Singh Thakur	Jr. Hindi Translator	
Sh. Subash C. Muduli	Personal Assistant	
Sh. Rohit Agrawal	Assistant	
Mrs.Filomina Lakra	Assistant	
Sh. P.K.Shrivastava	Assistant	Retired on 31st May, 2017
Sh. Raj Kumar Handa	Assistant	
Ms. Sandhya Sharma	Assistant	
Sh. Bhagwani Prasad Kol	Upper Division Clerk	
Sh. Raghubir Prasad	Upper Division Clerk	Retired on 31st May, 2017
Sh. Baishakhu Lal Urreti	Upper Division Clerk	
Sh. Satish Kumar Vinodia	Upper Division Clerk	Passed away on 12th Jan, 2018
Sh. Narendra Kumar Jhariya	Upper Division Clerk	Promoted on 5th Jan,2018
Sh. Sarthak Soni	Stenographer	
Sh. Pramod Kumar Choubey	Lower Division Clerk	Promoted as UDC on 21st June, 2018
Sh. Sharad Kumar Kosta	Lower Division Clerk	Promoted as UDC on 5th October, 2018
Sh. Rahul Koshta	Lower Division Clerk	
Sh. Vikas Kumar Gupta	Lower Division Clerk	
Ms. Anjali Rajput	Lower Division Clerk	
Multi-tasking Staff		
Sh. Santosh Kumar Maravi		M.T.S.

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Director

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