वार्षिक प्रतिवेदन
Annual Report
2018-19







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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NIRTH

Annual Report
वार्षिक प्रतिवेदन
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ICMR-National Institute of Research in Tribal Health

Nagpur Road, Garha, Jabalpur 480 003

Preface



With great pride I present the Annual Report of ICMR-NIRTH for the period 2018-19. I feel honoured to present the report of the institute which is dedicatedly working especially on tribal population since 35 years. Despite 104 million tribal population as per 2011 census, they remain marginalized geographically, socio-economically and getting health coverage's. 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 emerged as a unique Hybrid model of research especially on tribes that strives by undertaking research in frontier areas especially on tuberculosis, malaria, fluorosis, life style diseases, viral diseases and zoonotic diseases. Further, it also knitted with socially relevant work, especially in providing diagnosis to genetic disorders, social mobilization, social intervention strategies etc. to mitigate the problem along with Tribal and Health Department of State and Central Government.

Apart from research activities, the scientists of the institute are involved in academic excellence programmes through guiding masters and Ph.D scholars from various reputed national and international universities. 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, paramedics, scholars, scientists, staff, etc with an intend to serve the tribal population better.

Finally, on behalf of all my colleagues, I take this opportunity and extend our sincere thanks to Professor (Dr.) Balram Bhargava, Secretary, DHR & DG, ICMR, Joint SAC committees, expert group committees for their encouragement, advice, and unstinted support without which much of our achievements would not have been possible.

Dr. Aparup Das
Director

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1. COMMUNICABLE DISEASES

1.1. INTENSIFIED TUBERCULOSIS CONTROL PROJECT AMONG SAHARIA - A PARTICULARLY VULNERABLE TRIBAL GROUP (PVTG) IN M.P.

PI	:	**Dr. Jyothi Bhat, Scientist 'E'**
Co-Is	:	**Dr. Rajiv Yadav, Scientist 'E'**
		Dr. R.K. Sharma, Scientist 'E'
		Dr. V.G. Rao, Consultant
		State TB Officer
Status	:	**Ongoing**
Funding	:	**Govt. of MP**

Tuberculosis has been found to be a major public health problem among Saharia, a particularly vulnerable tribal group (PVTG) of Madhya Pradesh. NIRTH reported a very high pulmonary TB prevalence of 1270 per 100000 among them in 1991-92. The prevalence of infection and ARTI were reported to the extent of 16.9% and 3.3% respectively. In study in 2007-08 the pulmonary TB prevalence was found to be 1518 per 100000 population and in another study, it was more than 3000 per 100000 population in 2013-14. In view of this, the NIRTH carried out a series of TB disease prevalence, risk factor and Knowledge, Attitude and Practices (KAP) surveys to understand the TB situation amongst the Saharia PVTG of Madhya Pradesh. The major risk factors found to be associated with TB were: malnutrition, poverty, overcrowding, indoor air pollution, stone quarry work, tobacco smoking as well as alcohol consumption. The findings indicate that there are many gaps regarding various aspects of tuberculosis such as modes of transmission, prevention and treatment. The results also show that DOT is not happening in majority of the cases. Their living conditions are poor as majority of the houses are single room houses with poor ventilation & light. The same room is used for cooking and the material used for cooking is either wood or crop residues which results in indoor air pollution - a known risk factor for tuberculosis. The results of the recently conducted intervention study by the institute with intensified case detection along with IEC activities among Saharia tribe in Shivpuri district of Madhya Pradesh demonstrated 33% decline in the prevalence of pulmonary TB during the period of three years.

This project aims at early case detection through engagement of community volunteers and ensure treatment adherence through regular monitoring and supervision. It also focuses on

improving the health seeking behavior of the tribe through community-based Advocacy, communication and social mobilization (ACSM) activities. The very high transmission of infection is expected to be interrupted by intensive case detection, prompt treatment and case holding.

The project was initiated in June 2018. Baseline work of census and registration of Saharia individuals in seven districts is completed. Village volunteers are selected and trained at district level. Baseline disease survey is ongoing. The active case detection was initiated in December 2019 and so far, 1096 cases have been detected and put on treatment.

The project is ongoing.



Training of volunteers



Community meeting



Addressing the concerns of community



Data collection in field

1.2. INTENSIFIED TUBERCULOSIS CONTROL AMONG SAHARIA TRIBE OF MADHYA PRADESH (GUNA DISTRICT)

PI	:	**Dr. Rajiv Yadav, Scientist 'E'**
Co-Is	:	**Dr. Jyothi Bhat, Scientist 'E'**
		Dr. R K Sharma, Scientist 'E'
		Dr. V G Rao, Consultant
		State TB Officer
Status	:	**Ongoing**
Funding	:	**Govt. of M.P. (Tribal Welfare Department)**

The Primary objectives of the study is to promote early TB case detection through the engagement of community volunteers; to ensure treatment adherence through regular monitoring and supervision; to reduce unfavourable treatment outcomes and to increase awareness on TB and RNTCP services through community based ACSM activities.

Methodology

The study is being carried out in four phases -

Phase I - Burden estimation

- Assessment of TB situation
- Identification of TB suspects (including children)
- Linkage to nearest diagnostic facilities
- Linkage to rapid diagnostic tools such as Gene Xpert for prompt diagnosis.

Phase II - Interventions

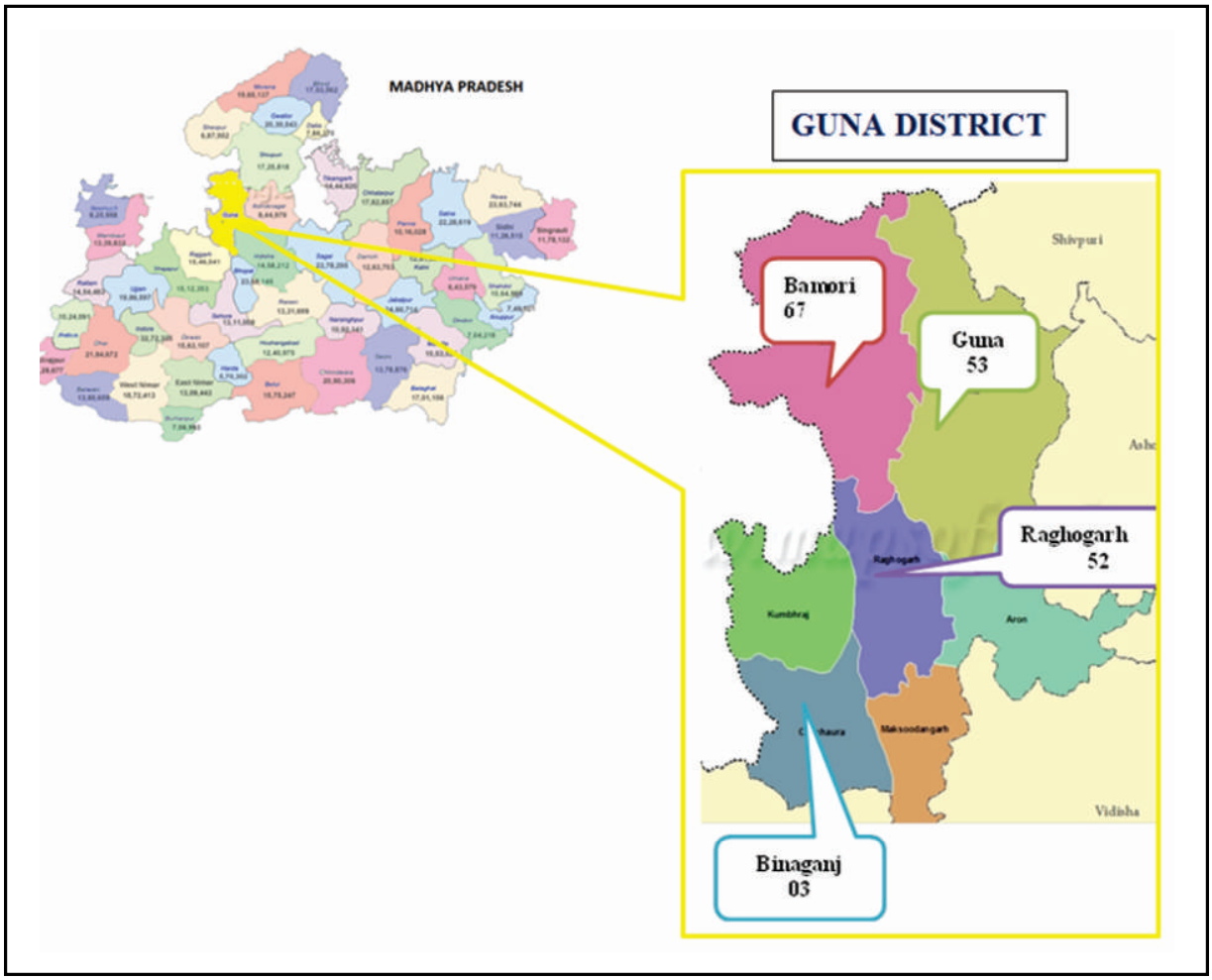
- Intensive case detection
- prompt treatment and case holding
- IEC activities

Phase III - Training and regular reorientation of health & RNTCP staff

Phase IV - Periodic monitoring of TB situation

- Number of new TB suspects
- Number of new TB cases detected
- Number of patients completing the treatment
- Number of patients with unfavourable treatment outcomes

The study is being carried out in Saharia tribe village of Guna district of Madhya Pradesh.



Work done

Village volunteers have been recruited in the selected saharia villages (216 villages), one volunteer per 1000 population is recruited and total 55 village volunteers are recruited in the district (Male and Female both). Most of them belong to Saharia community. Registration of Saharia population was done in the all the selected villages from August 2017 to March 2019 and identification of TB suspects is completed by trained village volunteers through monthly door to door survey.

Registration of Saharia population and Identification of TB suspects: Total 51201 Registration of Saharia population was done including 14071 children (0 - 9 Yr.) and 37130 adults (> 10 Yr.) in the all the selected villages of four block and 3450 of TB suspects/Symptomatic were identified in these villages.

Case detection: Total number of TB case detected in four blocks of Guna district are 499 bacteriologically positive by smear / or culture/CBNAAT and X-ray out of 51201 individuals. Of the 499 cases, 07 are Extra-pulmonary and 17 are Paediatric TB cases. Eleven cases are multi drug resistant.

Table-1: Treatment outcome of TB Patients

S.No.	Block Name	Symptomatics	Male	Female	Total Cases	Cure	TC	Dead	Drop
1.	Guna	501	299	202	64	26	43	4	5
2.	Bamori	836	485	351	116	14	41	2	1
3.	Raghogarh	161	118	43	27	12	14	0	7
4.	Binaganj	23	13	10	3	0	0	0	0
Total	**4**	**1521**	**915**	**606**	**210**	**52**	**98**	**6**	**13**
						150			

Note: TC: Treatment Completed

Treatment Outcome: Table 1. Shows the treatment outcome of TB patients. Of 499 cases 163 were cured, 212 patients completed and treatment is ongoing for 73 patients, 10 were default (lost to follow-up), 06 were treatment failure were and 23 patients were found dead. Along with these 05 recurrence cases of TB occurred. The notification rate was 974 which is 8 times higher than RNTCP (107).

The study is ongoing.



Volunteers Training



Household Numbering



Meeting with DTO



Filed visit



Meeting with PRIs



TB patient counselling

NEW INITIATIVE

1.3. HUMAN PULMONARY PARAGONIMIASIS IN CRAB EATING COMMUNITIES AND SMEAR NEGATIVE SUSPECTED TB CASES FROM SOME STATES OF INDIA

PI	:	**Dr. K. Rekha Devi, RMRC Dibrugarh**
Site PI	:	**Dr. Jyothi Bhat, Scientist 'E'**
Funding	:	**ICMR, New Delhi**

This is a mission mode project coordinated by RMRC Dibrugarh and ICMR Headquarters New Delhi. The project aims to detect human pulmonary paragonimiasis in fresh-water crab eating communities of India and smear negative pulmonary TB cases from some states of India and to examine local fresh-water crabs for metacercarial infection due to *Schistosoma* species. The *Schistosoma* species will be confirmed using molecular techniques and laboratory animal experimentation. ICMR-NIRTH will conduct the study in Madhya Pradesh. The expected outcomes of studies are the identification of active foci of human pulmonary paragonimiasis, a neglected disease, in India will provide evidence whether paragonimiasis is wide spread in freshwater crab eating communities in India. Information generated in this study will help in initiating paragonimiasis control programme in India.

2. GENETIC DISORDER

2.1. SICKLE CELL ANAEMIA CONTROL AND TREATMENT IN MADHYA PRADESH

PI	:	**Dr. S. Rajasubramaniam, Scientist E**
CoPI	:	**Dr. Rajiv Yadav, Scientist E** **Dr. Ravindra Kumar, Scientist B**
Status	:	**Ongoing**
Funding	:	**Govt. of Madhya Pradesh**

Sickle Cell Anemia(SCA) control, treatment and prevention project is being carried out under 'Convergence model', in which 4 departments/agencies (ICMR-NIRTH Jabalpur, M.P. State Health Department, M.P. Department of Medical Education and M.P. Tribal Development Department) work in collaboration. The main aim of the project is to find out SCA affected individuals by screening of various suspected groups, such as children in the 0-6 yrs and 12-18 years age group, adolescent unmarried people above 18 years, newly married couples, all pregnant women (ANC cases) and extended family members in 22 tribal districts of Madhya Pradesh. A total of 50 lakh population will be screened during the program.

The main objectives of the study are to find out SCA affected individuals by screening of various suspected groups, such as children in the 0-18 yrs age group, adolescent unmarried people above 18 yrs, newly married couples and all pregnant women (ANC cases); to diagnose SCA in individuals at village level screening and to provide regular and free treatment to SCA patients diagnosis of other blood related disorders in addition to SCA to provide regular counseling to sickle cell trait individuals in order to prevent birth of SCA children and to create awareness among general public about SCA by IEC.

Training manual, IEC material have been prepared. A special software for online and offline modes with GPS tracking for data input and analysis developed for Android and Desktop use. Orientation program for CMHO and Civil Surgeons of 22 tribal districts and two days hands on training of BMOs, Pathologists and Program Officers (NCD) were organized in 6 different batches from 5th Sept to 25th Sept 2018. A total of 110 participants attended the training program. Screening has been started in two districts (Mandla and Chhindwara). Prevalence of sickle cell trait among screened individuals was 12.5%.



Orientation of CMHOs and Civil Surgeons on the Sickle Cell Screening project



Hands-on-training of Block Medical Officers on diagnosis of sickle cell anemia

2.2. SCREENING OF HEMOGLOBINOPATHIES IN NARSHINGPUR DISTRICT WITH SPECIAL REFERENCE TO ALPHA HEMOGLOBIN CHAIN VARIANTS

PI	**:**	**Dr. S. Rajasubramaniam, Scientist 'E'**
CoPI	**:**	**Dr. Ravindra Kumar, Scientist 'B'**
Status	**:**	**Ongoing**
Funding	**:**	**Intramural**

Hemoglobinopathies are the most common inherited monogenic disorder. The structural hemoglobin variants results from single amino acid substitutions in α or β chains. Around 1300 Hb variants have been described in literature. Often these variants are innocuous, but in some cases, they may alter the stability or functional properties of the hemoglobin and lead to a clinical disorder. Alpha chain variants are not described as much as beta globin chain variants therefore their clinical spectrum and frequency is still unknown. Recently we have identified 14 individuals from 3 unrelated families belonging to Jharia community from Narsingpur District carrying a rare alpha Hb chain variant (Hb O Indonesia, [alpha1 116(GH4) Glu>Lys)]. As per personal communication with district health authorities, it has been realized that majority of the Jharia community members from Narsingpur district suffer from 'sickle cell' like disorder. The present study is aimed at identifying the hemoglobin disorder afflicting this community from the region.

The main objectives of the study are to screen for hemoglobinopathies in residents of Narsinghpur District; to identify the clinical profile of individuals carrying hemoglobin disorders in particular those with alpha chain variants; to characterize the mutations underlying Hb deficiency and determine their distribution; to correlate the clinical findings with the type of mutations present, and to correlate the alpha chain variant distribution in relation to migratory pattern of Jharia community in Narsingpur District.

Methodology

A total of 2000 school going children (12 - 18 years) from Narsingpur district to be screened. The schools were selected by random sampling technique using purposive sampling procedure keeping in view the operational feasibility. A total of 10 schools have been included wherein, 200 students will be randomly selected to partcipate in the study.

Work Done:

During the study period 623 students from 6 schools belonging to age group of 12-18 years have been screened. Majority of children tested belonged to OBC communities (45%) followed by Gond tribe (22%) and SCs (27%). Hemoglobinopathies status of tested individuals revealed that 55 were sickle cell trait, one sickle cell homozygous, 3 each were carrying beta thalassemia trait and Hb Lepore trait. Twelve children were deficient for G6PD enzyme. Molecular analysis for alpha thalssemia was performed on 301 samples. Table 1 shows the break of various genotypes detected.

Table 1: Various genotypes detected in Narsinghpur

TOTAL	αα/αα	$-\alpha^{3.7}/-\alpha^{3.7}$	$-\alpha^{4.2}/-\alpha^{4.2}$	$-\alpha^{3.7}/\alpha\alpha$	$\alpha\alpha/-\alpha^{4.2}$	$-\alpha^{3.7}/-\alpha^{4.2}$
301	203 (67.4)	18 (5.9)	8 (2.7)	28 (9.3)	30 (10.0)	14 (4.7)

*Numbers in parenthesis indicates percentage

2.3. PILOT AND VALIDATION STUDIES OF A NEW MALARIA AND SICKLE CELL DIAGNOSTIC DEVICE

PI	:	**Dr. Praveen Bharti, Scientist 'E'**
Co-Is	:	**Dr. Rajasubramaniam, Scientist 'E'**
		Dr. Anil Kumar Verma, Scientist 'B'
Status	:	**Ongoing**
Funding	:	**Hemex Health, USA**

Malaria and sickle cell are the major public health problem in India. Majority of the burden is contributed by the tribal populations living in remote, forested and interior areas of central and north east India. Present diagnostic tools for SCD rely on advanced laboratory systems and are often very expensive, not easy to use and time-consuming. Lack of public health diagnostic facilities results in vast majority of hitherto undetected patients resulting in heavy morbidity and mortality. Early diagnosis is crucial for initiating life-saving therapies and knowledge of sickle cell carrier status is critical in prevention and parental planning for at-risk populations. The validation of a simple, rapid, portable bedside test for SCD could transform clinical care for affected persons in both low-income developing countries and urgent care settings. Paper-based microchip electrophoresis technology identifies and quantifies mutated hemoglobins in a drop of blood. This method avoids sample preparation, need for expensive lab-based electrophoresis or HPLC and uses an inexpensive, portable, and user-friendly device.

The main objectives of the study is to test the performance of an affordable, portable, fast and highly-sensitive point of care diagnostic device Gazelle™ in comparison to current gold standards of malaria and sickle cell disease diagnostics.

Methodology

Blood samples were collected from 300 patients (Phase I) enrolled in pilot study in a high prevalence setting at Govt Hospital, Jagdalpur, Chhattisgarh. Each sample was tested with prototype of Gazelle™, and the results were compared to electrophoresis and HPLC. Methods: Phase II studies will include testing of 1000 samples on the improved version of Gazelle™

Work Done

A total of 300 samples were collected and screened for sickle cell anemia by solubility, hemoglobin (cellulose acetate) electrophoresis, HPLC wherever necessary and the prototype device. Out of 300 samples, 295 were included (3 samples were excluded due to incomplete runs; sequencing results pending for 2 samples) in the analysis, 12 (4%) samples were positive by electrophoresis, solubility, HPLC and device (100%) for SCA (disease), 62 (21%) were positive for sickle cell trait by all methods including device (100%) and 221 samples were normal by all methods. The sensitivity and specificity of the device in comparison to hemoglobin electrophoresis was 100% in detection of sickle cell disease and sickle cell trait. Gazelle™ showed high accuracy (100%) as compared to current to standard screening test **(Table 1)**.

Table 1: Overall accuracy of Gazelle in comparison to clinical standard tests.

Category	Hemoglobin Type	Correct	Incorrect	Accuracy
Sickle Cell Disease and sickle β-Thalassemia	HbSS, HbSβ-thal	12	0	100%
Sickle Cell Trait	HbAS	62	0	100%
Normal	HbAA	221	0	100%
All categories	-	**295**	**0**	**100%**

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

PI	:	**Dr. Ravindra Kumar, Scientist 'B'**
Co-PI	:	**Dr. S. Rajasubramaniam, Scientist 'E'**
Status	:	**Completed**
Funding	:	**Intramural**

The study was carried out 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.

Methodology

20 µL of whole blood was collected and mixed with solubility buffer (180 µL) by inversion, the mixture was incubated at room temperature for 5 min, and 20µL of the mixture was spotted onto chromatography paper (Whatman filter paper no. 3) and dried. Dry blood stain patterns were interpreted visually by naked eye.

Results

The stability of the different concentrations of the buffers (12% and 15 %) at different temperatures were tested (0°C,4°C, room temperature [20-30°C] and 40°C). The tests were repeated after keeping the buffers at different temperatures for 24 hours. We observed that best results with the buffer stored at 4°C (Figure 1). Length of storage of above buffer at 4°C (Day 0, 7, 15, 30, 60, 120 and 180 days) was also tested. Dry blood spotting efficiency of 12% MS buffer longer than 90 days was lower than 15% MS buffer. The MS (15%) buffer was found to be stable up to 180 days i.e. 6 months and showed accurate identification of all genotypes (Figure 2).

After testing the stability of the buffer, all further experiments were carried out with 15% sodium metabisulfite buffer. A total of 401 (232 AA, 82 AS, 87 SS) samples were tested (Table 1). The tests revealed 100% sensitivity and 100% specificity in identification of HbS. However, the sensitivity of differentiation between sickle cell trait(AS) with disease (SS), was found to be 97.7% with 100 % specificity. The accuracy for differentiating the AS with SS genotype was 98.82%.

Overall, the study show that paper based screening test is low cost, electricity free, point of care screening test for sickle cell anemia. The present test has an accuracy of 98.82% for differentiating the AS with SS genotype and the present test can not differentiate SS with SC and SD genotype.

Table 1: Showing paper-based screening test with different hemoglobin pattern using 15% meta bisulphite (MS) buffer

Hb pattern (N=401)	Hb electrophoresis (n)	Paper based screening (n)
SS	87	85
AS	82	84
AA	232	232
Total	401	401

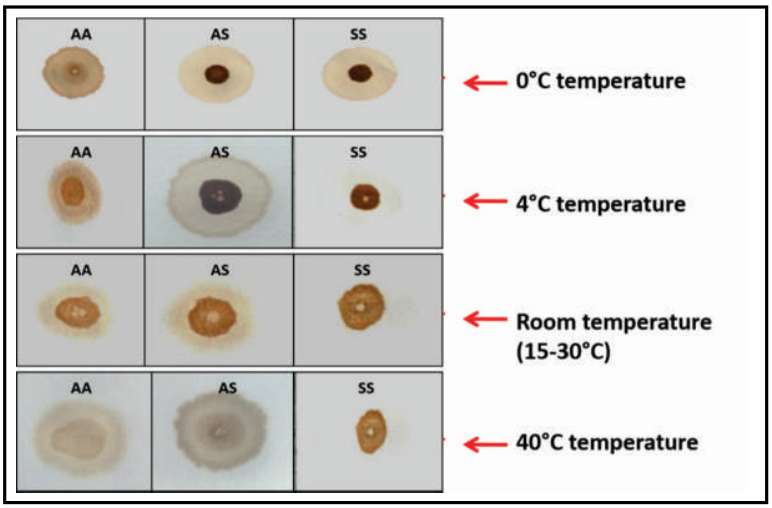


Figure 1: Effect of Temperature on test results.
A total of 10 sickle cell anemia (SS), 10 sickle cell trait (AS) and 10 normal (AA) samples were tested each time.

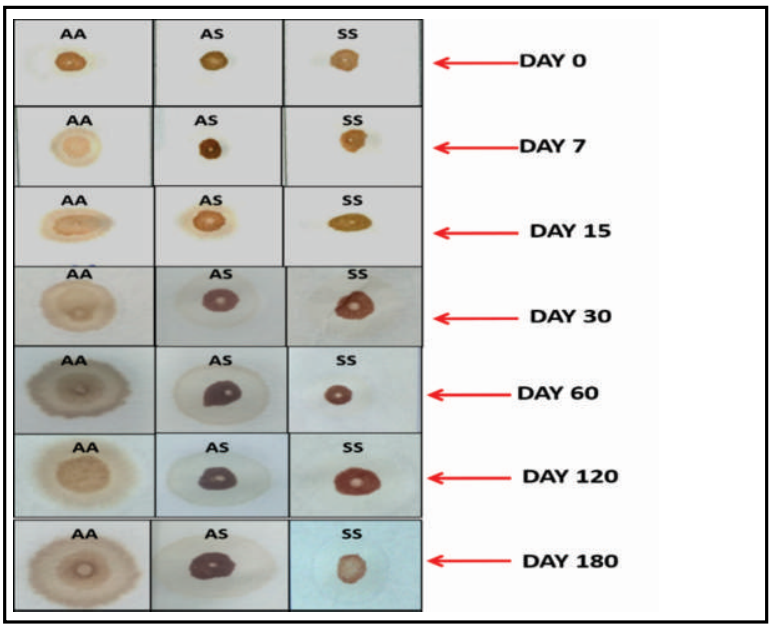


Figure 2: Effect of length of storage of buffer on test results.
A total of 10 sickle cell anemia (SS), 10 sickle cell trait (AS) and 10 normal (AA) samples were tested each time.

2.5. Morbidity Profile of Sickle Cell Disease in Central India

PI	:	**Dr. Rajiv Yadav, Scientist 'E'**
Status	:	**Ongoing**
Funding	:	**Intramural**

The study has been undertaken with two major objective - 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.

Methodology

Patients referred 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 were registered. Patients identified 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 structured proforma and patients were advised to come for follow-up every three months.

Work done

Seventy-one sickle cell disease patients were registered in the Sickle cell clinic (in collaboration with Government Medical College, Jabalpur) during April 2018-March 2019. All of these patients were from Balaghat, Chindwara, Dindori, Jabalpur, Katni, Mandla, Narsingpur, Panna, satna, Seoni, Shahdol. Sidhi and Umaria districts. About 59% were male and 41% were female. About 63.4% of patients were in Paediatric group. Majority (52%) of the patients belonged to Scheduled caste (mainly Ahirwar, Basod, Chadar, Choudhari, Jharia, Mahar, Mehra and Vanshkar) and 17% were from tribal communities (Dhulia, Gond and Pradhan). About 28.0% were from Other backward class (mainly Barman, Patel, Rajak, Razak, Sen and yadav) and 3% were from Sindhi & Muslim. About 31% of patients had history of multiple blood transfusions (blood transfusions of more than 2 times) and 45% of patients had no history of blood transfusion. About 82% of the patients had onset of the disease before 5 years of age, followed by 5-10 yrs age (17.8%). Fever (97%), Pallor (97%), joint pains (94%), Icterus (94%), abdominal pain (69%) and fatigue (59%) were major sign and symptoms observed in these patients. Other sign and symptoms include Bony

pain (14%), chest pain (89%), Joint swelling (18%) and Dactylitis (7%). Splenomegaly was observed in 52% of the patients.

A total of 1100 SCD patients were registered in the SCD clinic up to March 2019. 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 prescribed 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 2019, a total of 645 SCD patients were 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 has been reduced and shifted to mild category. It is observed that supplementation with folic acid and quick administration of anti-pyretic/anti-inflammatory drugs along with health education to avoid disease precipitating factors shown positive effect to decrease the severity of the disease.

3. VECTOR BORNE DISEASES

3.1. EVOLUTIONARY INTERPLAY OF SINGLE NUCLEOTIDE POLYMORPHISMS (SNPS) AT THE PROMOTER REGION OF TNF-α GENE IN DIFFERENT CLINICAL OUTCOMES OF MALARIA IN INDIA

PI	:	**Dr. Aparup Das, Scientist 'G' & Director**
Status	:	**Completed**
Funding	:	**Intramural and Senior Research Fellowship of ICMR**

Host genetic factors are frequently ascribed to differential malaria outcomes as a by-product of evolutionary adaptation. To this respect, Tumor Necrosis factor alpha (TNF-α), a human cytokine, is known to be associated with malaria through its differential regulation in diverse malaria manifestations. Since diversity in differential malaria outcome is uncommon in every endemic settings, possible association of TNF-α and malaria is not commonly established. In order to check for association between the occurrence of Single Nucleotide Polymorphisms (SNPs) in the TNF-α gene with different malaria manifestations, we have sequenced a 4,011 base pair region (Figure 1) constituting the promoter and the whole gene of human TNF-α in 61 patients [(16 cerebral plus severe (SCM), 21 severe (SM) and 24 uncomplicated (UM)] samples in a highly malaria endemic state (Odisha) of India. Multiple sequence alignment revealed presence of six SNPs (- 1031 T > C, - 863C > A, - 857C > T, - 308G > A, - 806C > T, +787C > A), out of which the -806C > T and +787C > A are novel in malaria patients in general and the +787C > A was detected for the first time in humans. Although alleles due to six different SNPs segregate differentially in the three groups of malaria (SCM, SM and UM) in the present study (Figure 2), interestingly, for the - 1031 T > C position, the frequency of individuals possessing the homozygous rare allele was higher in the SCM group and also is in linkage with the adjoining SNP (-863C > A) (Figure 3) with a higher number of heterozygotes in the UM group. The Tajima's D values considering all the SNPs in a defined group were positive and statistically insignificant conforming no evolutionary constraint. However, statistically significant deviation from expectation under Hardy-Weinberg equilibrium for -1031 T > C SNP in the UM group points towards the probable role of natural selection providing some kind of protection to malaria in Odisha, India.



Figure 1: Schematic representation of the structure of the 4011 bp fragment representing TNF-a gene and promoter showing the location of different SNPs. The blue region is the promoter, maroon regions are the four exons and yellow strips are introns. The black bars represent the already reported SNPs and the red bars indicate the novel ones.

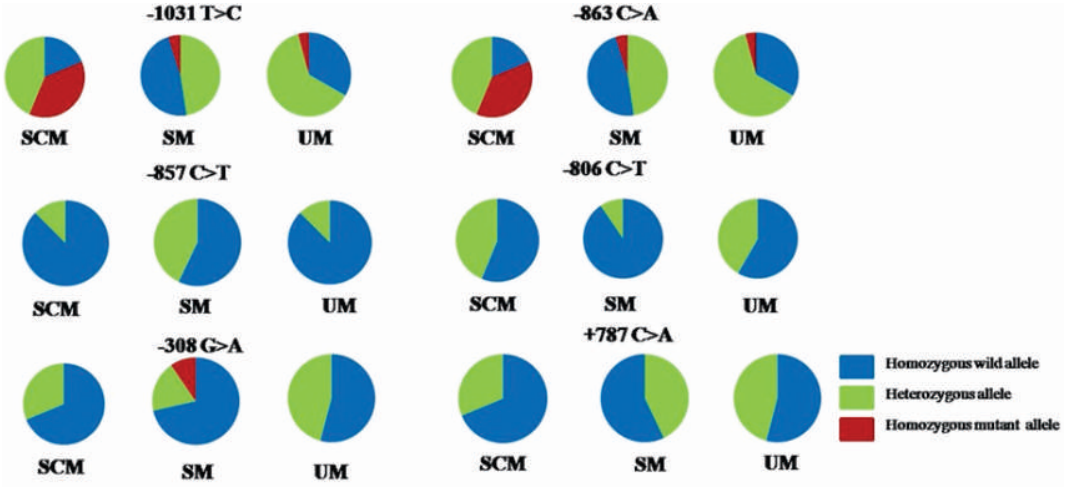


Figure 2: Pie chart representing frequencies of the six SNPs in the TNF-a gene across the three groups of malaria manifestations. The blue region of the pie charts represents frequencies of homozygous wild alleles; the green region represents frequencies of heterozygous alleles; the maroon region represents frequencies of homozygous mutant alleles of the six SNPs across the three groups of malaria manifestation, viz. Severe malaria with cerebral involvement (SCM), Severe malaria only (SM) and Uncomplicated malaria (UM).

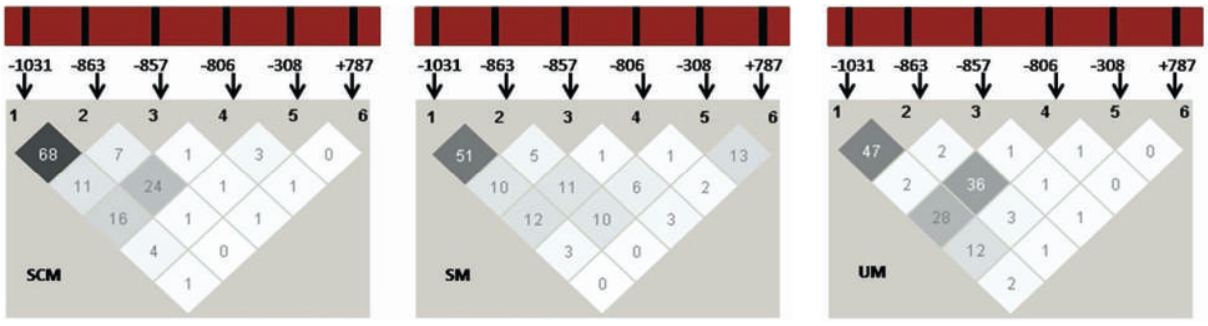


Figure 3: Tests for pair-wise linkage disequilibrium between the SNPs in SCM, SM and UM groups. Strength of association between a pair of SNPs is indicated by the colour intensity of the boxes such as the darker boxes represent stronger and the lighter ones represent weaker ones. The numbers within the boxes are the r2 values, stronger the genetic association between two SNPs, higher is the r2value, showing statistically significant linkage between the two SNPs.

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

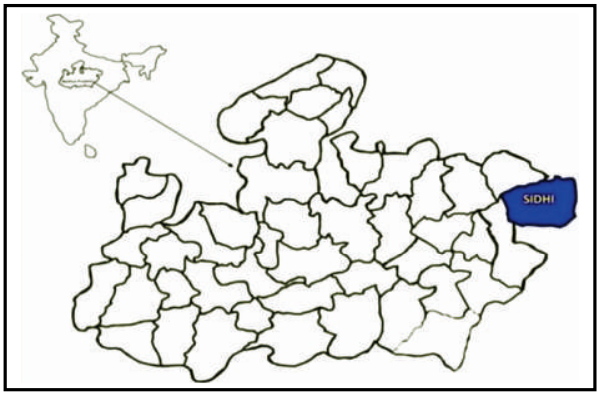
PI	**:**	**Dr. A. K. Mishra, Scientist 'E'**
Status	**:**	**Ongoing**
Funding	**:**	**ICMR Task Force**

Vector control continues to be the major component of malaria control. Indoor spraying of residual insecticides and LLINs are the two long-term vector control intervention measures used in the programme. With these measures, and effective species-specific drugs, malaria has been reduced in many parts of the country. For further enhancement of results achieved in malaria control, the existing strategies/tools are to be used effectively and also there is a need to assess whether these strategies/tools are effective in addressing 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 planning and implementing suitable vector control strategies.

The main objective of the project is to study bionomics of the prevalent malaria vectors and their role in malaria transmission for development of evidence based sustainable vector control strategy for malaria control.

Methodology

The study was conducted in a malarious district Sidhi in Madhya Pradesh state where almost nothing is known about the vector and their bionomics. It was initiated from June 2017 in 8 villages of different terrains 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. The area was under routine indoor residual spray (IRS) of Alphacypermethrin 5% 2 rounds in a year in subcentres of >2 API by NVBDCP. LLINs were also distributed in subcentres of >5 API in the years 2013-14 and 2017. Surveys were carried out on monthly basis in every village to cover pre-monsoon, monsoon, post monsoon and winter seasons. This report includes data from April 2018 to February 2019 except July and August 2018.



Map of Madhya Pradesh showing Sidhi district



Terrain of 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 upto adult stage and identified. Susceptibility status of *An. culicifacies* to diagnostic dose of insecticides was done before initiation of the study.

Work done

The average indoor resting per man hour anopheline density (MHD) was 14.5 of which 65 % 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*. Eight months data revealed that the higher anopheline and vector density was observed in September, October and November months (Figure 1). The proportion of vector species is almost same in both CHCs. Ecotype wise MHD data showed that the vector proportion was higher (>65%) in forest and foothill villages. (Figure 2). It was also observed that the density inside the human dwelling was very low, as most of the *An.culicifacies* and *An.fluviatilis* (>70%) were caught from outside the houses (cattle shade).

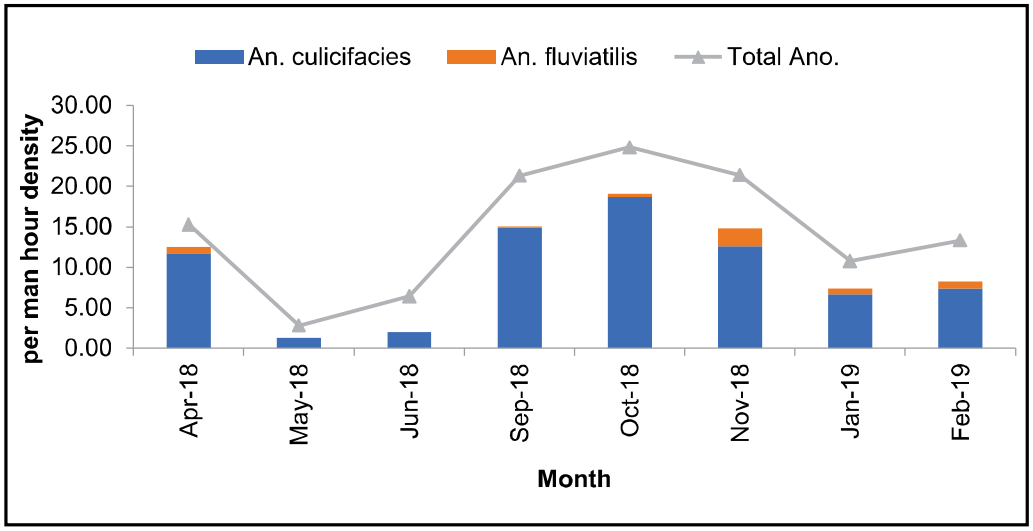


Figure 1: Indoor resting collection

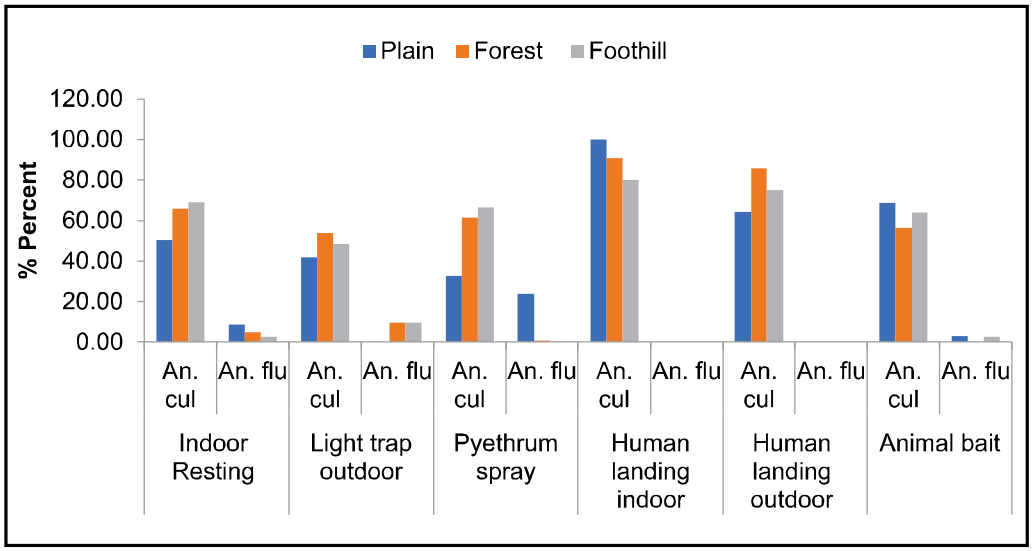


Figure 2: Proportion of vector (*An. culicifacies* and *An. fluviatilis*) in different ecotypes

In outdoor light trap catches, the per trap per night catch of anophelines was 6.5 of which vector proportion was about 57%. 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 April and October months (Figure 3). The proportion of vector species is almost same in both CHCs. Almost equal anophelines catch per night was observed in all ecotypes (Figure 2); however, vector proportion was higher in forest (54%) and foothill (48%) villages as compared to plain villages (42%).

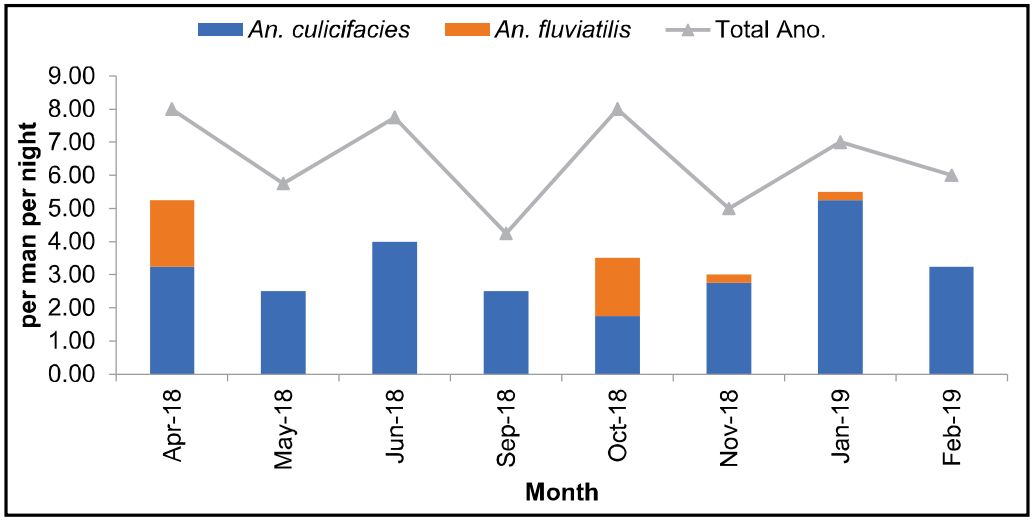


Figure 3: Light Trap Outdoor catch

During pyrethrum spray catches, the numbers per room of anophelines was 5.2 of which vector species *An. culicifacies* and *An. fluviatilis* proportion was about 62% (Figure 4), which was higher in forest (61%) and foothill (66%) villages as compared to plain (32%, Figure 2). The highest anopheline catch was observed in April month.

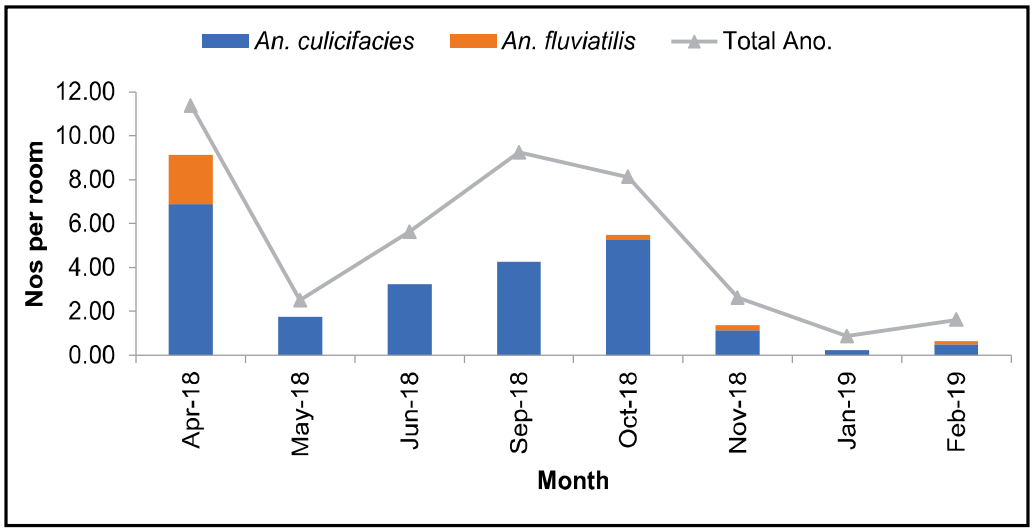


Figure 4: Pyrethrum Spray Sheet Collection

The per man per night catch of anophelines was very low in both indoor (0.5) and outdoor (0.6, however; proportion of *An.culicifacies* was > 80% in both. Month wise data revealed that highest catch was observed in June in outdoors whereas in indoors higher numbers were caught in April (Figure 5 A and B). The catch in indoor was comparatively higher in plain and foothill area and in outdoor in forest area (Figure 2). Most of the human landing catch (> 75%) was observed during early hours of night (before midnight).

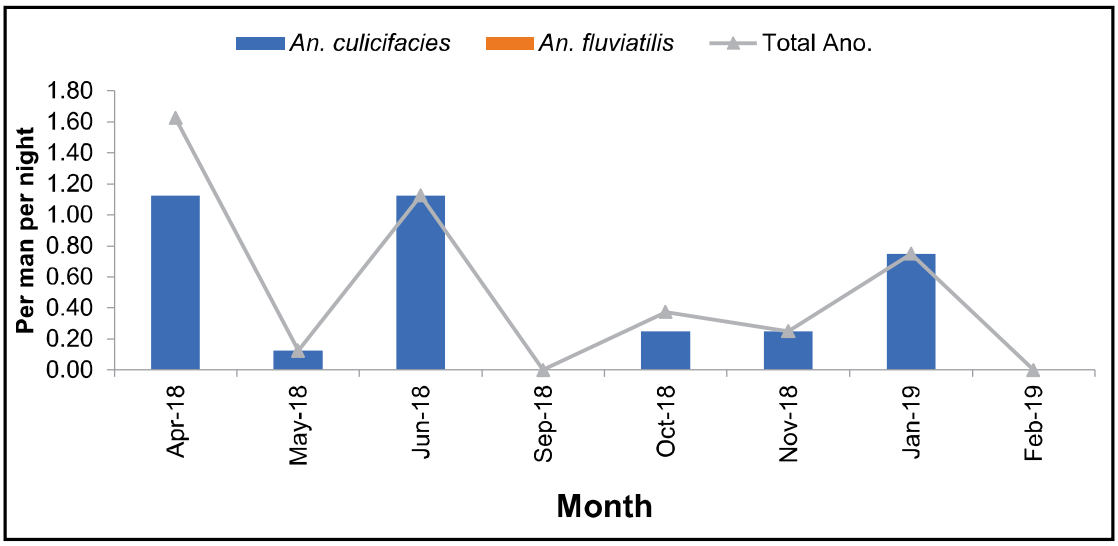


Figure 5 A: Human Landing Indoor

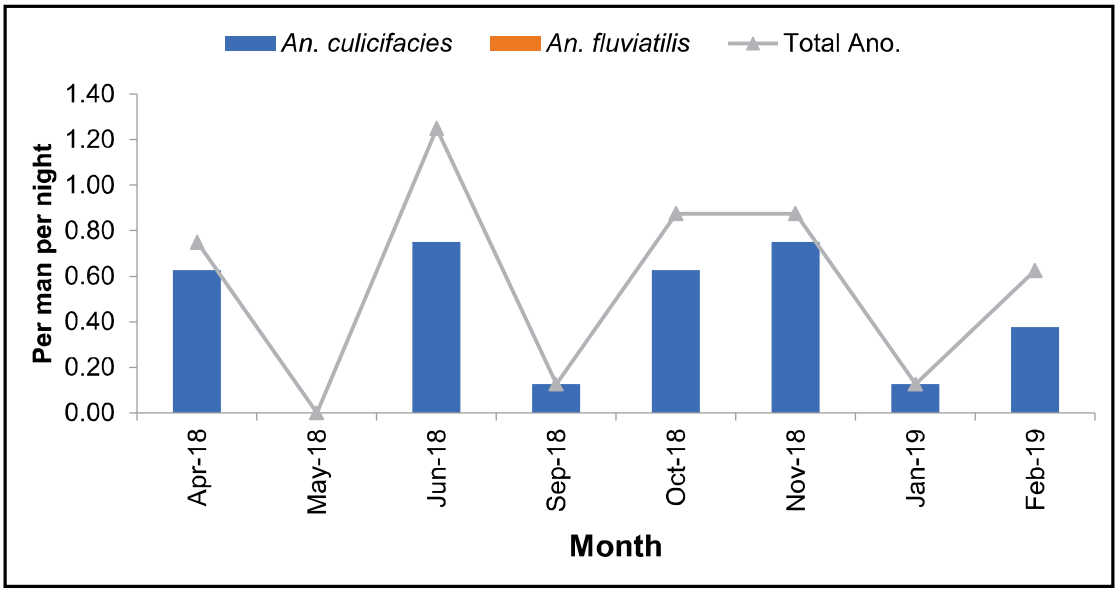


Figure 5B: Human Landing Outdoor

Animal bait collections revealed 5.2 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 April and September months (Figure 6). The density of total anopheline and vectors was almost same in both CHC in all ecotype. However, vector proportion was higher in plain **(Figure 2)**.

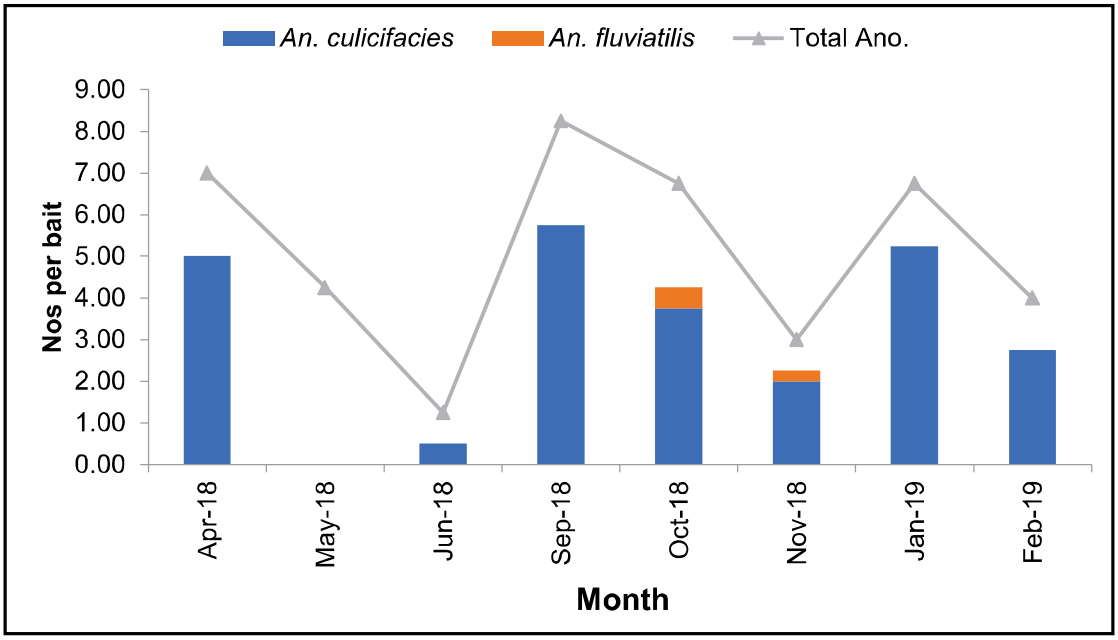


Figure 6: Animal Bait Collection

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 described by Snounouet *al.* (1993). The PCR assay result showed none of the mosquito was positive for sporozoite out of 1038 *An. culicifacies* and 27*An. fluviatilis* tested.

An allele-specific PCR assay of Singh et al 2004 followed by AD-PCR and BCE-PCR assays described by Goswami et.al. 2006 was used for the identification of all sibling species of *An. culicifacies.* An allele specific polymerase chain reaction (AS-PCR) assay based on differences in nucleotide sequences in D3 domain of 28S ribosomal DNA (Singh et.al. 2004b) for *An. fluviatilis* sibling species was used for identification Out of 753 *An. culicifacies* tested for sibling species determination, 23.0, 44.4 and 33% sibling species B, C and E were detected respectively. This proportion was almost equal in all habitats and in both CHCs.

To determine the host feeding preference, blood elutes were collected on Whatman filter paper No. 1 from the stomach of wild caught fully fed and semigravid specimens of *An. culicifacies.* Blood elutes were analyzed by gel diffusion method and by PCR methods. A total of 197 samples of *An. culicifacies* and 11 *An. fluviatilis,* collected on Whatman filter paper No. 1 from the stomach of wild caught vector species were tested by PCR of which only 7 *An.culicifacies* and 1 *An. fluviatilis* were found human positive. Over all anthropophilic index (AI) was 3.5 in *An. culicifacies* and 9.0 in

An. fluviatilis. The AI was comparatively higher in CHC Semaria in *An. culicifacies* (5.4) when compared with AI of Kusumi (1.9) which was not significant (chi sq. 1.71, p= 0.258). Only one specimen of *An. fluviatilis* was found positive for human blood out of total seven tested. A total of 78 *An. culicifacies* B, C and E were tested for blood meal analysis of which the AI was found almost equal in C (5.6) and E (6.5). No *An. culicifacies* B was found human blood positive.

During the period, a total of 11 anopheline species emerged from different water bodies of which proportion of vector species *An. culicifacies* and *An. fluviatilis* was 49% (Table 1). *An. culicifacies* emerged mainly from stream and rocky pits whereas *An. fluviatilis* emerged mainly from streams and rocky pits. The emergence was found almost same in each ecotype.

Table 1: Larval emergence in different breeding sites

Species	Stream	Pool	Rocky pits	Seepage water	Ditch	Hoof Prints	Pit	Total
An. culicifacies	101	0	44	15	7	6	10	**183**
An. fluviatilis	12	0	5	0	0	0	0	**17**
An. annularia	12	2	1	0	2	0	1	**18**
An. barbirostris	1	0	3	1	0	0	4	**9**
An. jamesii	4	0	4	0	0	0	0	**8**
An. maculatus	9	0	0	0	0	0	0	**9**
An. nigerrimus	1	0	0	0	0	0	0	**1**
An. pseudojamesi	0	2	0	0	0	0	0	**2**
An. splendidus	2	0	0	0	0	0	2	**4**
An. subpictus	32	2	4	0	1	0	1	**40**
An. theobaldi	24	7	38	14	23	0	11	**117**
Grand Total	**198**	**13**	**99**	**30**	**33**	**6**	**29**	**408**

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 0.05% with 96.5% CPM (Table 2).

Table 2: Insecticide susceptibility test

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

The findings necessitate continuous monitoring of insecticide resistance and further research on vector behavior in order to strengthen control measures. Further, elucidation and characterization of the underlying insecticide resistance mechanisms and identification of sibling species of vectors is important. The high densities of vector species in these areas in spite of control programmes point out towards the need of studies to evaluate the effectiveness of such measures. In addition, the next step should be the application of vector control strategies based on the evidences provided by studies.

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

PI	:	**Dr. A. K. Mishra, Scientist 'E'**
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 is 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.

The objective of the project is to monitor and update database on insecticide resistance in malaria vectors in Madhya Pradesh state and to review and strengthen the capacity in monitoring and mapping of vector resistance to insecticides.

Methodology

Out of 12 districts suggested by NVBDCP, we have carried out susceptibility tests in 6 districts viz. Alirajpur, Dhar, Hoshangabad, Khargone, Shivpuri and Datiya during the period. All the districts are under synthetic pyrethroids (SP) spray for routine IRS under the programme except datiya district where spray was never done. 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 0.05% 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± 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.

Work done

The results of the susceptibility status revealed that resistance in *An.culicifacies* to DDT was found in all the districts with mortality 7.0 to 60.0. Malathion resistance was seen in five districts with mortality 58.1 to 87.0 except one district Datiya where possible resistance (mortality 93.0) was observed. The vector was also found resistant to Aplhacypermethrin 0.05% in two districts viz. Dhar and Alirajpur with the mortality 84.2 to 87.6. Other four districts showed possible resistance with mortality 93 to 975. The species was found possibly resistant to Deltamethrin 0.05% in five districts with mortality 95.2 to 97 where as in one district Datiya, the species showed susceptible status with 100% mortality (Table 1). The terrain wise susceptibility status was almost same in all type of terrains.

Table 1: Susceptibility status in 6 districts of Madhya Pradesh

Districts	Insecti- cide	Mosquito tested		Dead 24 hr		Corrected % mortality	Susceptibility status
		Exp	Control	Exp	Control		
Alirajpur	DDT 4%	105	45	8	1	7.6	Resistant
Dhar	DDT 4%	120	45	21	0	17.5	Resistant
Hoshangabad	DDT 4%	105	60	8	2	7.6	Resistant
Khargone	DDT 4%	120	60	15	1	12.5	Resistant
Shivpuri	DDT 4%	100	55	41	0	41.0	Resistant
Datia	DDT 4%	100	45	60	1	60.0	Resistant
Alirajpur	Mal 5%	105	45	61	0	58.1	Resistant
Dhar	Mal 5%	120	45	78	0	65.0	Resistant
Hoshangabad	Mal 5%	105	60	76	1	72.4	Resistant
Khargone	Mal 5%	120	60	78	0	65.0	Resistant
Shivpuri	Mal 5%	100	55	87	2	87.0	Resistant
Datia	Mal 5%	100	45	93	2	93.0	Possible resistant
Alirajpur	Alpha 0.1%	105	45	92	2	87.6	Resistant
Dhar	Alpha 0.1%	120	45	101	1	84.2	Resistant

Hoshangabad	Alpha 0.1%	105	60	101	0	96.2	Possible resistant
Khargone	Alpha 0.1%	120	60	112	1	93.3	Possible resistant
Shivpuri	Alpha 0.1%	100	55	93	2	93.0	Possible resistant
Datia	Alpha 0.1%	100	45	97	2	97.0	Possible resistant
Alirajpur	Delta 0.05%	105	45	101	2	96.2	Possible resistant
Dhar	Delta 0.05%	120	45	112	1	93.3	Possible resistant
Hoshangabad	Delta 0.05%	105	60	100	0	95.2	Possible resistant
Khargone	Delta 0.05%	120	60	116	1	96.7	Possible resistant
Shivpuri	Delta 0.05%	100	55	97	2	97.0	Possible resistant
Datia	Delta 0.05%	100	45	100	2	100.0	Susceptible

Overall, *An.culicifacies* the main malaria vector was found resistant to DDT 4% in all 6 districts surveyed and Malathion resistance in five districts of Madhya Pradesh surveyed. This vector was also found resistant to synthetic pyrethroids Aplhacypermethrin in Dhar and Alirajpur districts and susceptible to Deltamethrin in Datiya. Other districts showed varying level of resistance to both synthetic pyrethroids.

3.4. MALARIA ELIMINATION AND DEMONSTRATION PROJECT (MEDP) MANDLA: ENTOMOLOGICAL SURVEILLANCE AND MONITORING

PI	:	**Dr. A. K. Mishra, Scientist 'E'**
Status	:	**Ongoing**
Funding	:	**Sun Pharmaceutical Industries Limited**

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 the district. We are working for monitoring and supervision of vector control part. The plan of the project includes entomological surveillance and monitoring in every 3 months by NIRTH in different intervention group of villages to assess the impact of intervention on mosquito vector population. Information collected through entomological surveillance techniques assist in the understanding of the spatial and temporal changes in vector species, efficacy and effectiveness of vector control measures employed for malaria vector control. NIRTH team visited Mandla for entomological investigation in April, July and October in 2018 and in January 2019.

Methodology

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.

Work done

The average anopheline density (PMH) during the months May, July and October 2018 and January 2019 observed in 9 villages of different CHCs of Mandla district (Table 1 and 2) was 19.6 which was highest in category A villages (23.9) as compared to category B (15.0) and category C (19.7) villages. *An.culicifacies* and *An.fluviatilis* proportion was 83.4, 57.9, 65.8 and 66.8 in May,

July, October-18 and Jan-19 respectably. The other anopheline species collected were *An.subpictus, An.annularis, An.vagus, An.splendidus, An.pallidus,* and *An.barbirostris*.

A total of 762 *An. culicifacies* and 18 *An. fluviatilis* collected during resting collections were assayed for the presence of malaria parasites by employing diagnostic PCR but none were found positive. *An.culicifacies* sibling species C is most prevalent (52%) followed by E (32%) and B (16%). *An. fluviatilis* sibling species T is most prevalent (73%) followed by U (27%).

Table 1: Relative abundance of indoor resting anophelines (per man hour) in different area of Mandla

Species	Village of category A			Village of category B			Village of category C			Total District		
	Nos	(%)	MHD	Nos	(%)	MHD	Nos	(%)	MHD	Nos	(%)	MHD
An. culicifacies	349	60.9	14.5	195	0.5	8.1	420	70.9	14.0	964	63.2	12.4
An. fluviatilis	4	0.7	0.2	10	0.0	0.4	7	1.2	0.2	21	1.4	0.3
An. subpictus	149	26.0	6.2	72	0.2	3.0	91	15.4	3.0	312	20.5	4.0
An. annularis	44	7.7	1.8	47	0.1	2.0	61	10.3	2.0	152	10.0	1.9
An. vagus	0	0.0	0.0	0	0.0	0.0	1	0.2	0.0	1	0.1	0.0
An. splendidus	9	1.6	0.4	13	0.0	0.5	5	0.8	0.2	27	1.8	0.3
An. palidus	14	2.4	0.6	22	0.1	0.9	3	0.5	0.1	39	2.6	0.5
An. barbirostris	4	0.7	0.2	1	0.0	0.0	4	0.7	0.1	9	0.6	0.1
Total Anopheles	573		23.9	360		15.0	592		19.7	1525		19.6

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 0.05% 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.

Table 2: Month wise indoor resting anophelines (per man hour) in different area of Mandla

Month	Village Criteria	Hrs	Vector			Total Ano.	
			Nos	Density	%	Nos	Density
May-18	A	6	39	6.5	86.7	45	7.5
	B	6	45	7.5	90.0	50	8.3
	C	12	77	6.4	78.6	98	8.2
	Total	24	161	6.7	83.4	193	8.0
Jul-18	A	6	172	28.7	54.4	316	52.7
	B	6	87	14.5	58.0	150	25.0
	C	6	141	23.5	62.7	225	37.5
	Total	18	400	22.2	57.9	691	38.4
Oct-18	A	6	110	18.3	69.6	158	26.3
	B	6	64	10.7	50.0	128	21.3
	C	6	109	18.2	75.7	144	24.0
	Total	18	283	15.7	65.8	430	23.9
Jan-19	A	6	32	5.3	59.3	54	9.0
	B	6	9	1.5	28.1	32	5.3
	C	6	100	16.7	80.0	125	20.8
	Total	18	141	7.8	66.8	211	11.7
Grand Total			985		64.6	1525	

Results of the susceptibility tests, 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 3).

Table 3: Susceptibility of *An.culicifacies* carried out by NIRTH in Mandla

Insecticide	% Mortality
DDT 4%	28.0
Malathion5%	84.0
Alphacypermethrin 0.05%	95.0
Deltamethrin 0.05%	98.3

Cone bioassays were carried out in July and 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 the exposure, 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 were 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 87 to 97% (Figure 1). The tests carried out on day 30 after spraying, the mortality observed was 44 to 62%. This poor mortality indicates that the spraying was not done properly.

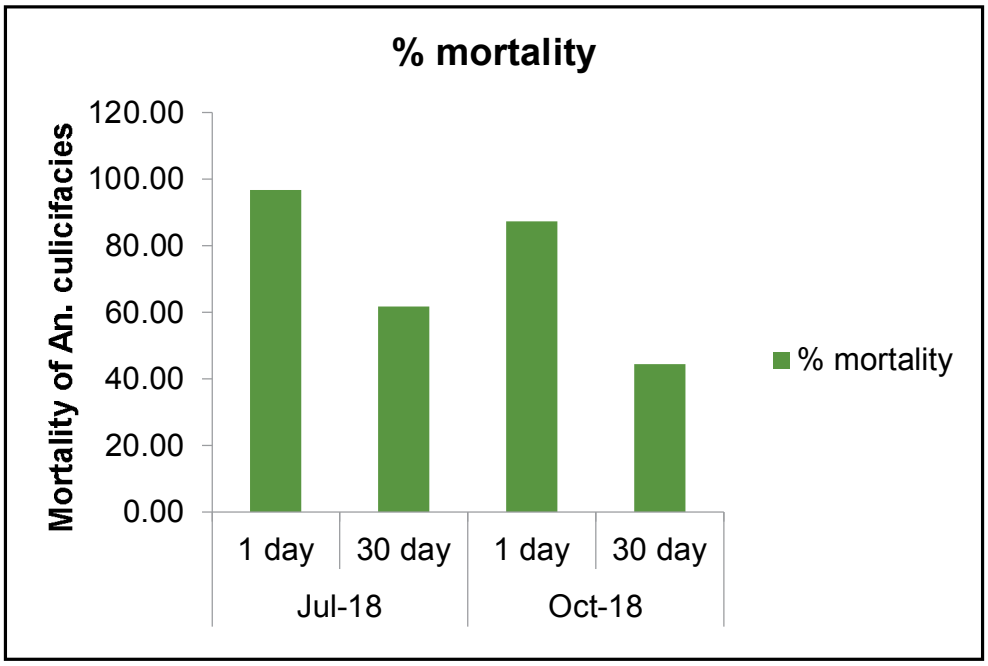


Figure 1: Cone Bioassay in sprayed villages of Mandla

3.5. A PILOT SCALE BIO-ECOLOGICAL STUDIES ON AEDES AEGYPTI POPULATION FOR DEVELOPING ALTERNATE DENGUE CONTROL STRATEGY

PI	**:**	**Dr. A. K. Mishra, Scientist 'E'**
Status	**:**	**Ongoing**
Funding	**:**	**ICMR, New Delhi**

Arbo-viral diseases such as dengue and chikungunya are on an increasing trend since last decade. These are vector borne /vector transmitted infections causing significant public health problems across the country. During the last two decades owing to the transformation of life style and increasing use of water and water storage practices in the community prevalence of vector *Ae. aegypti* has increased tremendously. Because of certain life style characteristics associated with *Ae. aegypti* incidence of vector borne viral infections has increased exponentially. Since no drug/drugs/vaccines are available so far for these diseases, control of these diseases relies mainly on the reducing transmission by way of vector management strategies. In the light of increased dengue incidence in India, particularly rural and in tribal areas, it is important to have a comprehensive knowledge of the population parameters of vector such as temporal and spatial distribution of the species, the absolute population density, DENV /CHIKV infection status of the population etc. in order to identify and implement appropriate vector control methods.

The multicentric study is being carried out in dengue prone areas around Jabalpur, Madhya Pradesh with objectives - to enumerate Aedes breeding habitats, estimate their productivity at household level and identify the key containers; to determine the indices of Aedes mosquitoes and relative proportion of *Aedes aegypti* and *Ae. albopictus; t*o study the spatial and temporal distribution of *Ae. aegypti* adults, and to estimate dengue infection rates in the natural *Ae. aegypti* population.

Methodology

The study is being carried out in two semi urban areas of Jabalpur district namely Barela and Shahpura. Populations of these two towns are 12600 and 13600 respectively as per the 2011 census record with about 3000 households in each town. Both the towns are located on state high way at equal distance from NIRTH head quarter. Population resides on both side of the road probably in the ratio of 60:40. Each site is divided in two clusters, one on the right side of the road

and another on the left side of the road. In each cluster of both the sites three wards has been selected randomly keeping in mind the representation of all strata of society in the study.

In both the areas piped water supply is available which is not very regular and as such people store water in different containers. Fetching of water from Hand pump and wells is also common in periphery of both the areas. Number of households in each ward varies from 150 to 2700. Therefore, assuming the bretaeu index of 3-5 in each area, 50 households in each ward were selected by systematic sampling. The frequency of selected houses in the ward varied from alternate house to every fourth house depending upon the numbers of approximate households. Every selected households have been surveyed once in a month and all the water filled containers were examined with torch. As such at least 300 households in each area has been searched. Pupa and 4th instar larvae were brought to laboratory for further development and emergence of mosquito.

Work done

Mosquitoes were collected from the 8 households every fortnight among the enumerated households using torch, suction tube and mechanized aspirator in the morning between 8 to 11 AM. BG sentinel traps were also installed for collection of Aedes species for 14 days. Traps were searched for trapped mosquitoes on day 1, 3 ,7 and 14. Trapped mosquitoes were taken out in test tubes for further identification. Species belonging to Aedes genera were stored in TRI reagent for further pooling and analysis the presence of Dengue and Chikungunya virus infections by PCR methods. House index (HI), Container index (CI) and Breteau index (BI) calculated as parameters of prevalence and its temporal and spatial variation.

During the period from August 2018 to April 2019, overall 2741 and 2776 households having 20973 and 16417 containers were searched from Barela and Shahpura town respectively for the presence of Aedes species immature stages. 257 and 215 households were having positive containers (360 and 282) for Aedes larvae. Overall HI, CI and BI were 9.4,1.7 and 13.1 and 7.7,1.7 and 10.2 in Barela and Shahpura respectively. The indices varied from ward to ward in both the areas. The wards having population engaged in making earthen pots were having more prevalence of Aedes immature stages in both the areas. Ward wise entomological indices are given in table 1 and 2. The prevalence of Aedes immature varied from month to month with peak recorded in August and September in both the areas and there after prevalence reduced significantly because of environmental conditions and the presence of survey team which have very positive impact on

the attitude of local population and people themselves discard the breeding sites. Month wise indices are given in table 3 and 4.

Among the positive containers, disused containers and mud pot were the most preferable breeding habitats at both the sites followed by cement tanks. Coolers at barela area contributed significantly more breeding than in Shahpura town (Table 5).

Table 1: Ward wise container examined and entomological indices in Barela town

Ward No.	Total HH exam	No.	HH Pos	Cont. Pos	Cont with Pupa	No. Pupa	HI	CI	BI
1	453	3370	33	47	3	115	7.3	1.4	10.4
3	453	3564	42	45	12	140	9.3	1.3	9.9
5	485	2830	42	44	7	102	8.7	1.6	9.1
7	450	3015	36	56	6	43	8.0	1.9	12.4
11	450	4367	64	96	7	70	14.2	2.2	21.3
13	450	3827	40	72	6	700	8.9	1.9	16.0
	2741	20973	257	360	41	1170	9.4	1.7	13.1

Table 2: Ward wise container examined and entomological indices in Shahapura

Ward No.	Total HH exam	No.	HH Pos	Cont. Pos	Cont with Pupa	No. Pupa	HI	CI	BI
1	475	2764	40	54	4	60	8.4	2.0	11.4
3	452	3435	66	87	12	143	14.6	2.5	19.2
5	468	1999	30	38	8	210	6.4	1.9	8.1
10	456	2410	16	18	0	0	3.5	0.7	3.9
12	450	3386	34	46	4	85	7.6	1.4	10.2
14	475	2423	29	39	2	30	6.1	1.6	8.2
	2776	16417	215	282	30	528	7.7	1.7	10.2

Table 3: Month wise number of containers examined and entomological indices in Barela

Months	Total HH exam	No.	HH Pos	Cont. Pos	Cont with Pupa	No. Pupa	HI	CI	BI
Aug	310	2142	94	129	17	295	30.3	6.0	41.6
Sep	309	2278	64	89	9	203	20.7	3.9	28.8
Oct	309	2111	10	14	1	10	3.2	0.7	4.5
Nov	308	1894	5	5	0	0	1.6	0.3	1.6
Dec	308	1911	14	14	0	0	4.5	0.7	4.5
Jan	308	1391	11	12	0	0	3.6	0.9	3.9
Feb	308	1466	13	15	0	0	4.2	1.0	4.9
Mar	308	1430	0	0	0	0	0.0	0.0	0.0
Apr	308	1794	4	4	3	20	1.3	0.2	1.3

Table 4: Month wise number of containers examined and entomological indices in Shahpura

	Shahpura			Barela		
Container	No. Exam	Pos	%	No. Exam	Pos	%
Cooler	192	3	1.6	116	13	11.2
Cement Cistern	296	3	1.0	289	16	5.5
Cement Tank	765	53	6.9	578	48	8.3
Ceremic drum	109	0	0.0	183	2	1.1
Metal Drum	503	0	0.0	409	2	0.5
Metal container	2807	9	0.3	3068	4	0.1
Mud Pot	547	30	5.5	761	62	8.1
Mud Pot disuse	210	31	14.8	387	57	14.7
Overhead Tank C	13	0	0.0	32	2	6.3
Overhead Tank P	668	1	0.1	445	6	1.3
Plastic Drum	1489	19	1.3	1893	49	2.6
Plastic container	11780	54	0.5	11967	55	0.5
Plastic contain. D	496	42	8.5	649	35	5.4
UGT	65	11	16.9	63	0	0.0
Dis use Container	41	28	68.3	46	25	54.3

Table 5: Specific Breeding sites in Study areas

	Shahpura			Barela		
Container	**No. Exam**	**Pos**	**%**	**No. Exam**	**Pos**	**%**
Cooler	192	3	1.6	116	13	11.2
Cement Cistern	296	3	1.0	289	16	5.5
Cement Tank	765	53	6.9	578	48	8.3
Ceremic drum	109	0	0.0	183	2	1.1
Metal Drum	503	0	0.0	409	2	0.5
Metal container	2807	9	0.3	3068	4	0.1
Mud Pot	547	30	5.5	761	62	8.1
Mud Pot disuse	210	31	14.8	387	57	14.7
Overhead Tank C	13	0	0.0	32	2	6.3
Overhead Tank P	668	1	0.1	445	6	1.3
Plastic Drum	1489	19	1.3	1893	49	2.6
Plastic container	11780	54	0.5	11967	55	0.5
Plastic contain. D	496	42	8.5	649	35	5.4
UGT	65	11	16.9	63	0	0.0
Dis use Container	41	28	68.3	46	25	54.3

In the beginning of study, 6 hours per fortnight were spent in collection of mosquitoes. Because of negligible density the times and houses increased and 12 hours per fortnight were spent in each area (two hours in each ward). Only 46 and 17 specimens of Aedes genera were collected from Barela and Shahpura areas. *Ae. aegypti* is the predominant species in both the areas. No specimen of *Ae. albopictus* and *Ae. vittatus* was recorded from Barela Town.

3.6. MOLECULAR CHARACTERIZATION OF *PLASMODIUM FALCIPARUM* HEME DETOXIFICATION PROTEIN (HDP) FROM CENTRAL INDIA: AN APPROACH FOR MALARIA DIAGNOSTIC TOOL

PI	:	**Dr. Praveen Bharti, Scientist 'E'**
Status	:	**Ongoing**
Funding	:	**ICMR, New Delhi**

The study is being carried out with objectives to study the genetic polymorphism of the gene encoding heme detoxification protein (HDP); Cloning, expression and purification of Plasmodium falciparum heme detoxification protein; to measure the antibody response against heme detoxification protein in the malaria patients; and to investigate the stage specific expression of heme detoxification protein during the erythrocyte cycle.

Methodology

This study was carried out in tribal and forested areas of Balaghat districts of Madhya pradesh. Total of 200 blood samples were collected and genomic DNA was isolated using the commercial kit. Molecular diagnosis of Plasmodium species (*P. falciparum, P. vivax, P. ovale*, and *P. malariae*) was performed using nested PCR.

Work done

Out of 200 samples, 37 samples were found to have mixed infections and rest were *P. falciparum* mono infection (table no 1). A total of 138 mono-infections of *P. falciparum* samples (using infinite population statistics) were selected for the study purpose and 56 samples were analysed for diversity and repeat region (Figure 1). Diversity analysis of HDP showed the insertion of four nucleotides in the one of the isolate, although this is the short fragment of around 500bp which has shown the limited variation (Figure 2).

Table 1: Details of the mixed infection

Species	No. of samples
PF	163
PF+PV	33
PF+PM	4
Total	**200**

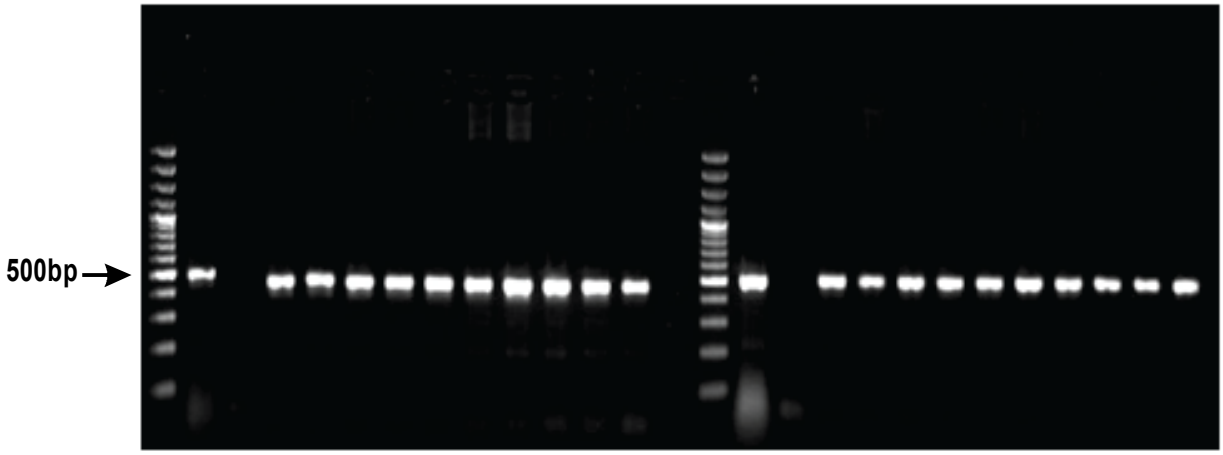


Figure 1: Representative gel picture (1.2%of agarose), showing amplification of *Pf*HDP gene.

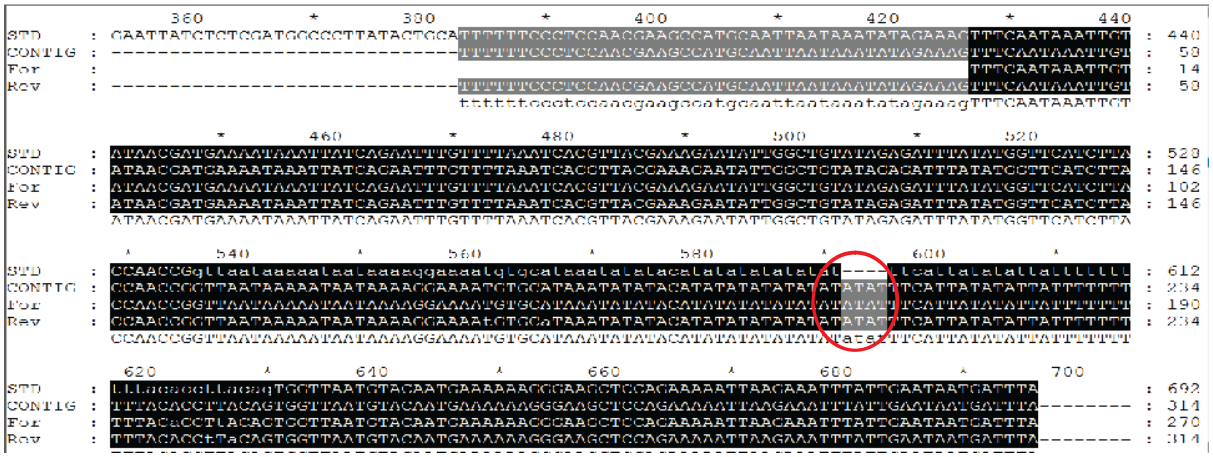


Figure 2: Showing the insertion of four nucleotide between position 591 and 592

3.7. STUDY ON HRP2 AND HRP3 GENE IN PLASMODIUM FALCIPARUM PARASITES FROM ODISHA STATE, INDIA: A PROSPECTIVE EVALUATION

PI	:	**Dr. Praveen Bharti, Scientist 'E'**
Status	:	**Completed**
Funding	:	**Livo-link Foundation (Tata Trusts)**

Plasmodium falciparum histidine rich protein 2 (*Pf*HRP2) is used as the major biomarker in most of the commercially available Rapid Diagnostic Tests (RDT) due to its exclusive occurrence in *P. falciparum*. HRP3 is a comparative protein produced by *P. falciparum* which shows 80-90% sequence homology with HRP2 and is identified by McAb against HRP2 in RDT due to its high sequence similarity. Deletion of hrp2 gene has become a major threat for the diagnosis of malaria especially in remote tribal area where RDT is the only option left for the identification of malaria parasite due to unavailability of Microscopy and health care laboratory facilities.

The objective of the project was to evaluate the presence or absence of *pfhrp2* and/or *pfhrp3* gene in *P. falciparum* samples from a malaria-endemic site, Kalahandi district of Odisha, India.

Methodology

Screening of malaria parasite was initially done by microscopy in the district hospital of Kalahandi and samples positive for *P. falciparum* mono infection were collected for further study. Genomic DNA of the parasite was extracted from the whole blood and *P. falciparum* mono infection was confirmed by PCR using 18S rRNA. PCR amplification of hrp2, hrp3 and their flanking gene were performed on *P. falciparum* mono infection samples.

Results

A total of 4515 samples were screened by microscopy. Out of 4515, 426 samples were enrolled for the study. Of which 62.4% (n=266) were positive for *P. falciparum*, 0.93% (n=4) were positive for *P. vivax* and 1.4% (n=6) were positive for both *falciparum* and *vivax*. A total of seven samples were found to be RDT negative and microscopy positive for *P. falciparum*. Samples positive for *P. falciparum* (n=272) were tested by nested PCR using 18S rRNA. Out of 272 microscopically confirmed *P. falciparum* positive samples, 86.7% (n= 236) were confirmed as *P. falciparum* mono infection including seven samples that were negative by RDT. Mixed infection of *P. falciparum* and

P. vivax were present in 9.2 % (n=25), *P. falciparum* and *P. malariae* in 0.73% (n=2), *P. falciparum* and *P. ovale* in 0.37% (n=1) and quadruple infection having all four species were present in 0.73% (n=2). About 2.2% (n=6) samples were negative by PCR (fig 1). PCR amplification of *hrp2, hrp3* and their flanking gene showed that 2.57 % samples (n=7) were lacking the *pfhrp2* and its flanking gene while hrp3 is present in all seven samples (table 1 and fig 2-4).

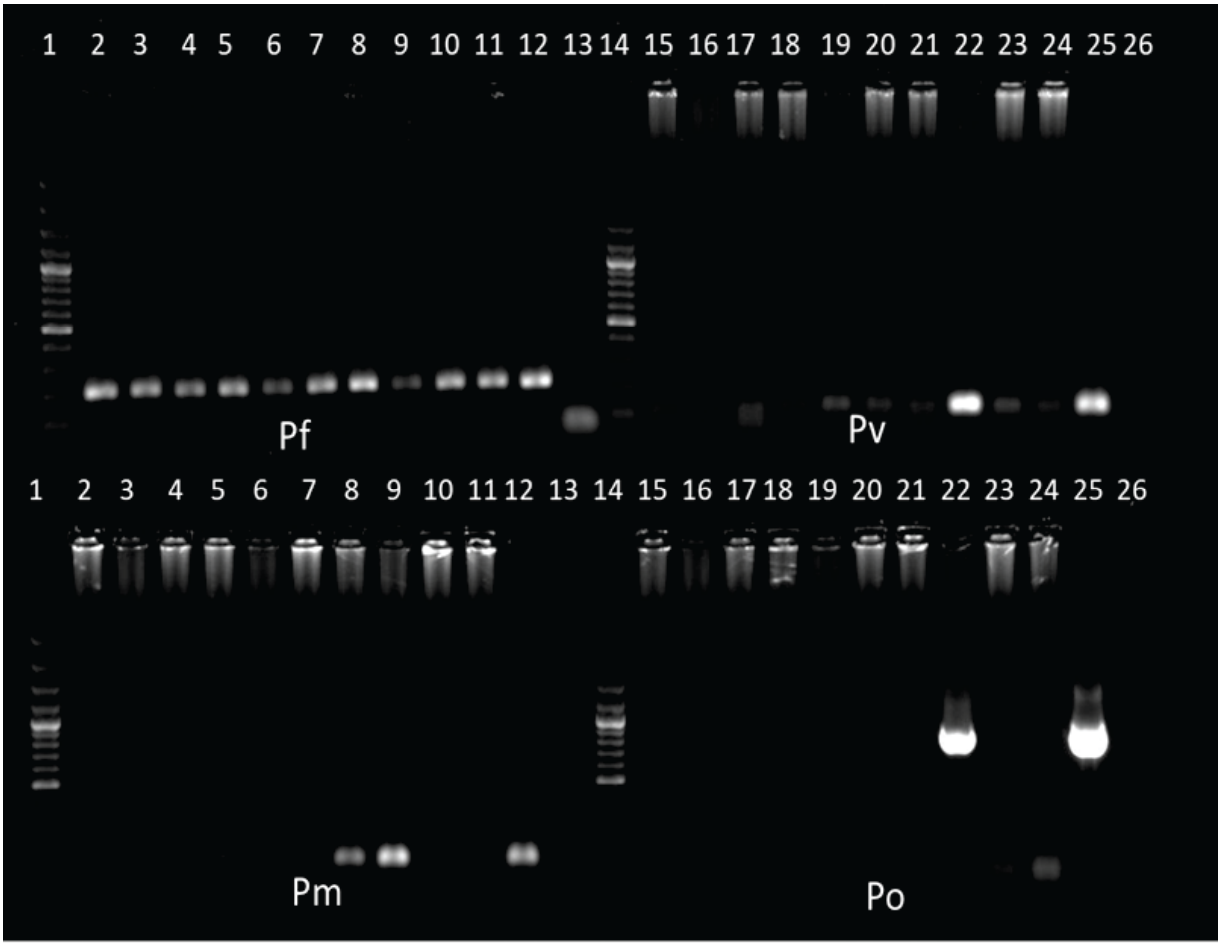


Figure 1: Agarose gel picture showing PCR amplification of 18s RNA gene to detect four (*P. falciparum, P. vivax, P. malariae, P. ovale*) plasmodium malaria species.

Upper Lane *P. falciparum* (205-bp fragment) Lane 1, ladder, lane 2-11 - positive sample; lane 12 positive (+) control and lane 13 negative (-) control. ***P. vivax*** (112-bp fragment) Lane 14 is ladder, lane 15 to 21 and lane 23, 24 negative sample, lane 22 positive sample; lane 25 positive (+) control and lane 26 negative (-) control. **Lower Lane *P. malariae*** (144-bp fragment) Lane 1 is ladder lane 2 to 7 and lane 10, 11 negative samples, lane 8-9 positive sample; lane 12 positive (+) control and lane 13 negative (-) control. ***P. ovale*** (800bp fragment) Lane 14 is ladder, lane 15 to 21 and lane 23, 24 negative sample lane 22 positive sample; lane 25 positive (+) control and lane 26 (-) negative control

Pfhrp2 exon 2

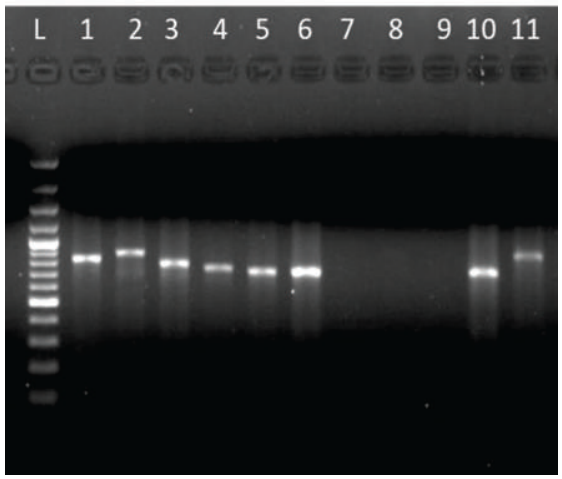


Figure 2: Gel picture showing lack of amplification in RDT negative samples (lane 7-9)

Pfhrp3 exon 2

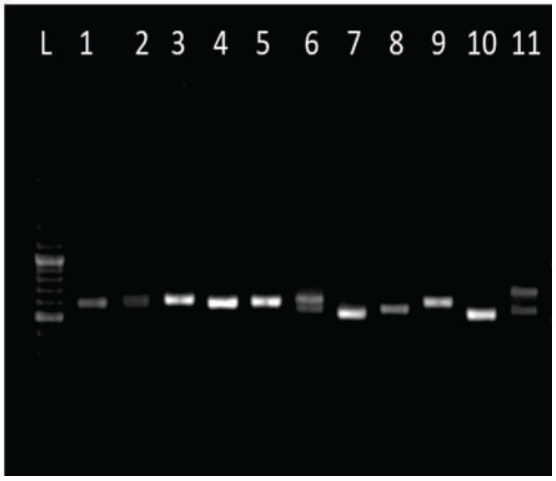
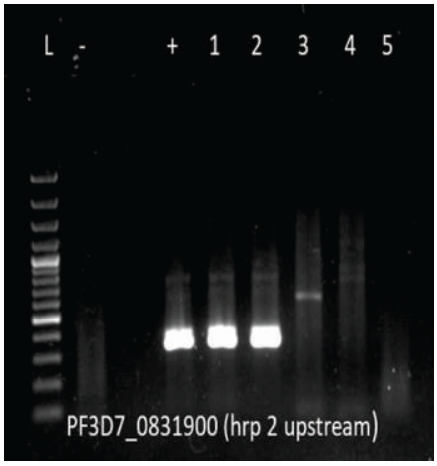
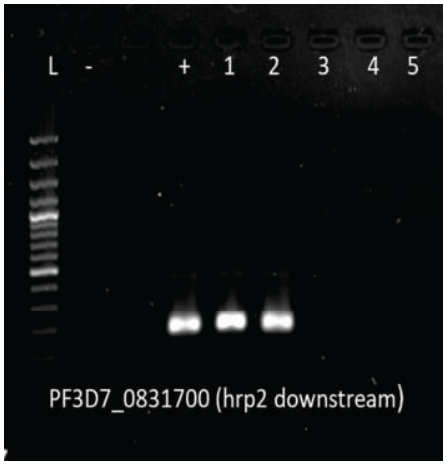
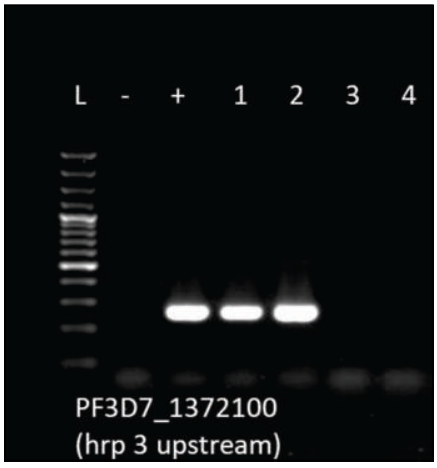


Figure 3: Gel picture showing PCR amplification of pfhrp3 gene







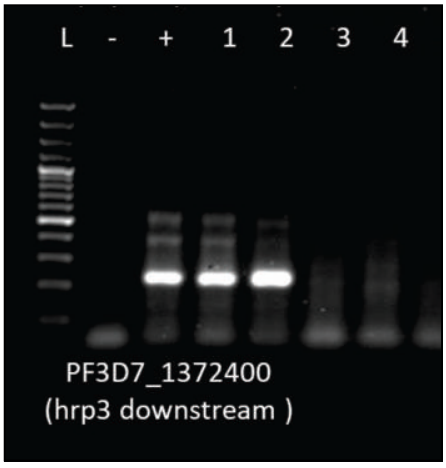


Figure 4: Gel picture showing lack of amplification of hrp2 flanking gene (lane 3-5) and hrp3 flanking gene (lane 3 and 4) in RDT negative samples

Table 1: Deletion pattern of pfhrp2 and pfhrp3 and their flanking gene

Isolate ID	PCR Result (18S rRNA)	Hrp2 exon 2	Hrp2 exon 1-2	Hrp2 upstream	Hrp2 downstream	Hrp3 exon 2	Hrp3 exon1-2	Hrp3 upstream	Hrp3 downstream
LE375	+	-	+	-	-	+	+	+	+
LE377	+	-	-	-	-	+	+	+	+
LE379	+	-	-	-	+	+	+	+	+
LE392	+	-	-	-	-	+	-	-	-
LE395	+	-	-	-	-	+	+	+	+
LE402	+	-	-	-	-	+	+	+	+
LE410	+	-	+	-	-	+	-	-	-

3.8. MOLECULAR SURVEILLANCE OF *PLASMODIUM FALCIPARUM* DRUG RESISTANCE MARKERS IN CLINICAL SAMPLES FROM INDIA

PI	**:**	**Dr. Praveen Bharti, Scientist 'E'**
Co-I	**:**	**Nazia A Ali, Technical Officer**
Status	**:**	**Ongoing**
Funding	**:**	**Intramural**

The objective of the study is to monitor major antimalarial drug resistance gene from across the India. Mutations in 4 different genes of *Plasmodium falciparum* (dhfr, dhps, mdr and K-13 propeller) that confer resistance to sulphadoxine-pyrimethamine and artemisinin therapy will be analyzed. Samples collected from 8 malaria endemic states of India.

Methodology

Molecular markers were analysed from *Plasmodium falciparum* infected blood samples using polymerase chain reaction and DNA sequencing method. Obtained DNA sequence were analysed with reference sequence.

Work done

Till date 100 DNA samples were analysed for antimalarial resistance markers.

Mutation analysis of Pfk13gene: Total 80 samples were successfully sequenced and analyzed; no mutation was observed.

Mutation analysis in Pfmdr gene: 80 samples were sequenced**;** 20(25%) isolates have point mutations with genotype A551T (amino acid Y184F non-synonymous) G646 (amino acid V216I non-synonymous) and T306C (synonymous, no change in amino acid). Rest 60(75%) were wild type.

***Mutation analysis in Pfdhfr* gene:** 87 samples were sequenced successfully and analyzed. 12(13.8%) have mutations with C59R and S108N, 75(86.2%) were wild type.

***Mutation analysis in Pfdhps* gene:** 86 samples were sequenced and analyzed. 85(98.8%) isolates have mutations with G437A. Only 1% was wild type (Figure 1 a, b, c & d).

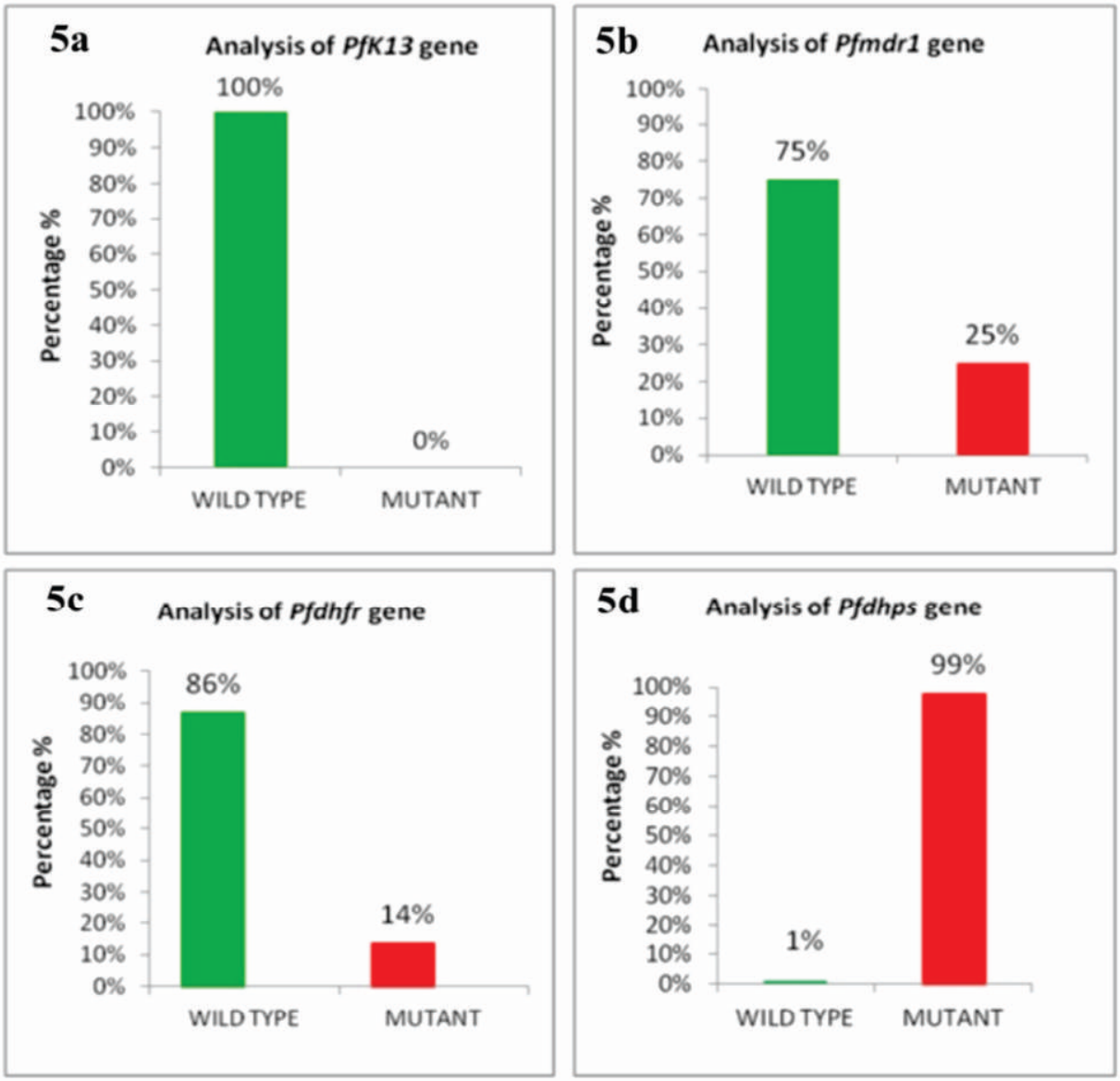


Figure 1a-d: Percentage of mutations in *Pfk13, Pfmdr1, Pfdhfr and Pfdhps* gene.

3.9. MANDLA-MALARIA ELIMINATION DEMONSTRATION PROJECT (M-MEDP)

PI	**:**	**Dr. Praveen Bharti, Scientist 'E'**
Co- Is	**:**	**Dr. Man Mohan Shukla, Scientist 'F'**
		Dr. A. K Mishra, Scientist 'E'
		Dr. K. B Saha, Scientist 'F'
		Dr. R. K Sharma, Scientist 'E'
Status	**:**	**Ongoing**
Funding	**:**	**PPP of Govt. of M.P., FDEC-India, and ICMR through ICMR-NIRTH**

Mandla is bordered by district Balaghat on the south, by the state of Chhattisgarh on south-east border, by district Dindori on the east, by district Seoni on the west and by district Jabalpur in the north. It is evident that the district is surrounded by malaria-endemic districts and states with high risk of inter-border transmission of malaria. The main objective of the study is to demonstrate successful elimination of malaria from 1233 villages of Mandla district and use the lessons learnt for eliminating malaria from rest of Madhya Pradesh and the country.

Methodology

Project use evidence-based proven strategies of case management (rapid diagnosis and prompt treatment of malaria case), Integrated Vector Management (indoor residual spray, minor engineering, long-lasting insecticide treated nets, etc.), robust surveillance system and appropriate Behaviour Change Communication (BCC) strategy.

1. ***Robust surveillance and case management:*** The project follows the WHO recommended T4 – Track, Test, Treat and Track strategy for malaria surveillance. Positive case reporting is done in real-time via WhatsApp in a group containing all district-level malaria personnel for prompt notification and response. It includes Chief Medical & Health Officer, Block Medical Officers, Malaria Inspectors, Malaria Technical Supervisors, Malaria Field Coordinators, MEDP district staff etc. Regular reports of household visits and line-list of febrile cases are notified to the district office via SOCH. The application works in offline mode and can be synchronized with the server via internet at the end of the day. The project also collects blood slides and filter paper samples for every 10th febrile case for microscopy and PCR based assays, respectively. These samples are transported to the district office for fixing and sent to ICMR-NIRTH for further investigations.

2. *Vector Control:* The project monitors the Indoor Residual Spray (IRS) and post-distribution usage of Long Lasting Insecticide treated bed nets (LLIN) distributed by the Government of Madhya Pradesh. The project also performs routine entomological investigations on a quarterly basis with the help of its technical partner – ICMR NIRTH. These investigations help us monitoring the quality of IRS, study the vector behavior and biology etc.

3. IEC/BCC activities: The project emphasizes Information Education Communication and Behavior Change Communication of the community of Mandla. MEDP has developed original IEC/BCC material consisting of calendars, flipbooks, job-aids, posters, booths etc. based on direct feedback from the community. Currently, IEC/BCC activities are being performed in middle schools, community markets (*haat bazaars)* and as part of regular door-to-door fever surveillance.

4. *Capacity building and Continuous monitoring & learning:* The project is working on capacity building of the VMWs/MFCs along with Accredited Social Health Activists (ASHAs), Auxiliary Nurse Midwifery (ANMs) and Multi Purpose Workers (MPWs) of the state. An exhaustive needs-assessment on malaria knowledge and practices of ASHAs of the district was undertaken by the project and findings with recommendations were shared with the state. Following which, MEDP was invited to participate in the trainings of 1000+ ASHAs of the district.

Work done

Malaria Surveillance for the year 2018 -2019, total of 103791 fever cases were observed and tested by rapid diagnostic test (RDT) in the field during the mass survey from April to March 2019, of which 185 samples were positive for malaria. Detail of mass screening for positivity of malaria cases in give in figure-1.

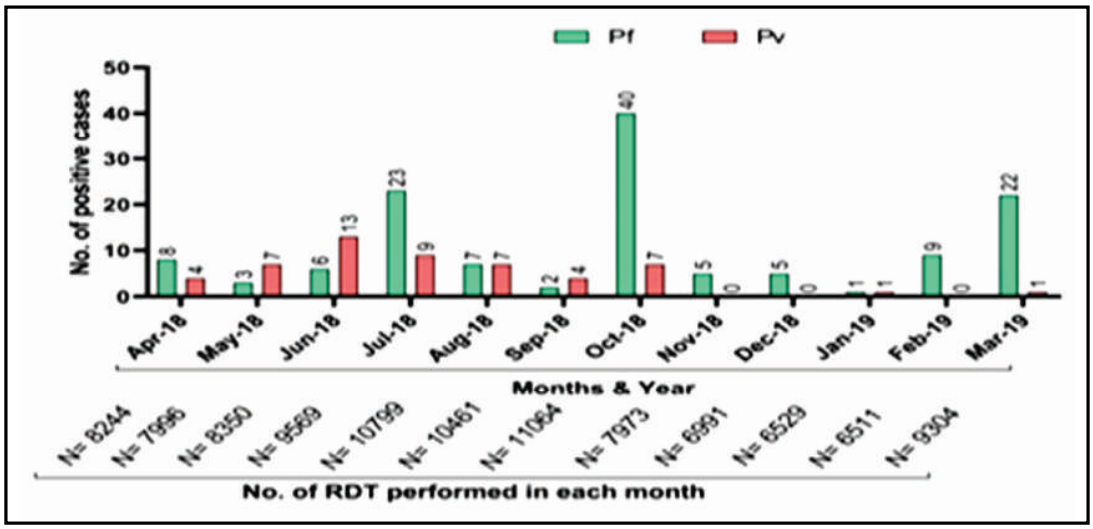


Figure 1: Graph showing month wise malaria positivity by Rapid diagnostic tests
Pf- *Plasmodium falciparum*, Pv – *Plasmodium vivax*.

Figure-2 shows imported cases from various districts and states all over the country to different areas of Mandla district in 2018.

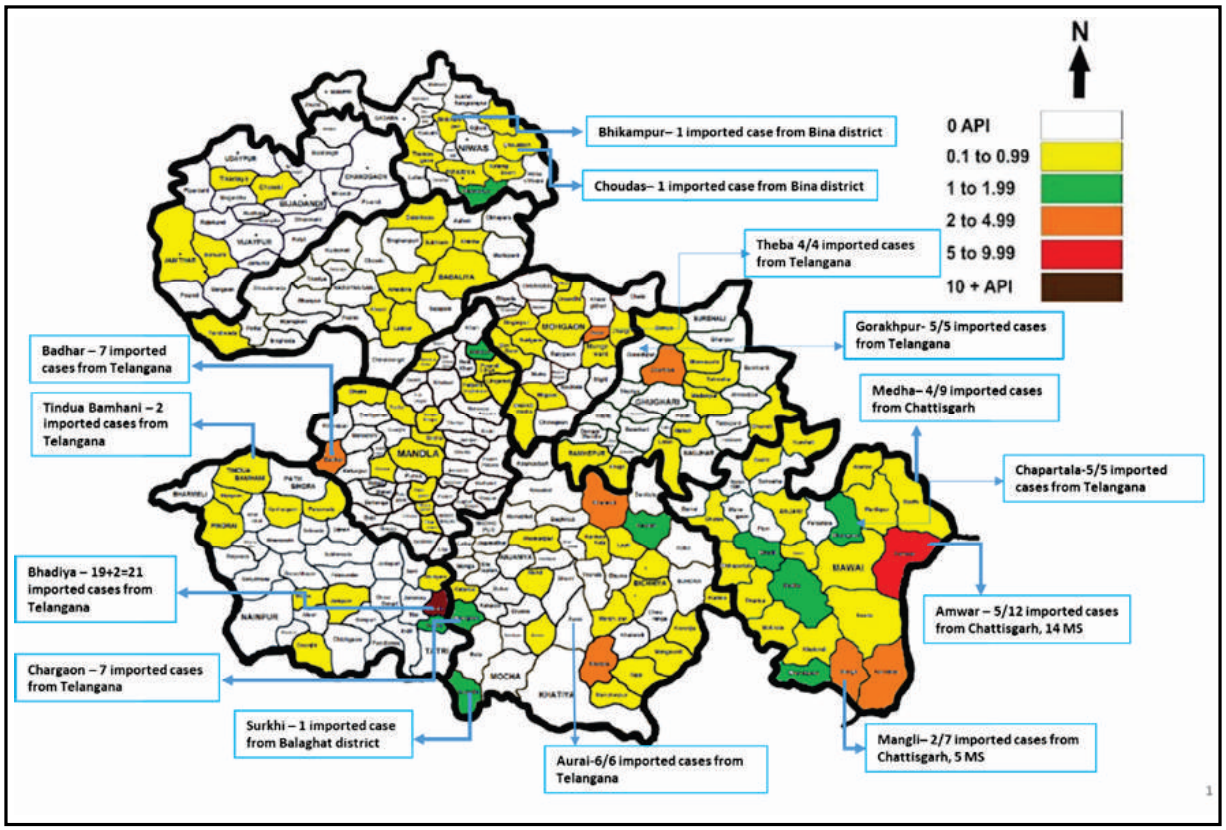


Figure 2: Migration of malaria cases in different parts of Mandla from various locations

Mass screening: As part of the operational plan, MEDP started the Cluster Combination Approach (CCA) exercise in select areas to assess the asymptomatic malarial case load and to determine the most cost effective model for malaria elimination. The planning of the exercise was done with ICMR NIRTH. RDT tests were performed for assessing malaria positivity of the cases. The mop-up of mass screening started on September 29, 2018 and ended on October 5, 2018 yielding a total coverage of 74.3% with a total of 42 *Plasmodium falciparum* cases.

3.10. STUDY OF ASYMPTOMATIC MALARIA BURDEN AND MALARIA VECTOR DYNAMICS IN MANDLA DISTRICT OF MADHYA PRADESH: MALARIA ELIMINATION DEMONSTRATION PROJECT (MEDP)

PI	:	**Dr. Praveen Bharti, Scientist 'E'**
Co- Is	:	**Dr. Man Mohan Shukla, Scientist 'F'**
		Dr. A. K Mishra, Scientist '
		Dr. K. B Saha, Scientist 'F'
		Dr. R. K Sharma, Scientist 'E'
Status	:	**Ongoing**
Funding	:	**ICMR, New Delhi**

The overall objective of the project is to determine the burden of sub-microscopic/ sub-RDT asymptomatic malaria, molecular characterization of malaria parasites and entomological investigations of vector for malaria control and management. The specific objectives of the study are - to determine burden of the symptomatic malaria and characterization of malaria parasite using molecular tools (to support the MEDP); to determine the seasonal density, diversity, Plasmodium specific sporozoite rate of malaria vectors and to assess insecticide susceptibility status of these vectors (to support the MEDP); to determine the prevalence of sub-microscopic/ sub- RDTs asymptomatic malarial infection in selected areas of symptomatic malaria (low and high incidence) of Mandla district, M.P. (Research Component), and to assess the transmissibility potential of asymptomatic malaria subjects/cases. (Research Component).

Methodology

This study is complementary project of ongoing Mandla -Malaria Elimination Demonstration Project (M-MEDP) in Mandla district of Madhya Pradesh (M.P). Mandla District is one of the malarious and highly forested district of M.P. dominated by tribal population. Mandla contributes about 5% of total malaria cases from M.P. This study is being carried out in Mawai and Narayanganj blocks of Mandla district of M.P.

Fortnightly survey in each village round the year was conducted by village workers of the MEDP staff using rapid diagnostic tests. Blood smears were prepared from every 10th fever cases to find out the malaria parasite using microscopy and PCR to determine the sensitivity of RDT. DNA was isolated from blood samples collected in filter paper using Chelax beads. After DNA isolation molecular diagnosis for detection of Plasmodium species was done using species-specific nested PCR, based on amplification of the 18S ribosomal RNA gene. The presence or absence of each

species was assessed by standard agarose gel electrophoresis and ethidium bromide staining of the PCR products.

Work done

Mass screening: A total of 1621 blood smears were collected from the field site. Further anlaysis and microscopic examination showed that total twenty six blood smears were positive for malaria. Out of 26 (1.6%), 25 of them were positive for *P. falciparum* and only one *P. vivax*. Total twenty two samples were positive from PCR and out of 22 PCR positive; sixteen samples were having mono infection of *P. falciparum*. Rests of the six samples were having mix infection of other species than *P. falciparum* (figure 1).

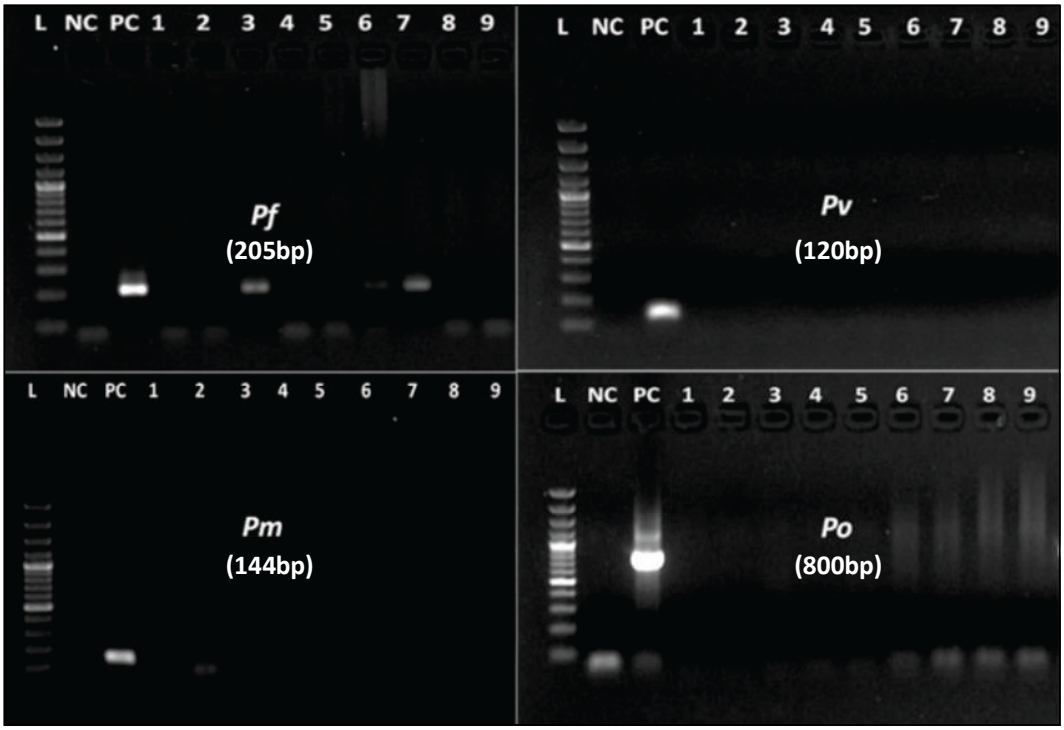


Figure 1: Gel image showing diagnostic PCR results of four Plasmodium species.

(B) *Entomological surveillance Methodology:* 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.

Susceptibility test against adult *An. culicifacies* mosquitoes was conducted according to WHO standard guidelines to ascertain the present susceptibility status. Susceptibility test was done

using standard WHO insecticide susceptibility test kit of different concentrations of candidate insecticides (DDT 4.0%, Malathion 5.0%, respective doses of different synthetic pyrethroids i. e. Alphacypermethrin 0.05% and Deltamethrin 0.05%). 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.

Residual activity of insecticide formulations sprayed in the district was determined during each IRS through cone bioassays on different sprayed surfaces such as cement walls, mud walls, thatch etc. in the villages. The bioassays were done on day 1 and 30 post-spraying using WHO cones.

Work done

The average anopheline density (PMH) during the months May, July and October 2018 and January 2019 observed in 9 villages of different CHCs of Mandla district (Table1and2) was 19.6 which was highest in category villages (23.9) as compared to category B(15.0) and category C(19.7) villages. *An. culicifacies* and *An. fluviatilis* proportion was 83.4, 57.9, 65.8 and 66.8 in May, July, October-18 and Jan-19 respectably. The other anopheline species collected were *An. subpictus, An. annularis, An. vagus, An. splendidus, An. pallidus,* and *An. barbirostris*.

A total of 762 *An. culicifacies* and 18 *An. fluviatilis* collected during resting collections were assayed for the presence of malaria parasites by employing diagnostic PCR but none were found positive. *An. culicifacies* sibling species C is most prevalent (52%) followed by E (32%) and B (16%). *An. fluviatilis* sibling species T is most prevalent (73%) followed by U (27%).

Table 1: Relative abundance of indoor resting anophelines (per man hour) in different area of Mandla

Species	Village of category A			Village of category B			Village of category C			Total District		
	No.s	(%)	MH D	No.s	(%)	MHD	No.s	(%)	MHD	No.s	(%)	MHD
An. culicifacies	349	60.9	14.5	195	0.5	8.1	420	70.9	14.0	964	63.2	12.4
An. fluviatilis	4	0.7	0.2	10	0.0	0.4	7	1.2	0.2	21	1.4	0.3
An. subpictus	149	26.0	6.2	72	0.2	3.0	91	15.4	3.0	312	20.5	4.0
An. annularis	44	7.7	1.8	47	0.1	2.0	61	10.3	2.0	152	10.0	1.9
An. vagus	0	0.0	0.0	0	0.0	0.0	1	0.2	0.0	1	0.1	0.0
An. splendidus	9	1.6	0.4	13	0.0	0.5	5	0.8	0.2	27	1.8	0.3
An. palidus	14	2.4	0.6	22	0.1	0.9	3	0.5	0.1	39	2.6	0.5
An. barbirostris	4	0.7	0.2	1	0.0	0.0	4	0.7	0.1	9	0.6	0.1
Total Anopheles	573		23.9	360		15.0	592		19.7	1525		19.6

Table 2: Month wise indoor resting anophelines (per man hour) in different area of Mandla

Month	Village Criteria	Hrs	Vector			Total Anopheles	
			No.s	Density	%	No.s	Density
May-18	A	6	39	6.5	86.7	45	7.5
	B	6	45	7.5	90.0	50	8.3
	C	12	77	6.4	78.6	98	8.2
	Total	24	161	6.7	83.4	193	8.0
Jul-18	A	6	172	28.7	54.4	316	52.7
	B	6	87	14.5	58.0	150	25.0
	C	6	141	23.5	62.7	225	37.5
	Total	18	400	22.2	57.9	691	38.4
Oct-18	A	6	110	18.3	69.6	158	26.3
	B	6	64	10.7	50.0	128	21.3
	C	6	109	18.2	75.7	144	24.0
	Total	18	283	15.7	65.8	430	23.9
Jan-19	A	6	32	5.3	59.3	54	9.0
	B	6	9	1.5	28.1	32	5.3
	C	6	100	16.7	80.0	125	20.8
	Total	18	141	7.8	66.8	211	11.7
Grand Total			985		64.6	1525	

Results of the susceptibility tests, 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 with varying level of resistance to Alphacypermethrin and susceptibility to Deltamethrin. Corrected % mortality of *An. culicifacies* was found 28, 84, 95 and 98% against DDT, Malathion, Alphacypermethrin and Deltamethrin respectively (Table 3).

Table 3: Susceptibility of An.culicifaciescarried out by NIRTH in Mandla

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

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 the exposure, 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+2oC 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 87 to 97% (Figure 2). The tests carried out on day 30 after spraying the mortality observed was 44 to 62%. This poor mortality indicates that the spraying was not done properly.

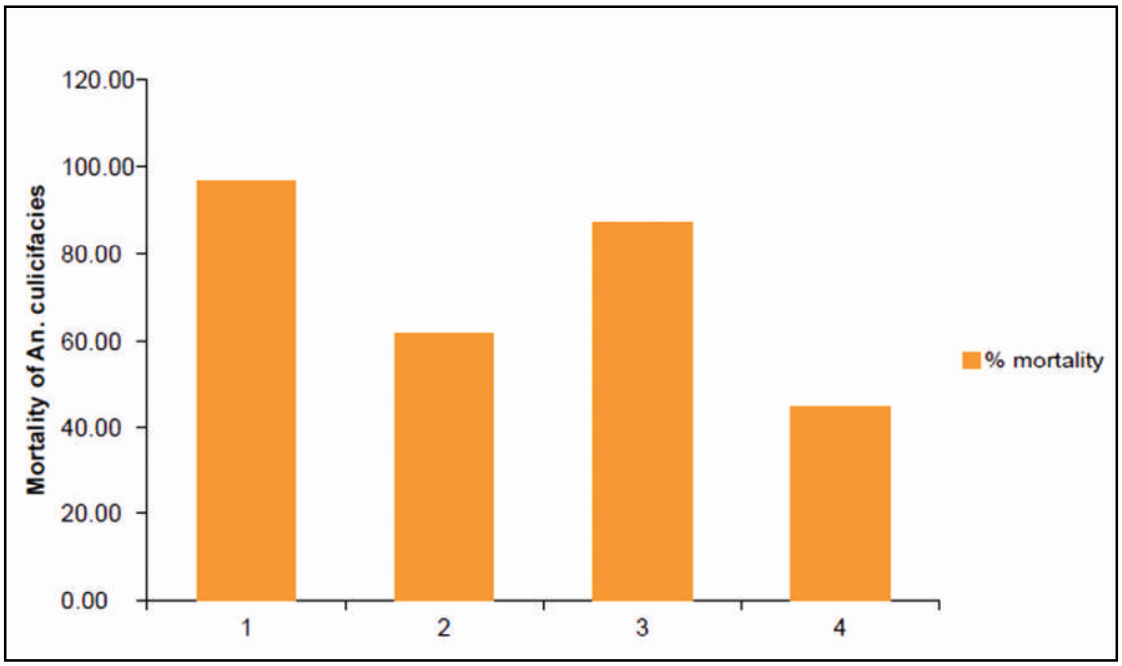


Figure 2: Cone Bioassay in sprayed villages of Mandla by ICMR-NIRTH

3.11. EFFICACY AND SAFETY OF ACT FOR THE TREATMENT OF UNCOMPLICATED *PLASMODIUM FALCIPARUM* MALARIA ACROSS INTERNATIONAL BORDERS OF INDIA: WEST BENGAL, MEGHALAYA, ASSAM AND MANIPUR

PI	:	**Dr. Praveen K. B harti, Scientist 'E'**
CoPI	:	**Dr. M M Shukla, MBBS, Scientist 'F'**
		Dr. Anil Kumar Verma, Scientist 'B'
		Dr. Sher Singh, NVBDCP, New Delhi
Status	:	**Ongoing**
Funding	:	**WHO, country office, India**

The study is being carried out with an objective to assess the therapeutic efficacy and safety of artemether-lumefantrine for the treatment of uncomplicated *Plasmodium falciparum* malaria across international borders of India.

Methodology

The study was conducted in one or two Primary health centre (PHC) or Community health centres (CHC) from 5 states of India i.e., Manipur, Meghalaya, Assam, Mizoram and West Bengal near to international border of India (Figure 1). Febrile patients aged between 1 year 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. The demographic information (age, gender, body temperature) were recorded and malaria patients were enrolled as per the following criteria.

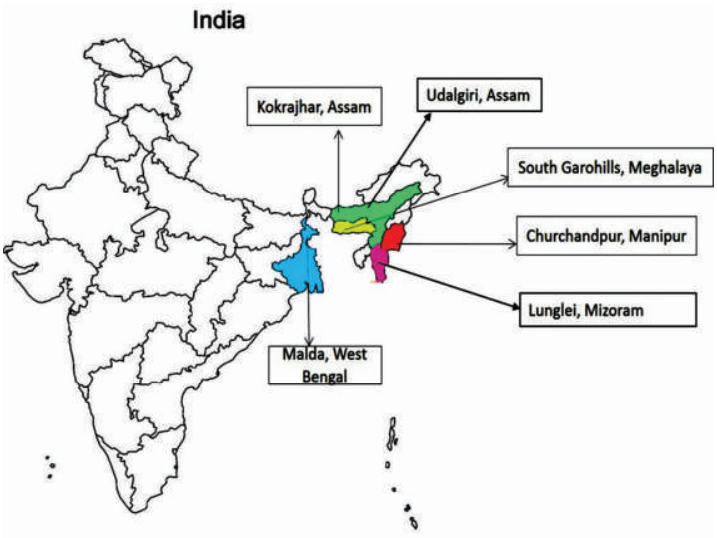


Figure 1: Map showing the study sites i.e. district Kokrajhar and Udalgiri (Assam), district South Garo Hills (Meghalaya), district Churachandpur (Manipur), district Lunglei (Mizoram) and district Malda (West Bengal).

***Exclusion criteria*:** Patients with general danger signs or signs of severe falciparum malaria, who were unable to drink, had severe vomiting, reported a history of convulsion 7 days prior to patient contact, presence of lethargy or decreased consciousness, inability to sit or stand, were all excluded. Patients who failed to complete treatment due to persistent vomiting or failed to attend scheduled visits during the first 3 days or withdrew their consent were also excluded. After enrolment, 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.

Work done

In all the study sites, total 8400 symptomatic patients were screened for malaria parasite by microscopic examination of peripheral blood smears. Out of these, 76 cases were found to be infected with *P. falciparum*, 14 cases were with *P. vivax* infection and no cases with mixed infection of *P. falciparum* either with *P. vivax* or *P. malariae*was found. Sitewise microscopic examination detail is given in table 1.

Table 1: Details of microscopic examination of symptomatic patients screened for malaria parasite.

S No	Study sites	Screened	Positive		
			Pf	Pv	Mixed
1	Churachandpur district, Manipur	90	Nil	Nil	Nil
2	South Garo Hills district, Meghalaya	5391	22	3	Nil
3	Kokrajhar district, Assam	1173	4	2	Nil
4	Udalgiri district, Assam	769	29	5	Nil
5	Lunglei district, Mizoram	318	46	Nil	Nil
6	Malda district, West Bengal	758	1	5	Nil

Total 52 eligible patients were enrolled for the study after taking written consent and among these, 16 patients were successfully followed up to 28 days and follow up of 33 patients is ongoing. Three patients were withdrawn from the study while no loss to follow-up was observed. All the successful follow-up cases showed 100% Adequate Clinical and Parasitological Response (ACPR) and no treatment failure case was recorded in the study. No adverse event observed during the treatment also. Details of enrolment and follow up are given in table 2.

Table 2: Over all patient enrolment and follow up status

Study site	No of enrolment	Follow up status		Withdrawal	Loss to Follow up
		Successful	Ongoing		
Manipur	00	00	00	00	00
Meghalaya	16	12	01	03	00
Assam	23	00	23	00	00
Mizoram	12	04	08	00	00
West Bengal	01	00	01	00	00
Total	52	16	33	03	00

***Training of Project staff*:** The project staff was trained under the supervision of experts at NIRTH, Jabalpur before posting at different study sites. The staff was educated about the importance of the study; they were also vigorously trained for malaria blood slide preparation, malaria RDT performance and reading, microscopic examination of malaria parasite, sample storage and collection and treatment. They were imparted knowledge about the clinical symptoms of malaria and various diagnostic methods.



Training of project staff at ICMR-NIRTH, Jabalpur



Orientation meeting on "Therapeutic efficacy of antimalarials (ACT) combination therapy for the treatment of uncomplicated *Plasmodium falciparum* malaria

3.12. STUDY OF ASYMPTOMATIC MALARIAL INFECTION IN LOW AND HIGH MALARIA TRANSMISSION AREAS IN MADHYA PRADESH

PI	:	**Dr. Anil Kumar Verma, Scientist 'B'**
Co-PI	:	**Dr. M.M. Shukla, Scientist 'F'**
		Dr. Praveen Bharti, Scientist 'E'
Status	:	**Ongoing**
Funding	:	**Intramural**

The main objective of the study is to estimate the prevalence of asymptomatic malaria infection in low and high transmission area, and to find the association between parasite genotype, host blood group, antimalarial drug resistance maker and nutritional status among the persons with asymptomatic parasitaemia.

Methodology

Active survey was conducted in eight villages of Balaghat district of M.P. by trained staff. People were approached for their interest to participate in the evaluation of malaria infections. Blood samples were collected by finger prick method after informed consent. Rapid diagnostic test was performed to detect malaria infection. Thick and Thin blood smear slides were prepared for microscopic examination at ICMR-NIRTH, Jabalpur. A few drops of blood were spotted on Whatman filter paper for molecular analysis. Epidemiological and Anthropometric data in designed questionnaire such as age, sex, current residential area (no residential address or village name), malaria history, date of specimen collection was collected form study volunteer. All febrile cares tested positive by RDT were provided treatment as per National treatment guideline. The Air dried slide/ samples were transported to the laboratory for microscopy and molecular analysis according to standard protocols.

Work done

A total 422 samples were screened by RDT and microscopy. The analysis of slides of 422 samples showed 5.7% malaria positivity with dominant of *Plasmodium falciparum* (100%). Four species of malaria parasite *i.e., P. falciparum*, *P. Vivax*, *P. malariae* and *P. ovale* are present in the

study area. However, the molecular analysis of 320 samples shows the presence of four species of malaria parasite and mixed infection in Balaghat (Figure 1). Out of 320 samples analysed by PCR, 18.75 % samples were found positive for *P. falciparum*, 10 % for *P. Vivax*, 0.3 % for *P. malariae* and 0.6% for *P. ovale*.

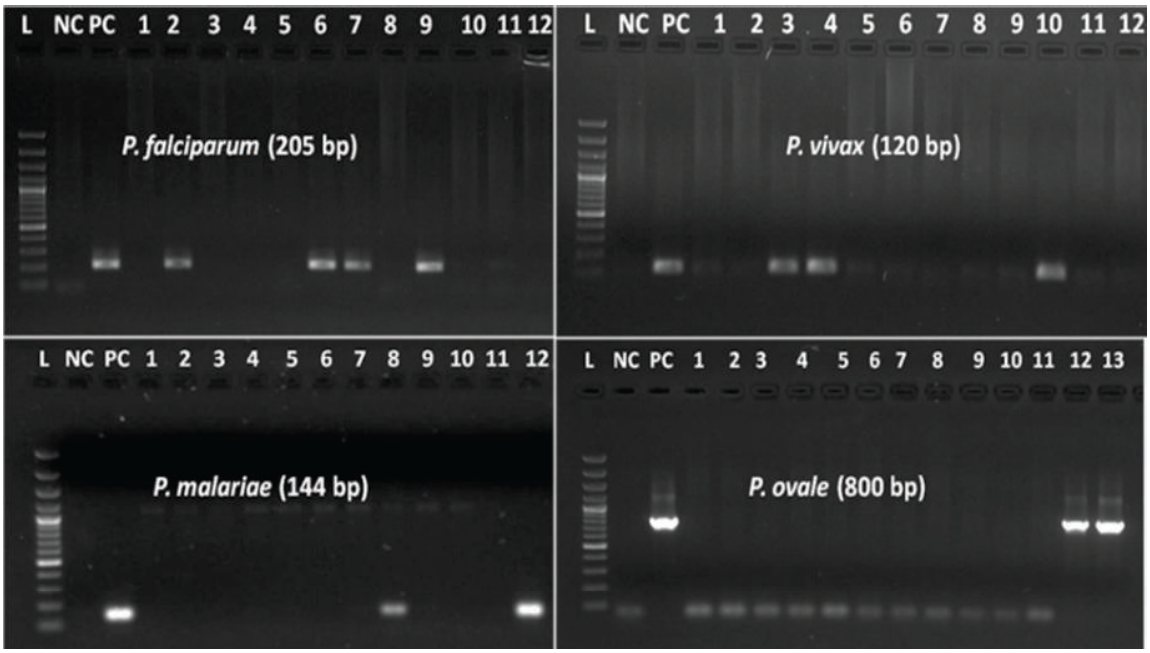


Fig 1: Representative gel pic of molecular diagnosis of suspected malaria samples.

3.13. MALARIA CONTROL THROUGH *WOLBACHIA* - A MALARIA VECTOR REPLACEMENT/REDUCTION IN ECOSYSTEM

PI	:	**Dr. Vidhan Jain, Scientist 'C'**
CoPIs	:	**Dr. Raja Subramanium, Scientist 'E'**
		Dr. AK Mishra, Scientist 'E'
		Dr. Manjunathachar HV, Scientist 'B'
Status	:	**Ongoing**
Funding	:	**Intramural**

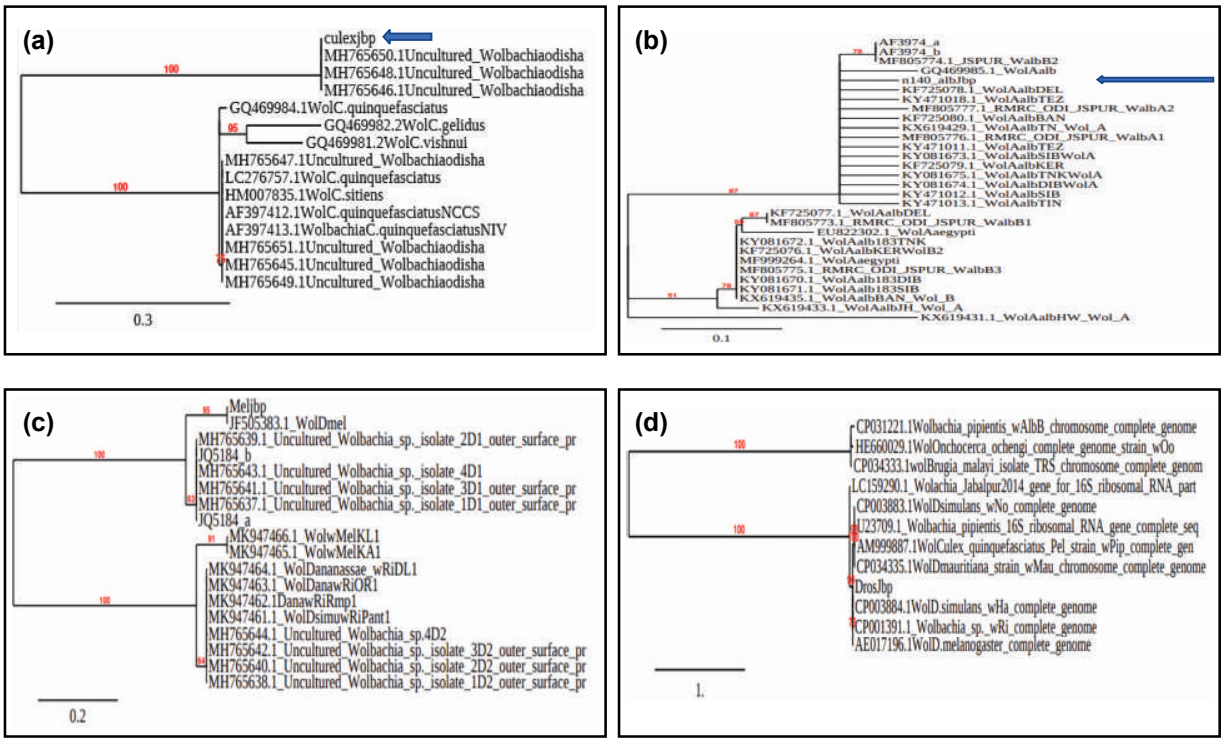
The study is carried out with overall objective to establish *Wolbachia* (with known strains and newly characterized strains) carrying mosquitoes lines of *An. culicifacies*, *An. fluviatilis* and *An. stephensi* with reduced/refractory malaria transmission ability to limit disease transmission in order to achieve and subsequently sustain malaria elimination targets by 2030.

Methodology

Establishment of fruit fly culture is done at short scale. Around 50 isofemale lines were established using corn meal agar media supplemented with fresh mixed fruit juice. Few males flies from culture were taken and anesthetized, forearms, thorax, wings, anal parts and testes were observed under 16X (sterio microscope) and 10X (light microscope). Species were identified based on Sex comb patterns. Main species were *D. ananassae*, *D. kikkawai* and *D. melanogaster.* For molecular biology of insect host and its reproductive endosymbiont "Wolbachia" Primers based on Insects 12 S rRNA (product = 400 BP), Eubacterial 16 S rRNA (product = 1150 BP), Wolbachia specific, 16 S rRNA (products = 440 BP and 890 BP) and WSP genes (product = 540 BP) were designed and standardized. Insects CIFA and CIFB genes responsible for cytoplasmic incompatibility were also amplified (product = 150-200 BP). Strain specific PCR (wAlb and wPip) were also standardized. DNA isolation was done by protocol mentioned by Aljanabi et al, 1997 with little modifications. Products were sequenced after treating them with Exosap enzymes using Sangers method. Giemenez staining from egg lysate and teased ovary and Acridine orange staining was attempted few times in order to stain and visualize the endosymbionts by microscopy. Method of egg collection was also standardized using apple juice agar pasted with yeast. We are in process to develop insect cell line culture of Wolbachia using appropriate cell line (eg. C6/36).

Work done

In 2019, Out of 30 lines tested for wolbachia, 10 lines were positive for the infection (33%) using wspec 16 s rRNA Wolbachia primers from Gwarighat/Tilwaraghat region. Infections were detected in *D. annanassae* and *D. melanogaster*. Culex and *Aedes albopictus* were also tested. DNA sequence nBLAST, Multi-sequence alignment and phylogeny based on WSP/16S rRNA genes revealed **wRi** strain and **wMel** strain in local drosophila flies and **wAlbA** in *Aedes albopictus* (similar to GD13099 strain, China). In *Culex* mosquitoes detected wolbahcia was similar to *Pel* strain (complete genome)/EruWolCpip3 strain (Turkey)/Fc01 strain (Maharashtra) of isolate wPip in this region. So far very few Aedes and Culex mosquitoes were tested. In one of the drosophila line at position 915 base T is found to be substituted by A of 16 S rRNA gene >CP001391.1 (complete genome wRi as ref. sequence). Gimenez staining in egg lysate revealed pink pleomorphic structures but still more skilful microscopy work is needed in order for Wolbachia visualization.



1. Wolbachia detection in local drosophila flies, *Aedes albopictus* and Culex mosquitoes.
2. Phylogenetic association revealed close homology with other published Indian strains.
3. Amplification of cytoplasmic incompatibility genes (CIF A and B) in majority of the drosophila flies positive for wolbachia.

Figure 1: Phylogenetic tree based on WSP gene sequence of wolbachia detected in Culex mosquitoes (1a), *Aedes albopictus* (1b), Drosophila spp. (1c). Local isolates are being shown by blue arrow. Other isolates shown are from India, accession numbers available at NCBI. Maximum likely hood algorithm is used while tree is constructed using web based tool phylogeny.fr. Fig. 1d is based on the 16S rRNA sequence homology with other reference complete wolbachia genomes.

4. VIROLOGY & ZOONOSIS

4.1. ESTABLISHMENT OF GRADE II VIRAL RESEARCH AND DIAGNOSTIC LABORATORY

PI	**:**	**Dr. Pradip V. Barde, Scientist 'E'**
Status	**:**	**On going**
Funding	**:**	**ICMR, New Delhi**

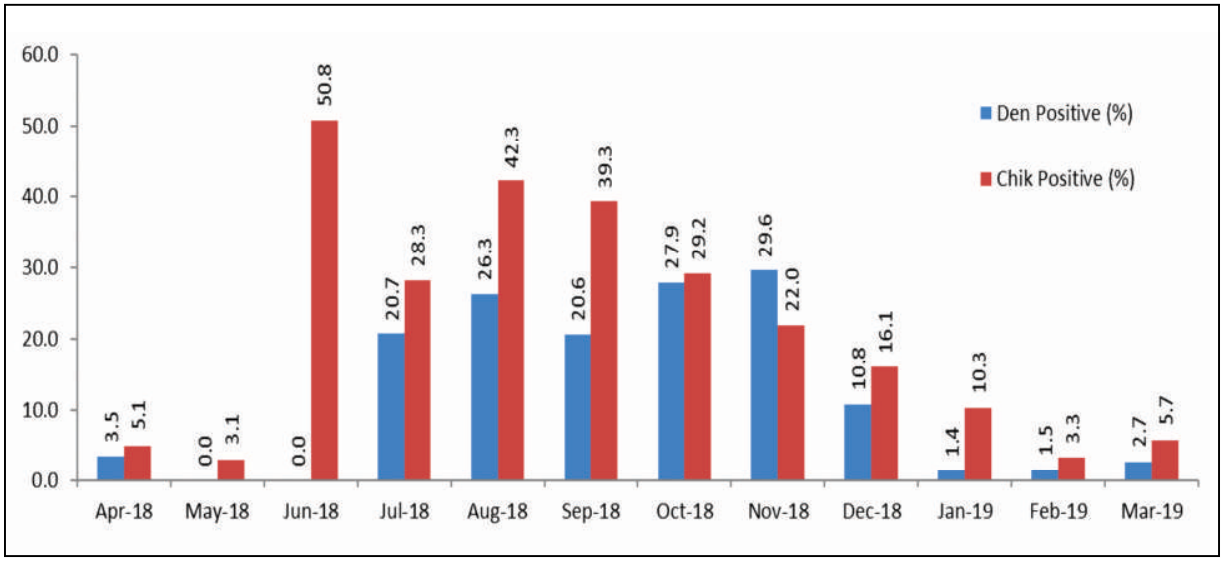


Figure 1: Graph showing percent positivity of dengue and Chikungunya in year 2018-19. Months are shon on X axis and percent positivy is shown on Y axis.

The 371 Triplex RT-PCR dengue positive samples could be subjected to serotyping using Real time RTPCR. These samples were received from 25 districts of MP and CG. All four serotypes were found circulating in the region with dominance of DENV 3. Further genotyping studies showed that the there was no shift in genotype detected earlier years.

Viruses causing Hepatic diseases: Acute hepatitis results in symptoms such as fever with yellowing of skin and/or eyes sclera and urine, loss of appetite and abdominal pain and most importantly jaundice. Four Hepatitis Viruses Hepatitis A, Hepatitis E, Hepatitis B and Hepatitis C are the main cause of viral hepatitis. 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. The samples of patients having hepatitis symptoms were tested by ELISA following defined algorithm.

From April 2018-March 2019 a total of 2087 samples were tested for Hepatitis A of which 62 (3%) ware found positive for HAV IgM antibodies. Two thousand two hundred and seven samples were tested for Hepatitis E IgM antibodies out of which 594 (26.9%) were positive. Out of 2049 samples tested for Hepatitis B surface antigen (HBsAg) 222 (10.8%) were positive. Only 1.5% (n=30) samples showed presence of HCV antibodies. HEV with 63.8% was the most important etiology of viral hepatitis; whereas HCV contributed the least number (3.5%) of cases. (Figure 2)

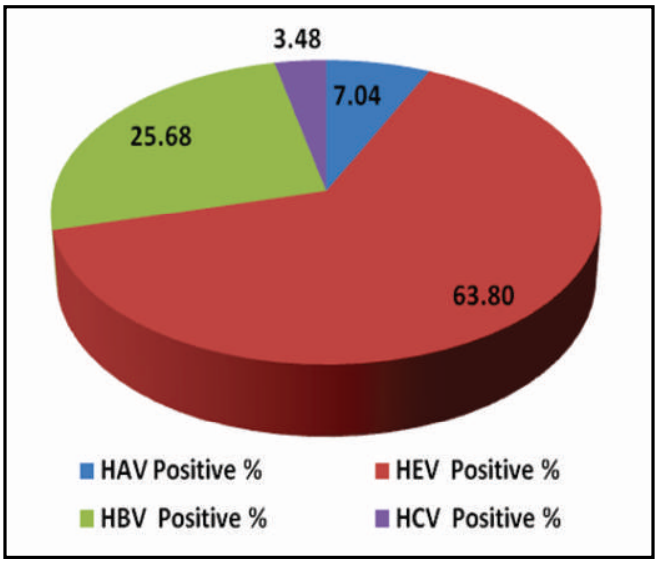


Figure 2: Graph sowing percent Contribution of different viral Hepatiis amoung positive cases.

Respiratory Virus Infections: Influenza like illness (ILI) is a result of infection by Influenza A, B and Respiratory Syncytial virus Rhinovirus, Coronavirus, Parainfluenza, *etc* and are major public health problem. This year we tested 570 samples by multiplex real time RT PCR and 180 (31.5%) were found positive for one or another etiology. Maximum (n=124) were positive for Influenza A H1N1pdm09, whereas 32 (5.6%) were positive for seasonal Influenza A viruses. Six samples were positive for Respiratory virus, five for Rhinovirus whereas Parainfluenza virus was detected in 7 samples.

Vaccine preventable and other viral diseases (Measles and Rubella and Human Papiloma Virus): The laboratory last year was included in the network of World health Organization's Measles and Rubella Network. The activities started since Sept. 2018 and till March. 2019 the lab has tested 50 samples for Measles of which 16 (32%) were found positive. Out of 34 samples tested for Rubella 14.7% were positive by molecular and serological tests. The laboratory participated in national EQAS programme and the results of the testing at ICMR- NIRTH were 100% in concordance with referral laboratory.

Infection of Cervix by human papilloma virus 16 and 18 can result in cervical carcinoma. We tested 87 samples from Cancer patients for presence of HPV 16 and 18 by PCR. Among the patients, 45 (51.7%) were infected with HPV 16 and 27 (31%) with HPV18. Co-infection of HPV 16 and 18 were detected in 15 (17.2%) patients.

***Outbreaks*:** The laboratory was actively involved in outbreak investigations in different parts of central India. Seven outbreaks suspected of viral origin were investigated.

Cases of febrile Illness with joint pain were reported from villages of Seoni district in the last week of July 2018. Samples were collected from 171 individuals of which 131 were found positive for Chikungunya Infection. Entomological studies showed that *Ae. Aegypti* was the main vector. The virus was also detected from *Ae. vitattus* mosquitoes. Similarly, Urban areas of Jabalpur reported cases of fever (n= 3039) of which 672 (22.1%) were diagnosed as Dengue and 1106 (36.4%) were having infection of Chikungunya. *Ae. Aegypti* was vector in urban area. The molecular studies showed that the East Central South African (ECSA) strain of Chikungunya Virus was the causative agent in both the outbreaks. Whereas, all four dengue viruses with dominance of DENV 3 were detected from samples of Jabalpur. Damoh district of MP also reported cases of Dengue and out of 62 samples 42 were positive for dengue; DENV 2 and DENV 3 were detected from those samples.

Durg- Bhili District of CG also experienced an outbreak of Dengue the laboratory provided support by identifying serotype. DENV 2 and DENV 3 were the cause of outbreak.

Suspected outbreak of viral hepatitis occurred in Sagar district in MP in August 2018. Careful analysis of samples and epidemologicl picture supported by laboratory findings revealed that the outbreak was of Leptosprisis as 9 patients out of 53 patients showed presence of IgM antibodies to Leptospra.

Suspected Measles cases (n=9) were noticed in tribal areas of Dindori district. The samples collected from children were tested by molecular and serological testes. Six were having Measles. Further molecular analysis showed that the virus was belonging to D-8 genotype.

Hepatitis E outbreak occurred in Raipur CG. Eighty-four samples were referred by local medical collage for confirmation of diagnosis and molecular typing. The molecular analysis showed that outbreak was due to Genotype I of HEV virus; which is detected in the area earlier also.

***Molecular Characterization of Hepatitis B Virus**:* We continued our studies on molecular characterization of Hepatitis B Virus. We could satisfactorily amplify analyze and submit 25 partial and 10 full genome sequences of HBV. The phylogenatic analysis showed that genotype D and sub-genotypes D1, D2, D3 and D5 are circulating in Madhya Pradesh. The mutations of clinical and epidemiological importance were detected.

Overall during this period, the laboratory investigated outbreaks suspected of viral origin [Chikungunya (n=2) Dengue (n=3), Measles (n=1), Hepatitis E (n=1)]. Outbreak of Hepatitis due to Leptospirosis occurred in Sagar was investigated by this laboratory. Full genome sequencing study was conducted Hepatitis B Virus revealed several clinical and epidemiological important mutations. The virus belonging to genotype D with sub-genotype D1, D2, D3 and D5 were detected.

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

PI	:	**Dr. Pradip V. Barde, Scientist 'E'**
Status	:	**On going**
Funding	:	**Govt. of M.P. (Vanbandhu Yojana)**

In this project we attempted to evaluate commercially available rapid diagnostic tests for Dengue for future use in tribal and rural areas of MP.

Work done

Total 608 samples were tested for the evaluation of RDT. The samples were initially tested by either NVBDCP recommended IgM ELISA and NS1 ELISA. The RDT kits were stored at three different temperatures for period of one month and then the known positive and negative samples were tested by RDT tests. The results of RDT testing were initially entered in to MS. Excel and then analyzed (Figure 1). On completion of the testing work, the scored results were entered in excel sheet on the basis of occurrence of true positive (TP), false positive (FP), true negative (TN) and false negative (FN) values then statistical testes were used to calculate the sensitivity and specificity.

The sensitivities and specificities for tested 280 samples in NS1 RDT ranged from 95%-100% (SE), 98%-99% (SP) with compared to NS1 ELISA and 80%-90% (SE) and 97%-98% (SP) when compared to qRT-PCR respectively. In case of IgM RDT the range of sensitivities and specificities were observed 48%-80% and 86%-98% respectively (Table 1).

For the diagnosis of acute DENV infection, tests are based on DENV isolation, presence of dengue viral antigens, detection of viral nucleic acid in blood through techniques such as qRT-PCR, IgM seroconversion. Dengue antigen detection is the most accurate diagnostic tools during the first 5 days of illness, as IgG and IgM antibodies are not produced until 5-7 days after the onset of symptoms in primary infections.

In this study the samples suspected of dengue infection are referred to the laboratory from different Government health facilities. Serum from the blood samples were extracted by centrifugation at 3000 rpm for 3-5 min at 4°C. These separated serum samples further allowed for viral RNA extraction and were grouped separately for qRT-PCR testing (5 days or less of onset of illness) and IgM ELISA detection (more than 5 days) subsequently. After testing from these two methods samples were selected for the evaluation of RDT kits on the basis of samples size both

positives and negatives. IgM ELISA positive samples were categorized on the basis of ODs which were from 0.5-1 and more than 1 OD.

The result of RDT testing were analyzed by three individuals and recorded in the prescribed format. Later, completion of the testing work, the scored results were entered in excel sheet on the basis of occurrence of true positive (TP), false positive (FP), true negative (TN) and false negative (FN) values then calculated the sensitivity and specificity.

Further, this study will be very helpful to examine the performance of current RDTs for the direct purpose of determining serostatus and to investigate the performance of the test in areas with co-circulating flaviviruses and vaccination, and assess the use of other reference standards such as PRNT which may be a more specific measure of DENV exposure and may be a superior reference standard which can lead for the development of new dengue RDTs or modification of currently available RDTs may be the most beneficial for vaccination screening. The results so far are given in Table 1.

Table 1: Sensitivity and specificity of three RDTs at three different stored temps. i.e. 4°C, 37°C and 45°C with compared to NS1/IgM ELISA and qRT-PCR (280 samples)

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
95 %	99 %	95 %	98 %	95 %	98 %	96 %	98 %	97 %	98 %	95 %	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
80 %	98 %	80 %	98 %	80 %	97 %	80 %	97 %	80 %	98 %	80 %	97 %	90 %	97 %	90 %	98 %	90 %	98

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
80 %	94 %	78 %	94 %	80 %	95 %	78 %	98 %	70 %	98 %	60 %	97 %	50 %	90 %	50 %	86 %	48 %	90 %

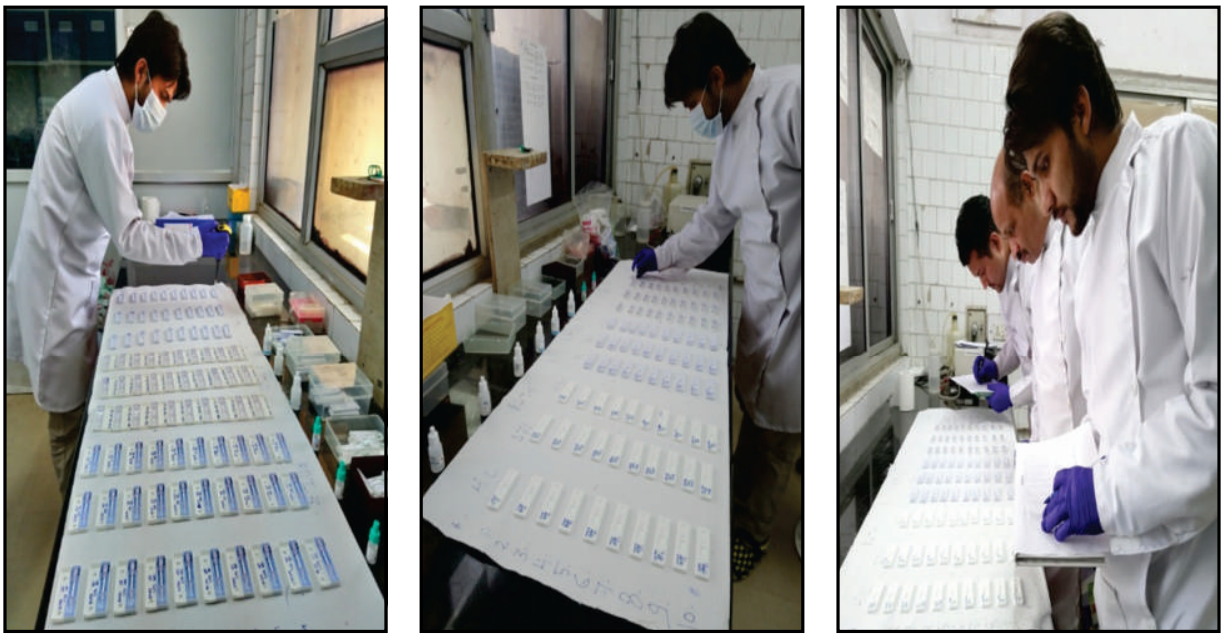


Figure 1: Testing and scoring of RDT

So far, the study has showed that 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.

5. DIVISION OF *IN-VIVO* RESEARCH

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

PI	:	**Dr. Manjunathachar HV, Scientist 'B'**
Co-Is	:	**Dr. Pradip V Barde, Scientist 'E'**
		Dr. CG Raut, Scientist 'F'
		Dr. Ravendra Sharma, Scientist 'E'
		Dr. Pragya Yadav, Scientist 'E', NIV, Pune
Status	:	**Ongoing**
Funding	:	**Intramural**

Crimean Congo hemorrhagic fever (CCHF) is a tick borne zoonotic viral disease reported from different parts of the world. Human get infection primarily through the bite of infected ticks (*Hyalomma spp*.). Recently, the incidence of CCHF has increased rapidly in many countries including India with significant case fatality rate in humans.

Methodology

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) after obtaining permission from office of the Joint Director Vety. Services, State Animal Disease Investigation laboratory, Madhya Pradesh. The sample size was determined statistically and accordingly, 378 small and large ruminants' samples were collected and subjected to CCHF IgG ELISA by following biosafety norms. 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. We have recorded 16.8 % and 11% CCHF IgG positivity in small and large ruminants, respectively.

CCHF virus is circulating in unnoticed manner and need further holistic investigation to develop health strategies and need trainings to farmers about prevention of zoonotic diseases.



Collection of blood samples from different domestic animals in tribal areas



Interaction with farmers for accessing the knowledge about zoonotic diseases, awareness level and examination of animal in resource poor setup.

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

PI	**:**	**Dr. Manjunathachar HV, Scientist 'B'**
Co-Is	**:**	**Dr. CG Raut, Scientist 'F'**
		Dr. Pradip V Barde Scientist 'E'
Status	**:**	**Ongoing**
Funding	**:**	**Intramural**

Overall study shows the re-emerging diseases like scrub typhus and leptospirosis diagnostic facility was initiated in central India where its helps in differential diagnosis of other febrile diseases. However, intensity of the disease burden is very high in this region and needs proper prevention strategies.

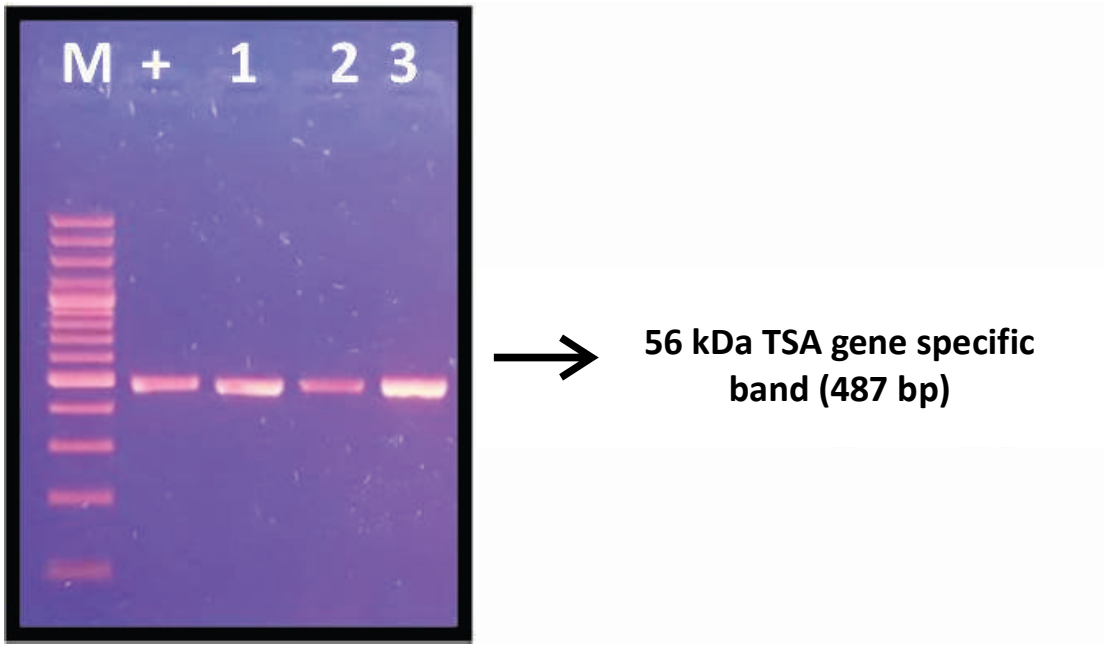


Figure 1: PCR amplification of 56 kDa gene of *O. tsutsugamushi*

5.3. DEVELOPMENT OF FIELD BASED DIAGNOSTIC TEST FOR SCRUB TYPHUS

PI	:	**Dr. Manjunathachar HV, Scientist 'B'**
Co-I	:	**Dr. CG Raut, Scientist 'F'**
Status	:	**Ongoing**
Funding	:	**Intramural**

Scrub typhus is one of the major cause of acute febrile illness, caused by *Orientia tsutsugamushi.* Disease is mainly endemic to the Asia-Pacific region, and sporadically in some other regions of the world. Serology, based on IgM ELISA is the mainstay of diagnosis for scrub typhus. Nevertheless, to say, requires technically sound personnel and good laboratory condition and mainly in interior tribal areas conducting test is difficult. In view of this, study was designed with objective(s), to clone and expression of the promising diagnostic candidates of *Orientia tsutsugamushi,* standardization and development of latex agglutination test for field diagnosis of scrub typhus.

Work done

The circulating strains of *Orientia tsutsugamushi* were identified in the Madhya Pradesh. For cloning and amplification of genes primers were designed, amplified the product. Cloning need to be carried out (Fig.1). The project shows that different circulating strains of *Orientia tsutsugamushi* were recorded in Madhya Pradesh.

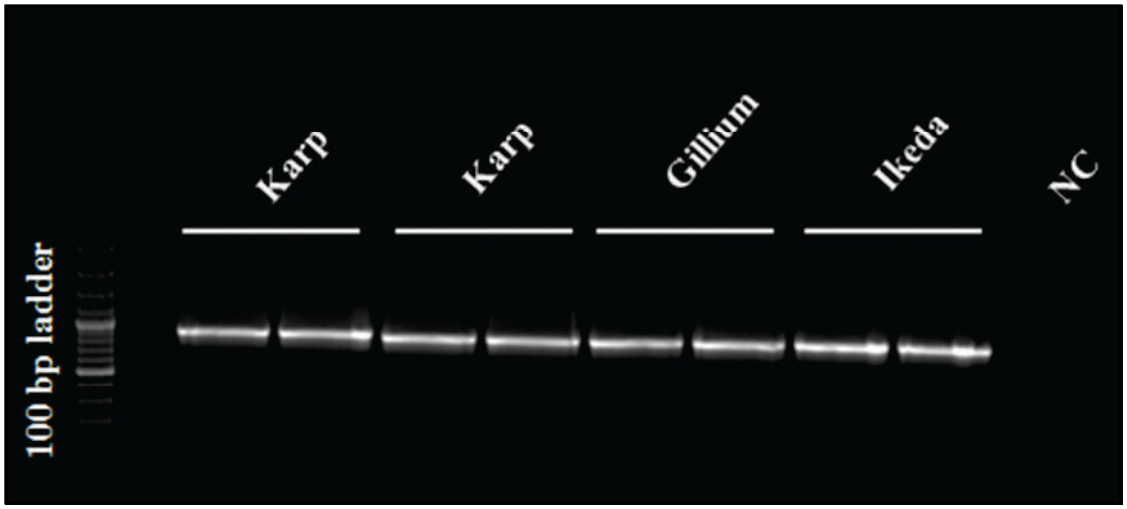


Figure 1: Representative picture showing amplification of different strains of 56kDa gene by tagged primers

5.4. FUNCTIONALIZATION OF CENTRAL ANIMAL FACILITY AND ETABLISHMENT OF IN VIVO RESEARCH FACILITY

PIs	:	**Dr. CG Raut, Scientist 'F'**
		Dr. Manjunathachar HV, Scientist 'B'
Status	:	**Ongoing**
Funding	:	**Intramural**

ICMR-NIRTH is involving in multidimensional research activities in important diseases and disorders with special emphasis on tribal health. To carry out the In-vivo and in-vitro research activities and to address the research gaps related to communicable diseases like tuberculosis and other diseases like malaria, filarial, viral diseases, fluorosis, genetic disorders and other non-communicable diseases, build a state of art Central Animal Facility. ICMR-NIRTH has taken over building from UPRNNL in July 2018. The total area of the facility is 28000 sq.ft and the 1100 sq.ft (G+2F) is designated in the ratio of 40:60 of animals housing core activities (conducting experiments, maintenance and breeding of laboratory animals, laboratory work) and service area. To make functionalization of the facility, study was undertaken with following objectives, Commissioning, validation and certification of Central Animal Facility (CAF), procurement of laboratory animals, Quarantine procedures, Acclimatization of lab animals to this facility.

Methodology

To make functionalization of the facility, constituted Institutional Animal Ethics committee (IAEC) under CPCSEA, Institutional Biosafety Committee (IBSC) for ICMR-NIRTH, Jabalpur. Extensive multidimensional preparations were done in the central animal facility to have the compliance of CPCSEA and prerequisites for handover take over procedures. Meetings were organized to evaluate the central animal facility and projects related to in-vivo research, and over all Institute laboratories handling microorganisms, recombinant DNA manipulations and bio-ecological samples were discussed and obtained approvals (Fig. 1, 2 &3).

Animals were procured from AIIMS Bhopal in October 2018 (C57BL/6 (n) = 20, Swiss albino (n) = 11 and SD Rat (n) = 18) and they were housed in quarantine room with suitable macro and micro environment as per CPCSEA guideline. During this period their health and genetic monitoring was performed. Animals having good health status and genetic purity were shifted to the dedicated animal holding rooms. Micro and macro environment was monitored by BMS and controlled HVAC / AHU system.

Work done

For estimation of breeding performance, animals were grouped for breeding. Total 100 pubs were delivered by C57Bl/6 mice and 8 pubs were delivered by SD rat. Litter size of C57Bl/6

mice ranges between 4 -9 and for SD rat it was 7-8 (table 1). Projects related to animal usage were approved by IAEC. During the period one-week workshop was also organized.

Overall highlights of the projects are that functionalization of ICMR-NIRTH Central animal facility was done by maintaining number of records, registers related to CPCSEA. Some stocks of lab animals have been procured and their genetic and health monitoring was conducted to access the purity of the strains. Animals were well adopted to the condition and seen through good breeding performance.

Table 1: Livestock and their status.

Species	Strains	F	M	Total
Mice	C57BL/6	76	60	136
	Swiss Albino	03	04	07
Rat	SD	03	08	11
Total		**83**	**72**	**154**



Fig. 1 : Inspection of CAF, laboratory area, animal holds rooms by inspection team during the visit



Fig.2: Different core activities designated places in Central Animal facility



Fig.3: Breeding stock, performing different activities in animal colony, peripheral blood collection from tail vein etc.

5.5. HEALTH AND GENETIC MONITORING OF LABORATORY ANIMALS

PIs	:	**Dr. CG Raut, Scientist 'F'**
		Dr. Manjunathachar HV, Scientist 'B'
Status	:	**Ongoing**
Funding	:	**Intramural**

As per CPCSEA guideline, periodic health monitoring of lab animals is an integral part of small laboratory animal facility. To maintain the define-ness of health of lab animals for different parameters, defining of laboratory rodents at genetic level the study was carried out (Fig.1). Accordingly we performed genetic monitoring of lab animal by using D1 Mit 17 marker for swiss albino (n=4) and C57 bl/6 (n=11) mice and D14 Rat 77 marker for SD Rat (n=3). Specific amplification was observed for swiss albino (Product size – 187 bp), C57 bl/6 mice (Product size – 170 bp) and SD rat (Product size – 239 bp) and shown in figure-2. These results confirmed the genetic purity of animal stocks.

Further, we have tested and verified our animal stocks twice in a year for health aspects. Health monitoring was performed by IgG ELISA for serological test (*Mouse Mycoplasma Pulmonis, Mouse Lymphocytic Chtoreomeningitis virus, Mouse Henta Virus, Mouse Hepatitis Virus and Mouse Sendai Virus*), Hematological and microscopic examination (CBC and hemoparasites), Faecal sample testing for endo parasite examination. After quarantine period of lab animals, animal samples were randomly selected and tested. All samples were found negative for hemoparasites, endo parasites and for aforesaid IgG serological tests. Hematological parameters were within the normal range.

The highlight of the project are that seroprevalence of common murine pathogens was found negative through IgG ELISA. Samples were also found negative for ectoparasites, endoparasites and haemoprotozoan parasites like *B. microti*. These results confirmed the Good health status and Genetic purity of animal stocks.



Figure 1: Sample collection for genetic and health monitoring of lab animals

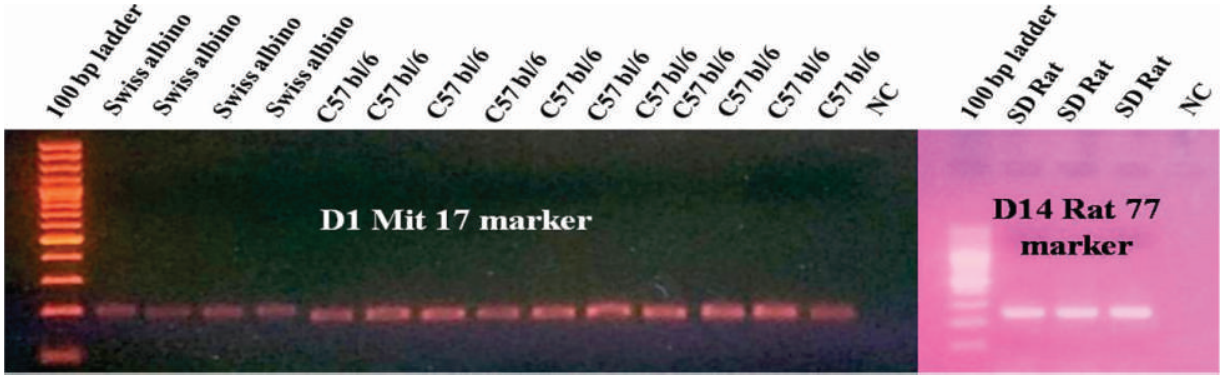


Figure 2: Representative gel image for genetic monitoring of lab animals.

5.6. UNDERSTANDING THE MACRO- ECOLOGY OF CENTRAL ANIMAL FACILITY TO ACHIEVE THE DEFINED STATUS OF LABORATORY ANIMALS

PIs	:	**Dr. CG Raut, Scientist 'F'**
		Dr. Manjunathachar HV, Scientist 'B'
Status	:	**Ongoing**
Funding	:	**Intramural**

The main objective of the study is to maintain the animals in defined status, to understand the macro-ecology and their microorganisms in and around central animal facility, to protect the laboratory animals from outside macro-ecology by applying preventive measures, to detect, identify, characterize and maintain the microorganisms for future scientific use, to maintain the colony of macro-ecology for further studies study was carried out.

Methodology

To protect the defined lab animals from wild rodents and as a part of pest control management programme, the rodent traps were kept around CAF.

Work done

Total 21 numbers of wild rodents were trapped and maintained. They are housed separately and provided suitable environmental condition. They showed adaptability to the captivity. Randomly, excreta of seven different cages were examined for leptospira by PCR and four samples were found positive for *leptospira spp*. Four rodents were found positive for *Trypanosoma lewisi* by microscopic examination (Fig.1). IgG ELISA results shows that, LCMV positive =3, Sendai virus positive =2 rodents. Having the alertness, we noticed there were six birds found dead in different locations during a period of 1-2 months around CAF. These were sent to Pathology department, Veterinary College, Jabalpur. Results revealed coccidiosis and toxicity in Asian Koel (n=1), Chronic respiratory disease in pigeons (n=2), and remaining (pigeon n=2 & owl -1) samples were putrefied.

The study shows the need for improved pathogen surveillance and disease monitoring in rodent population towards zoonoses as well as open the path to think about studying natural transmission of different pathogens.

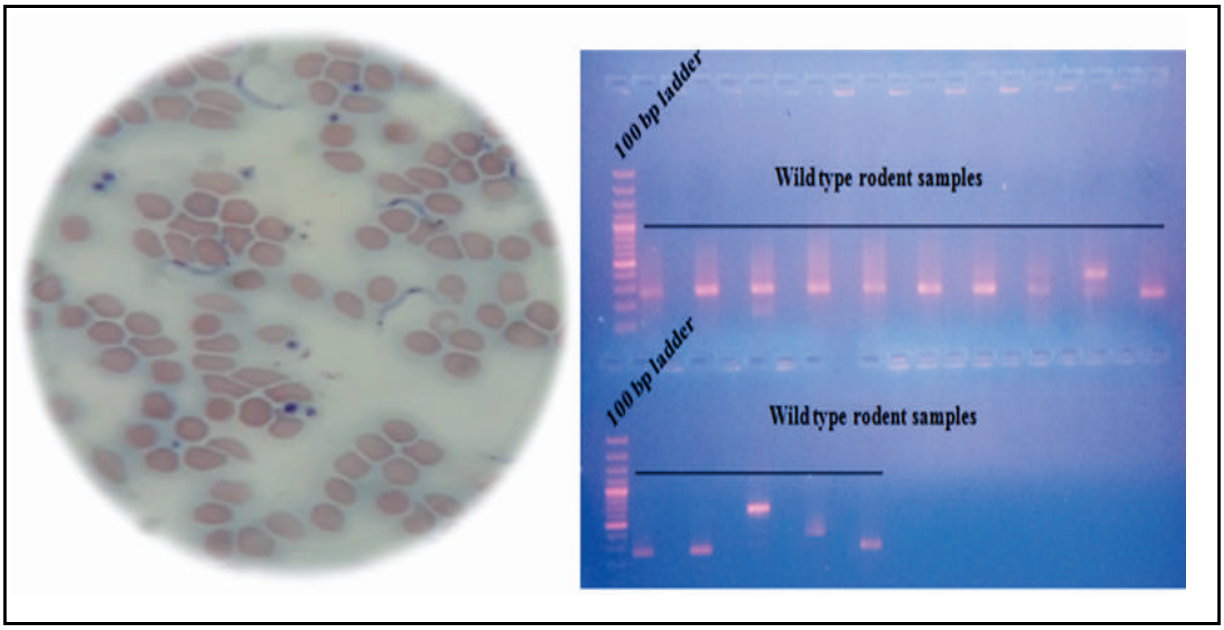


Figure 1: Microscopic pic of *T. lewesi* and gel pic showing amplification of ITS-1 gene for *T. lewesi*.

5.7. SURVEY OF ZOONOSES

PIs	:	**Dr. CG Raut, Scientist 'F'**
		Dr. Manjunathachar HV, Scientist 'B'
Status	:	**Ongoing**
Funding	:	**Intramural**

The objective of the study is to know the seroprevalence of zoonotic agents, to test the samples of animal origin whenever there is an outbreak of disease or referred samples the study was undertaken.

Methodology

Wild rodent samples were referred to ICMR-NIRTH, Div. of *In-Vivo* Research during the scrub typhus outbreaks in September 2018 at Ratlam and Mandsaur districts of Madhya Pradesh. Since, the human samples were IgM positive and the test was carried out by AIIMS, Bhopal. In order to elucidate the transmission cycle of *Orientia tsutsugamushi* in wild rodents, the different organs samples were received. DNA samples were isolated from tissue samples and subjected to primary PCR followed by gene specific nested PCR targeting 56 kDa gene. PCR results revealed that, 58.82% samples were positive for *O. tsutsugamushi* by PCR (Figure 1). Gene homology and phylogenetic tree analysis of 56 kDa gene revealed all ten positives samples were belongs to Karp serotype of *O. tsutsugamushi.* Data suggest that heterogenous forested areas in the outbreak regions and climatic condition in Madhya Pradesh helps in perpetuating *O. tsutsugamushi* transmission cycle.

Work done

In view of this to study of risk of both zoonotic disease in the area, initially we have trapped 22 wild type rodents from Jabalpur by using wire cage and wonder traps. Their blood and urine mixed faecal samples were collected. Genomic DNA was extracted from blood and urine mixed faecal samples and subjected to PCR Leptospira spp. Leptospira amplification of 16s rRNA gene was carried out by nested PCR. Results revealed that, 54.5% samples were found positive for Leptospira by PCR (Figure 2).

The findings of the study have been communicated in time to IDSP, Bhopal, MP regarding zoonotic link of pathogen transmission. This report might have been used by the health authorities for developing and implementing the strategy for the control and prevention of scrub typhus.

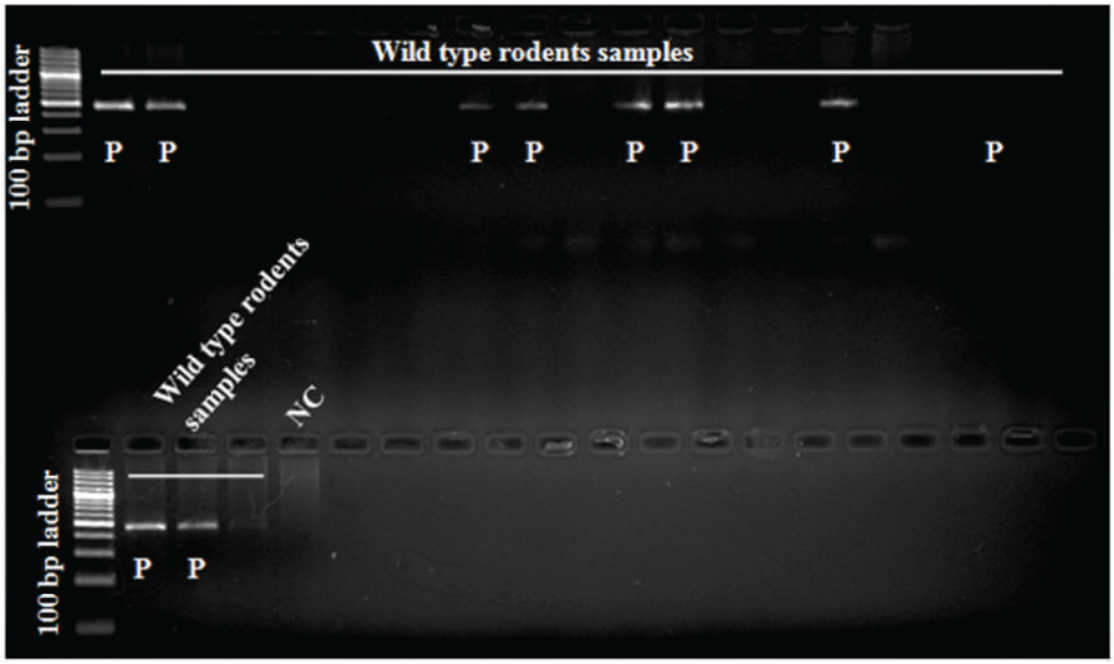


Figure 1: Representative gel for amplification of 56 kDa gene

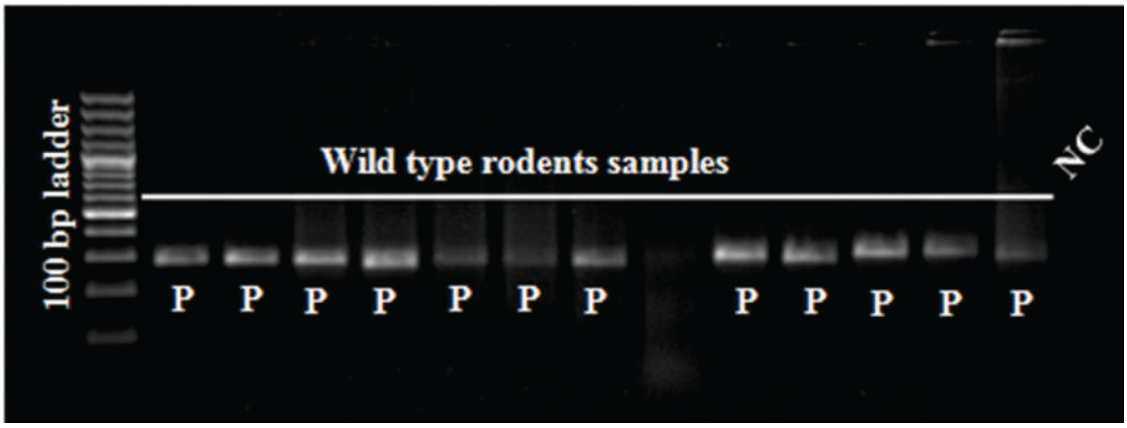
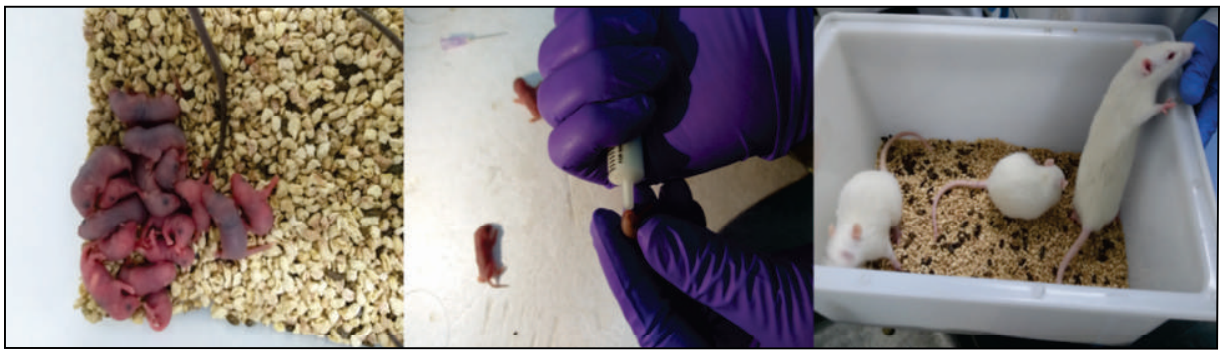


Figure 2: Representative gel for amplification of 16s rRNA gene of Leptospira spp

5.8. ISOLATION, CHARACTERIZATION OF PATHOGENS AND DEVELOPMENT OF ANIMAL MODELS

PIs	**:**	**Dr. CG Raut, Scientist 'F'**
		Dr. Manjunathachar HV, Scientist 'B'
Status	**:**	**Ongoing**
Funding	**:**	**Intramural**

Study was undertaken with the following objectives, Isolation of pathogens from clinical, ecological and animal samples, characterization of isolated pathogens, development of rodent animal models for human diseases, In-Vivo development of antigens and antibodies. As an initiation of new set up and biosafety concern, the relevant equipment's like Biosafety cabinets, Animal Anesthesia apparatus, Individual Ventilated Caging system (IVCs) were installed. Permission received from CPCSEA, MoEF&CC, New Delhi for breeding of small lab animals. Set up made ready for the experimental studies on animals. As an alternative to lab animals considering 3Rs principle (Reduction, Refinement and Replacement) the establishment of Cell Culture facility is in progress.



Representative pics of pups, handling of pups, and adult stock of different strains in CAF.



Housing of animals in IVC cages.

6. NON-COMMUNICABLE DISEASES

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

PI	:	**Dr. Tapas Chakma, Scientist 'G'**
Status	:	**Completed**
Funding	:	**Govt. of M.P. (Vanbandhu Yojana)**

Scabies is a contagious skin infection occurs among humans caused by a tiny parasite the mite. Globally its burden has been estimated to be as high as 300 million cases per year. In developing countries, scabies is a significant public health problem because of its high prevalence and frequent complication. Children appear to be more commonly affected and are at a significant risk of streptococcal super infection, which may be complicated by acute glomerulonephritis.

The parasite burrow into the skin and deposit their eggs, forming a burrow that looks like a pencil mark, eggs mature in 21 days. Symptoms of scabies is itching, especially at night, rashes especially between the fingers or inter digital space, sores (Abramsons) on the skin from scratching and digging thin pencil-mark line on the skin, in young children, the head, neck, shoulders, palm and soles are also involved. In older children and adult, the hand, wrist, genitals and abdomen are also involved.

Madhya Pradesh is the second largest state of the country. The state has a total population of 72.6 million as per 2011 census, 21% of which are tribal. There are 46 Scheduled Tribes, spread over nearly in 51 districts of Madhya Pradesh. Out of these 46 tribes, 3 tribes, are most backward tribes and are identified as particularly vulnerable tribal Group (PVTG). Baiga is one such (PVTG) tribe of Madhya Pradesh and found mainly in Mandla and Dindori district. They reside in hilly area covered with forest. The total Baiga population is about 23443 spread over in 201 villages of Dindori district.

The main objective of the study was 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.

Methodology

It was an intervention study and the study was carried out in all 201 Baiga tribe dominated villages. According to 2004-2005 report in Dindori district total 201 villages has Baiga dominated

population with 5178 households and 23443 total populations. Our assumption is that in 2014 there will be an increase of at least 10% population, i.e. about 2344 individuals, thus a total of about 25787 Baiga individuals. Since it is a contagious disease, for ethical reason other tribals & non-tribal population living in those villages also needs to be included in the intervention programme which is likely to be about 20% of the Baiga population. Therefore, a total of about 31619 individuals were covered.

Results

A total of 201 villages of Dindori district were surveyed covering a total population of 93161 individuals. Initially the project was aimed to cover the Baiga tribe but later it was decided to cover the entire population of the same villages for the 100% coverage of the villages, the proportion of Baiga population was 24.09 % 54.6% were other tribe and remaining 21.5% were general population. The population composition of the surveyed villages was 31.4% below 15 years, 55.0% population was belonging to 15-49 years and 13.6% were above 50 years of age. Male to female proportion were almost equal and 49.8% were males and 50.2% were females. Illiteracy was found in 30.2% of the total population, 21.3% were literate up to primary level and 29.0% were up to middle levels only. Most of the villages were in forest area where 29.3% houses were kachcha 61.8% were semi pakka and only 2.4% were pakka houses. The main occupations of this area are agricultural labour or farming activity and 63.1% were from this occupation category, 28.8% were unskilled labourers, 3.7% were skilled labourers and 2.7% were doing some service and 1.7% were involved in business. Nearly one-third of the population were using toilet and 71.3% of the studied population were using open field for defecation and only 28.2% were having toilet facility. The primary source of potable water was hand pump and 58.3% were using hand pumps followed by open well in 30.8% remaining population was using ponds or river while the source of water for washing was hand pump 31.1%, open well 24.7% and 44.2% were using river or pond.

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 single dose of 8mg Ivermectin with GB Lotion and Group B (n=663) treated with GBH Lotion only. The cases were observed on 3rd day, 7th day and 14th day and recorded as Complete response, Partial response, no effects and Missing. The Results showed that completion/cured rate on 3rd day in Group-A was 34.4% while in Group-B it was 11.8% and on 7th day 93.3% and 78.6% respectively for Group A & Group B. The cumulative proportion of cure rates in Group a showed significant reduction in the scabies onward day 3. ($P<0.0001$). A follow up study to investigate the reoccurrence of the scabies has been initiated in January 2019. All the cases diagnosed earlier from 201 villages were revisited and screened. We observed 58 cases who were re-infected (Recurrence Rate =5.51%). However, another 227 newly diagnosed cases were also detected during follow up visits which were treated immediately.






IEC campaign was also launched and 148 Ashram Hostel/Schools Aganwadi were covered.

6.2. PREVALENCE OF FLUOROSIS IN THE COMMUNITY OF SELECTED DISTRICTS OF INDIA AND DEVELOPMENT OF AN APPROPRIATE INTERVENTION MODEL FOR PREVENTION AND CONTROL OF FLUOROSIS - M.P.

PI	:	**Dr Tapas Chakma, Scientist 'G'**
Status	:	**Ongoing**
Funding	:	**ICMR-Tribal Task Force**

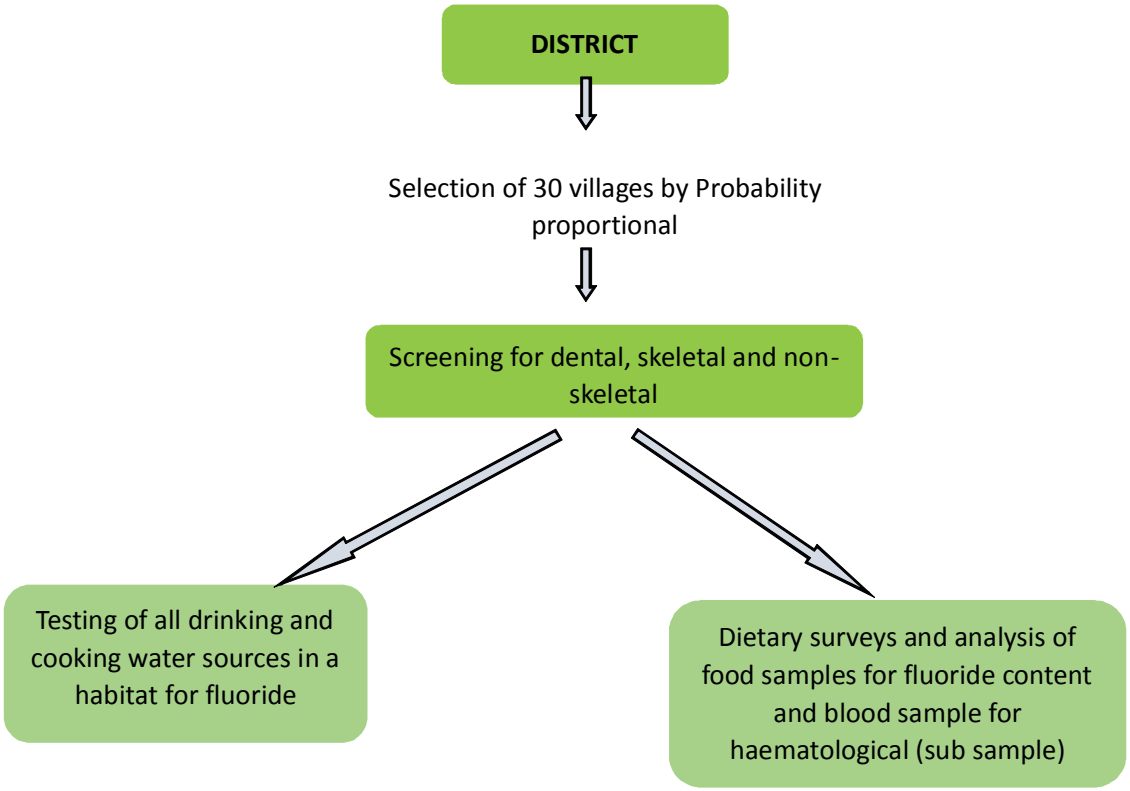
According to Ministry of Health & Family Welfare, April 2014; National Rural Drinking Water Programme, 17 lakh people are affected and 43039 habitats are contaminated with fluoride. In India still there are several districts or habitations where ground water is the only source for drinking water as no surface water is available. Fluoride is also a normal constituent of the enamel itself, but it is also known to cause Dental, Skeletal, non-skeletal fluorosis, osteosclerosis, thyroid, kidney changes and cardiovascular, gastrointestinal, endocrine, neurological, reproductive, developmental, molecular level & immunity effects, if concentration is higher than 1.5 mg/l in drinking water (WHO, 1996). According to WHO, 1984 and Indian standard drinking water specification, 1991, the maximum permissible limit of fluoride in drinking water is 1.5 ppm and highest desirable limit is 1.0 ppm. Fluoride concentrations above 1.5 ppm in drinking water cause dental fluorosis and much higher concentration may cause skeletal fluorosis. The available data suggest that 15 states in India are endemic for fluorosis (fluoride level in drinking water >1.5mg/l) and about 62 million people in India suffer from dental, skeletal and non-skeletal fluorosis, out of these 6 million children were below the age of 14.

The present study will be a cross sectional community-based study and will be carried out among the 60,000 population (>6 years of age) in each selected district. The population (>6 years) will be screened for dental, skeletal and non-skeletal fluorosis. All sources of drinking and cooking water in a habitation will be tested for fluoride by Ion selective method. Dietary survey and urine samples will be carried out on sub samples. Common foods consumed by the population will also be analyzed for fluoride content.

The primary objectives of the study are to assess the prevalence of dental, skeletal and non-skeletal fluorosis in the community of selected districts in the country; to find out the severity of dental fluorosis among areas with different fluoride levels in potable water; to assess fluoride level in potable water and urine samples; and to develop an appropriate intervention model for prevention and control of fluorosis together with its feasibility of adoption with local stakeholders.

Methodology

It is a cross sectional study is being carried out in Chhindwara district of Madhya Pradesh state.



6.3. INDIA HYPERTENSION CONTROL INITIATIVE (IHCI) REPORT, MADHYA PRADESH

PI	:	**Dr Tapas Chakma, Scientist 'G'**
Status	:	**Ongoing**
Funding	:	**Vital Strategies and WHO**

The India Hypertension Control Initiative (IHCI), launched in the State in April 2018, is a multi-partner initiative with the Ministry of Health & Family Welfare, Indian Council of Medical Research, State Government, WHO India and Vital Strategies. The project aims to reduce premature cardiovascular deaths by strengthening hypertension management and control using evidence-based strategies.

Work done

The study is being carried out in three districts of Madhya Pradesh viz. Bhopal, Chhindwara and Ratlam. The summary of hypertensive registered in the study are given in table 1.

Table 1: The number of registrations done and hypertensive registered

Name of district	Estimated number with hypertension (>30yrs)	Total number of registrations till 30th Sept.'19	Proportion (%) of hypertensives registered
Bhopal	2,56,756	14,857	5.8%
Chhindwara	1,57,993	23,489	14.9%
Ratlam	1,58,995	8,395	5.3%
Total	**5,73,744**	**46,741**	**8.1%**

Key findings during supervisory visits

- Number of facilities visited in 3 districts: 128 (Bhopal-27, Chhindwara-66, Ratlam-35)
- % health facilities with stockouts of any protocol drug: Bhopal (30%), Chhindwara (5%), Ratlam (23%) despite adequate availability at district levels
- Defaulter retrieval system was in place at 39% Health facilities: Bhopal (48%), Chhindwara (49%), Ratlam (29%)

- Opportunistic screening is being done in Bhopal 50%, Chhindwara38% and Ratlam9% of health facilities only
- Functional digital BP monitors in 95% of health facilities: Bhopal (100%), Chhindwara (91%), Ratlam (97%)
- Designated nurse / staff in only 63% health facilities Bhopal (67%), Chhindwara (64%), Ratlam (57%)
- Effective storage systems for treatment cards were available at 95% Health facilities: Bhopal (100%), Chhindwara (89%), Ratlam (100%)

***Key achievements*:**

A. Phase I districts: Bhopal, Chhindwara, Ratlam

- Out of 174 Health facilities, 95% are implementing IHCI. Two new health facility in Bhopal started IHCI implementation in September'19
- So far, 46,741 hypertension cases registered and put under treatment in 3 districts (8.1% of expected patients of Hypertension in 3 districts)

B. Phase II districts: Sehore, Seoni, Ujjain (Preparation of IHCI implementation- Timeline to launch the program was **"end of Sept.'2019"**)

6.4. HEALTH ASSESSMENT OF VILLAGERS OF TAMNAR BLOCK, DISTRICT RAIGARH, CHHATTISGARH

PI	:	**Dr. Suyesh Shrivastava, Scientist 'B'**
Co PI	:	**Dr. Tapas Chakma, Scientist 'G'**
		Mr. Arvind Kavishwar, PTO
Status	:	**Ongoing**
Funding	:	**ICMR, New Delhi**

The main objectives are to study: are to study the morbidity profile of the tribe residing in Tamnar Block of Raigarh District; to assess the Nutritional status through anthropometry; and to assess the utilization pattern of various government health programmes by the community.

Methodology

The Project has been initiated in February, 2019. Trained investigators are collecting information on census by house to house survey in a pretested semi-structured questionnaire by personal interview. Socio-economic information from the head of the household is collected in a pretested proforma. A detail clinical examination is carried out by a medical officer and pulse, blood pressure is also measured. Anthropometry like height are measured using SECA anthropometric rod and weight is measured by digital weighing scale by trained investigators.

Laboratory data: Blood samples is collected in filter paper and brought to ICMR-NIRTH main laboratory for haemoglobin estimation by cyanmathaemoglobin method from all willing individuals. Random blood sugar (RBS) is measured by glucometer. From all symptomatic for Tuberculosis, sputum smears are made in the field and brought to ICMR-NIRTH laboratory for AFB examination. Efforts are also made to get the X-ray of all the symptomatic individuals. Stool samples are collected from the children in stool collection bottles for identification of ova and cyst. All fever cases are examined for presence of malaria parasites using RDT kit.

Work Done

The field work is initiated in March 2019 and so far, survey team has visited fourteen villages of Tamnar Block of Raigarh District C.G.



Photograph 1 : Data collection in the field



Photograph 2: Examination of Blood Sugar in the Field



Photograph 3: Mobility of TB patient to the nearest facility



Photograph 4: Examination of the TB patient in field

6.5. 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

PI	:	**Dr Surendra Kumar, Scientist 'D'**
Co PI	:	**Dr Ravendra Sharma, Scientist 'E'**
Status	:	**Ongoing**
Funding	:	**Govt. of M.P. (Vanbandhu Yojana)**

The tobacco use is very common in Indian population. The tobacco consumption is very also high among tribes of India. A study conducted by our institute in 2009 showed that about 65% of Gond tribe population use tobacco product in one or other form. Keeping this background in mind, we proposed an intervention to promote awareness about the side effects of tobacco use and provide consoling and support to quit tobacco.

The main objective of study was to develop a comprehensive model, combining three elements of individualized approaches to quit tobacco use within existing health and non-health services.

Methodology

The study conducted in twenty Gond tribe dominated villages of Kundam block of Jabalpur district. The study was conducted in three phases, in phase-I the baseline survey was conducted to study the background characteristics of study population including the tobacco use, level of addiction and tobacco related morbidities. In the second phase intervention including inter-personal counseling on tobacco cessation, IEC/BCC community level activities were carried out 12 months. In the third phase the endline survey was carried out to study the impact of intervention on tobacco use.

Work done

The study was initiated in the month of February 2017. In the baseline survey, a total 4360 population was covered from Kundam block (Male 2207, Female 2153). Tobacco use was found 47.6%. A total 1568 individuals were clinical examined and leukoplakia was observed in 7.6%. According to FTND Scale, out of 1113 individuals examined, low dependency was observed in 26.9%, low-moderate dependency in 49.8% and moderate in 22.6% and high dependency was observed in 0.8% individuals.

In the second phase (Intervention phase) a trained psychologist and social worker provided personal counselling to all low-moderate and moderate tobacco users according to FTND scale and

executed the ABC (Ask Brief advise and cessation) intervention. A total 731 tobacco users were enrolled for ABC intervention. These 731 users were periodically given brief advise and counselling to quit tobacco use. The community level IEC activities, such as poster distribution, slogan writing, rallies, community meetings to create awareness about the side effect of tobacco uses. The IEC activities were also carried out in schools and Adivashi hostels in these selected villages. The videos movies were also played on laptops to show the harmful effect of tobacco uses in the intervention villages/schools.



IEC Activities in school



Movie Show on harmful effect of tobacco in school



Calendar distribution in villages



Slogan writing on wall

Third phase of the study (evaluation phase) is recently completed and it is observed that as per FTND scale the nicotine dependency declined from 22.6% moderate in baseline to 0.76% in endline survey. Similarly, the low-moderate dependency declined from 49.8% to 32.7% during the baseline and endline surveys. The proportion of low nicotine dependency was 66.6% in endline as compared to 26.9% in baseline. This shows a considerably decline in nicotine dependency in the study population though the ABC (Ask Brief advise and cessation) intervention. The detail data analysis is in progress.

7. SOCIAL SCIENCE & ETHNOMEDICINE

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

PI	:	**Dr. K.B. Saha, Scientist 'F'**
Co-I	:	**Dr. R.K.Sharma, Scientist 'E'**
		Dr. Tapas Chakma, Scientist 'G'
Status	:	**Ongoing**
Funding	:	**Govt. of M.P. (Vanbandhu Yojana)**

According to an estimate, 89% of the India's population are at risk of malarial infection and 80% of malaria reported in the country is confined to areas consisting of 20% of population residing in tribal, hilly, difficult and inaccessible areas. India has the highest number malarial deaths outside African continent and according to an estimation based on NVBDCP data approximately 50% of all malaria related deaths in India occurs in tribal dominated areas. So, the study was undertaken in tribal dominated areas of Madhya Pradesh. The primary objective of the study is to determine the prescribing practices and utilization pattern of the anti-malarial drugs in the tribal areas.

Methodology

During the period five survey instrument was designed as prerequisite for quantitative survey. Survey instruments include Schedule-I (Household listing form), Schedule-II (General household survey related to knowledge on malaria and preventive techniques), Schedule-III (Malaria screening schedule), Schedule-IV (Schedule for malaria confirm cases) and Schedule-V (ASHA schedule). Guideline was also prepared for interviews in qualitative surveys. Eight investigators were recruited and trained on survey techniques and on different aspects of malaria. Village lists were prepared from block health authorities of Ranapur and Jhabua from the district Jhabua and block Burhar from district Shahdol. Office space was created in the study districts by hiring rooms. The quantitative survey was initiated in both the districts.

7.2. UNDERSTANDING TRIBAL CULTURE, LIFESTYLE, ANIMAL HUSBANDRY ACTIVITIES AND CAUSE OF DEATH IN FIVE TRIBES OF INDIA THROUGH ESTABLISHMENT OF TRIBAL HABITATS IN ICMR- NIRTH, JABALPUR

PI	:	**Dr Dinesh Kumar, Scientist 'E'**
Co-I	:	**Dr Nishant Saxena, Scientist 'B'**
		Dr Suyesh Srivastava, Scientist 'B'
		Dr Manjunatha Char, Scientist 'B'
Status	:	**Ongoing**
Funding	:	**Ministry of Tribal Affairs (MoTA), New Delhi**

The main objectives of this project are to study the living pattern particularly socio-cultural aspects, food habits, animal husbandry, and health issues of the 5 identified tribal communities by interaction and collaboration with them; to invite traditional artisans along with their colleagues of 5 different tribes to NIRTH campus and built their representative huts exactly simulating a traditional hut of their own community; to understand daily (day to day) life style, washing, cleaning, cooking, defecating, eating and sleeping habits of typical tribal family from each of the tribal community; and to use the five tribal habitats as models for dissemination of knowledge generated with other community members, researchers, institutes related with tribal studies.

Methodology

The study is being carrying out among five tribes; 3 primitive tribes (Baiga, Bharia and Saharia) from M.P, 1 primitive tribe (Hill Korwa) from Chhattisgarh and 1 tribe (Bhil) from Rajasthan). The study aimed to describe their lifestyle and cultural practices through establishing their huts in the Institute and rethinking about the causes of poor health and its association along with dissemination of living pattern into the public domain, researcher and policy creators. The study has five research components maternal and child health, sociocultural aspects, cause of death and zoonosis disease based on survey and establishing their huts by the tribal artisans in the Institute.

Work done

Accordingly, the 3 ideal Hut Model of primitive tribes Baiga, Bharia and Saharia residing in Madhya Pradesh has been established in the Institute (fig-1,2&3). We have also developed 3D models of individual tribal hut for dissemination and presentation of lifestyle & culture of these primitive tribes. The cross-sectional descriptive survey with probability proportion to size sampling

technique was applied for data collection among the different tribes in the country. The data collection has been completed among Baiga community in Dindori district and Bharia tribe in Chhindwara district. The data was collected by trained investigators through structured interview schedule after explaining the contents and obtaining written consent from all the respondents. The preliminary findings of the study is given in table-1. A total, 101 household were surveyed in 5 selected targeted villages namely Bouna, Khamhera and Chada from Bajag block, Jampani from Karanjia block and Gaura kanhari from Samanapur tribal blocks in Dindori district. Out of 101 women, about 58% had taken ANC check-up during the pregnancy. Out of them, 54 women delivered at different places as 34 (63%) women given child birth at home and only 27% at health Institution. The socio-cultural practices), type of family and house land details of household, women decision making, traditional healer and anthropometric measurement of household members were cover. In this concern, about 148 (26 male & 83 female and 39 child) individuals were covered for determining the nutritional aspects. The death situation and causes during the preceding last one year from the date of survey has revealed about 13 deaths (neonatal death-6, child death-1, adult death-5 and maternal death-1). For zoonotic disease, 92 blood sample were collected from cattle (cow & bull)-34, goat-57 and human-1. The survey work was also carried out among Bharia community around inside and outside the Patalkot valley in Tamia block of Chhindwara district. A total of 102 household were surveyed in 6 selected villages namely Sidhouli, Gaildubba, Karaem, Lotia, Bamdi and Ghana Kodiya. 102 women under MCH, 100 for sociocultural practices, 21 death situation and its causes and for zoonosis research 83 human blood sample & 63 animal blood sample collected. The data entry of survey work and laboratory work for zoonosis research is under progress. The study is in ongoing.

The major highlights of the study are - research is focused to preserve and dissemination of tribe's lifestyle and culture. Correlations of disease with their living patterns to be measured. Origin and significances of disease to be resolute in different tribes according to their habitats.



Fig.1: Baiga Hut Model



Fig.2: Bharia Hut Model



Fig.3: Saharia Hut Model

Photographs showing the field work among Baiga and Bharia tribes











Pictures of field visits among Bharia community

Photos of field visits among Baiga community

Table 1: Sociocultural, MCH, pattern of death and zoonosis diseases aspects

Variable	Baiga tribes		Bharia tribes	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Type of Family				
• Nuclear	57	56.43	36	35.30
• Joint	44	43.57	66	64.70
Total	**101**	**100**	**102**	**100**
Source of Drinking water				
• Well	28	27.72	25	24.50
• Handpump	52	51.48	48	47.05
• Stream/River	01	0.99	5	4.90
• Spring	14	13. 86	19	18.62
• Others	06	5.94	05	4.90
Total	**101**	**100**	**102**	**100**
ANC Taken				
• Full ANC	33	56.89	52	71.23
• Partial ANC	25	43.10	21	28.76
Total	**58**	**100**	**73**	**100**
Place of Delivery				
• Home Delivery	34	62.96	13	20.31
• Institutional	20	37.03	49	76.56
• way of Reaching hospital	0	0	2	3.12
Total	**54**	**100**	**64**	**100**
Death status				
• Neonatal Death	06	46.15	04	19.04
• Child Death	01	7.69	03	14.28
• Adult Death	05	38.46	13	61.90
• Maternal Death	01	7.69	01	4.76
Total	**13**	**100**	**21**	**100**
Zoonosis disease				
• Animal blood sample	91	98.9	63	43.1
• Human blood sample	01	1.1	83	46.9
Total	**92**	**100**	**146**	**100**

7.3. LIFESTYLE INTERVENTION PROGRAM ON HEALTH SEEKING BEHAVIOR, MALNUTRITION AND MALARIA PREVENTION IN ASHRAM SCHOOL CHILDREN OF DINDORI DISTRICT IN MADHYA PRADESH

PI	:	**Dr Dinesh Kumar, Scientist 'E'**
Co-I	:	**Dr Nishant Saxena, Scientist 'B'**
		Dr Anil Verma, Scientist 'B'
Status	:	**On going**
Funding	:	**National Academy of Sciences India, Prayagraj**

The long-term objective of this study is to sensitise, encourage and promote adoption of the healthy life style and healthy eating (diet) among ashram students and to encourage the informed and rational decision making for right and bright future. The short-term objective of the study is to organise school based multi-component healthy lifestyle programme focusing on diet, physical exercise, and necessary trainings /workshops; to establish an enabling school environment with integrated (Well-defined) canteen guidelines; to create awareness on WASH (water, sanitation and hygiene) among children, teachers and support staff for healthier climate; and to evaluate the net impact and utility of lifestyle intervention programme.

Methodology

The study has randomized control design to cover the health aspects on health seeking behavior and malaria awareness among the children in ashram Schools. The study has planned to cover the 8 schools 4 from Boys and 4 from Ashram school. The study is being carrying out in Ashram schools children of Shahpura block in Dindori district. The Life style intervention Program focused to educate through implementing the IEC on life skills education and health care awareness including general health awareness, awareness on WASH and awareness program on girls Health. The Baseline Survey has been completed among 300 children (boys & girls) in Ashram school in Dindori district in M.P. using the structured questionnaires in terms of health behaviour, malnutrition and malaria awareness, etc. About 300 tribal children (boys & girls) has covered in the survey/data collection.

Work done

The first phase, baseline survey has completed with the covering of 4 boys and 4 girls Ashram schools. A total of 300 students investigated, of them 153 boys and 147 girls. The data

collected on health seeking behaviours parameters, nutritional aspects with anthropometric measurements and awareness on malaria prevention after explaining the content and written consent. The preliminary finding revealed that out of all children about 80% are knowing about the good health and 19% are using tobacco in different forms and about 65% are involving in physical activities and only 30% are knowing about malnutrition, etc.

By using WHO z score classification the results are shown in table-1. About 67.7% children were found normal. The girls were also interview on personnel hygiene related to health issues (fig-1). The data entry and details analysis are in progress. The major highlights of the project are - Intensive research to empowering with the developing skills of children's in Ashram schools. Health seeking behaviors, nutrition status and awareness on malaria to be improved. Awareness on personal health hygiene & quality of care among girl's student to be enhanced.

BMI-for-age (WHO z score classification)		
BMI-for-Age	N	%
Severe thinness (<-3 SD)	39	13.0
Moderate thinness (-3 SD to -2.0 SD)	58	19.3
Normal (-2 SD to 1 SD)	202	67.4
Obese (> 2SD)	1	.3
Total	300	100

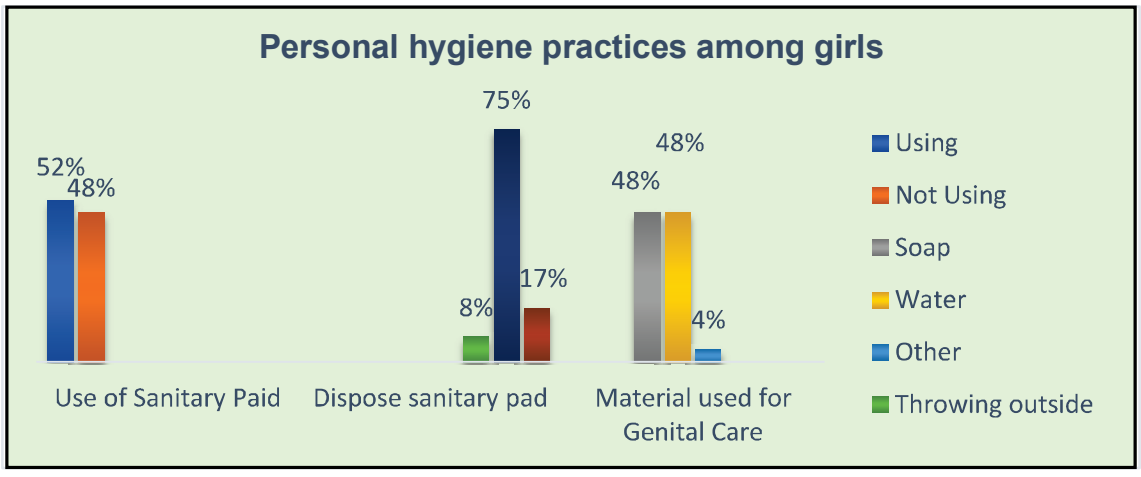


Figure 1 : Distribution of Girls' personal hygiene in Ashram schools









Pictures of field visits in Ashram Schools

7.4. IMPACT OF ANTENATAL CARE (ANC) INTERVENTION ON NEONATAL HEALTH IN SOCIALLY DISADVANTAGED WOMEN IN CENTRAL INDIA: A PILOT STUDY

PI	:	**Dr Dinesh Kumar, Scientist 'E'**
Co-I	:	**Dr Suyesh Srivastava, Scientist 'B'**
		Mr Ajay Kumar Goyal, PTO
Status	:	**Ongoing**
Funding	:	**Intra-mural**

The main objectives of the study are to determine the prevalence of ANC services and birth related characteristic; to investigate the association between ANC interventions and neonatal health; and to investigate the risk factors of neonatal health and its correlations.

Methodology

The study is being carrying out with community based cross sectional survey among Gond tribe in Kundam block of district Jabalpur in Madhya Pradesh. This study block covered majority of Gond population (> 90%) in the area. The Gond tribe is one of the most backward and socially and economically poor living in interior areas. The main instrument for collecting the data were set of structured questionnaires for the survey. In all ever-married women aged 15-49 years was interviewed after obtaining the written consent. The questions on Antenatal care, place of delivery, survival condition of new born, etc. were asked only to those women who had live/still births in the 3 years preceding the survey and restricted to the most recent birth.

Work done

Approximately 433 women was interviewed through selected 36 villages. The data on antenatal care, place of delivery birth weight during the tome of birth, etc., was covered after obtaining the written consent with the all respondents. The information on age at death for the live births/still birth taken place in 3 years preceding the survey. Out of 433 women, 394 women exposed the maternity and delivered at different places. The preliminary finding is given in table-1. All women were distributed according the reproductive age in 3 specific age groups, about 2% women revealed in early age < 20 years and majority of women 50.4% in 20- 24 age group and 47.6% in > 24 age group. Use of ANC services about 72% women had taken 4 antenatal check-ups and 27% women had taken less than four ANC check-up and about 1% had not taken any ANC check-ups. Type of supervision for conducting home delivery, out of 69 home deliveries including the way of reaching hospital about 87% child birth was assisted by untrained dai and remaining assisted by neighbor and relatives. Places of deliveries are described as at health institution, home and way of reaching hospital and are showed in figure-1. The study is in progress.

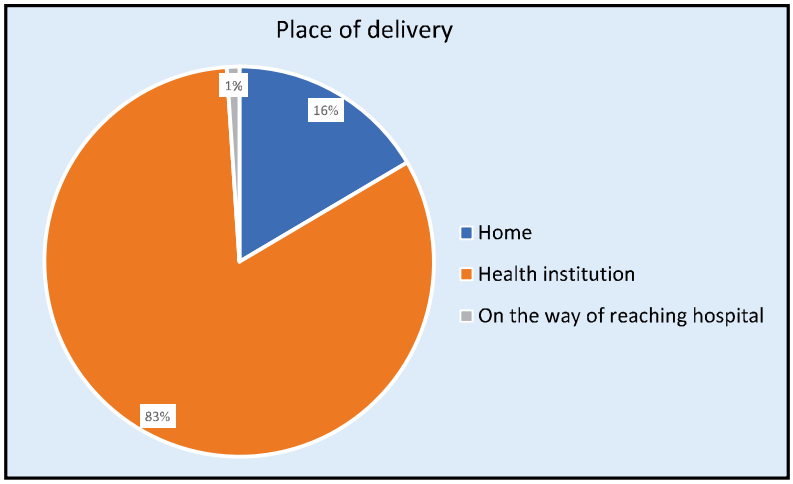


Figure 1: Place of delivery

Table 1: ANC services and birth related characteristics

Variables	Number of women	Percentage
Age group		
<20 years	9	2.0%
20-24 years	218	50.4%
>24 years	206	47.6%
ANC Check-ups		
Less than 4 ANC	118	27%
more than 4 ANC	311	72%
Not ANC taken	4	1%
Assistant during delivery		
Trained Dai/ ASHA	1	1.4%
Untrained Dai	60	87%
Relatives	8	11.6%



Interview with women



Laisoning with Anganwadi for survey

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

PI	:	**Dr Nishant Saxena, Scientist 'B'**
Status	:	**Ongoing**
Funding	:	**Intramural**

The tribal culture is rich in folk traditions related to health. In these communities, health and treatment are closely inter-related with the environment, ecology and supernatural entities. The tribal traditional healers are the core the health culture of the tribal communities acting as the medium between nature and supernatural for the 'man'. These healers have vast knowledge about the various usages of medicinal plants and use them for treatment. However, standardised empirical data about who is using what, where, how and how much is not available. The present study is based among the Baiga which is a Particularly Vulnerable Tribal Group (PVTG) of Madhya Pradesh particularly in the Dindori district. The objective is: to compile an inventory of ethnomedical practitioners (EMPs) and beneficiaries/patients in the Baiga tribe of Madhya Pradesh; and, to record the experiences and testimonials of the patients who availed treatment from EMPs.

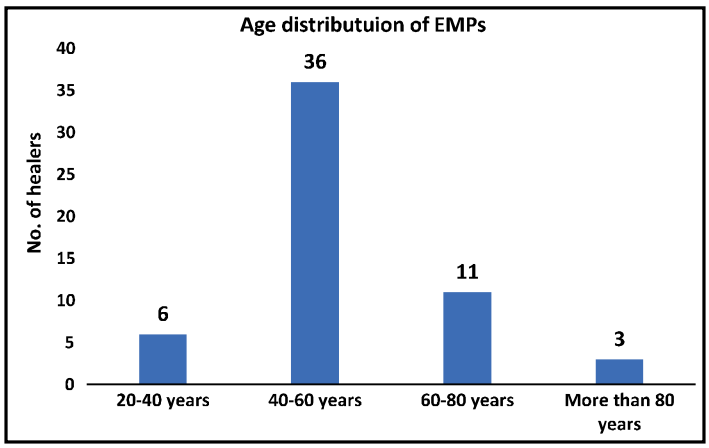
Methodology

The study deployed anthropological methods and techniques, mostly qualitative in nature, like observation, unstructured interview, and audio-visual documentation to collect the data. There is no readily available list or record of the EMPs or their beneficiaries/patients and so snow-ball method was used to reach to them. This leg of field work was carried out in the remotest and inaccessible areas of *'Baiga-chak*' i.e. 'abode of Baiga' comprising of Bajag, Samnapur and Karanjia tehsils of Dindori district. The *Baiga-chak* is recognized as the hub of Baiga culture, history and tradition.

Work done

Preliminary contacts with EMPs in 23 villages of the *Baigachak* area of Dindori district could be established. In all 56 EMPs could be contacted out of which 28 belonged to Baiga community, 20 to Gond community and 8 to other non-tribal groups. However, it was found that there is no bar of ethnicity as to whom a person will approach when in need of medical assistance. 4 EMPs were female out of which 3 belonged to the Baiga community. Interestingly, the community personnel revealed that there is categorization of the EMPs into three types: some were exclusively herbalists using medicinal plants popularly known as "*Vaidya*" and some were faith healers i.e. treated exclusively by magico-religious practices or "*jhaad-phoonk*". A third category also exists of those healers who use both methods and popularly known as "*Gunia*" and most of the EMPs fall in this category. The concept of specialization is also prevalent among the traditional healers as some specialize in a particular disease or condition like epilepsy, dog bite, snake bite, etc. and have a niche in the society. Discussions with EMPs revealed that they are afraid to share too much

information with the outsiders on the pretext of losing their 'value' in the society, losing their healing powers, and most importantly the fear of losing their means of livelihood. Data of usage of 89 medicinal plants was also collected. With the view to preserve these plants for undertaking further researches and as a heritage of the tribal culture, these plant varieties have been planted in the Tribal Medicinal Plants Garden at the NIRTH Campus. Based on these results, the project was submitted to ICSSR under Ministry of Human Resource and Development, Govt. of India for funding under the IMPRESS (Impactful Policy Research in Social Sciences) scheme and has been shortlisted.





Picture: Researchers in consultation with a Gunia from Baiga community



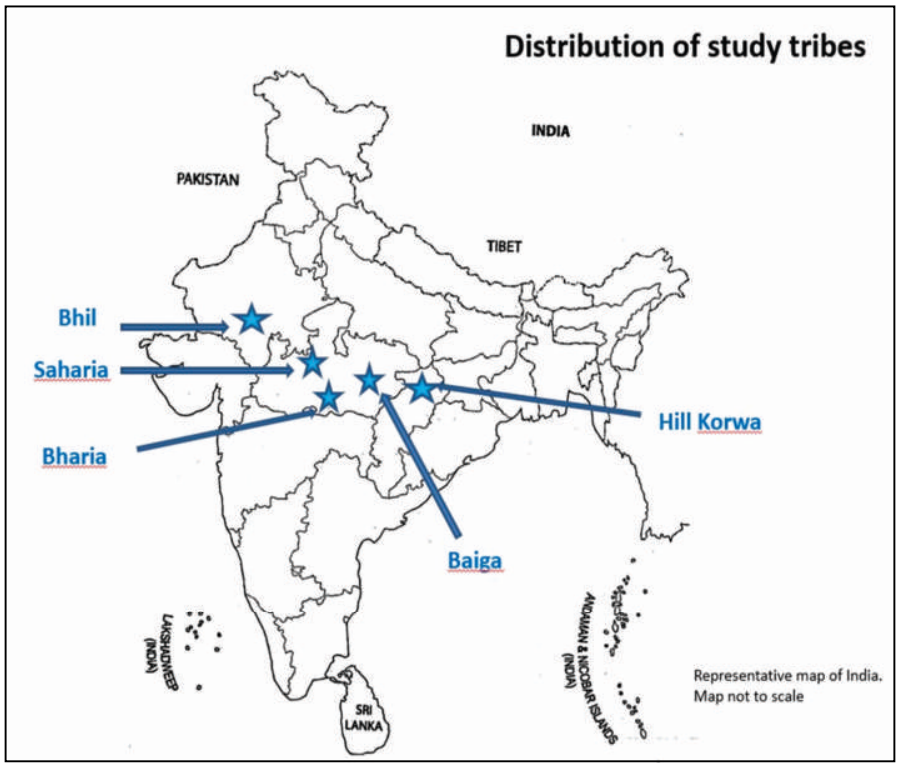
A female Baiga traditional healer harvesting *Van-jeera* or *Centratherum anthelmenticum* from the kitchen garden

7.6. TRANSLATING TRADITIONAL KNOWLEDGE OF ETHNOMEDICAL PRACTICES OF INDIAN TRIBES INTO PUBLIC HEALTH BENEFIT

PI	:	**Dr. Nishant Saxena**
Co-PI	:	**Dr. Dinesh Kumar**
Status	:	**Ongoing**
Funding	:	**Intra-mural**

Background

It has been observed that tribal folk mostly approach the traditional healer first who uses crude extracts of plants. Right dosage of chemicals in the herbal extract is not scientifically determined. Hence, it is imperative that right chemical (plant extract per se) and right quantity of that chemical based on age, gender and body weight are to be taken for effective treatment of disease. However, the first step in this direction is to document the healing practices of tribes, especially the usage of plants and herbs as there is significant dearth of systematic information tribe wise on this aspect. To fulfill this aim, the present study was undertaken among five tribes viz. Bharia, Baiga and Sahariya of Madhya Pradesh (all three are PVTGs), Hill Korwa of Chhattisgarh (a PVTG) and Bhil of Rajasthan (numerically one of the largest tribal groups in the country).



The study was presented in the ICMR Expert Group Meeting on Traditional Medicine at New Delhi on 12.11.18 which agreed in principle for the project and advised to develop a standard protocol for documenting medicinal practices and preparations being used by tribes together in consultation with other ICMR institutes namely NITM Belgavi, RMRC Port Blair and RMRC Dibrugarh. The protocol has been developed jointly and shall be presented before the next ICMR Expert Group Meeting on Traditional Medicine before being tested in the field settings. Moreover, efforts are on to develop a standard protocol for documenting the experiences of the patients availing treatment from tribal traditional healers so as to generate evidence from patient's perspective also.





Pictures: Tribal Traditional Medicinal Plants garden in NIRTH Campus

NEW INITIATIVE

7.7. MALARIA TREATMENT PATTERN IN TRIBAL DOMINATED AREAS IN MADHYA PRADESH, INDIA

PI	:	**Dr. R. K. Sharma, Scientist 'E'**
Co-Is	:	**Dr. K.B. Saha, Scientist 'F'**
		Dr. Tapas Chakma, Scientist 'G'
Status	:	**Ongoing**
Funding	:	**ICMR, New Delhi**

Madhya Pradesh is one of the vulnerable states in India where malaria control is complex because of its difficult geographical setup such as deep valleys, hills and hillocks with thick dense forest along with large tribal settlement and poorly understood sociological factors. The six major vectors in the tribal dominated areas are also resistant to DDT. Consequently, DDT was withdrawn from many tribal areas and replaced by synthetic pyrethroid as indoor residual spray (IRS). Similarly to vectors, the dominant parasite *Plasmodium falciparum* (*Pf*) also shows resistance to chloroquine (CQ) and sulfodoxine and pyrimethamine (SP). So to counter the situation the NVBDCP in year 2010 introduced Artemisinin-based- Combination Therapy (ACT) in the country. To speed up the efficient diagnosis of malaria, Rapid Diagnostic Kits (RDT) was also introduced recently. Keeping the above discussion in mind it is felt essential to understand the pattern of the treatment follows by the service providers and same utilized by the community in the light of definition of drug utilization by WHO. The treatment here essentially follow the prescribed drugs for malaria due to *Plasmodium falciparum (Pf)* and *Plasmodium vivax (Pv)* as the drugs for these two species of parasites are different. The research study is an endeavour to understand the prescribed line of treatment for these two types of malaria in tribal set up and ascertain its adherence by understanding the drugs prescribed by the health providers and utilization/consumption pattern of the drug by the community.

Objectives

The primary aim of the study is to determine the treatment seeking, prescribing practices and utilization pattern of the anti-malarial drugs in the tribal areas in Madhya Pradesh in different seasons.

Methodology

It is being conducted in selected four tribal dominated districts in a state - two districts with 25-50% tribal population and other with >=50% tribal population. The selected four district selected for the study are Alirajpur, West Niwar (Khargone), Dindori and Sindhi. The selected CHC, PHCs and villages will remain unchanged during all seasonal surveys. The district are selected based on the proportion of tribal population and Malaria Slide Positivity Rate (SPR) according of National Vector Borne Diseases Control Programme (NVBDCP) data for year 2013 and 2014. About 40,000 households will be covered in the study, further assuming an average of 200 household per village in tribal areas - a sample of atleast 40 villages to cover 8000 households. Both qualitative and quantitative survey techniques are being used to study the treatment seeking and utilization of different health services by the tribals and practices followed by health providers in prescribing the drugs in the study areas.

Work done

The study is recently initiated, after recruiting and training of staff, the field work is started in the month of September. So far, first round of survey is completed in two districts and around 22,000 population is covered. The survey in remaining two district is presently going on.

7.8. MOBILE APPLICATION FOR IMMUNIZATION DATA IN INDIA (MAIDI) (ICMR Multi-centric Study)

PI	:	**Dr. Nivedita Gupta, Scientist 'F', ICMR, Delhi**
Site PI	:	**Dr. R. K. Sharma, Scientist 'E'**
Co-I	:	**Dr. Arvind Verma, PTO**
Status	:	**Ongoing**
Funding	:	**Grand Challenges, BIRAC, Govt. of India**

Achieving full immunization coverage in children below one year of age poses a huge challenge in India. Currently, there are existing gaps and challenges at the level of beneficiaries, health care providers and health system and limited system to integrate these three components, thereby posing hindrance to successful implementation of immunization programme. These gaps in health system include lack of real time monitoring and supportive supervision, fixing accountability, performance evaluation of the heath staff and timely/real data reporting. On this important aspect, a study is proposed to develop a mobile application tool for targeting all the levels. This is an ICMR initiative involving six ICMR institutes for working in eight states. The ICMR-NIRTH is given responsibility to carry out the study in Madhya Pradesh and Chhattisgarh states.

Objectives

The main objective is to achieve improvement in coverage of immunization by strengthening capabilities and establishing a common platform for beneficiaries, health care providers and health system through our innovative mobile application. The specific objectives are as - to develop an integrated mobile application for beneficiaries, healthcare providers and health system; to validate and pilot the mobile application in selected facility and community level, and to study the operational & feasibility of the application.

Methodology

The first phase of study is to achieve three objectives *viz* a). Development of mobile application, b). Validation and piloting the application, and c). The operational feasibility of the application. First objective is achieved through activities such as engaging competent IT professionals for designing different modules of application and integrating component modules for final application. Validation of the application will be undertaken following feedback from test sites. After this, the application will be piloted for a period of 12 months in selected facilities and communities.

In the next phase, the application will be piloted in representative sample of eight states, selected on the basis of geographical diversity, interstate variability and differences in child health indicators. The states will be Assam, Madhya Pradesh, West Bengal, Odisha, Maharashtra, Uttar Pradesh, Tamil Nadu and Chhattisgarh. From each of these states, one PHC will be selected from a priority district and four sub-centers/ANMs from that PHC will be selected for our study. Two ASHAs from each of these selected sub-centers and three private providers nearer to the study PHC will be included. After development of application the prototype testing and laboratory validation of mobile app will be carryout by developers. After finalization of application, it will be in piloting phase for twelve months in selected PHCs. After twelve months of piloting, operational feasibility assessment will be carried out over a period of three months.

Work Done

The Mobile Vaccine Access & Coverage System (mVACS) mobile application is developed using Java ME for implementations on diverse platforms including low-end Java phones. For low-end mobile phone a simple mobile interface optimized for small screen sizes is developed. Android smart phone interface supporting offline data entry using HTML5 is also developed. The application also supports SMS-based functions (sending SMS, automatic reminders, support or feedback, patient's follow up using SMS). The Mobile App have have six main menus *viz.* Registration; Health Workers; Immunization; Education (IEC/BCC/Training (Images/ Audio/Videos)); AEFI; and Surveys (Head count and Rapid surveys related to immunization). After prototype testing, the laboratory validation of mobile application is currently being carryout by developers.

8. REGULAR ACTIVITIES

8.1. 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. This year total of 3594 tests were performed by CBNAAT. Of these 933 were positive for *M.tuberculosis* and 85 were resistant to rifampicin. Laboratory also processed more than 1551 specimens for culture on solid LJ media for follow up of MDR TB and CBNAAT negative specimens. Total 2145 specimens were tested for First line LPA. Of these 131 were resistant to Isoniazide, 26 were resistant to rifampicin while 23 were resistant to both the drugs. Six hundred and thirty-four specimens were tested for Second line LPA. Of these 163 were resistant to fluoroquinolone, nine were resistant to second line injectable drug while 48 were resistant to both the classes of drugs.

8.2. STATE REFERENCE LABORATORY & ICTC

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. The ICTC is the testing unit where 813 tests were done this year of which 127 were positive including 5 ANC cases.

8.3. ICMR-NIRTH FIELD STATION, KEYLONG

ICMR-NIRTH field station at Keylong, Lahul and Spiti, Himachal Pradesh was established in the year 2015 at the Regional Hospital, Keylong situated at an altitude of nearly 10,000 feet above sea level. The area is predominated by tribal population. The field station is established to identify the health of local problems and suggest strategy. During this period four scientists (specialized in Microbiology, BDS/Medical, Anthropology and Social work) along with one field worker, one data entry operator, and one driver were recruited for the field station. All together there are four scientists and 11 staff working in the field station out of the 20 sanctioned posts. The four project scientists were initially stationed at ICMR-NIRTH, Jabalpur and provided necessary training by associated them with different scientists of the institute. The field station scientists in consultation with the institute's scientists have prepared three major project proposals for undertaking studies

predominantly in the district Lahul and Spiti, Himachal Pradesh. These projects proposal include studies on Tuberculosis, Health need assessment and on Reproductive tract infection. These studies were approved in the 1st Joint SAC held at ICMR, New Delhi in the month of December 2018. NIRTH ethics Committee also provided clearance to these studies. Further three manuscripts based on earlier studies conducted from the field station on haemoglobinopathies, hepatitis and reported reproductive tract infection were prepared and ready for publication.



Hilly and difficult terrain in Keylong

8.4. MODEL RURAL HEALTH RESEARCH UNIT, DANTIA

MRHRU, Datia have started functioning and have undertaken the following project on **Screening for various Haemoglobinopathies in District Datia (MP) and surrounding areas**

PI	:	**Dr. (Prof) Rajesh Gaur, Dean, Datia Medical College, Datia**
Co PI	:	**Dr. R. S. Gupta, CMHO, District Hospital, Datia,**
		Dr. S. Rajasubramaniam, Scientist E, NIRTH, Jabalpur
		Dr. Rajiv Yadav, Scientist D, NIRTH, Jabalpur
Status	:	**Ongoing**
Funding agency	:	**Intramural**

The objectives of the project include undertaking a screening program for Sickle cell disease, Beta-thalassemia major and G-6-P-D deficiency among residents of Datia region, to follow up, all Sickle Cell Disease patients to evaluate morbidity and mortality and to provide supportive care and management of sickle cell through counselling and to prevent the birth of sickle homozygous babies in families at risk through genetic counselling.

The identification or diagnosis of sickle haemoglobin level is be done in 2 steps. In first step sickling phenomenon is identified through sickling slide test and/or solubility test. The second step involves confirmation and determination by haemoglobin electrophoresis or HPLC.

Detection of Beta-thalassemia is done through measurement of size, number, and maturity of different blood cells in a specific volume of blood, and NESTROF test and confirmation will be done through haemoglobin electrophoresis with haemoglobin F and A2 quantitation.

Screening for G6PD deficiency is done by DPIP decolourization method. Quantitation of G6PD enzyme activity will be done in by measuring the change in OD at 340 nm using a spectrophotometer over a time period of 10 minutes.

Work done:

So far 458 specimens are tested and 10 were positive for sickling, while 22 were positive by NESTROF. The mutants identified were 2- A2A, 2-AS.

Total Samples	Sex		G6PD	Sickle Solubility	Nestrof Test	Hb Electrophorosis Pattern
	Male	Female				
458	62	396	nil	10	22	2- A2A, 2-AS

8.5 CENTRAL 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 institute like Netaji Subhash Chandra Bose Medical College, Veterinary College, Home Science College, Rani Durgavati Vishwavidyalaya, etc. It also extends services to research personal from other universities/institutes.

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 user 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	42
1. International Periodicals	25
2. Indian Periodicals	17
Books	1,462
WHO Publications	826
Bound Foreign Journals	1,480
Bound Indian Journals	863
MEDLINE CDs	21
Census + Other CDs	07
Census Floppies	60
CDs on Other Subjects	130
Total Library Collection	4,891

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

Providers: - ICMR e-Consortia	No. of E-Journals/Access links
Science	http://science.sciencemag.org/
NEJM	http://content.nejm.org/
Lancet	http://www.sciencedirect.com/
NATURE	http://www.nature.com/
JGATE PLUS (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 Cent ral's Open Access Journals http://www.biomedcentral.com/content	1,053 total open access journals listed & 3,28,031articles listed
Free Medical Journals http://www.freemedicaljournals.com/index.htm	5,088 Journals
Bentham Science Publishers http://www.ben thamscience.com/ http open/a -z.htm#A	3,30Journals

9. PUBLICATION OF RESEARCH PAPERS

1. Acharya A, Bansal D, Bharti PK, Khan FY, Abusalah S, Elmalik A, et al. Molecular surveillance of chloroquine drug resistance markers (Pfcrt and Pfmdr1) among imported Plasmodium falciparum malaria in Qatar. *Pathog Glob Health*. 2018;112(2):57-62. (IF: 1.7).

2. Barde PV Mishra N, Singh N. Timely diagnosis, use of information technology and mosquito control prevents dengue outbreaks: experience from central India. *J Infect Public Health*. 2018 Mar 29. pii: S1876-0341(18)30036-4. doi: 10.1016/j.jiph.2018.03.002. (IF: 1.43).

3. Ghanghoriya P, Srivastava P, Bharti PK. Study of clinical response and parasite clearance response to Artemisinins in severe malaria in children. *International Journal of Contemporary Pediatrics*. 2018 Apr 20;5(3):905-11. ISSN-2349-3291.

4. Iyer LR, Verma AK, Paul J, Bhattacharya A. Phagocytosis of Gut Bacteria by Entamoeba histolytica. *Front Cell Infect Microbiol*. 2019;9:34. (IF: 3.52).

5. Kumar A, Gautam RK, Verma S, Raikwar R, Chaurasia A, Ahirwar A, Saxena N, Saha KB. 2019. Disparity in physical growth and nutritional status among tribal children in four states of India. In Rajesh K. Gautam & Permananda Bharti (eds.) *Health and Nutritional Status of Indigenous Population*, pp. 99-118. New Delhi: B. R. Publication Corporation (ISBN No. 9789388789318).

6. Kumar D, Singh TB, Ghanghoria P, Ghanghoria V. Pregnancy related complications and its association with socio-demographic factors in Central India: A logistic regression hypothesis. *Journal of Community Health Management*, July- Sept., 2019;6(3), in press.

7. Kumar R, Patel P, Gwal A, Bharti PK, Colah R, Rajasubramaniam S. Clinico-Hematological Presentation of Rare Hemoglobin Variant (HB-O Indonesia) in 3 Families. *Indian J Hematol Blood Transfus* 2019. https://doi.org/10.1007/s12288-019-01125-6.

8. Kumar R, Patel P, Gwal A, Bharti PK, Colah R, Shanmugam R. Clinico-Hematological presentation of Rare Hemoglobin Variant (HB-O Indonesia) in 3 families. *Indian J Hematol Blood Transfus*, 2019. https://doi.org/10.1007/s12288-019-01125-6 (*IF: 0.3*).

9. Kumar R, Rajasubramaniam S. Red Cell Indices in screening of thalassemia trait during antenatal period. *Journal of Obstetrics and Gynecology of India*, 2019. https://doi.org/10.1007/s.13224-019-01262-y (IF: 0.79).

10. Lad H, Yadav M, Mehta P, Patel P, Sawant P, Colah RB, Mukherjee MB, Rajasubramaniam S. First observation of Hb Lepore Hollandia in the Baiga tribal family. *Indian J of Hematol and Blood Trans* 2018. https://doi.org/10.1007/s12288-018-0931-3 (IF: 0.3).

11. Manjunathachar HV, Kumar B, Parthasarathi BC, Ghosh S. Control of tick- and tick-borne diseases of animals: Vaccine design and its challenges. Advances in Medico-Veterinary Parasitology, An Indian perspective, Editors; Arun K. Yadav, VeenaTandon and S L Hoti. Panima Publishing Corporation, New Delhi, PP-251-280.

12. Manjunathachar HV, Kumar B, Saravanan BC, Choudhary S, Mohanty AK, Nagar G, Chigure G, Kumar R, de la Fuente GV, Ghosh S. Identification and characterization of vaccine candidates against Hyalomma anatolicum—Vector of Crimean-Congo haemorrhagic fever virus. *Transboundary and Emerging Diseases*, 2019, 66(1), pp.422-434. https://doi.org/10.1111/tbed.13038 (IF: 3.5).

13. Muliyil DE, Singh P, Jois SK, Otiv S, Suri V, Varma V, Abraham AM, Raut CG, Gupta M, Singh MP, Viswanathan R, Naik S, Nag V, Benakappa A, Bavdekar A, Sapkal G, Singh K, Gupta N, Verma S, Santhanam S, Mishra S, Bhatnagar A, Prasad GRV, Kolekar J, Raj N, Sabarinathan R, Sachdeva RK, George S, Chaudhary S, Verghese VP, Jagtap V, Bharadwaj M, Murhekar M. Sero-prevalence of rubella among pregnant women in India, 2017. *Vaccine* 2018, 36:7909-7912. Doi:10.1016/j.vaccine.2018.11.013. [IF: 3.235].

14. Murhekar M, Bavdekar A, Benakappa A, Santhanam S, Singh K, Verma S, Sapkal GN, Gupta N, Verghese VP, Viswanathan R, Abraham AM, Choudhary S, Deshpande GN, George S, Goyal G, Gupta PC, Jhamb I, John D, Philip S, Kadam S, Sachdeva RK, Kumar P, Lepcha A, Mahantesh S, Manasa S, Nehra U, Munjal SK, Nag VL, Naik S, Raj N, Ram J, Ratho RK, Raut CG, Rohit MK, Sabarinathan R, Shah S, Singh P, Singh MP, Tiwari A, Vaid N. Sentinel Surveillance for Congenital Rubella Syndrome - India, 2016-2017. *MMWR Morb Mortal Wkly Rep*. 2018 Sep 14;67(36):1012-1016. doi: 10.15585/mmwr.mm6736a4. PMID:30212443. [IF: 12.888].

15. Nema N, Verma S, Kumar R. Investigation of methylenetetrahydrofolate reductase C677T and factor V Leiden mutation as a genetic marker for retinal vein occlusion. *Taiwan J Ophthalmol*. 2018 Apr-Jun;8(2):99-103.

16. Oboh MA, Ndiaye D, Antony HA, Badiane AS, Singh US, Ali NA, Bharti PK, Das A. Status of Artemisinin Resistance in Malaria Parasite Plasmodium falciparum from Molecular Analyses of the Kelch13 Gene in Southwestern Nigeria. *Biomed Res Int*. 2018; 2305062. (IF: 2.58).

17. Oboh MA, Singh US, Antony HA, Ndiaye D, Badiane AS, Ali NA, Bharti PK, Das A. Molecular epidemiology and evolution of drug-resistant genes in the malaria parasite Plasmodium falciparum in southwestern Nigeria. *Infect Genet Evol*. 2018;66:222-8.(IF: 2.5)

18. Pandey S, Sahu M, Potdar V, Barde PV. Molecular Analysis of Influenza A H1N1pdm09 virus circulating in Madhya Pradesh, India in the year 2017. *Virus Disease*. 2018 Sep;29(3):380-38 (IF: 0.4).

19. Patil J, More A, Patil P, Jadhav SM, Newase P, Agarwal M, Amdekar S, Raut CG, Parashar D, Cherian SS. Genetic characterization of chikungunya viruses isolated during the 2015-2017 outbreaks in different states of India, based on their E1 and E2 genes. *Archives of Virol* 2018, 163(11) 3135-40. (DOI 10.1007/s00705- 018-3974-8). [IF: 2.160].

20. Rao VG, Bhat J, Yadav R, Sharma RK, Muniyandi M. Declining tuberculosis prevalence in Saharia, a particularly vulnerable tribal community in Central India: evidences for action. *BMC Infectious Diseases,* 2019: 19:180 (IF=2.6).

21. Rao VG, Bhat J, Yadav R, Sharma RK, Muniyandi M. A comparative study of the socio-economic risk factors for pulmonary tuberculosis in the Saharia tribe of Madhya Pradesh, India. Transactions of *The Royal Society of Tropical Medicine and Hygiene*, 2018;112(6): 272– 278, https://doi.org/10.1093/trstmh/try052 (IF= 2.8).

22. Saha KB, Behera P, Munshi H, Tiwari BK, Singh SK, Saha UC, Singh MP. What affects utilization of malaria control services? A qualitative approach to understanding community perception in highly malarious Gadchiroli district, Maharashtra, India. *J. Biosocial Science* (2018), doi:10.1017/s002193201800038X. (IF: 1.188).

23. Saha UC and Saha KB. Health care for India's remote tribes. *Kurukshetra* (The monthly journal from Ministry of Rural Development), 2018, 67 (1): 27-.30.

24. Saxena N, Kumar A, Saha KB. Revitalizing traditional knowledge of ethnomedicine among tribes of India. In Rajesh K. Gautam & Permananda Bharti (eds.) *Health and nutritional Status of Indigenous Population*, 2019: 1-11. New Delhi: B. R. Publication Corporation (ISBN No. 9789388789318).

25. Saxena, N. Cognitive anthropology vis-a-vis anthropology and cognitive sciences. In Proceedings of the National Seminar on Anthropological Research in India: Tradition and Transition edited by Prof. Ramesh Sahani Department of Anthropology, Panjab University, Chandigarh (Accepted).

26. Saxena, N. Cognitive Anthropology. In A R N Srivastava (ed.) Encyclopedia of Anthropology (being published in Hindi). New Delhi: (Accepted).

27. Saxena, N. Tribal medicine in India. In A R N Srivastava (ed.) Encyclopedia of Anthropology (being published in Hindi). New Delhi: (Accepted)

28. Shrivastava R, Rajasubramaniam S. Host–Plasmodium interaction: role of RNAi. *Current Science*, 2018. 115(12): 2219-2231. (IF: 0.756).

29. Shukla MK, Barde PV and Singh N. Utility of CDC DENV-1-4 Real-Time RT-PCR Assay in dengue diagnosis. Dengue WHO Bulletin (Accepted Sept 2018).

30. Singh B, Sharma RK. Scheduled tribe population and Tribal communities in Jammu & Kashmir state of India: A Spatio-temporal Analysis. *Tribal Health Bulletin*, 2018; 25 (1&2):31-51.

31. Singh MM, Kumar R, Tewari S, Agarwal S. Association of GSTT1/GSTM1 and ApoE variants with Left Ventricular Diastolic Dysfunction in Thalassemia Major Patients. *Hematology* 2019;24(1):20-25.(IF:1.315).

32. Singh MP, Saha KB, Chand SK, Sabin LL. The economic cost of malaria at the household level in high and low transmission areas of central India. A*cta Tropica*, 2019;90: 344-349.(IF: 2.629).

33. Singh N, Mishra AK, Saha KB, Bharti PK, Sisodia DS, Sonal GS, Dhariwal AC, Sharma RK. Malaria control in a tribal area of central India using existing tools. *Acta Trop*. 2018;181:60-8. (IF: 2.5).

34. Tripathi P, Kumar R, Agarwal S. Spectrum and hematological profile of hereditary anemia in North Indians: SGPGI experience. *Intractable Rare Dis Res.* 2018 Nov;7(4):258-263.

35. Vaidya SR, Kulkarni AS, Bhattad DR, Raut CG. Revealing True Diversity of Measles viruses Circulating in India, 2012-17. J Infection, 2019;79(3):277-287. [IF: 4.603].

36. Velayutham B, Chadha VK, Singla N, Narang P, Rao VG, Nair S, Srinivasan R, Gomathi NS, Joseph B, Selvaraju S, Shivakumar S, Narang R, Praseeja P, Bhat J, Ponnuraja C, Bhalla BB, Shivashankara BA, Sebastian G, Yadav R; Sharma RK, Sarin R, Myneedu VP, Singla R, Khalid UK, Kumar SM, Jayasankar S, Sanker P, Krishnaveni V, Rajeevan V, Mathuria K, Bhalla M, Singh N; Tumane KB, Dawale A, Tiwari CP, Bansod RL, Jayabal L, Murali L, Khaparde SD, Rao R, Natrajan M. Recurrence of tuberculosis among newly diagnosed sputum positive pulmonary tuberculosis patients treated under the Revised National Tuberculosis Control Programme, India: a multi-centric prospective study. PLoS One. 2018 Jul 6;13(7):e0200150. doi: 10.1371/journal.pone.0200150 (IF: 2.7).

37. Verma AK, Bharti PK, Das A. HRP-2 deletion: a hole in the ship of malaria elimination. *Lancet Infect Dis*. 2018;18(8):826-7. (IF: 27.5).

38. Verma R, Das G, Manjunathachar HV, Muwel N. Advances in Diagnostics of Parasitic Diseases: Current Trends and Future Prospects. *International Journal of Current Microbiology and Applied Sciences*. 2018, 7(7): 3261-3277.

39. VG Rao, Muniyandi M, Bhat J, Yadav R, Sharma R. Research on tuberculosis in tribal areas in India: A systematic Review. *IJTLD*. 65 (2018) 8 – 1 4.

40. Viswanathan R, George S, Murhekar M, Abraham A, Singh M, Jadhav S, Nag V, Naik S, Raut CG, Ashok M, Gupta M, Jagtap V, Kasuskar O, Gupta N, Sapkal G. Comparison of two commercial ELISA kits for detection of rubella specific IgM in suspected CRS cases and IgG antibodies in a sero survey of pregnant women. Diagno Micro Infect Dis. 2019. pii: S0732-8893(19)30082-3. doi:10.1016/j.diagmicrobio.2019.01.009. [Epub ahead of print]. [IF: 2.341].

10. CONFERENCE/ TRAINING/ MEETINGS

10.1. CONFERENCE/ TRAINING/ MEETINGS ATTENDED

Dr. Aparup Das, Scientist 'G' & Director

- Attended the seminar on "Indian Tribal Medicinal Plant Research: Challenges and Prospects" organized by the Faculty of Pharmacy, IGNTU, Amarkantak as the Chief Guest and delivered the Keynote Address on 29 April 2018.
- Attended the launching-cum-regional scientific workshop on 'Intensified TB Control among Saharia' on 15th June, 2018 at Gwalior, Madhya Pradesh organized in collaboration with the Directorate of Health Services, Government of Madhya Pradesh. The event was launched by Shri Rustam Singh [Retd. IPS], Hon'ble Minister, Public Health & Family Welfare, Govt. of MP. Prof. Balram Bhargava, Secretary, DHR & Director General, ICMR, New Delhi, addressed the meeting through video conference.
- Attended the meeting on submission of the final report of “Expert Committee on Tribal Health” to the Steering Committee on Tribal Health held at Nirman Bhavan, New Delhi on 1st August, 2018, under the joint chairmanship of Smt. Preeti Sudan, IAS, Secretary, Ministry of Health and Family Welfare, Govt. of India and Shri Deepak Khandekar, IAS, Secretary, Ministry of Tribal Affairs, Govt. of India.
- Attended the meeting of the release of report on 'Tribal Health in India” under the joint chairmanship of Shri Jagat Prakash Nadda, Hon'ble Minister of Health & Family Welfare, Govt. of India, and Shri Jual Oram, Hon'ble Minister of Tribal Affairs, Govt. of India, held on 9th August 2018 in Nirman Bhavan, New Delhi.
- Delivered an invited lecture at the '14th International Conference on Vectors and Vector Borne Diseases' held from 9th - 11th January, 2019 at Bhubaneswar, Odisha.
- Invited as Chief Guest and Keynote speaker in 'Three Days Hands-on workshop on Bioinformatics' held on 5th February, 2019 at Jiwaji University, Gwalior.
- A Memorandum of Agreement (MOA) for establishment of Model Rural Health Research Unit (MRHRU) at Chhattisgarh, India was signed between the Director, NIRTH and the Secretary, Health & Family Welfare, Government of Chhattisgarh, Mrs. Niharika Barik Singh on 7th March, 2019 at Mantralaya, New Raipur, C.G.
- Attended meeting of Judgment committee as member for 'ICAR Best Teacher Award 2017-18' held on 27th March, 2019 at Nanaji Deshmukh Veterinary Science University, Jabalpur.

Dr Tapas Chakma, Scientist 'G'

- Attended launch of IHMI project at Bhopal by the Governor of Madhya Pradesh on 7th April 2018.

- Organised field training at Chhindwara of Project staff from AN college, Patna for implementation of Integrated fluorosis mitigation in Bihar.
- Attended Brain storming session on climate change and the Natural geogenic contaminants at Devecha Centre for Climate Change at IISC Bangalore and delivered a lecture on the health effects of Fluoride and role of Nutrition on fluorosis mitigation on 20th and 21st June 2018.
- Attended as resource person for the Cardiovascular health officers of IHMI project, organized by WHO from 16th to 19th July 2018 at New Delhi.
- Attended through Skype "Fluorosis advisory group meeting" at Devecha Centre for Climate Change at IISC Bangalore on 19th July 2018.
- Delivered a guest lecture on Role of Nutrition on fluorosis mitigation in IMA state conference held at Jabalpur on 27th October 2018.
- Attended strategic workshop on fluorosis and delivered a lecture on the "Hurdles of Fluorosis Mitigation, Experience from 20 Years", organized by AN college, Patna on 22nd December 2018.
- Delivered a guest lecture on "Appropriate study design in Research Methodology" on 16th January 2019, in a workshop organized by Medical College, Ratlam.
- Attended Review meeting of various partners of ICMR Task force on fluorosis in ICMR HQ, New Delhi and presented the work done at NIRTH.
- Attended workshop for Oral Health officers of Maharashtra, and delivered two lectures 1). Health effects of Fluorosis and 2). Role of Nutrition on fluorosis mitigation organized by NCD division of Public health, Govt. of Maharastra, held at Mumbai on 13th March 2019.
- Attended RAC meeting of MDRU, Rewa on 26th March 2019.
- Attended workshop on Research Methodology and delivered two lectures on Study design and How to formulate research questions in workshop organized by SS Medical College, Rewa on 27th March 2019.

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

- Attended a meeting with Directorate of Animal Husbandry, Bhopal for Sero-survey of CCHFV in Livestock project during the month of April, 2018.
- Attended a meeting with Madhya Pradesh Biodiversity Board regarding research work with the ecological samples during the month of April, 2018.
- Attended a meeting with Principal Chief Conservator of Forest (PCCF) and discussed about the sample required from wild life for testing of zoonotic infections during the month of April, 2018.

Dr. K. B. Saha, Scientist 'F'

- Organized a camp on 'World Malaria Day' on 25th April 2018 at village Marhapatha, Bargi, Jabalpur. It includes awareness programme, besides malaria diagnosis and treatment.
- Attended a meeting on 10th May 2018 with Director, NVBDCP and other officials from the programme and state government of MP related to MEDP at Mandla and also visited field areas and rural health posts to review the activities particularly of MEDP village health workers.
- Attended a seminar on 'Organization and ethics of biomedical research publication' on 1st June 2018 held at NIRTH, Jabalpur.
- Attended a training workshop at RMRC Bhubaneswar on 'Crisis communication' on 6th and 7th June 2018 organized by ICMR and Global Health Strategy at RMRC, Bhubaneswar.
- Attended a meeting with Health Commissioner, Govt. of Madhya Pradesh on 10th September 2018 at Bhopal regarding the status of the institutes *Van Bandhu* projects.

Dr. Jyothi Bhat, Scientist 'E'

- Attended Scientific Advisory Committee meeting of NIRT, Chennai as special invitee during 3rd & 4th November 2018 at Chennai.
- Attended first Joint SAC of ICMR institutes on 18th & 19th December 2018 at ICMR HQ New Delhi.
- Attended India-UK Networking Partnership Workshop on 'Meeting the Challenges of TB Research Priorities in India' during 11th -12th February 2019 at ICMR, New Delhi.

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

- Deputed by EMR, MOHFW, GOI to Vidisha Madhya Pradesh for 15 days following ZIKA outbreak in the month of November 2018 and supervised all the intervention activities carried out by state health authorities.

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

- Attended a meeting on implementation of the project "Mobile Application for Immunization Data in India", funded by BIRAC on 13th March 2019 at ICMR HQ, New Delhi.
- Attended India-UK Networking Partnership workshop on "Meeting the Challenges of TB Research Priorities in India" during 11-12 February 2019 at ICMR HQ, New Delhi
- Attended first Joint SAC of ICMR institutes on 18th & 19th December 2018 at ICMR HQ New Delhi.
- Attended project review meeting at M.P. Secretariat on 22nd June 2018 at Bhopal.
- Attended one day seminar on "Organization and ethics of biomedical research publication" held on 1st June 2018 at NIRTH, Jabalpur.

Dr. P. V. Barde, Scientist 'E'

- Attended a meeting at organized by MoTA Parliament House on Meeting on 'Issues related to tribal health' on 8th October 2018.
- Attended a meeting on 'MRHRU progress review' on 28th January 2019 at ICMR HQ, New Delhi.
- Attended a meeting on 'Influenza Surveillance project' on 19 March 2019 organized by DHR, Delhi.

Dr. Praveen K. Bharti, Scientist 'E'

- Attended the orientation meeting on "The rapeutic efficacy of antimalarials (ACT) combination therapy for the treatment of uncomplicated *Plasmodium falciparum* malaria" was organized on 21st May 2019 at Guwahati, Assam

Dr. Nishant Saxena, Scientist 'B'

- Delivered Plenary Lecture titled 'Ethnomedicine - an untapped treasure among tribes of India: Challenges and Prospects' in the National Seminar on Indian Tribal Medicinal Plants Research: Challenges and Prospects held at IGNTU Amarkantak, 28-29 April, 2018. Also, Chaired the Oral Presentation Session 1 and Evaluated the Poster Session in this seminar.
- Participated in the one-day Seminar on 'Organization and Ethics of Biomedical Research' organized at NIRTH Jabalpur on 1st June 2018.
- Delivered Invited Lecture on 'Issues, challenges and development of tribals in India' at School of Business, VIT-AP, Amravati on 6th October 2018 and also conducted one day Workshop on Ethnography for students and faculty.
- Participated and presented in the ICMR Expert Group Meeting on Traditional Medicine on 12th November 2018 at ICMR HQ, New Delhi.
- Delivered lecture as Invited speaker (online mode) in the Innovation and Start-up Summit 2019 at Banda, UP entitled 'Think global, act local: Innovation and Culture'.
- Participated as invited expert in the National Workshop of Tribal Healers on 19th - 23rd February 2019 at IGRMS, Bhopal.

Dr. Ravindra Kumar, Scientist 'B'

- Attended CME for laboratory technocrats organized by Jabalpur Association of Pathologists and Microbiologists and Department of pathology, NSCB Medical College Jabalpur on 2nd & 3rd February 2019
- Attended a workshop on sickle cell disorder on 21st & 22nd December 2018 at Govt. Homeopathic Medical College and Hospital, Bhopal

- Attended a brainstorming session on 'Consultation on Sickle Cell Anemia' on 17th & 18th August 2018 at Khargone, M.P.
- Delivered a lecture on Thalassemia prevention on 9th May 2018 at Govt. Nursing college, Elgin Hospital Campus.

Dr. Suyesh Shrivastava, Scientist 'B'

- Attended Inaugural ceremony of IHMI Project on 7th April 2018 at Vidhan Sabha Bhavan, Bhopal.
- Attended and completed a six days course on 'Principles and Practice of Clinical Research' during 16th - 21st April 2018 held at Hyderabad, India.
- Attended a training programme for Cardiovascular Health Officer and Senior Treatment Supervisors from 7th - 18th July 2018 at Bhatinda.

Dr. Anil Kumar Verma, Scientist 'B'

- Attended a five days training programme on 'Role of technology in community level disaster mitigation' during 26th - 30th November, 2018 organised by Centre for Disaster Management (CDM), Lal Bahadur shastri Academy of Administration, Mussoorie, UttaraKhand.

Dr. Manjunathachar H.V., Scientist 'B'

- Attended a meeting with scientists of National Institute for High Security Animal Diseases (NIHSAD), Bhopal on 24th April, 2018 and discussed about possibilities to work on collaborative platform on transcriptions and genomics aspects.
- Delivered a talk on 'Disease transmission and maintenance of hygiene' to school children's in Kundam block during 1st - 15th April 2018 under swachhta pakhwada.



- Delivered a lecture in XXII National Training programme on 'A short course on diagnostic and control of emerging parasitic diseases' in KVAFSU Regional Campus, Veterinary College, Hebbal, Bangalore on 25th January 2019.



- Attended 14th International conference on 'Vector and vector borne diseases' during 9th - 11th January 2019 at Bhubaneshwar and delivered oral presentation on 'Scrub typhus / Chiggerosis: A re-emerging disease', and two posters.



- Attended a meeting with Director, Indira Gandhi Rastriya Manav Sangrahalya, Bhopal on 21st January 2019 to discuss the feasibility of development of tribal habitats.



Dr. Manjunathachar & Dr. Nishant Saxena with Dr. Sarit K Chaudhary, Director IGRMS, Bhopal

10.2. SEMINAR/WORKSHOP/TRAINING PROGRAMME CONDUCTED

1. Orientation Program for CMO/CMHO/BMO on Hemoglobinopathies, Diagnosis, Prevention and management during 5th -25th September 2018 in 6 batches. Total 110 participants were trained.






2. One Day Seminar was organized on 'Ethics of Biomedical Research Publications' on 1st June 2018 at ICMR-NIRTH, Jabalpur. Dr. V. Ravindran, Calicut, Prof. R.N. Pandey, Dept. of Biostatistics, AIIMS, Delhi, Dr. Rajni Kant, Scientist 'F', ICMR HQ, New Delhi. Dr.Tulika Seth, AIIMS New Delhi and Dr. Anju Sharma, Scientist 'G', ICMR HQ, New Delhi and Editor IJMR delivered the lecturers on ethics in publication.




- Meeting was organized with CPCSEA officials as part of compliance. Dr. Brijesh Garg, CPCSEA Nominee for the breeding purpose of Central Animal Facility conducted CPCSEA inspection of Central Animal Facility on 7th April 2018.





- An Orientation training -cum workshop on the project Intensified TB control program in Saharia PVTGs was organized from 29th-31st August 2018.





10.3. AWARDS

- Dr. Manjunathachar, Scientist 'B' received the best poster Award in the 14th International conference on 'Vector and vector borne disease' at Bhubaneshwar for the presentation on Multi-antigenic vaccine against *Hyalomma anatolicum*- A vector of Crimean Congo Hemorrhagic fever.





Participants, CAF staff along with ICMR-NIRTH Director, Dr. Aparup Das, Dr CG Raut, HoD and Dr. Manjunathachar, Sci-B & veterinarian in workshop closing ceremony.

11. EVENTS

ICMR-NIRTH Jabalpur celebrated World Malaria Day on 25th April 2018 in highly malarious tribal area of Madhya Pradesh.	
Mrs. Manjula Saxena, Deputy Secretary, Department of official language, Ministry of home affairs, Govt. of India visited the Centre on 26th April 2018.	
Dr. PK Sen, Director, NVBDCP, New Delhi and other health officials visited the institute on 11th May 2018 and held discussion with scientists of the institute.	
At All India Radio Station, Jabalpur, a live talk on the research activities at ICMR-NIRTH, Jabalpur was delivered by Director NIRTH, Dr. Aparaup Das on 3rd June 2018.	

The lauching -cum-regional scientific workshop on intensified TB control among Saharia was held on 15th June 2019 at Gwalior, MP.	
Institute celebrated 4th International Yoga Day on 21st June 2018 with Zeal and Enthusiasm. A lecture was delivered by Prof. Bhart Kumar Tiwari, HOD, Department of Yoga and Philosophy, RDVV University, Jabalpur.	
Dr. Swati Sadanand Godbole, Mayor, Jabalpur, Municipal Co-corporation, Jabalpur visited the institute on 30th July 2018.	
Institute celebrated 72nd Independence Day with great pride, zeal, glory and enthusiasm.	

An Oath was taken by the Scientists, Staff and students on Sadbhavna Divas 20st August 2018.	
Rajbhasha Prize distribution ceremony 2018. Hindi fortnight celebrated during 1st to 15th September 2018.	
Vigilance awareness week was observed during 29th October to 2nd November 2018 on the theme “Eradicate corruption- Build a new India.	
Mr. William Jany and Mr. Shyamal Majumdar, Clark International, USA visited the institute and delivered a talk on 17th January 2019.	

Institute celebrated 70th Republic day with great zeal and enthusiasm. Director Dr. Aparup Das unfurled the national flag at the campus.	
Institute celebrated 'National Science Day' on 28th February, 2019 with the theme “Science for the People and the People for Science”. On this occasion, sixty-eight students from 11 different local schools along with teacher were invited to showcase their science models at ICMR-NIRTH.	
The 36th Foundation Day of ICMR-NIRTH, Jabalpur was celebrated on 1st March 2019.	
A Memorandum of Agreement (MOA) for establishment of Model Rural Health Research Unit (MRHRU) at Chhattisgarh, India was signed between the Director Dr. Aparup Das and the Secretary Health & Family Welfare, Government of Chhattisgarh, Mrs. Niharika Barik Singh on 7th March, 2019 at Mantralaya, New Raipur, C.G.	

International Women's Day was celebrated with zeal on 8th March, 2019 at ICMR-National Institute of Research in Tribal Health (ICMR-NIRTH), Jabalpur.	

12. APPENDICES

12.1: COMMITTEES

INSTITUTIONAL ETHICS COMMITTEE (IEC)

Name of Existing Member and Affiliation	Designation	Discipline
Dr. Shashi Khare Retd. Prof Gynecology and Ex-Dean, NSCB Medical College, Jabalpur	Chairperson	Medical (Gynecology)
Dr. Sharad Jain Prof. of Pathology, NSCB Medical College, Jabalpur	Member	Medical (Pathology)
Dr. Rajesh Sharma Prof. and Head, Dept. of Pharmacology and Toxicology College of Veterinary Science and Animal Husbandry, NDVSU, Jabalpur	Member	Pharmacology
Dr. Uma C. Saha Prof. General Management and Development, XIDAS, Jabalpur	Member	Social Science
Mr. Jamal Akhtar Baig Director, ENFORCE (NGO) Area Colony, Bhopal (M.P.)	Member	NGO Representative
Mr. Sankalp Sanghi Advocate, High Court of Madhya Pradesh, Jabalpur	Member	Law
Shri Komal Prasad Vishwakarma Vill.-Mukunwara, Post- Ghatpipaliya Dist: Jabalpur	Member	Community Leader
Dr. Avyakt Agarwal Asst. Prof (Pediatrics), NSCB Medical College Jabalpur	Member	Medical (Pediatrics)
Dr. Riti Seth Asst. Prof (Microbiology), NSCB Medical College Jabalpur	Member	Microbiology (Basic Science)

Dr. Rajiv Yadav Scientist 'D', ICMR-NIRTH, Jabalpur	Member	Medical (Pharmacology)
Dr. Tapas Chakma Scientist 'G' ICMR-NIRTH, Jabalpur	Member Secretary	Medical (Epidemiology)

CPCSEA - INSTITUTIONAL ANIMAL ETHICS COMMITTEE

Name of Existing Member & Affiliation	Designation	Discipline
Dr. Aparup Das, Scientist- G and Director, ICMR, NIRTH, Jabalpur	Chairperson	
Dr. Jyothi Bhat, Scientist – E, ICMR-NIRTH, Jabalpur	Member	Scientist from different discipline
Dr. S. Rajasubramaniam, Scientist – E, ICMR-NIRTH, Jabalpur	Member	Biological Scientist
Dr. S. Sambath, Scientist-C, Zoological Survey of India, Jabalpur	Member	Scientist from different discipline
Dr. Prateek Kumar Jain, Adina Institute of Pharmaceutical Sciences, Sagar, MP	Member	CPCSEA Main Nominee
Dr. Surendra Jain, Sagar Institute of Research and Technology – Pharmacy, Bhopal, MP	Member	Scientist from outside the institute (Nominated by CPCSEA)
Shri. Rakesh Kumar Gawaly, RKDF College of Pharmacy, Bhopal, MP.	Member	Socially Aware Member (Nominated by CPCSEA)
Dr. Manjunathachar H.V. , Scientist – B, ICMR-NIRTH, Jabalpur	Member Secretary	Veterinarian and Member Secretary

INSTITUTIONAL BIOSAFETY COMMITTEE

Name of Existing Member and Affiliation	Designation
Dr. Aparup Das Scientist- G and Director ICMR- NIRTH, Jabalpur	Chairman
Dr. YK Bansal Plant Tissue Culture Lab. Dept. of Biosciences, RDVV, Jabalpur	DBT Nominee
Dr. Riti Jain Seth Associate Professor Dept. of Microbiology NSCB Medical College, Jabalpur	External Expert
Dr. Tapas Chakma Scientist- G ICMR- NIRTH, Jabalpur	Biosafety Officer
Dr. S. Rajasubramaniam Scientist – E ICMR-NIRTH, Jabalpur	Internal Member
Dr. Pradip V. Barde Scientist-D, ICMR- NIRTH, Jabalpur	Internal Member
Dr. Praveen Kumar Bharti Scientist-D ICMR- NIRTH, Jabalpur	Internal Member

Institute Local Building Monitoring Committee-(Capital Works)

Sh. S.S. Mehta	Executive Engineer (Retd.), PWD	**Chairman & External Expert**
Sh. Mahtab Alam	Executive Engineer (Retd.),	External Expert
Sh. Gyan Chand Jain	Administrative Officer, ICMR-NIRTH	Member
Sh. Pramod Kumar	Account Officer, ICMR-NIRTH	Member
Sh. RK Thakur	Section Officer (Stores), ICMR-NIRTH	Member Secretary

Dissemination of Information Committee

Dr. Jyothi Bhat	Scientist-E,	ICMR- NIRTH	Chairperson
Dr. Ravendra K.Sharma	Scientist-E,	ICMR-NIRTH	Member
Dr. Pradip Barde	Scientist-E,	ICMR-NIRTH	Member
Dr. Arvind Verma	Pr.Tech.Offic er	ICMR-NIRTH	Member
Sh. Avinash Dubey	Technician-A,	ICMR-NIRTH	Member

Rapid Response Team

Dr. Tapas Chakma	Scientist-G,	ICMR-NIRTH	Chairman
Dr. Jyothi Bhat	Scientist-E,	ICMR- NIRTH	Member
Dr. Pradip Barde	Scientist-E,	ICMR-NIRTH	Member
Seven supporting Staff (Technical /Others)			

Library Committee

Dr. K.B. Saha	Scientist-F,	ICMR- NIRTH	Chairman
Dr. S. Rajasubramaniam	Scientist-E,	ICMR- NIRTH	Member
Dr. Ravendra K. Sharma	Scientist-E,	ICMR-NIRTH	Member
Sh. Gyan Chand Jain	Admn. Officer,	ICMR-NIRTH	Member
Sh. Pramod Kumar	Accounts Officer,	ICMR-NIRTH	Member
Sh. S.N. Singh	Pr.Technical Officer,	ICMR -NIRTH	Member Secretary

Anti –sexual Harassment Committee

Dr. Jyothi Bhat	Scientist-E,	ICMR-NIRTH	Chairperson
Dr. Alpana Abbad	Pr.Tech.Officer,	ICMR-NIRTH	Member
Dr. Uma Saha	Professor	XIDAS Jabalpur	Outside Expert
Sh. L.S. Kaushal	Sr. Tech. Officer-C,	ICMR-NIRTH	Member

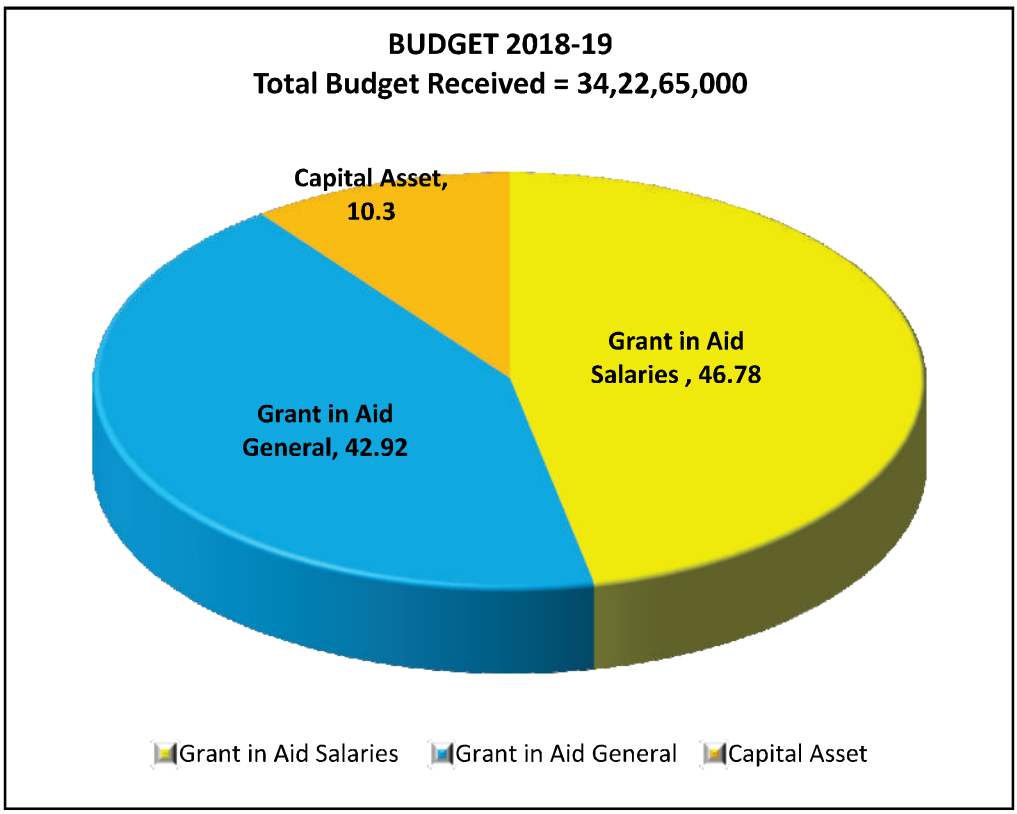
Annual Report Committee

Dr. Jyothi T.Bhat	Scientist-E,	ICMR- NIRTH	Member
Dr. K.B. Saha	Scientist-F,	ICMR - NIRTH	Member
Dr. P.V. Barde	Scientist-E,	ICMR-NIRTH	Member
Dr. Ravendra K. Sharma	Scientist-E,	ICMR- NIRTH	Member
Dr. Vidhan Jain	Scientist-C,	ICMR-NIRTH	Member
Dr. Nishant Saxena	Scientist-B,	ICMR-NIRTH	Member
Dr. Manjunathachar H V	Scientist-B,	ICMR-NIRTH	Member
Dr. Anil Verma	Scientist-B,	ICMR-NIRTH	Member
Dr. Arvind Verma	Pr.Tech. Officer,	ICMR -NIRTH	Member
Dr. Smt.Alpana Abbad	Pr.Tech. Officer,	ICMR -NIRTH	Member
Sh. Arvind Kavishwer	Pr.Tech. Officer,	ICMR -NIRTH	Member
Mrs. Nazia Anwar Ali	Tech. Officer – 1,	ICMR-NIRTH	Member
Dr. Prakash Tiwari	Tech. Assistant,	ICMR-NIRTH	Member

Publication Screening Committee

Dr. Aparup Das	Scientist-G & Director,	ICMR- NIRTH	Chairperson
Dr. Tapas Chakma	Scientist-G	ICMR- NIRTH	Member
Dr. K. B. Saha	Scientist-F	ICMR-NIRTH	Member
Dr. S. Rajasubramaniam	Scientist-E	ICMR-NIRTH	Member
Dr. R. K. Sharma	Scientist-E	ICMR-NIRTH	Member
Dr. P. V. Barde	Scientist-E	ICMR-NIRTH	Member
Dr. V. G. Rao	Scientist-G	ICMR-NIRTH	Member
Dr. Nishant Saxena	Scientist-B	ICMR-NIRTH	Member Secretary

12.2 BUDGET


BUDGET 2018-19
Total Budget Received = 34,22,65,000
Capital Asset, 10.3
Grant in Aid Salaries , 46.78
Grant in Aid General, 42.92
Grant in Aid Salaries
Grant in Aid General
Capital Asset

12.3 राजभाषा नीति के कार्यान्वयन एवं अनुपालन से संबंधित प्रगति रिपोर्ट

आईसीएमआर–राष्ट्रीय जनजाति स्वास्थ्य अनुसंधान संस्थान, जबलपुर में भारत सरकार, गृहमंत्रालय, राजभाषा विभाग की राज भाषा नीति के समुचित कार्यान्वयन एवं अनुपालन के लिए सतत प्रयास किए जा रहे हैं। प्रतिवेदन अवधि के दौरान इस संस्थान में हिंदी के पगामी 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 संस्थानमें 'राजभाषा कार्यान्वयन समिति' गठित है :–

1. डॉ. अपरूपदास, निदेशक	–	अध्यक्ष
2. डॉ. मनमोहन शुक्ला, वैज्ञानिक' एफ'	–	सदस्य
3. श्री ज्ञानचंदजैन, प्रशासनिक अधिकारी	–	सदस्य
4. श्री प्रमोदकुमार, लेखा अधिकारी	–	सदस्य
(वर्तमान में भा.आ.अ.प. मुख्यालय में स्थानांतरित, लेखा अधि. का पद रिक्त है)		
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। प्रतिवेदन अवधि तक इस समिति की कुल 87 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 प्रतिशत 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 फाइलो पर भी हिंदी में टिप्पणियां लिखी जाती हैं। पिछली बैठकों में संस्थान द्वारा मूल हिंदी पत्राचार एवं मूल रूप से हिंदी टिप्पणी–लेखन का प्रतिशत और बढ़ाए जाने तथा संस्थान में प्रतिवर्ष हिंदी की नई पुस्तकों की खरीद पर कार्यान्वयन के कदम उठाए गए 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, सूचना के अंतर्गत रिक्त पदों के विज्ञापन, निविदा सूचना एवं निविदा प्रपत्र आदिनिर्दिष्ट दस्तावेजों के अतिरिक्त रिक्तपदों के विज्ञापन आदि भी हिंदी / द्विभाषी रूपमें जारी किए जाते हैं।

4. प्रशिक्षण

इस संस्थान के अधिकांश अधिकारियों एवं कर्मचारियों को हिंदी का कार्य साधक ज्ञान / प्रवीणता प्राप्त है और प्रशासनिक अनुभागों–स्थापना, लेखा एवं भंडार अनुभागों में तैनात कर्मचारियों द्वारा अधिक से अधिक मूलतः हिंदी में सरकारी कामकाज निश्पादित करने का प्रयास किया जाता है।

राजभाषा विभाग के निर्देशों के अनुसार, जिन कर्मचारियों को हिंदी टंकण एवं हिंदी आशुलिपि के सेवा कालीन प्रशिक्षण की आवश्यकताथी, उन सभी को हिंदीशिक्षण योजना, राजभाषा विभाग, जबलपुर कार्यालय से हिंदी टंकण / हिंदी आशुलिपि का प्रशिक्षण दिलाया गया है। वर्तमान में केवल एकआशु लिपिक हिंदी आशुलिपि प्रशिक्षण के लिए शेष हैं, उन्हें शीघ्र ही हिंदी प्रशिक्षण योजना के माध्यम से 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 पहुँचसके।

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 प्रतिवर्ष 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 (1 से 15सितम्बर, 2018) के अंतर्गत विभिन्न हिंदी प्रतियोगिताएं आयोजित की गईं तथा विजेताओं को 14–09–2018 को 'हिंदी–दिवस' के अवसर पर' राजभाषा पुरस्कार वितरण समारोह' में निदेशक महोदय द्वारा इन प्रतियोगिताओं के विजेताओं को 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.	**हिंदीटंकण**		
	प्रथम	श्री शरद कुमार कोष्टा, अवर श्रेणी लिपिक	रु. 5000 / –
	द्वितीय	श्री राहुल कोष्टा, अवर श्रेणी लिपिक	रु. 3000 / –
	तृतीय	श्री नरेन्द्र कुमार झारिया, उच्च श्रेणी लिपिक	रु. 2000 / –
	सांत्वना (1)	कु. अंजली राजपूत, अवर श्रेणी लिपिक	रु. 1000 / –
	सांत्वना (2)	श्री सुबाष चंद्रमुदुलि, निजीसहायक	रु. 1000 / –
2.	**हिंदी टिप्पण एवं आलेखन**		
	प्रथम	श्री रोहित अग्रवाल, सहायक	रु. 5000 / –
	द्वितीय	श्री अविनाश कुमार दुबे, तकनीशियन 'ए'	रु. 3000 / –
	तृतीय	श्री नरेन्द्र कुमार झारिया, उच्च श्रेणी लिपिक	रु. 2000 / –
	सांत्वना (1)	कु. अंजली राजपूत, अवर श्रेणी लिपिक	रु. 1000 / –
	सांत्वना (2)	श्री सुबाष चंद्रमुदुलि, निजीसहायक	रु. 1000 / –
3.	**तात्कालिक हिंदी निबंध–लेखन (वैज्ञानिक / अधि. समूह)**		
	प्रथम	श्री अजय कुमार गोयल, प्रधान तकनीकी अधिकारी	रु. 5000 / –
	द्वितीय	डॉ. बालकृष्ण तिवारी, प्रधान तकनीकी अधिकारी	रु. 2000 / –
	तृतीय	श्री अरविंदकबिशवर, प्रधान तकनीकी अधिकारी	रु. 3000 / –
	सांत्वना(1)	श्री सुभाश गोडबोले, प्रधान तकनीकी अधिकारी	रु. 1000 / –
	सांत्वना(2)	श्री एल.एस. कौशल, वरि.तकनीकी अधिकारी (3)	रु. 1000 / –
4.	**तात्कालिक हिंदी निबंध–लेखन (कर्मचारी समूह)**		
	प्रथम	श्री विवके कुमार चौकसे, तकनीकी सहायक	रु. 5000 / –
	द्वितीय	श्री सार्थक सोनी, आंशुलिपिक	रु. 3000 / –
	तृतीय	कु. अंजली राजपूत, अवर श्रेणी लिपिक	रु. 2000 / –
	सांत्वना(1)	श्री रामकुमार वर्मा, वरि. तकनीशियन(3)	रु. 1000 / –
	सांत्वना(2)	श्री रोहित अग्रवाल, सहायक	रु. 1000 / –
5.	**हिंदीवाद–विवाद (वैज्ञानिक / अधिकारी समूह)**		
	प्रथम	डॉ. निशांत सक्सेना, वैज्ञानिक 'बी'	रु. 5000 / –
	द्वितीय	डॉ. बालकृष्ण तिवारी, प्रधान तकनीकी अधिकारी	रु. 3000 / –
	तृतीय	श्री एल.एस. कौशल, वरि. तकनीकी अधिकारी (3)	रु. 2000 / –
	सांत्वना(1)	डॉ. अनिल वर्मा, वैज्ञानिक 'बी'	रु. 1000 / –
	सांत्वना(2)	श्रीमती नाजिया अली, तकनीकी अधिकारी	रु. 1000 / –

क्रम.सं.	प्रतियोगिता	पुरस्कार प्राप्त करने वाले अधि./कर्म.	नकद पुरस्कार
5.	**हिंदी वाद–विवाद (कर्मचारी समूह)**		
	प्रथम	श्री सार्थक सोनी, आशुलिपिक	रु. 5000/–
	द्वितीय	श्री विवेक कुमार चौकसे, तकनीकी सहायक	रु. 3000/–
	तृतीय	श्री प्रदीप कुमार तिवारी, तकनीशियन 'सी'	रु. 2000/–
	सांत्वना(1)	श्री सुरेन्द्र सिंह मेहरा, तकनीशियन 'ए'	रु. 1000/–
	सांत्वना(2)	श्री प्रेम सिंह, प्रयोगशाला सहायक	रु. 1000/–
7.	**हिंदी कविता–पाठ (वैज्ञानिक/अधिकारी समूह)**		
	प्रथम	डॉ. अनिल वर्मा, वैज्ञानिक 'बी'	रु. 5000/–
	द्वितीय	डॉ. सुरेन्द्र कुमार, वैज्ञानिक 'डी'	रु. 3000/–
	तृतीय	श्रीमती नाजिया अली, तकनीकी अधिकारी	रु. 2000/–
	सांत्वना(1)	डॉ. बालकृष्ण तिवारी, वरि. तकनीकी अधि. (1)	रु. 1000/–
	सांत्वना(2)	डॉ. निशांत सक्सेना, वैज्ञानिक 'बी'	रु. 1000/–
8.	**हिंदी कविता–पाठ (कर्मचारी समूह)**		
	प्रथम	श्रीदीपचंद खातरकर, वरि. तकनीशियन (3)	रु. 5000/–
	द्वितीय	श्रीसुरेन्द्र सिंह मेहरा, तकनीशियन 'ए'	रु. 3000/–
	तृतीय	श्रीसुरेश कुमार परेहा, प्रयोगशाला सहायक	रु. 2000/–
	सांत्वना(1)	श्रीराजेन्द्र प्रसाद गोंड़, प्रयोगशाला सहायक	रु. 1000/–
	सांत्वना(2)	श्री सुबाष चंद्र मुदुलि, निजीसहायक	रु. 1000/–
		योग–	**रु. 96,000/–**

(कुल राशि–छियानवे हजार रुपए मात्र)

12.4: STAFF LIST AS ON 31st MAR-2019

NAME	DESIGNATION
DR. APARUP DAS	DIRECTOR
DR. TAPAS CHAKMA	SCIENTIST `G'
DR. MAN MOHAN SHUKLA	SCIENTIST `F'
DR. CHANDRASHEKHAR G.RAUT	SCIENTIST `F'
DR. GYAN CHAND	SCIENTIST `F'
DR. K.B.SAHA	SCIENTIST `F'
DR. JYOTHI T. BHAT	SCIENTIST `E'
DR. ASHOK KUMAR MISHRA	SCIENTIST `E'
DR. S. RAJASUBRAMANIAM	SCIENTIST `E'
DR. SURENDRA KUMAR	SCIENTIST `D'
DR. DINESH KUMAR	SCIENTIST `D'
DR. RAVENDRA KUMAR SHARMA	SCIENTIST `D'
DR. PRADIP VIJAY BARDE	SCIENTIST `D'
DR. PRAVEEN KUMAR BHARTI	SCIENTIST `D'
DR. RAJIV YADAV	SCIENTIST `D'
DR. VIDHAN JAIN	SCIENTIST `C'
DR. MANJUNATHACHAR H.V.	SCIENTIST `B'
DR. NISHANT SAXENA	SCIENTIST `B'
DR. RAVINDRA KUMAR	SCIENTIST `B'
DR. SUYESH SHRIVASTAVA	SCIENTIST `B'
DR. ANIL KUMAR VERMA	SCIENTIST `B'
Sh. GYAN CHAND JAIN	ADMINISTRATIVE OFFICER
Sh. PRAMOD KUMAR	ACCOUNTS OFFICER
Sh. DWARKA PRASAD LODHI	SECTION OFFICER
Sh. RAJENDRA KUMAR THAKUR	SECTION OFFICER
Sh. V. SOAN	PR.TECH. OFFICER
Sh. ARVIND KAVISHWAR	PR.TECH. OFFICER
DR. Smt. ALPANA ABBAD	PR.TECH. OFFICER
DR. BAL KRISHNA TIWARI	PR.TECH. OFFICER
DR. ARVIND VERMA	PR.TECH. OFFICER
Sh. SUBHASH GODBOLE	PR.TECH. OFFICER
Sh. SACHCHIDANAND SINGH	PR.TECH. OFFICER
Sh. AJAY KUMAR GOEL	PR.TECH. OFFICER
DR. MANOJ K. BHONDELEY	SR.TECHNICAL OFFICER (3)
Sh. PRAVAL SHRIVASTAVA	SR.TECHNICAL OFFICER (3)
DR. MENDI, P.S.S. SINGH	SR.TECHNICAL OFFICER (3)
Sh. CHANDAN KARFORMA	SR.TECHNICAL OFFICER (2)
Sh. LAXMAN SINGH KAUSHAL	SR.TECHNICAL OFFICER (2)
Mrs.REENA SHOME	SR.TECHNICAL OFFICER (2)
Sh. PRAKASH C. SRIVASTAVA	SR.TECHNICAL OFFICER (2)
Sh. RAJENDRA K. MINOCHA	SR.TECHNICAL OFFICER (1)
Sh. ASHOK KUMAR GUPTA	SR.TECHNICAL OFFICER (1)

Sh. ANIL GWAL	SR.TECHNICAL OFFICER (1)	
Mrs.CANINA LUKE	SR.TECHNICAL OFFICER (1)	
Sh. LALIT K. SAHARE	SR.TECHNICAL OFFICER (1)	
Sh. MAHENDRA JAIDEV UKEY	SR.TECHNICAL OFFICER (1)	
Mrs.MAYA PANDEY	SR.TECHNICAL OFFICER (1)	
Sh. SUBHASH KUMBHARE	SENIOR TECHNICIAN (3)	
Sh. PURUSHOTTAM PATEL	SENIOR TECHNICIAN (3)	
Sh. DEEPCHAND KHATARKAR	SENIOR TECHNICIAN (3)	
Sh. SHRI RAM MISHRA	SENIOR TECHNICIAN (3)	
Sh. BALRAM SINGH PATEL	SENIOR TECHNICIAN (3)	
Sh. M.P. TIWARI	SENIOR TECHNICIAN (3)	
Sh. D.K. MISHRA	SENIOR TECHNICIAN (3)	
Sh. RAM KUMAR VERMA	SENIOR TECHNICIAN (3)	
Sh. ASHOK KUMAR SAINI	SENIOR TECHNICIAN (3)	
Mrs.NAZIA ANWAR ALI	TECHNICAL OFFICER	
Sh. GHANSHYAM AHIRWAR	SENIOR TECHNICIAN (2)	
Sh. MAHENDRA KUMAR JAIN	SENIOR TECHNICIAN (2)	
Sh. AJESH KUMAR DUBEY	SENIOR TECHNICIAN (2)	
Sh. RAMESH KUMAR GOND	SENIOR TECHNICIAN (2)	
Sh. GENDA LAL GOND	SENIOR TECHNICIAN (2)	
Sh. PRADEEP KUMAR NAMDEO	SENIOR TECHNICIAN (2)	
Sh. VIJAY KUMAR KACHHI	SENIOR TECHNICIAN (2)	
Sh. JAGDISH PRASAD MISHRA	SENIOR TECHNICIAN (2)	
DR. SHIV KUMAR SINGH	SENIOR TECHNICIAN (2)	
Sh. HAKIM SINGH THAKUR	JR. HINDI TRANSLATOR	
Sh. SUBASH CH. MUDULI	PERSONAL ASSISTANT	
Sh. RAJ KUMAR HANDA	ASSISTANT	
Sh. BHAGWANI PRASAD	ASSISTANT	
Mrs.FILOMINA LAKRA	ASSISTANT	
Sh. ROHIT AGRAWAL	ASSISTANT	
Ms. SANDHYA SHARMA	ASSISTANT	
Ms. SNEHA BHANDARI	TECHNICAL ASSISTANT	
Sh. NITISH SINGH PARIHAR	TECHNICAL ASSISTANT	
Sh. SRI KRISHNA	TECHNICAL ASSISTANT	
Sh. VIVEK KUMAR CHOUKSEY	TECHNICAL ASSISTANT	
DR. PRAKASH TIWARI	TECHNICAL ASSISTANT	
MS. SWETA MISHRA	TECHNICAL ASSISTANT	
Sh. SANTOSH KUMAR PATKAR	TECHNICIAN-C	
Sh. HARI BARMAN	TECHNICIAN-C	
Sh. PRADEEP KUMAR TIWARI	TECHNICIAN-C	
Sh. SURENDRA K. JHARIYA	TECHNICIAN-C	
Sh. SHASHIKANT TIWARI	TECHNICIAN-C	
Sh. AMOL BABURAO MUN	TECHNICIAN-B,	**Transferred to this institute on 02/07/2018**
Sh. AVINASH DUBEY	TECHNICIAN-A	

Sh. PRAKASH SANGLE	TECHNICIAN-A
Sh. SHASHI BHUSHAN DUBEY	TECHNICIAN-A
Sh. ANUP K. VISHWAKARM	TECHNICIAN-A
Sh. SURENDRA SINGH MEHRA	TECHNICIAN-A
Sh. RAMSWAROOP UIKEY	TECHNICIAN-A
MS. MALA PRAJAPATI	TECHNICIAN-A
Sh. BAISHAKHU LAL	UPPER DIVISION CLERK
Sh. PRAMOD KUMAR CHOUBEY	UPPER DIVISION CLERK
Sh. NARENDRA K. JHARIYA	UPPER DIVISION CLERK
Sh. SARTHAK SONI	STENOGRAPHER
Sh. SHARAD KUMAR KOSTA	UPPER DIVISION CLERK
Sh. RAHUL KOSHTA	LOWER DIVISION CLERK
Sh. VIKAS KUMAR GUPTA	LOWER DIVISION CLERK
Ms. ANJALI RAJPUT	LOWER DIVISION CLERK
Sh. K. VENU GOPAL RAO	LABORATORY ASSISTANT
Sh. LAXMAN PRASAD	LABORATORY ASSISTANT
Sh. SURESH KUMAR JAISWAL	LABORATORY ASSISTANT
Sh. UMESH PRASAD GAUTAM	LABORATORY ASSISTANT
Sh. ANIL VINODIA	LABORATORY ASSISTANT
Sh. RAMESH KUMAR AHIRWAR	LABORATORY ASSISTANT
Sh. MALIKHAN SINGH	LABORATORY ASSISTANT
Sh. RAM KUMAR MEHRA	LABORATORY ASSISTANT
Sh. SUMMAT SINGH	LABORATORY ASSISTANT
Sh. AJAY KUMAR SONI	LABORATORY ASSISTANT
Sh. SANTOSH KUMAR KOL	LABORATORY ASSISTANT
Sh. SUKHLAL VISHWAKARMA	LABORATORY ASSISTANT
Sh. JAGDISH PRASAD THAKUR	LABORATORY ASSISTANT
Sh. SURESH KUMAR BURMAN	LABORATORY ASSISTANT
Sh. SURESH KUMAR PAREHA	LABORATORY ASSISTANT
Sh. ARAKH CHAND MALIK	LABORATORY ASSISTANT
Sh. VISHNOO PRASAD	LABORATORY ASSISTANT
Sh. MADAN SINGH MARAVI	LABORATORY ASSISTANT
Sh. RAJENDRA PRASAD GOND	LABORATORY ASSISTANT
Sh. PREM SINGH GOND	LABORATORY ASSISTANT
Sh. SONE LAL DUMAR	LABORATORY ASSISTANT
Sh. GANGA BAHADUR	LABORATORY ASSISTANT
Sh. PRITAM LAL GOND	LABORATORY ASSISTANT
Sh. PAPPU LAL DUMAR	LABORATORY ASSISTANT
Sh. SHANKAR LAL JHA	LABORATORY ASSISTANT
Sh. KAMTA PRASAD JAISWAL	LABORATORY ASSISTANT
Mrs.SHASHI PRABHA MISHRA	LABORATORY ATTENDANT-2
Sh. SHAMSHAD ALI ANSARI	LABORATORY ATTENDANT-2
Sh. SANTOSH KUMAR HALDKAR	LABORATORY ATTENDANT-2
Sh. VINAY KUMAR BALMIK	LABORATORY ATTENDANT-2
Sh. MUNNALAL	LABORATORY ATTENDANT-2
Sh. SANTOSH KUMAR MARAVI	MULTI TASKING STAFF



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Director

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