# वार्षिक प्रतिवेदन
# ANNUAL REPORT
# 2013-14

WORLD HEALTH ORGANIZATION
Collaborating Centre for the Health of Indigenous Populations

## क्षेत्रीय जनजाति आयुर्विज्ञान अनुसंधान केन्द्र
(भारतीय आयुर्विज्ञान अनुसंधान परिषद )
जबलपुर (म.प्र.)

## REGIONAL MEDICAL RESEARCH CENTRE FOR TRIBALS
(Indian Council of Medical Research)
JABALPUR (M.P.)


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नागपुर रोड, पो.आ. गढ़ा,

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विश्व स्वास्थ्य संगठन
जनजाति स्वास्थ्य के लिए सहयोगी केन्द्र

# Preface

It gives me immense pleasure to present the Annual Report of the centre for the year 2013-14. This year centre has launched new promising projects with stronger resolve and vigour to improve the health of tribals. During the period the centre has strengthened its ties with state government and the tribal welfare department with new initiatives.

Centre's multi-dimensional model for control of malaria in forested areas of Madhya Pradesh has yielded a phenomenal success in malaria control in the region. Directorate of NVBDCP impressed with these results has requested for the action plan and recommendations from the centre for forest malaria control. The plan of action is being made available to NVBDCP. Additionally, the centre has identified the causes of the prevalence of malaria in disturbed areas in central India. The scope of Molecular epidemiology, intervention studies and drug resistance studies has been expanded beyond the boundaries of the country up to the Mediterranean region through international collaboration. Most notable contribution in malaria control emanates from the discovery of presence of *Plasmodium ovale* in Chhattisgarh state for the first time. The centre has characterized 2 sympatric species of *P. ovale* circulating in the population. The Central Drugs Standard Control Organization, Food and Drugs Administration (CDSCO), New Delhi has nominated the centre for the evaluation of Rapid Diagnostic Tests Kits (RDT) manufactured and supplied in the country. Apex accredited Virology Research Diagnostic Laboratory of the centre investigated major Dengue and Chikungunya outbreaks in Madhya Pradesh and Chhattisgarh states and helped the state health department in controlling them.

The centre as a member of the expert committee on Tribals is assisting the ministry of health and family welfare in the preparation and formulation of new programs to address the health issues of tribes. The interaction of the centre with the Tribal Welfare Department has built an implicative system in bridging the gaps in tribal welfare to sustain changing national scenario.

Under auspices of the Tribal Health Research Forum as the coordinating centre, RMRCT has instituted a field unit at the Maharani Medical College, Jagdalpur to cater to the needs of the Tribes of Chhattisgarh state. The centre's role as technical advisor to Madhya Pradesh state government has resulted in the intensive screening of sickle cell carriers in 5 districts. It is worthwhile to mention that this program is being expanded to cover all 22 districts of the state. Studies are also being undertaken in the area of non communicable diseases like hypertension, nutrition and socioeconomic aspects of health in tribal population continue to be the other major areas of work for the centre.

As always scientists of the centre have participated in national as well as international conferences and presented their work. The quantity and quality of publications have greatly advanced. Apart from research, the centre also contributes in

advancing academics. The centre is recognized by various universities such as Rani Durgavati Vishwavidyalaya, Jabalpur, Symbiosis International University, Pune and Rajiv Gandhi Proudyogiki Vishwavidyalaya for doctoral programme.

The centre regularly provides services through its various clinics and testing centre. Workshops and trainings were organized at various occasions on fluorosis, malaria and HIV/AIDS for dissemination of knowledge and capacity building. Extracurricular activities like vigilance week, Hindi fortnight (Pakhwada) were observed by the centre. The foundation day of the centre on 1st of March was also celebrated with zeal and enthusiasm.

Finally, I would like to take this opportunity to acknowledge the unstinting support of Lt. General (Dr.) D. Raghunath our SAC chairman and other SAC members. I also wish to thank Dr. V. M. Katoch, Secretary to the Government of India, Department of Health Research, Ministry of Health and Family Welfare and Director General, ICMR for his constant encouragement and support to the centre.

**Dr. Neeru Singh**
Director

# 1. VECTOR BORNE DISEASES

## 1.1. EFFECTIVENESS OF INTENSIVE INTERVENTION MEASURES ON MALARIA PREVALENCE IN TRIBAL DISTRICT, DINDORI, MADHYA PRADESH

| | | |
|---|---|---|
| **Date of start** | : | April 2011 |
| **Duration** | : | Three years |
| **Status** | : | Completed |
| **PI** | : | Dr. Neeru Singh |
| **Funding** | : | ICMR (Translational Research) |

Dindori is a highly malarious district in MP, consisting of both *Plasmodium falciparum* and *P. vivax*, with a preponderance of *P. falciparum*. A study was undertaken to evaluate new intervention measures for developing a suitable model for malaria control in forest villages of the Dindori district in collaboration with State Vector Borne Disease Control Programme. These interventions are: Two rounds of IRS using synthetic pyrethroid, long lasting insecticide treated nets (LLINs), Rapid diagnostic test (RDT), Artemisinin based combination therapy (ACT) and Intensive Information, Education and Communication (IEC) / Behavior Change Communication (BCC). In this area long lasting insecticide treated bed nets were distributed and additionally two rounds of Alphacypermethrin were also sprayed.

### Objectives

- To assess the feasibility of the introduction and effectiveness of the long lasting insecticide treated mosquito nets (LLINs) on the vector density in villages of Baigachak in Dindori district.
- To determine Plasmodium specific sporozoite rate.
- To identify sibling species of *Anopheles culicifacies* and *An. fluviatilis* and the relative role of each sibling species on malaria transmission.
- To determine the impact of ACT (Artesunate and sulfadoxine pyrimethamine combination therapy) on malaria prevalence particularly on *Plasmodium falciparum*.

### Methodology

The study was carried out in 3 CHCs i.e. Bajag, Samnapur and Karanjia collectively known as Baigachak. Baigachak is known for its extremely rugged terrain and vast tracts of forest with tribal settlements. (Figure 1.1.1). Monthly cross sectional door-to-door fever surveys were carried out in the study villages. Finger-pricked blood smears were collected from all fever cases and cases with history of fever. The blood smears thus collected were stained with the JSB stain and examined under light

microscope. The microscopist examined 100 microscopic fields of thick smear before classifying a smear as negative.

specific circumsporozoite protein (CSP) of Pf, Pv 210 and Pv247 using the enzyme-linked immunosorbent assay (ELISA) and Polymerase Chain Reaction (PCR). All

**Figure 1.1.1: Study area**


Indoor resting Anopheles mosquitoes (per man hour) were sampled once in a month in the early morning (06.00 hrs) for 15 minutes each by a team of 2 insect collectors with flashlights and mouth aspirators in six villages (two villages from each CHC) as per standard techniques (WHO, 1975). Pyrethrum spray catches (PSC) were made once in a month from human dwellings (HD) randomly selected other than those selected for indoor resting collection from three villages (one village from each CHC) during 06.00 hours to 09.30 hours. Light trap catches (indoor-outdoor) were also made once in a month in three villages (one from each CHC) other than those selected for MHD and PSC. Heads and thoraces of *An. culicifacies* and *An. fluviatilis* were tested for species

patients infected with *P. falciparum* and *P. vivax* were given treatment as per treatment guideline of National Vector-Borne Disease Control Programme (NVBDCP). All adult subjects with *P. falciparum* were administered the oral dose of ACT (1500 mg Sulfadoxine, 75 mg Pyrimethamine and 600 mg of Artesunate divided into 3 days) with a single dose of Primaquine (45 mg). *P. vivax* cases were given 1,500 mg Chloroquine in three days, followed by 15 mg Primaquine daily for 14 days. Infants and children were given proportionally lower doses.

## Findings

Rapid fever surveys carried out from April 2013 to March 2014 revealed a total of 71 malaria positive cases (62 Pf, 8 Pv and 1

mix with Pf & Pv) out of total 2201 fever cases screened. The Slide Positivity Rate (SPR), Slide Falciparum Rate (SFR) and *P. falciparum* percentage were 3.2, 2.8 and 87% respectively (Figure 1.1.2). All indices showed a sharp decline particularly 72% reduction in SPR and 81% in spleen rate in children as compared to baseline data (2011). Age-wise and species specific data on malaria are shown in Table 1.1.1. The SPR and SFR were lowest in adults (aged >14 yrs) when compared with other age groups. *P. falciparum* proportion was high in all age.

The anopheline fauna of the villages consisted of mainly *An. culicifacies*, *An. subpictus*, *An. fluviatilis* and *An. annularis* in indoor resting collection, total catch and light trap catches. The mean density of *Anopheles* caught per man hour during the year was 10.9 of which the density of *An. culicifacies* and *An. fluviatilis* was 7.7 (70.6%) (Figure 1.1.3). In total catch, the numbers per catch of total anophelines was 11.3 of which *An. culicifacies* and *An. fluviatilis* was 8.0 (70.8%) (Figure 1.1.4). During light trap catches, per trap catch of total anophelines was 10.1 in indoors and 11.1 in outdoors. A total 1102

**Figure 1.1.2: Prevalence of malaria**

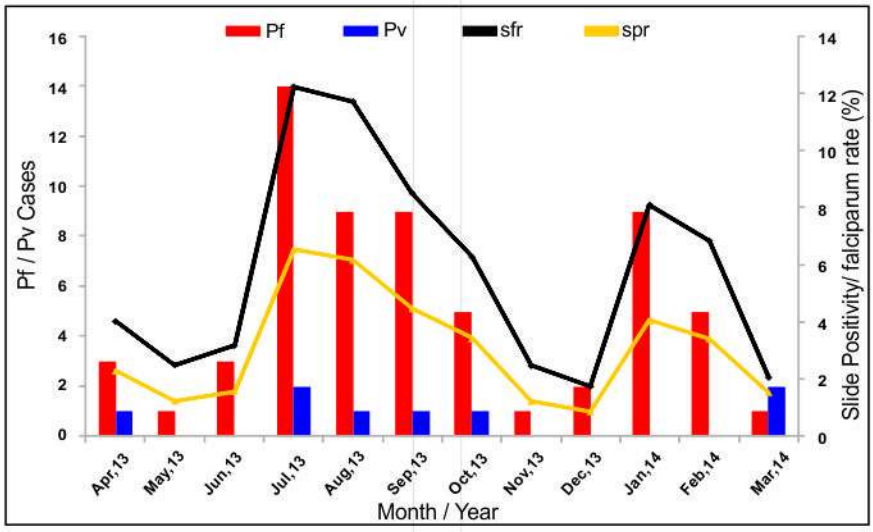



**Table 1.1.1: Age wise prevalence of malaria**

| Age in years | BSE | Pos | Pf | Pv | Pm | SPR | SFR | Pf (%) | OR (95% CI) |
|---|---|---|---|---|---|---|---|---|---|
| **<=1** | 61 | 5 | 5 | 0 | 0 | 8.2 | 8.2 | 100.0 | 2.7 (1.0 - 7.6)* |
| **>1 - 4** | 135 | 11 | 9 | 2 | 0 | 8.1 | 6.7 | 81.8 | 2.7 (1.3 - 5.8)** |
| **>4 - 8** | 700 | 21 | 16 | 4 | 0 | 3.0 | 2.4 | 81.0 | 0.9 (0.5 - 1.8) |
| **>8 - 14** | 641 | 13 | 12 | 1 | 0 | 2.0 | 1.9 | 92.3 | 0.6 (0.3 - 1.3) |
| **>14** | 664 | 21 | 20 | 1 | 0 | 3.2 | 3.0 | 95.2 | 1(reference) |

*p<0.05; **p<0.01; BSE: Blood Slide Examined; Pos: Positive for malaria; Pf: *Plasmodium falciparum;* Pv: *Plasmodium vivax;* SPR: Slide Positivity Rate; SFR: Slide falciparum Rate; Pf %: *P. falciparum* Percentage; OR (95% CI): Odd ratio for Malaria Positive (95% Confidence Interval).

*An.culicifacies* and 108 *An.fluviatilis* were tested for vector incrimination and none of them were found positive for malaria parasite.

**Translational output:** The study is completed and results were discussed at various meetings i.e. tribal health research forum, malaria group etc. The guideline for vectors of forest malaria control is developed and recommendations are shared with NVBDCP.

**Figure 1.1.3: Per man hour density of mosquitoes**

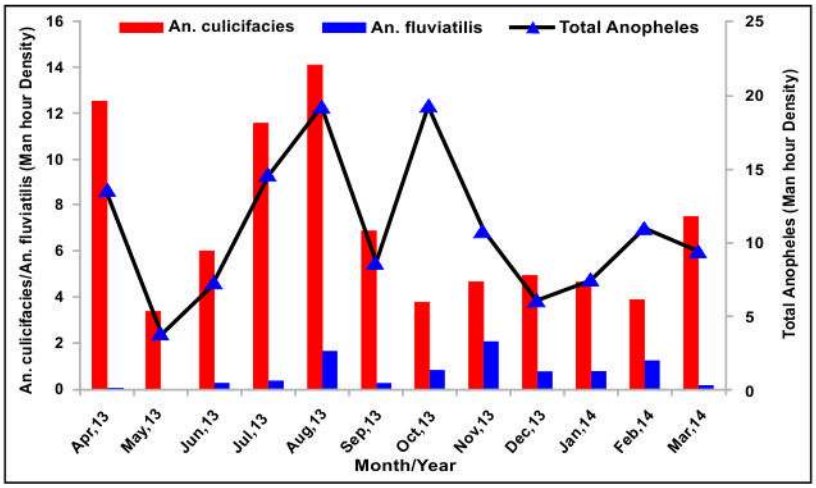
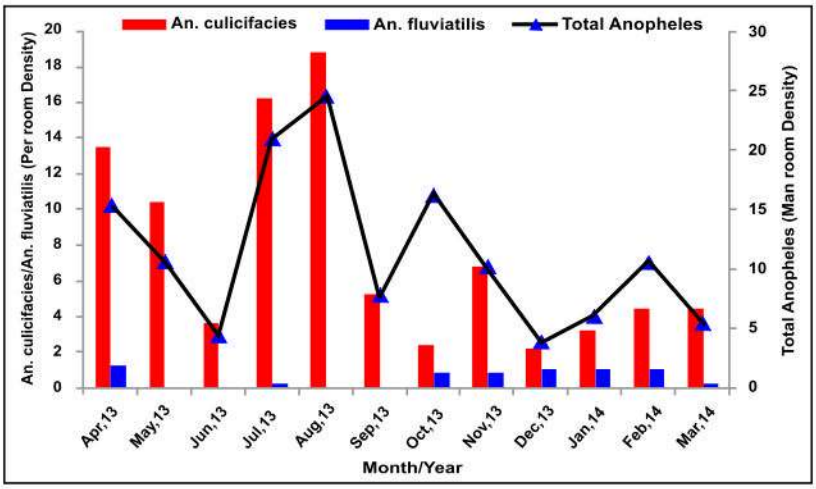



**Figure 1.1.4: Per room density of mosquitoes**



# 1.2. ASSESSMENT OF THE EFFECTIVENESS OF INTENSIVE INTERVENTION MEASURES ON MALARIA CONTROL PROGRAMME IN TRIBAL DISTRICT, BALAGHAT, MADHYA PRADESH

| | | |
|---|---|---|
| **Date of start** | : | April 2011 |
| **Duration** | : | Three years |
| **Status** | : | Completed |
| **PI** | : | Dr. Neeru Singh |
| **Funding** | : | ICMR (Translational Research) |

Balaghat is a highly malarious forested district consisting of three malaria parasites; *P. falciparum, P. vivax* and *P. malariae* with preponderance of *P. falciparum.* Balaghat district is a region of thick dense forest (longitude 80°15'E latitude 21°84'N, population 1756409) and there are several perennial streams and their tributaries which provide numerous breeding sites for mosquitoes. Two efficient vectors *Anopheles culicifacies* and *An. fluviatilis* are commonly prevalent. This study was undertaken in the villages of Birsa and Baihar Community Health Centre of district Balaghat to test new intervention methods for developing appropriate model for malaria in disturbed areas of the state in collaboration with State Vector Borne Disease Control Programme. The area is under two rounds of synthetic pyrethroid (alphacypermethrin) spray, local insecticide treated bed nets (ITNs), Rapid Diagnostic Test (RDT) and Artemisinin based combination therapy (ACT). In 2013 ZeroVector® Durable Lining (ZVDL) manufactured by Vestergaard Frandsen India Private Limited were installed in 6 villages (Experimental) and 8 villages were kept as control (under IRS).

## Objectives

- To assess the feasibility of the introduction of the zero vector durable lining (ZVDL) in Baiga villages of Balaghat.
- To determine Plasmodium specific sporozoite rate.
- To assess the impact on malaria transmission and sustainability of the ZVDL use.

## Methodology

This study was undertaken in the villages of Birsa and Baihar Community Health Centre (Figure 1.2.1). Monthly cross sectional fever surveys were carried out door-to-door in the study villages. Finger-pricked blood smears were collected from all fever cases and cases with history of fever. The blood smears thus collected were stained with the JSB stain and examined under light microscope. The microscopist examined 100 microscopic fields of thick smear before classify a smear as negative.

Spleen examination was done in children between 2–9 years with or without fever by Hackett's method.

linked immunosorbent assay (ELISA) and Polymerase Chain Reaction (PCR).

**Figure 1.2.1: Study Area**


Indoor resting Anopheles mosquitoes (per man hour) were sampled once in a month in the early morning (0600 hrs) for 15 minutes each by a team of two insect collectors with flashlights and mouth aspirators in four villages (two from each CHC) as per standard techniques (WHO, 1975). Pyrethrum spray catches (PSC) were made once in a month from human dwellings (HD) randomly selected other than those selected for indoor resting collection from two villages (one village from each CHC) during 06.00 hours to 09.30 hours. Light trap catches (indoor-outdoor) were also made once in a month in two villages (one from each CHC) other than those selected for MHD and PSC. Heads and thoraces of *An. culicifacies* and *An. fluviatilis* were tested for species specific circumsporozoite protein (CSP) of Pf, Pv 210 and Pv247 using the enzyme-

All patients infected with *P. falciparum* and *P. vivax* were given treatment as per treatment guidelines of National Vector Borne Disease Control Programme (NVBDCP). All adult subjects with *P. falciparum* were administered the oral dose of ACT (1500 mg Sulfadoxine, 75 mg Pyrimethamine and 600 mg of Artesunate divided into 3 days) with a single dose of Primaquine (45 mg). *P. vivax* cases were given 1,500 mg Chloroquine in three days, followed by 15 mg Primaquine daily for 14 days. Infants and children were given proportionally lower doses.

## Findings

Fever surveys carried out during the year 2013-14 revealed that a total of 854 fever cases were screened of which 132 were found positive for malaria (122 Pf and 10 Pv). The SPR, SFR and Pf% were 15.5,

14.3 and 92% respectively. However, in control villages (CTL) where no ZVDL were installed, malaria prevalence was higher (P<0.001). A total of 343 malaria positive cases (302 Pf, 39 Pv, 1 Pm and 1 mixed of Pf and Pv) were found out of 1020 screened. The SPR, SFR and Pf % were 33.6, 29.6 and 90% respectively. Results revealed a decline in SPR (15.5%) and SFR (14.3%) in the ZVDL villages as compared to the control villages (SPR 33.6% and SFR 29.6%) which is significant statistically (Figure 1.2.2).

Age-wise and species specific data on malaria are shown in Table 1.2.1 & 1.2.2.

The SPR and SFR were lowest in adults (age >14 years) when compared with other age groups. The anopheline fauna of the villages consisted of mainly *An. culicifacies*, *An. subpictus*, *An. fluviatilis* and *An. annularis* in indoor resting collection, total catch and light trap catches. The mean density of *Anopheles* caught per man hour during the year was 13.7 in experimental villages as compared to control villages (18.5). The density of *An. culicifacies* (6.5) and *An. fluviatilis (*0.2*)* in experimental villages were lower as compared to *An. culicifacies* (8.1) and *An. fluviatilis (*1.7*)* in control villages (Figure 1.2.3 & 1.2.4).

**Figure 1.2.2: Prevalence of malaria in experimental and control villages**

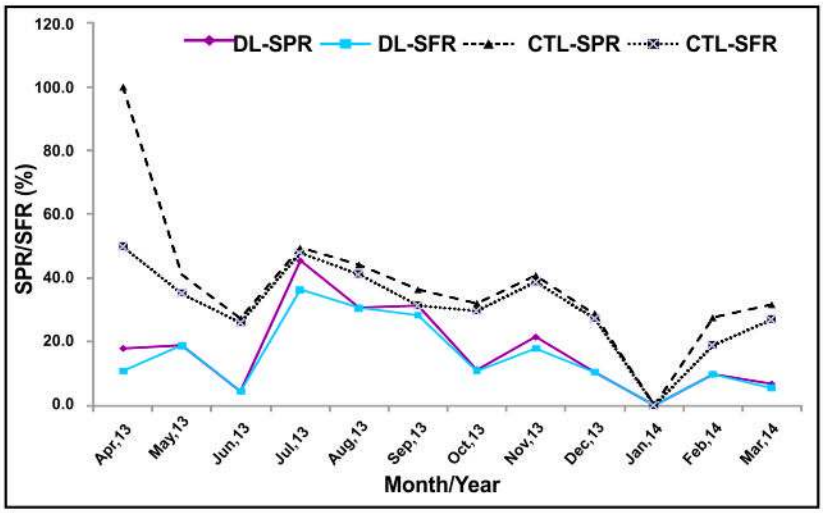



**Table 1.2.1: Age wise prevalence of malaria in experimental villages**

| Age in years | BSE | Pos | Pf | Pv | Pm | SPR | SFR | Pf (%) | OR (95% CI) |
|---|---|---|---|---|---|---|---|---|---|
| **<=1** | 33 | 6 | 5 | 1 | 0 | 18.2 | 15.2 | 83.3 | 2.0 (0.8 - 5.4) |
| **>1 – 4** | 77 | 13 | 12 | 1 | 0 | 16.9 | 15.6 | 92.3 | 1.9 (0.9 - 3.8) |
| **>4 - 8** | 198 | 39 | 36 | 3 | 0 | 19.7 | 18.2 | 92.3 | 2.3 (1.3 - 3.8)* |
| **>8 - 14** | 250 | 45 | 41 | 4 | 0 | 18.0 | 16.4 | 91.1 | 2.0 (1.2 - 3.3)* |
| **>14** | 296 | 29 | 28 | 1 | 0 | 9.8 | 9.5 | 96.6 | 1(reference) |

*p<0.05

**Table 1.2.2: Age wise prevalence of malaria in control villages**

| Age in years | BSE | Pos | Pf | Pv | Pm | SPR | SFR | Pf (%) | OR (95% CI) |
|---|---|---|---|---|---|---|---|---|---|
| <=1 | 52 | 24 | 17 | 7 | 0 | 46.2 | 32.7 | 70.8 | 4.0 (2.1 - 7.7)* |
| >1 - 4 | 162 | 81 | 67 | 14 | 0 | 50.0 | 41.4 | 82.7 | 4.7 (3.0 - 7.5)* |
| >4 - 8 | 266 | 112 | 106 | 6 | 0 | 42.1 | 39.8 | 94.6 | 3.4 (2.3 - 5.1)* |
| >8 - 14 | 255 | 76 | 66 | 9 | 1 | 29.8 | 26.3 | 88.2 | 2.0 (1.3 - 3.0)* |
| >14 | 285 | 50 | 47 | 3 | 0 | 17.5 | 16.5 | 94.0 | 1(reference) |

*p<0.001

In total catch, the numbers per catch of total anophelines was 5.8 in experimental villages as compared to control villages (15.1). Both *An. culicifacies* (2.3) and *An. fluviatilis (*0.03*)* in experimental villages were lower when compared to *An. culicifacies* (7.8) and *An. fluviatilis (*1.1*)* in control villages (Figure 1.2.5 & 1.2.6). In experimental villages, a total of 435 *An.culicifacies* and 10 *An.fluviatilis* were tested for vector incrimination by ELISA of which none were detected sporozoite positive. However, in control villages 4 *An.culicifacies* were found sporozoite positive (2 Pf and 2 Pv) out of 1399 assayed (sporozoite rate, 0.28%). All indices showed a sharp decline as compared to control villages. Durable lining were installed in January 2013. The initial response of the villagers was very good and we got tremendous support during installation. However, in October 2013, which is the major festival season, the villagers removed the ZVDL for cleaning and white washing the house. After that about 25% did not install the ZVDL and used for other reasons i.e. fencing the crop, outdoor shed etc.

**Figure 1.2.3: Per man hour density of mosquitoes in experimental villages**

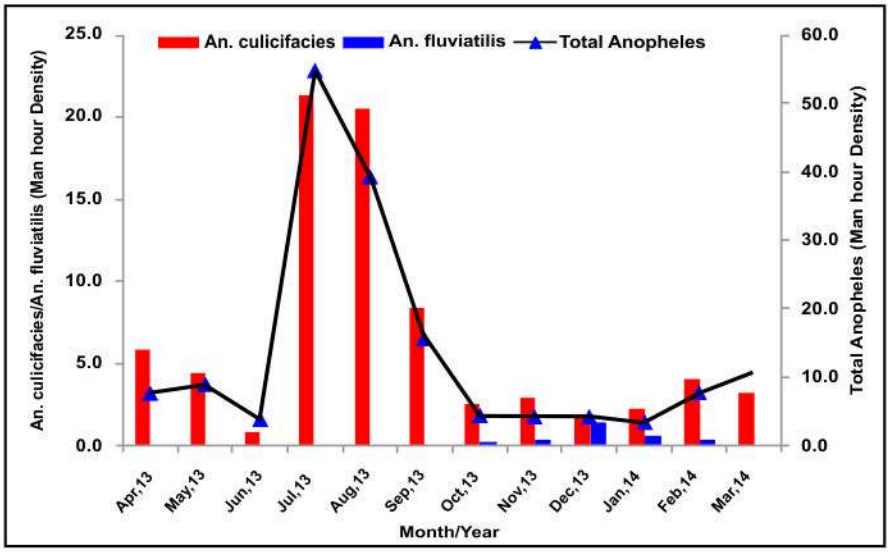


**Figure 1.2.4: Per man hour density of mosquitoes in control villages**

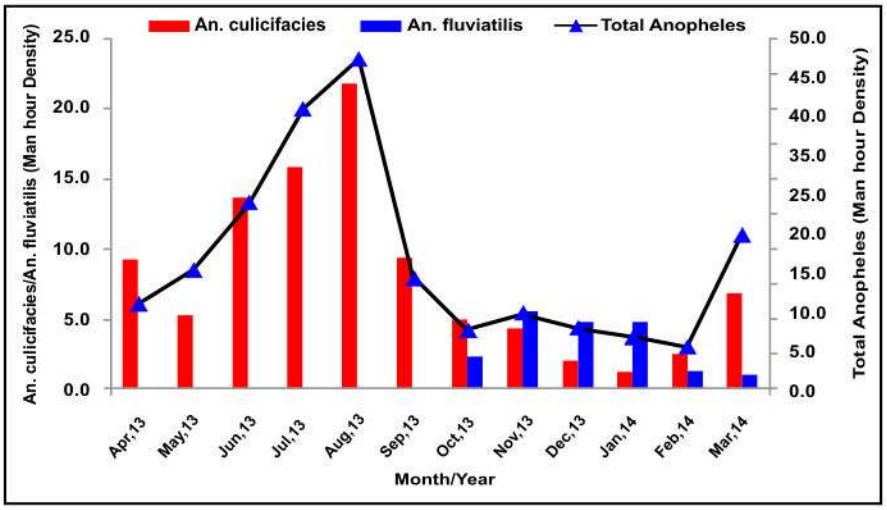



**Figure 1.2.5: Per room density of mosquitoes in experimental villages**

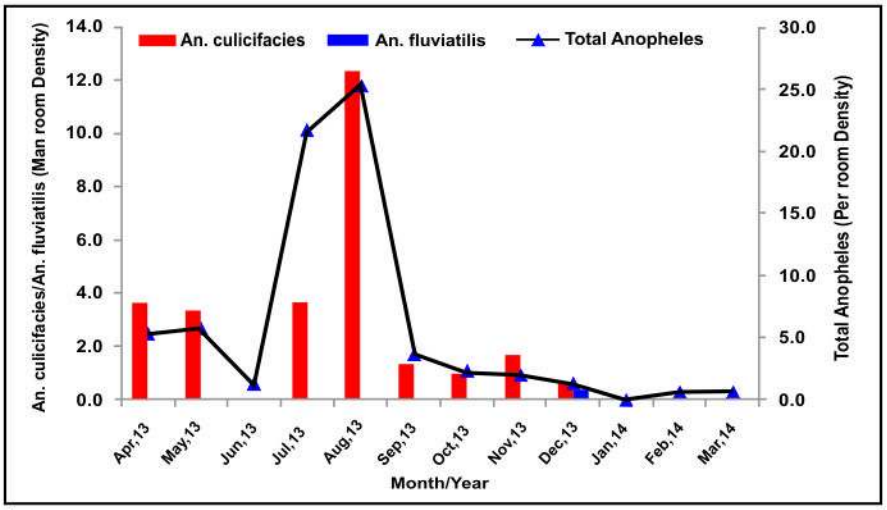
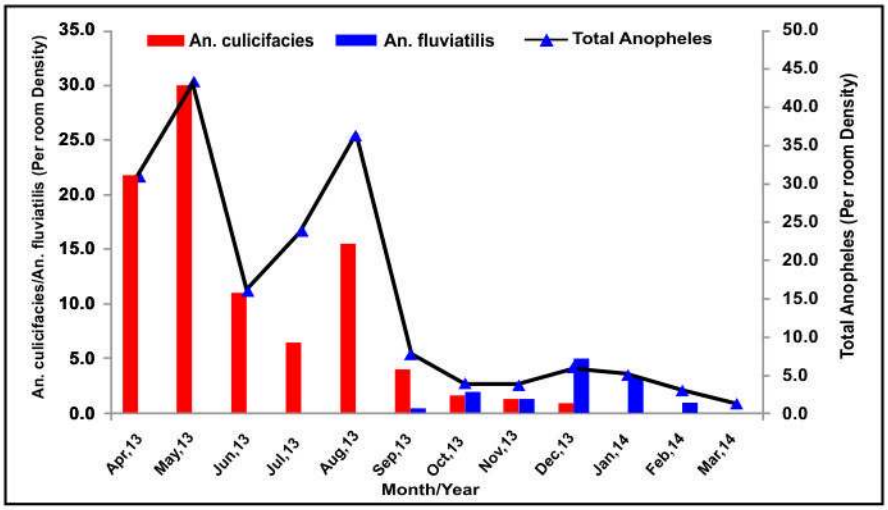



**Figure 1.2.6: Per room density of mosquitoes in control villages**



The durable linings were very effective for 11 months as 100% mortality was found in bioassays against *An. culicifacies*. However, after one year a decline in efficacy is recorded.

**Translational output:** These results indicate that more intensive measures are required in disturbed areas. A new project is prepared for such areas.

ZVDL installation

Misuse of Zero Vector Durable Lining (ZVDL)

## 1.3. MOLECULAR EPIDEMIOLOGICAL STUDY OF *PLASMODIUM FALCIPARUM* FIELD ISOLATES AND THE INCIDENCE OF MALARIA IN ENDEMIC REGIONS OF CENTRAL INDIA

| | | |
|---|---|---|
| **Date of start** | : | September 2011 |
| **Duration** | : | Five years |
| **Status** | : | Ongoing |
| **PI** | : | Dr. Neeru Singh |
| **Funding** | : | Department of Biotechnology Govt. of India |

The causative agent of the most severe form of malaria is *Plasmodium falciparum* and it has the capability to develop a high level of redundancy that enables it to invade human erythrocytes through a number of pathways. Genetic polymorphisms in *P. falciparum* key invasion molecules posed great obstacles in the development of a successful malaria vaccine. Thus, in order to develop a successful malaria vaccine, it is critical that a complete understanding of the parasite genetic diversity is elucidated especially for the antigens chosen in the vaccine. The in vitro method for the continuous cultivation for *P. falciparum,* made a significant

contribution to advances in our understanding of parasite biology.

## Objectives

- Study *Plasmodium falciparum* field isolates from central India.
- Study the humoral immune response against blood stage, parasite proteins during a natural infection of *P. falciparum*.
- Establish a field site to conduct Phase-II clinical trials for candidate vaccines.

## Methodology

The principle of culture technique is to maintain parasitized erythrocytes in a culture bottle containing a thin layer of RPMI media to allow adequate gas exchange in a low oxygen tension environment. The technique permits culture of lab adapted clone but failed to maintain the field isolates. Therefore, a comparison of different in vitro growth conditions was carried out based on different glucose concentration, Albumax and heat inactivated human plasma. RPMI-1640 medium was complemented with NaHCO3 2 g/l, Hepes 5.958 g/l, gentamicin 1 ml/l, hypoxanthine 13.6 mg/l and D-glucose 2.0 g/l in de-ionizing tissue grade water. Culture medium was further supplemented with Albumax-II, on a daily basis. The pH of the completed medium was set 7.2.

## Findings

During the period April 2013 to March 2014, a total of 32 *P. falciparum* positive samples were collected and cultured in the laboratory for further experimentations. Out of 32 field isolates 19 isolates were successfully adapted for in vitro culture. All field isolates were successfully passaged over successive erythocytic cycles for three months (Figure 1.3.1 to 1.3.4) with high parasite density to low parasite density and glycerol stocks were made and frozen for future invasion assay.

**Figure 1.3.1: Initial parasitemia - 0.1% (5264 P/µl of blood)**

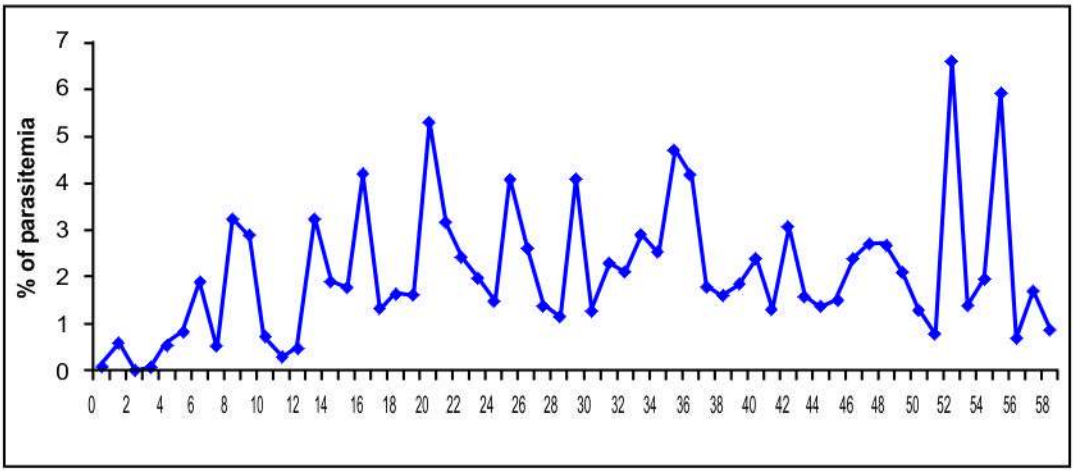


**Figure 1.3.2: Initial parasitemia - 0.01% (624 P/µl of blood)**

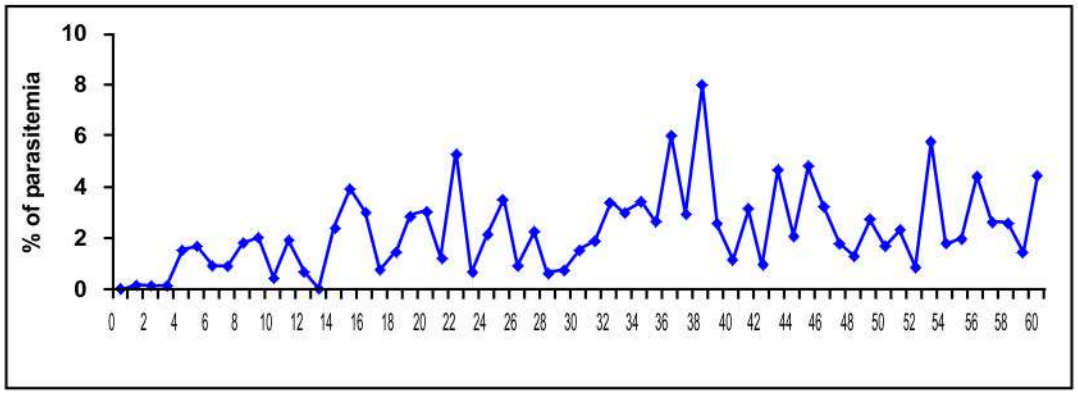



**Figure 1.3.3: Initial parasitemia - 0.005% (256 P/µl of blood)**

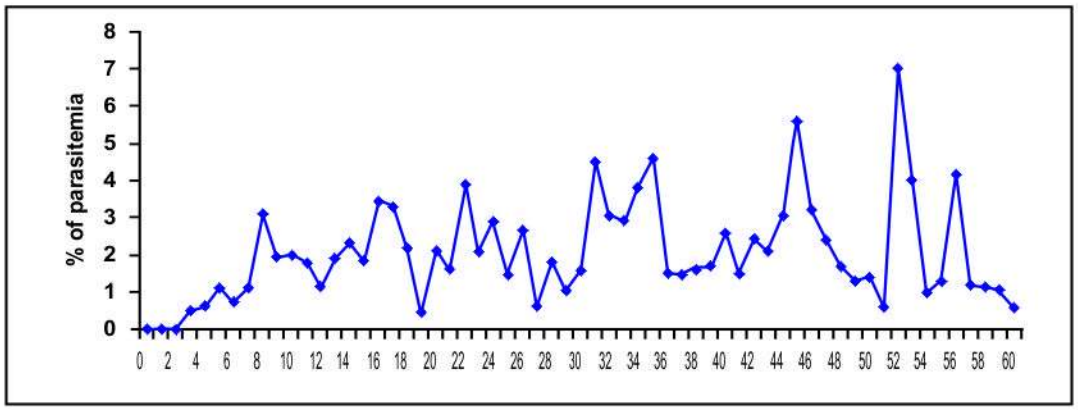
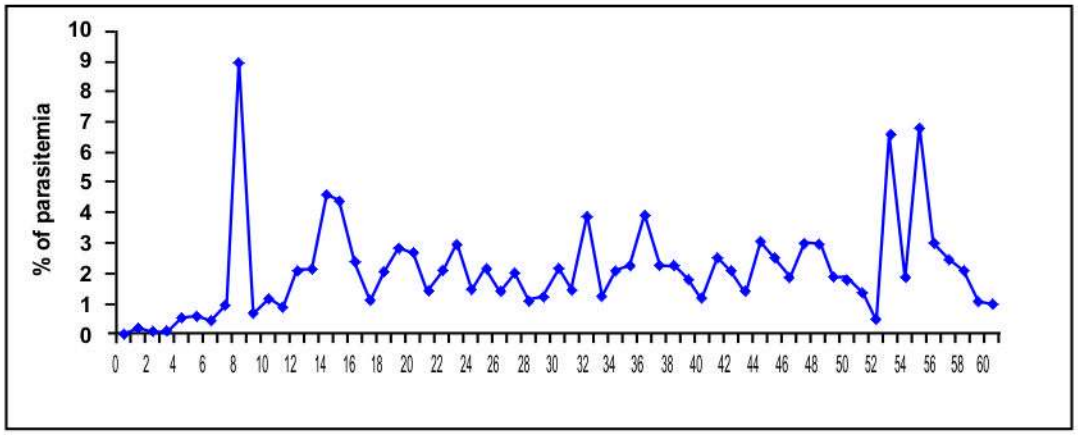



**Figure 1.3.4: Initial parasitemia - 0.001% (80 P/µl of blood)**



# 1.4. MOLECULAR EPIDEMIOLOGY OF MALARIA IN INDIA AND QATAR WITH AN EMPHASIS ON PARASITE DIVERSITY, DRUG RESISTANCE AND IMMUNE RESPONSE

| | | |
|---|---|---|
| **Date of start** | : | November 2012 |
| **Duration** | : | Three years |
| **Status** | : | Ongoing |
| **PI** | : | Dr. Neeru Singh |
| **Funding** | : | Qatar National Research Fund (NPRP No. 05-098-3-021) |

Malaria in India is highly variable according to place, time and the ecology of host-parasite vector relationships. Information on the nature and extent of genetic diversity within Plasmodium species is essential to understand the mechanism(s) underlying the pathology of malaria, the acquisition of immunity, the spread of drug resistance and the condition of transmission.

## Objectives

- To study the molecular epidemiology and genetic diversity of malaria parasites in India and in Qatar.
- To study the molecular mechanisms of malaria drug resistance in India and Qatar.
- To study the immune response to malaria infection in India and Qatar.

## Methodology

All clinically suspected patients for malaria parasite were screened by microscopy. Patients with malaria infection diagnosed were enrolled in the study after obtaining the written consent. Blood samples were collected at the time of enrollment for further molecular and immunological study.

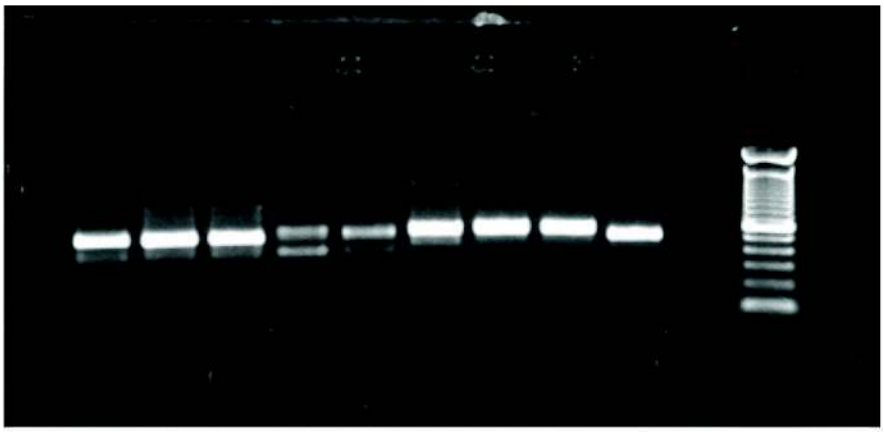
## Findings

A total 1449 patients were screened for malaria parasite of which 108 were found positive (7.5%, SPR) for malaria (89 *P. falciparum* and 19 *P.vivax*) with 82% *P. falciparum* cases. Out of these, 57 *P. falciparum* and 16 *P. vivax* cases were enrolled for the molecular and immunological studies. DNA was isolated from blood samples and species were also confirmed with diagnostic PCR. Genetic polymorphism of the MSP1, GLURP, PFS25 and CSP gene was analysed by DNA sequencing.

Polymorphic region (555 bp) of merozoite surface protein-1 (MSP-1) was amplified (Figure 1.4.1). A total of 89 *P. falciparum* samples were amplified and sequenced. Comparison of the sequences showed that all these isolates belong to one of these three alleles (Figure 1.4.2). The overall allelic prevalence was recorded which was higher in RO33 (40%) followed by K1 (34%) and MAD20 (26%). In the block 2 of MSP1, the nucleotide and the deduced amino acid sequence were found to be highly polymorphic among the

isolates. A total 14 types of variants in the K1 type alleles (Figure 1.4.3), 11 variants in MAD20 (Figure 1.4.4) and six variants in RO33 type allele were found (Figure 1.4.5).

**Figure 1.4.1: Gel picture of a MSP1 gene**



Lane1- 9 (555bp), lane10 for negative control and lane11 is 100 bp DNA ladder

**Figure 1.4.2: Distribution of *MSP1* allelic family**

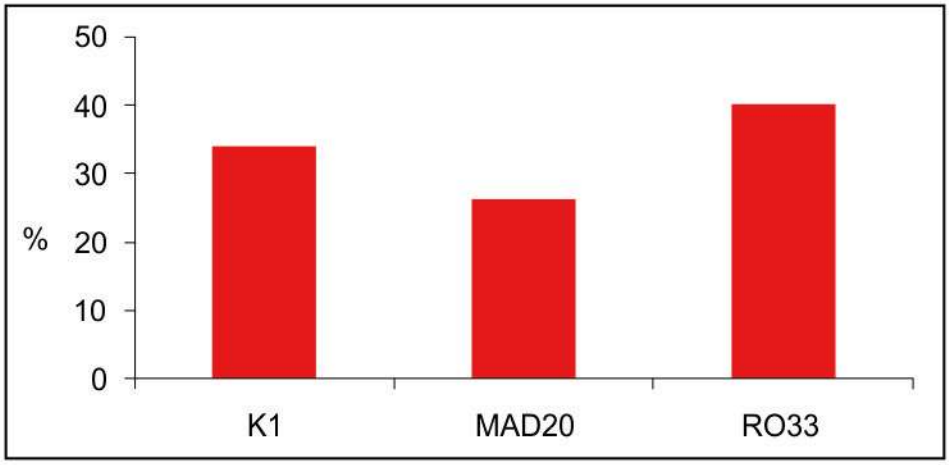



**Figure 1.4.3: Amino acid alignment of K1 allelic family**

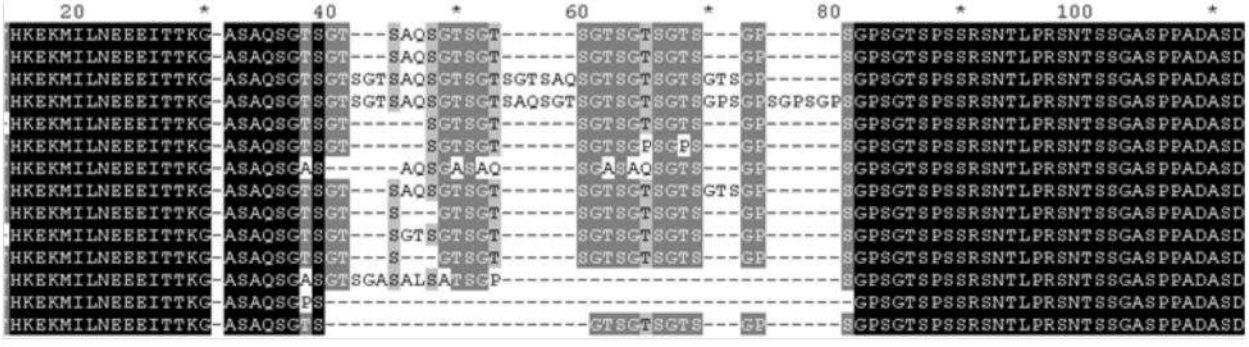


**Figure 1.4.4: Amino acid alignment of MAD20 allelic family**

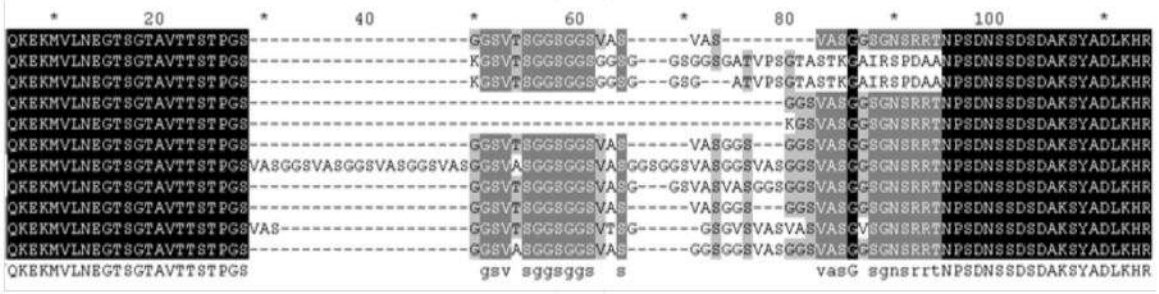
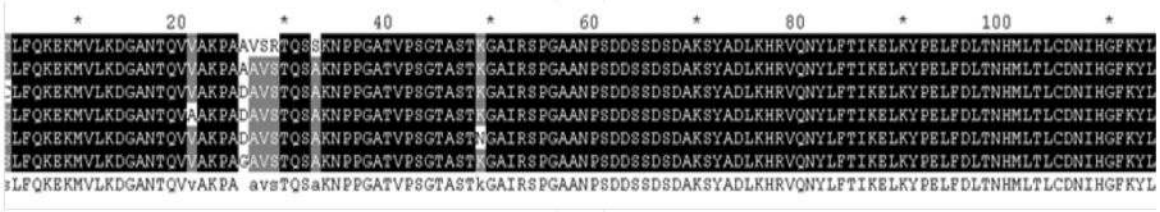
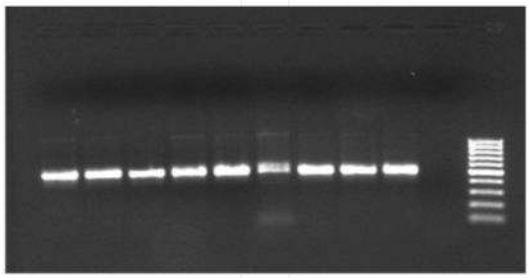


**Figure 1.4.5: Amino acid alignment of RO33 allelic family**



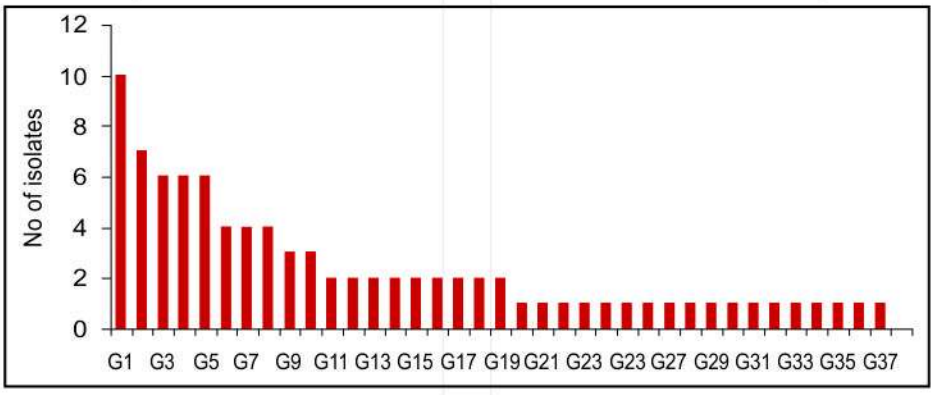
Polymorphism in glutamate-rich protein (GLURP) is mainly involving variations in the numbers of repeats of certain genomic sequences that therefore affect the size of the gene and its protein product. R2 region (1063 bp) was amplified and sequenced. Ninety four *P. falciparum* isolates were analyzed and showed an extensive diversity (38 type variants) in parasite populations (Figure 1.4.6 & 1.4.7).

**Figure 1.4.6: Gel picture of GLURP gene**



lane1- 9 (1063bp), lane 10 for negative control and lane11 is 100 bp DNA ladder

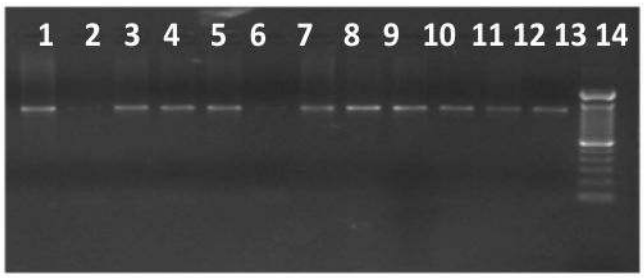
**Figure 1.4.7: Distribution of *GLURP* allelic family**



Pfs25 is a leading transmission blocking vaccine candidate, encoded by a single copy gene. Sequence analysis shows that Pfs25 protein contains 22 cysteine residues held together with 11 disulfide bonds. About 500 bp fragment was amplified and sequenced. One hundred four *P. falciparum* isolates were analyzed and showed very limited diversity (7 type variants) in parasite populations (Figure 1.4.8).

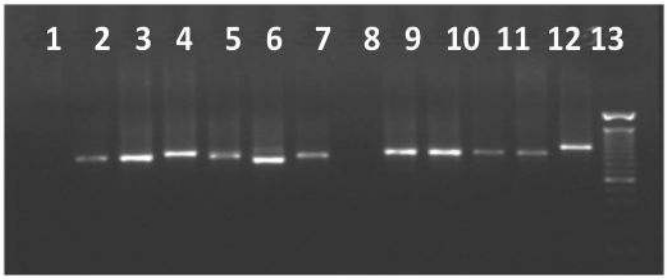
The CSP is the most abundant protein on sporozoite surface and consists of a highly polymorphic central repeat region flanked by a less polymorphic N-terminal and highly polymorphic C terminal non-repeat regions. The central region, which is predominantly consisting of tandem repeats of NANP (N, Asparagine; A, Alanine and P, Proline), in addition to the small number of NVDP (N, Asparagine; V, Valine; D, Aspartic acid and P, Proline) repeats, constitutes immunodominant B cell epitopes. *P. falciparum* CSP antigens have been showed polymorphisms from various malaria-endemic regions. The central repeats region of NANP and NVDP was amplified and sequenced. A total 75 isolates were sequenced and showed 18 type repeats (Figure 1.4.9 & 1.4.10). The study is ongoing.

**Figure 1.4.8: Gel picture of a Pfs25 gene**



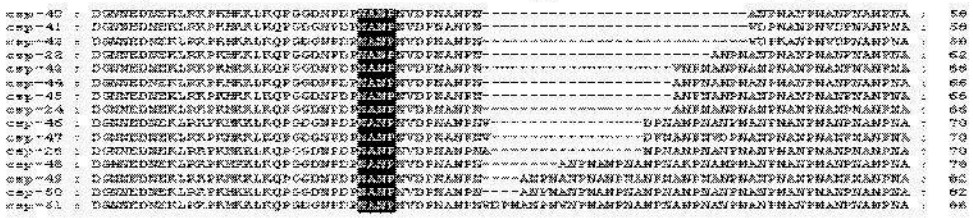

Lane 1- 13 samples tested and lane14 is100 bp DNA ladder

**Figure 1.4.9: Gel picture of CSP gene**




Lane 1- 12 (1026bp), and lane13 is 100 bp DNA ladder

**Figure 1.4.10: Amino acid alignment of Pfcsp gene**



# 1.5. CLINICAL AND MOLECULAR SURVEILLANCE FOR MONITORING THE EMERGING RESISTANCE TO ANTIMALARIAL DRUGS IN *PLASMODIUM FALCIPARUM* IN CENTRAL INDIA

| | | |
|---|---|---|
| **Date of start** | : | February 2012 |
| **Duration** | : | Three years |
| **Status** | : | Ongoing |
| **PI** | : | Dr. Neeru Singh |
| **Funding** | : | ICMR (TSP) |

Artemisinin-based combination therapies (ACTs) for the primary treatment of uncomplicated falciparum malaria are implemented in India. ACTs involve combining artemisinin derivatives with a partner drug Sulfadoxine Pyrimethamine (SP) in India. A study was undertaken to monitor the clinical and molecular resistance to antimalarial drugs (ACT) in uncomplicated *Plasmodium falciparum* malaria in Balaghat and Anuppur district of Madhya Pradesh and to carry therapeutic efficacy test with oral ACT over a 3 day period.

## Objectives

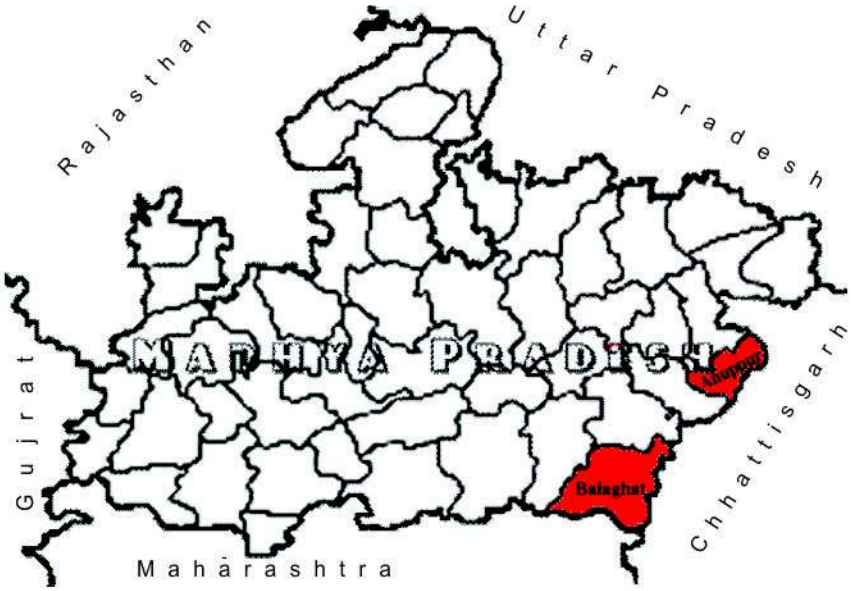
The primary objective of the study is to determine the clinical and molecular genetics of drug resistance against uncomplicated *P. falciparum* malaria. The following objectives were addressed.

- To determine the therapeutic efficacy of ACT.
- To determine the novel DHFR and DHPS mutations associated with treatment failure.

## Methodology

Balaghat is a highly malarious forested district with both *P. falciparum* and *P. vivax* and preponderance of *P. falciparum.* Balaghat district (Figure 1.5.1) is a region of deep valleys, hills and hillocks with thick dense forest (longitude 80°15'E latitude 21°84'N, population 1756409). Anuppur is located at 23.1°N 81.68°E with an average elevation of 505 metres. The area of the district is 3701 $km^2$ and one third of the area is forested. The population of the district is 7,49,237 of which 48% are ethnic tribes. The villages are located off the road and terrain is inaccessible. The study area lies on the border of Bilaspur and Korea districts of CG state. The area is under 2 rounds of indoor residual spray (IRS) with dichlorodiphenyltrichloroethane (DDT) for vector control. Both *P. falciparum* and *P. vivax* malaria parasites are present with preponderance of *P. falciparum.*

**Figure 1.5.1: Study sites**




**Therapeutic efficacy study:** A therapeutic efficacy study was carried out with ACT orally over a 3 day period following standard WHO protocol. The patients between 1-59 years of age presenting with fever and symptoms of *P. falciparum* malaria were screened for malaria parasites after obtaining informed consent. Fever history was recorded from the patient or by accompanying person (in case of children). Physical examination of the patients was performed and axillary temperature recorded. Thick and thin blood films were prepared from finger prick blood for Plasmodium species identification. Only *P. falciparum* infected patient who are willing to participate in the study were enrolled. Two to three drops of finger prick blood was also blotted on to 3mm filter paper (Whatman International Ltd., Maidstone, United Kingdom) for extraction of parasite DNA. All patients infected with *P. falciparum* and *P. vivax* were given treatment as per treatment guideline issued by National Vector Borne Disease Control Programme (NVBDCP).

**Molecular analysis:** The parasite DNA was extracted from blood samples collected on filter paper using the Tris-EDTA buffer-based method. The extracted DNA was used for PCR amplification of the *dhfr* gene spanning codons 15-170. For amplification of the 720 bp fragment, a primary PCR was set up using the primers PF1: 5,-TTTATATTTTCTCCTTTTTA-3' and PR1: 5'- CATTTTATTATTCGTTTTCT -3'. The primary PCR product was used for the nested PCR (684 bp) and the PCR products were analysed on a 1.5% agarose gel. For the *dhps* gene PCR amplification was carried out for the spanning codons 425-640. The primary PCR was set up for the amplification of *dhps* gene by using the primers P1: 5' CCATTCCTCATGTGT ATACAACAC-3' and P2: 5'- CTTGGTCTA TTTTTGTTAAAACATCC-3'. The 1330 bp

primary PCR product was used for the nested PCR. For amplifying *PfATPase6* gene the primary PCR was set up by using the primers P17F-AATATTGTTATTCAGAATATGATTATAA, P17RTGGATCAATAATACCTAATCCACC TA. The 910 bp primary PCR product was used for the nested PCR and the PCR products were analysed on a 1.5% agarose gel.

**Nucleotide Sequencing:** The PCR products were purified from the agarose gel by using HyYeld™ gel/PCR DNA extraction kit (Life technology, USA), and used with the ABI Big Dye Terminator Ready Reaction Kit Version 3.1 for the sequencing PCR (Applied Biosystems, USA). Sequence obtained was translated using the Edit Sequence tool (DNASTAR). The translated sequences were then aligned using the MEGALIGN programme (DNASTAR, INC., Madison, WI).

## Findings

**Balaghat district:** Three hundred twenty six patients were screened, of which 104 were positive for malaria and 96 were *P. falciparum* (of which only 81 enrolled), 7 were *P. vivax* and 1 showed mixed infection of *P. falciparum* and *P. vivax*. The mean age of patients was 10.25 years (range 2-50 years) and the *P. falciparum* parasite density was 2056 (range 1000- 20080) parasites/µl. The therapeutic efficacy outcome was determined for 50 patients as 31 patients did not complete the study. Over all therapeutic efficacy showed 100% adequate clinical and parasitological response.

**Anuppur district:** One hundred twenty two patients were screened, of which 32 tested positive for malaria, 30 *P. falciparum* (of which only 26 enrolled), 1 *P. vivax* and 1 showed mixed infections of *P. falciparum* and *P. vivax*. The mean age of patients was 12.0 years (range 2-40 years) and the *P. falciparum* parasite density was 1925 parasites/µl (range 1000- 18640). The therapeutic efficacy outcome was determined for 20 patients as 6 patients did not complete the study. Over all therapeutic efficacy showed 95% adequate clinical and parasitological response while one case (5%) showed late clinical and parasitological failure.

**Molecular Markers study:** Out of 81 registered cases, 63 were analyzed for *dhfr* mutations at five codons (16, 51, 59, 108, and 164). Seventy one percent parasite populations harbored the mutation while only 29% were wild type in Balaghat district. The majority of the parasite population carried double mutations (65%) with *pfdhfr* $A_{16}N_{51}\mathbf{R_{59}N_{108}}I_{164}$ mutant followed by single mutation *pfdhfr* allele $A_{16}N_{51}C_{59}\mathbf{N_{108}}I_{164}$ (5%) and 1% triple mutations *pfdhfr* allele $A_{16}N_{51}\mathbf{C_{59}S_{108}P_{118}}$ (Figure 1.5.2). Eighty nine percent parasite population were harbored the mutation in Anuppur district and all were double mutant allele (*pfdhfr* $A_{16}N_{51}\mathbf{R_{59}N_{108}}I_{164}$) while only 11% were wild type allele (Figure 1.5.3 & 1.5.4).

**Figure 1.5.2: Distribution of *dhfr* Genotypes (Balaghat district)**

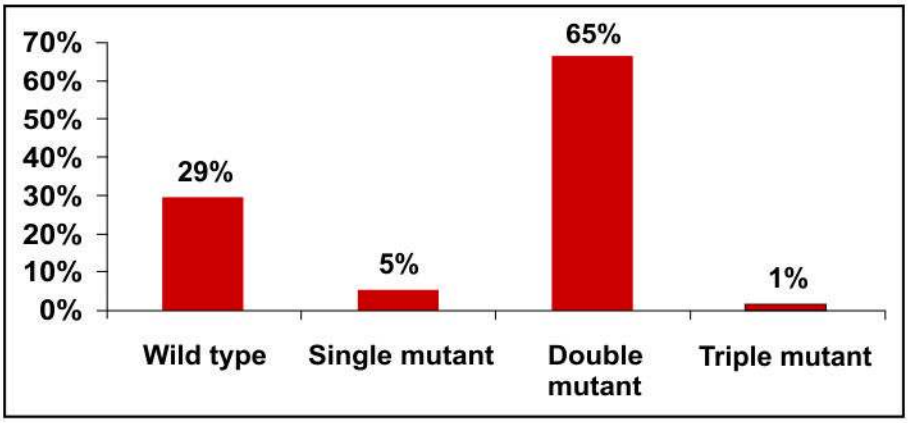
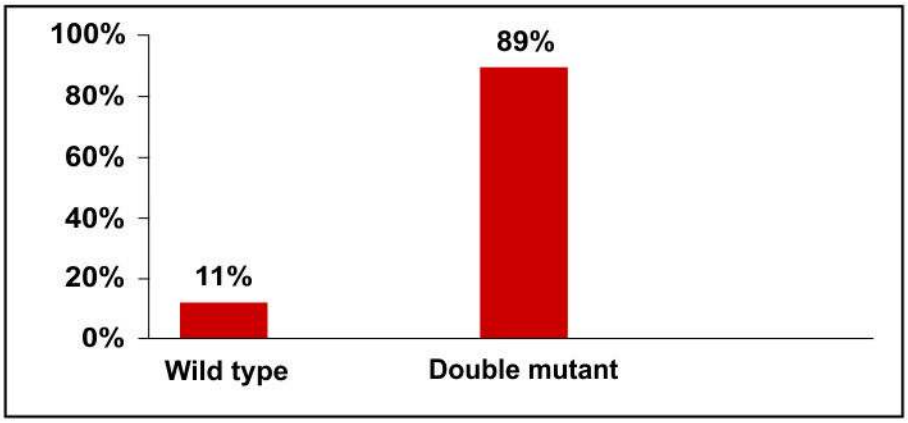
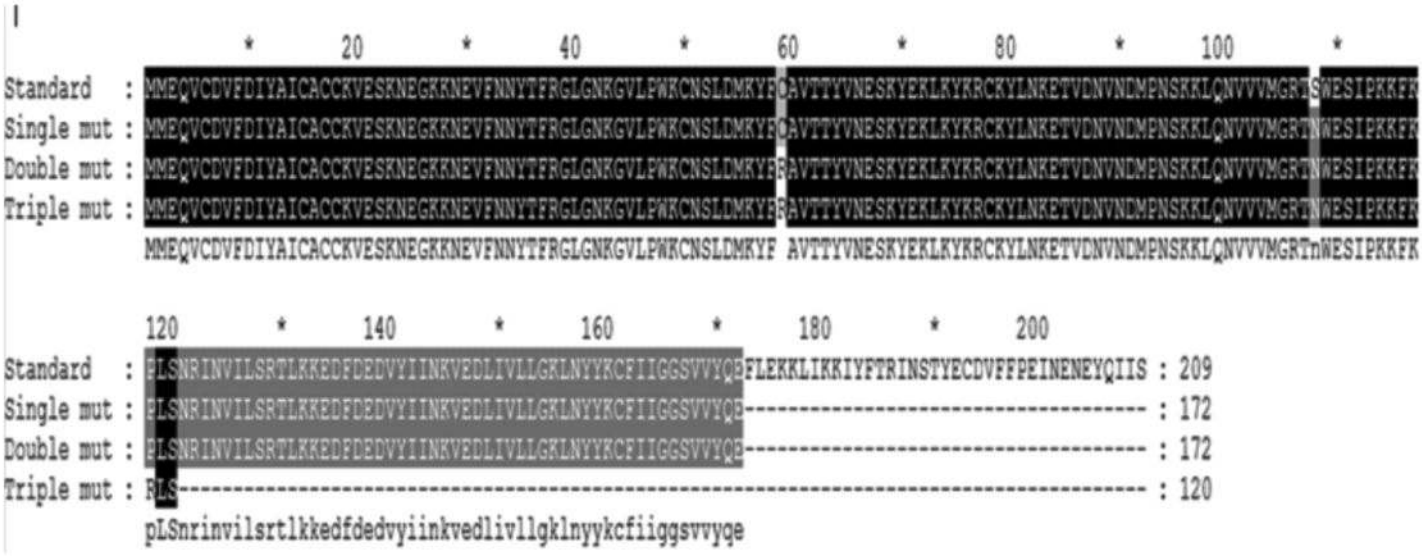



**Figure 1.5.3: Distribution of *dhfr* Genotypes (Anuppur district)**




Forty one isolates were analyzed for *dhps* mutation at five codons (436, 437, 540, 581, and 613). In general wild type *Pfdhps* allele $S_{436}A_{437}K_{540}A_{581}A_{613}$ was most prevalent (78%) followed by single mutant *Pfdhps* genotype $S_{436}\mathbf{G_{437}}K_{540}A_{581}A_{613}$ (22%) (Figure

1.5.5). A total of 56 isolates were analyzed for *PfATPase6* and 82% carried wild type allele and only 18% isolates showed single mutation at different (336- 450) codon (Figure 1.5.6 & 1.5.7).

**Figure 1.5.5: Distribution of *dhps* Genotypes**

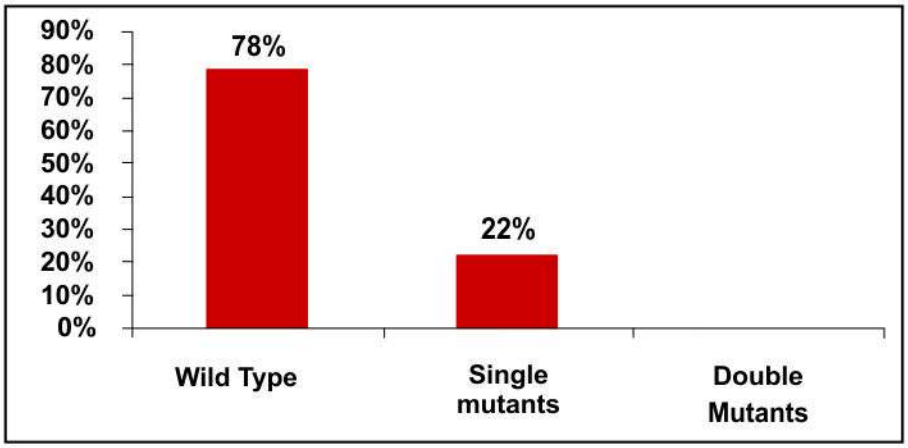



**Figure 1.5.6: Distribution of *PfATPase6* genotypes**

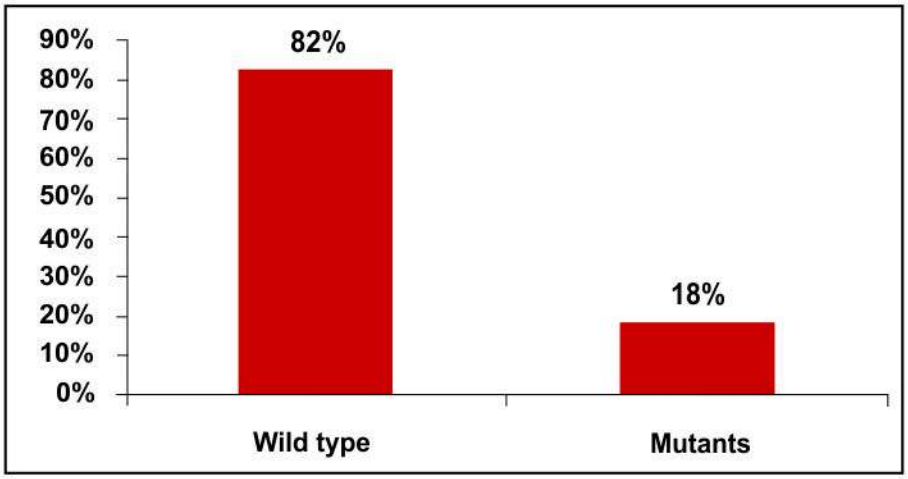
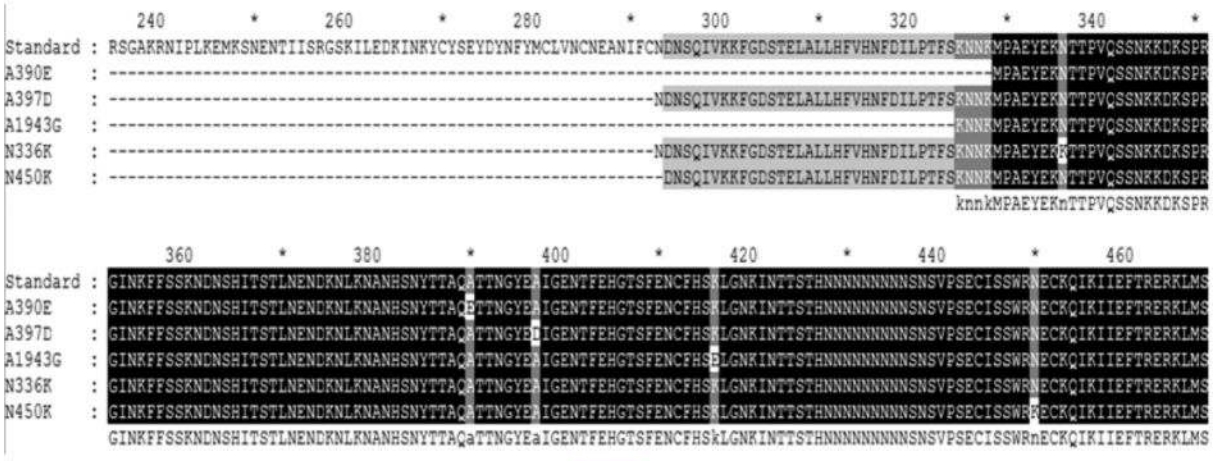



**Figure 1.5.7: Aminoacid alignment of *PfATPase6* genotypes showing the mutation**



# 1.6. BIONOMICS OF MALARIA VECTORS AND THEIR SIBLING SPECIES AND TO ESTABLISH THEIR ROLE IN MALARIA TRANSMISSION IN CHHATTISGARH, INDIA

| | | |
|---|---|---|
| **Date of start** | : | July 2013 |
| **Duration** | : | Three years |
| **Status** | : | Ongoing |
| **PI** | : | Dr. Praveen K. Bharti |
| **Funding** | : | Vector Borne Disease Science Forum, ICMR |

Malaria is a major vector borne disease in India. Six states are responsible for more than 60% malaria in India. Chhattisgarh is the second highly malarious state in the country. The study was undertaken in highly malarious districts of Chhattisgarh to study the bionomics of prevalent malaria vectors and their role in malaria transmission, for development of evidence based sustainable malaria control strategy with special reference to vector control.

## Objective

- To determine the density of malaria vectors in different ecotypes and their seasonal distribution.
- To determine the species specific breeding sites of malaria vectors.
- Determine the plasmodium specific sporozoite rate of different vectors by molecular techniques.
- To determine the blood meal preference of vector mosquitoes.
- To ascertain susceptibility status of vectors against different insecticides and disease burden.
- To identify the sibling species of all known malaria vectors by cytotaxonomically/PCR techniques.

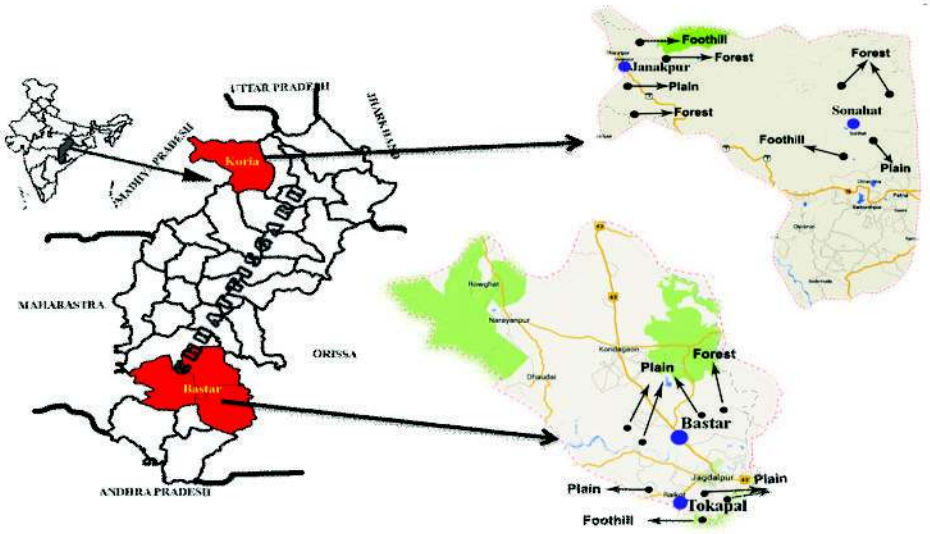
## Methodology

Entomological surveys were carried out from October 2013 to March 2014. Indoor resting mosquitoes (per man hour) were collected at monthly intervals from the 16 selected villages (Figure 1.6.1). *Anopheles* mosquitoes resting inside 2 fixed and 2 randomly selected houses/structures located in different parts of the village were sampled in the early hours of the day (06.00h-08.00 h) for 15 minutes each in a structure by a team of insect collectors with flashlights and mouth aspirators. Pyrethrum spray sheet collections (PSC) were made once in a month from human dwellings (HD) randomly selected other than those selected for indoor resting collection. Light trap catches (LT) were also made once in a month in 4 villages following standard techniques. Collected mosquitoes were identified in the field. *Anopheles culicifacies* and *An. fluviatilis* were processed and assigned a unique code for further experimentation. Blood fed *An.*

*culicifacies* and *An. fluviatilis* were collected on whatman filter paper no. 1 for blood meal preference analysis. Monthly species specific breeding site survey was also carried out at each study site. *An. culicifacies* and *An. fluviatilis* were assayed for the presence of malaria parasite by employing 18s rRNA PCR. DNA was isolated for sibling species identification. Monthly fever surveys were also carried out at each study village.

(95% CI 1.00-7.17) respectively. The average PMH density of *An. fluviatilis* was significantly higher in Korea as compared to Bastar ($p < 0.03$), while *An. culicifacies* showed no significance in Bastar and Korea ($p > 0.05$) districts. *An. subpictus* was the most predominant species (52.04%) with a rising peak in March in Bastar (Figure 1.6.2) while *An. jeyporiensis* was the most predominant species (27.04%) showing peak in March in Korea

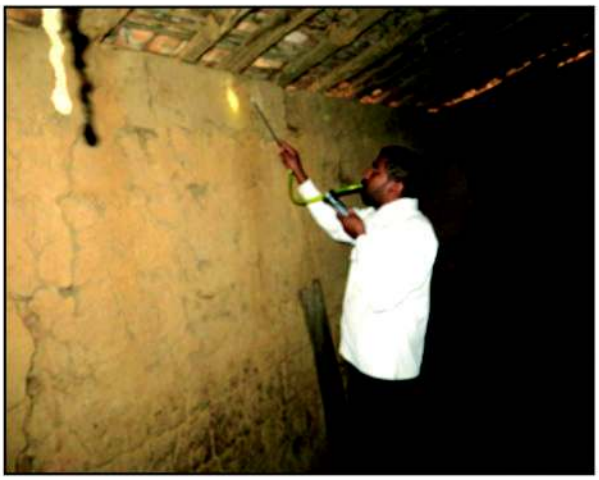
**Figure 1.6.1: Study area**




## Findings

The average per man hour density (PMH) of anopheles mosquito was 26.2 (ranging from 10.06 to 73.12) of which 26% were *An. culicifacies* and 9.37% were *An. fluviatilis* in indoor resting collection. The average per man hour density of *An. culicifacies* in Bastar and Korea district was 7.1 (95% CI 5.83-8.37) and 7.2 (95% CI 4.87-9.52) respectively. The average PMH density *of An. fluviatilis* in Bastar and Korea district was 0.38 (95% CI 0.01-0.74) and 4.08

(Figure 1.6.3). Ecotype wise analyses revealed that the relative abundance of malaria vector *An. culicifacies* was high in each ecotype while *An. fluviatilis* was dominant in both forest and foothill ecotype as compared to the plain. In the Pyrethrum Spray Sheet Collection, data revealed that *An. culicifacies* was most abundant (45.25%) species during the study period (Figure 1.6.4) followed by *An. subpictus* (28.5%) in comparison with other species ($p > 0.05$).



**Indoor Resting Collection (Cattle Shed)**

**Figure 1.6.2: Month wise Per Man Hour Density (Indoor Resting Collection) in district Bastar**

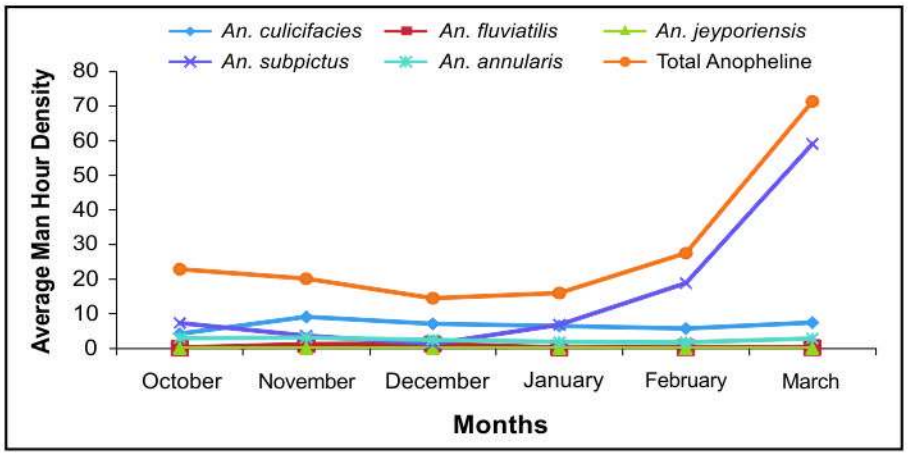



**Figure 1.6.3: Month wise Per Man Hour Density (Indoor Resting Collection) in district Korea**

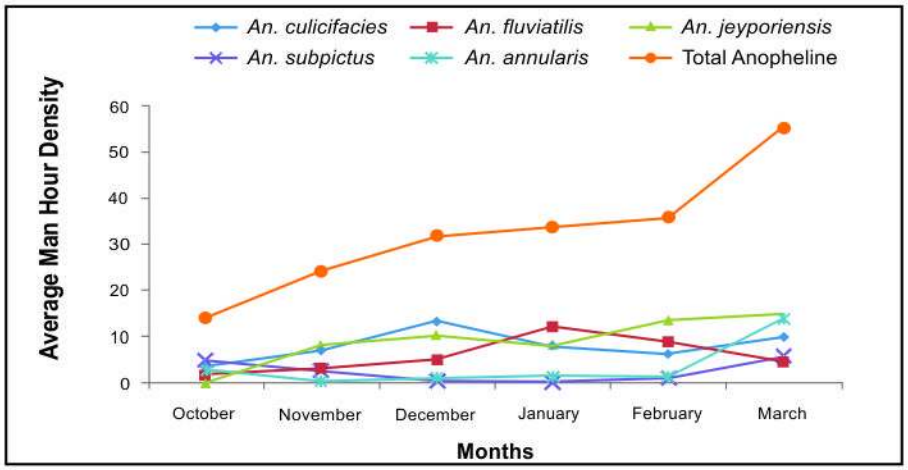
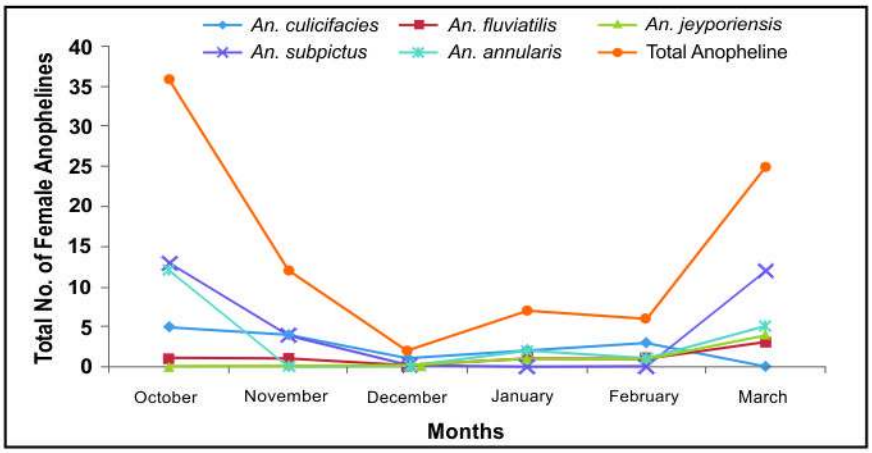


**Figure 1.6.4: Month wise Anopheline density by Pyrethrum Spray Sheet Collection**




Breeding site surveys were carried out in the study villages from streams, seepage water, river tributaries present in and around villages. *An. culicifacies* was found breeding in all the places such as rocky pit, rocky stream, running stream and seepage water while *An. fluviatilis* breeding was found only in seepage water. Whereas, other anophelines were mostly found breeding in running stream (Table 1.6.1).

Species Specific Breeding Site Survey from Stream (L), Rocky Pits (R)

**Table 1.6.1: Number of anopheline larval emergence from different breeding sources**

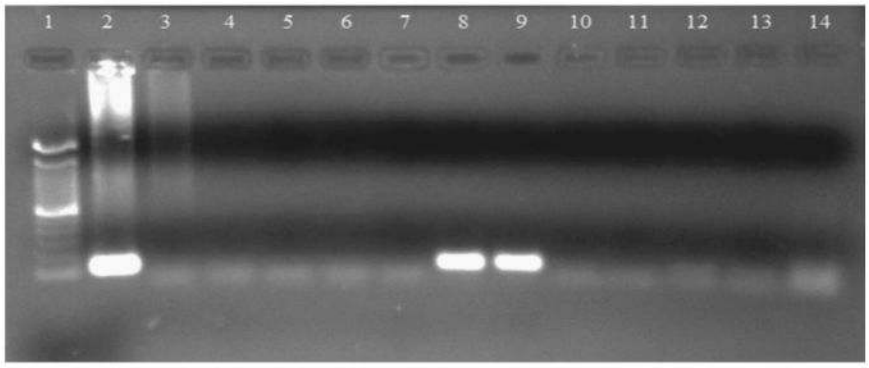
| Species | Breeding Places | | | |
|---|---|---|---|---|
| | Rocky pits | Rocky Stream | Running Stream | Seepage water from stream |
| *An. culicifacies* | 6 | 7 | 8 | 1 |
| *An. fluviatilis* | 1 | 0 | 1 | 5 |
| *An. jeyporiensis* | 0 | 1 | 11 | 11 |
| *An. splendidus* | 0 | 0 | 5 | 0 |
| *An. jamesi* | 0 | 0 | 5 | 0 |
| *An. pallidus* | 0 | 0 | 3 | 0 |
| *An. nigerrimus* | 2 | 0 | 0 | 0 |
| *An. theobaldi* | 3 | 0 | 37 | 0 |
| *An. subpictus* | 0 | 1 | 0 | 0 |

A total 1056 (775 *An. culicifacies* and 281 *An. fluviatilis*) anopheline mosquitoes collected from the study area were assayed by PCR for the presence of sporozoite. Out of which 3 were found positive for the *Plasmodium vivax* from Korea district.

Collected mosquitoes were identified in the field and blood from fed *An. culicifacies* and *An. fluviatilis* were tested for blood meal preference analyses. Out of total 175 mosquitoes tested for blood meal preference, 2 (1.1%) were found having human blood (anthropophilic) and 173 (98.9%) carried cattle blood (zoophilic).

The susceptibility test was undertaken during March and April and the corrected mortality of *An. culicifacies* to 0.1% Alphacypermethrin, 0.05% Deltamethrin, 5% Malathion and 4% DDT were determined. The corrected mortality of *An. culicifacies* was 5.8 to 7.5% in Bastar (Table 1.6.2) district and 12.5 to 13.3% in Korea district against 4% DDT (Table1.6.3). 100% mortality was obtained against 0.1% Alphacypermthrin in Korea district while 87.1-89.2% in Bastar district. The corrected mortality of 0.05% against Deltamethrin falls under the category of verification required (VR) in both the districts while 71.7 to 79.2% mortality against 5% Malathion falls under resistance (R) category.

**Figure 1.6.5: Gel picture showing the PCR amplification of *P. vivax* 18s rRNA gene (112 bp)**




(Lane 1: 100bp DNA ladder, Lane 2: positive control, Lane 3: negative control, Lane 4-14: genomic DNA isolated from mosquito)

**Table 1.6.2: Susceptibility status of *An. culicifacies* against various insecticides in different ecotypes in Bastar district**

| Insecticides | No. of mosquito | | % Mortality | | % Corrected Mortality | |
|---|---|---|---|---|---|---|
| | Forest | Plain | Forest | Plain | Forest | Plain |
| Alphacypermethrin 0.1% | 120 | 120 | 87.5 (VR) | 89.2 (VR) | 87.1 (VR) | 89.2 (VR) |
| Deltamethrin 0.05% | 120 | 120 | 86.7 (VR) | 86.7 (VR) | 86.2 (VR) | 86.7 (VR) |
| Malathion 5% | 120 | 120 | 74.2 (R) | 79.2 (R) | 73.3 (R) | 79.2 (R) |
| DDT 4% | 120 | 120 | 7.5 (R) | 5.8 (R) | 7.5 (R) | 5.8 (R) |

**Table 1.6.3: Susceptibility status of *An. culicifacies* against various insecticides in different ecotypes in Korea district**

| Insecticides | No. of mosquito | | % Mortality | | % Corrected Mortality | |
|---|---|---|---|---|---|---|
| | Forest | Foothill | Forest | Foothill | Forest | Foothill |
| Alphacypermethrin 0.1% | 120 | 120 | 100 | 100 | 100 | 100 |
| Deltamethrin 0.05% | 120 | 120 | 91.2 (VR) | 94.2 (VR) | 91.2 (VR) | 94.2 (VR) |
| Malathion 5% | 120 | 120 | 71.7 (R) | 76.7 (R) | 71.7 (R) | 75.8 (R) |
| DDT 4% | 120 | 120 | 12.5 (R) | 13.3 (R) | 12.5 (R) | 13.3 (R) |

## 1.7. ANALYSIS OF IN *VIVO* TRANSCRIPTOME OF *PLASMODIUM FALCIPARUM* FROM INDIAN PATIENTS SUFFERING FROM CEREBRAL MALARIA AND ITS COMPARISON WITH THAT FROM PATIENTS INFECTED WITH SEVERE MALARIA (WITH MOD SYMPTOMS)

| | | |
|---|---|---|
| **Date of start** | : | July 2013 |
| **Duration** | : | Three years |
| **Status** | : | Ongoing |
| **PI** | : | Dr. Neeru Singh |
| **Funding** | : | BMS ICMR |

*Plasmodium falciparum* continues to pose a great challenge to the health of most of the world's population. Patients infected with *P.falciparum* present with a range of outcomes, from asymptomatic parasitemia to severe disease and death. The host and parasite factors that mediate the severity of disease are only partially defined. One approach to the identification of parasite virulence factors is the characterization of *in vivo* parasite biological processes. A major variant surface antigen, the '*var*' *Plasmodium falciparum* erythrocyte membrane protein 1 (EMP1), encoded by the '*var*' multigene family mediates cytoadherence to vascular endothelium of various tissues, by binding to a variety of host factors.

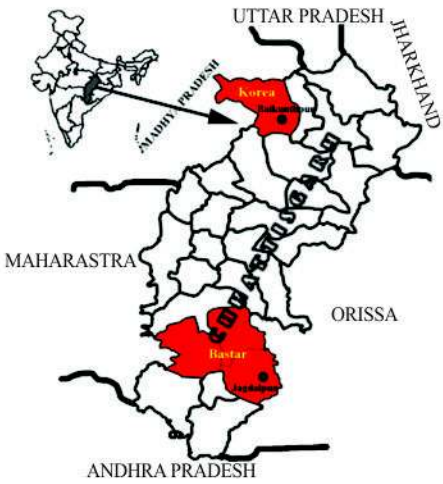
### Objectives

- To determine the *in-vivo P. falciparum* gene expression profiling and network in cerebral and severe (non cerebral) malaria.
- To compare the above *in-vivo* transcription profiles with that obtained from *in vitro* (FCK3 strain).

### Methodology

Maharani Medical College, Jagdalpur and District hospital, Baikunthpur are the 2 study sites in Chhattisgarh that have been selected for the present study (both the sites are shown in the Map in Figure 1.7.1).

**Figure 1.7.1: Study area**




Patients of all ages visiting Maharani Medical College, Jagdalpur and district hospital, Baikunthpur outpatient department and those admitted to the hospital with symptoms of malaria and malaria like symptoms were screened for malaria. Patients who fulfilled the enrolment criteria and consented to participate in the study were enrolled.

**Findings**

Ninety four patients were enrolled in the study. Twenty four samples of mild malaria, 36 samples of severe malaria and 34 samples of cerebral malaria were collected and processed for RNA isolation and cDNA preparation (Figure 1.7.2 & 1.7.3). Additionally 6 samples were collected in PAXgene™ Blood RNA tubes and shipped to JNCASR, Bangalore for microarray analysis.

**Figure 1.7.2: Nanodrop report of the total RNA isolated from the blood sample**

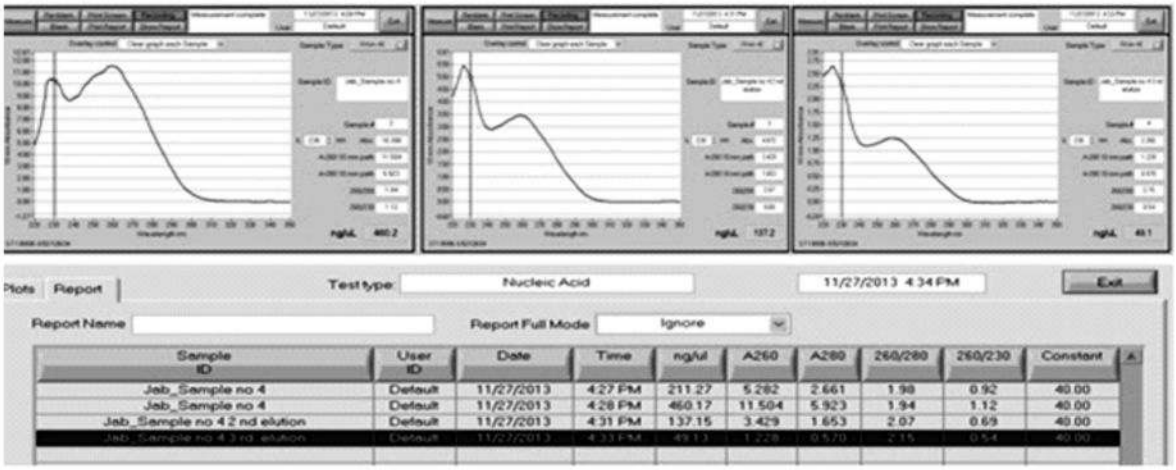
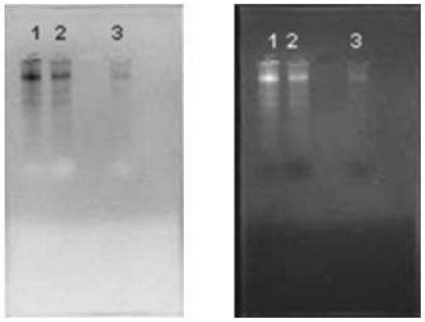



**Figure 1.7.3: Gel Images of isolated total RNA run on 1% agarose gel to check the integrity of obtained RNA**




**1= first elution**
**2= Second elution**
**3 = Third elution**

# 1. 8. STUDIES ON HRP2 AND HRP3 EXPRESSION IN *PLASMODIUM FALCIPARUM* PARASITES FROM ENDEMIC STATES OF INDIA: A PROSPECTIVE EVALUATION

| | | |
|---|---|---|
| **Date of start** | : | January 2014 |
| **Duration** | : | One year and six months |
| **Status** | : | Ongoing |
| **PI** | : | Dr. Neeru Singh |
| **Funding** | : | ICMR translational |

Rapid Diagnostic Tests are based on the detection of circulating parasite antigens and most of the RDTs used HRP2 as target for diagnosis of *Plasmodium falciparum* malaria. HRP2 is a protein that contains a histidine and alanine-rich repeat region and is released as a soluble protein in the blood of infected individuals. The sensitivity of detection of Pf HRP2 by malaria RDTs is affected by the Pf HRP2 sequence, more particularly by the number and composition of the amino acid repeats.

## Objective

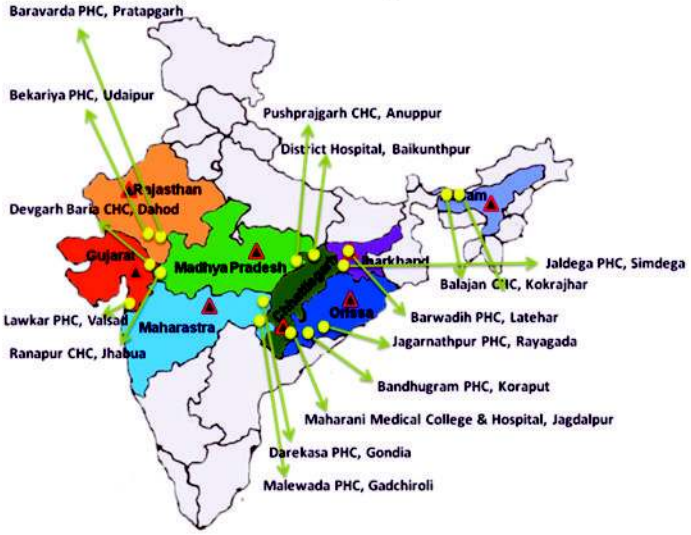
To evaluate the pfhrp2 and pfhrp3 gene variations / gene deletions in *P. falciparum* samples from malaria-endemic states of India.

## Methodology

Study sites were selected from 8 states (North East, Orissa, Madhya Pradesh, Chhattisgarh, Jharkhand, Maharashtra, Gujarat and Rajasthan). Two sites (one high transmission and one low transmission) were selected from each state (Figure 1.8.1). Screening of malaria parasite by microscopy and mono infection of *P. falciparum* positive sample collection is initiated after taking their written informed consent. Plasma was separated from erythrocytes and stored for further serological and molecular analysis.

This study is initiated.

**Figure 1.8.1: Study sites**



# 1.9. ASSOCIATION OF HOST CELL DERIVED MICRO PARTICLES WITH CEREBRAL MALARIA SEVERITY IN CENTRAL INDIA

| | | |
|---|---|---|
| **Date of start** | : | December 2013 |
| **Duration** | : | Three years |
| **Status** | : | Ongoing |
| **PI** | : | Dr. Vidhan Jain |
| **Funding** | : | Intramural |

Cell derived microparticles (MPs) are receiving increasing attention as a diagnostic and investigative tool for many infectious and noninfectious conditions in biomedical sciences. They carry surface markers of their parent cell of origin and thus provide an opportunity to study cells that are otherwise difficult to obtain. Higher levels of endothelial MPs have been shown to be associated with cerebral malaria (CM) as opposed to severe malaria anemia cases without CM signs. Platelet MPs have also been considered important in CM pathology likewise their origin cells.

## Objective

To assess the utility of host cell derived microparticles as an investigative tool (diagnostic and prognostic) to better understand severity due to cerebral malaria in central India.

## Methodology

Centrifugation protocol was stan-dardized to isolate micro-particles.

Separation procedure: Whole blood in citrated plasma was centrifuged at 5000g for 5 minutes followed by spinning of upper 90% layer at 5000g for another 5 minutes. Upper 90% plasma was centrifuged again at 13700 g for 3 minutes. Thirty µL of centrifuged sample was mixed with 16 µL of binding buffer and 2/3µL of mAbs for staining.

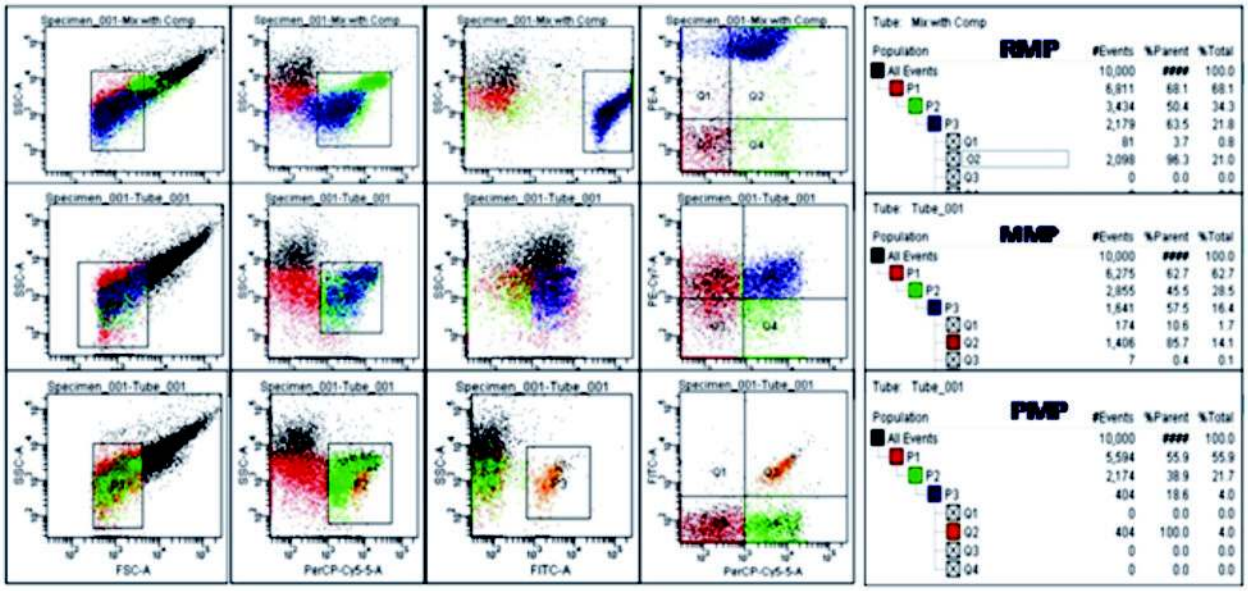
Immuno stains used are as follows:

- Anti human CD41 (MPs of platelet origin)
- Annexin V-FITC (Total MPs)
- AntiCD3 (lymphocyte MPs) and Anti CD14 (monocyte M
- Anti CD235a/Antiglycophorin A (MPs of RBCs origin)
- Anti CD 144 and Anti CD62E (endothelial MPs)
- Latex beads of 3 micron/1 micron were used for gating of the microparticles

## Findings

Double positive MPs (annexin V + marker of cell of origin) are shown in the figure 1.9.1. Protocol has been successfully standardized for red cell, monocyte and platelet microparticles. Further standardization for other microparticles is ongoing.

**Figure 1.9.1: Double positive microparticles shown in Q2 region after confirmation of gating using latex beads**




## 1.10. EVALUATION OF BIOMARKERS TO ASSESS MALARIA SEVERITY DUE TO *P. FALCIPARUM* IN CENTRAL INDIA

| | | |
|---|---|---|
| **Date of start** | : | May 2010 |
| **Duration** | : | Three years and six months |
| **Status** | : | Completed |
| **PI** | : | Dr. Neeru Singh |
| **Funding** | : | TSP ICMR |

Cerebral malaria (CM) is a quickly diffusible and reversible encephalopathy. Most of the hospitalized cerebral malaria cases die within 24-48 hours of admission. This makes it a challenging task for the attending physicians even at the tertiary health care centre as in the treated cases mortality rate 15-30%. Markers of inflammatory/angiogenic origin have been shown to be useful in assessing severity of the disease. An early identification of patients at risk of severity with the help of these markers would be useful in the clinical management of these patients.

### Objective

To determine the biomarkers associated with distinct pathology in different severe forms of *P. falciparum* malaria and to develop relevant prognostic and diagnostic markers for early recognition of complications and for improving the treatment outcomes.

## Methodology

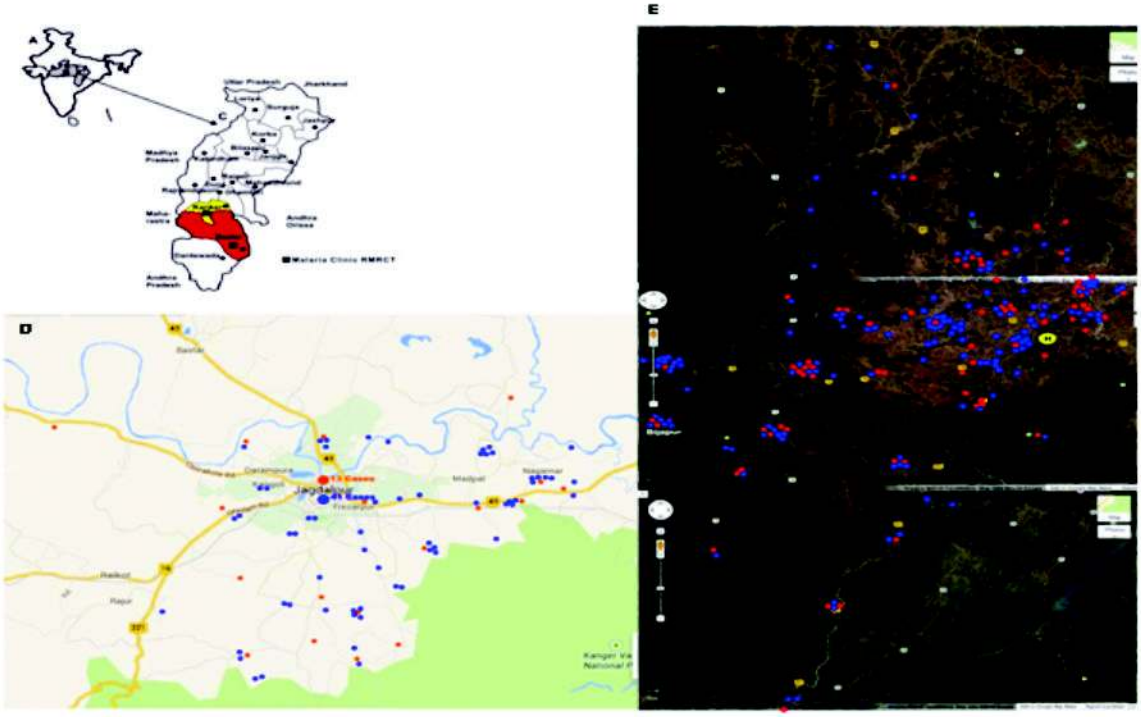
This study was carried out in Medical College associated Maharani hospital Jagdalpur, Chhattisgarh (site 1) and District Komaldev hospital Kanker, Chhattisgarh, Central India (site 2). All the admitted patients in adult/pediatric general medicine wards at both the study sites were screened for malaria parasite by microscopy (JSB stained thick and thin smears). Only *P. falciparum* positive malaria subjects were recruited under different enrollment categories i.e., mild malaria (MM), cerebral malaria (CM) and non cerebral severe malaria (SM) after obtaining written consent. Clinical details were obtained from hospital records. CM patients were further classified into two groups (CM survivors = CMS, and non survivors = CMNS) based on the treatment outcomes. Similarly SM patients were classified into two groups (SM survivors = SMS, and non survivors = SMNS). Additionally healthy controls (HC) were also enrolled for comparison. Follow-ups of the cases were done after 48 hours of treatment and at the time of discharge from the hospital and samples were collected. Percent parasitemia has been derived after counting the number of PRBCs (parasitized RBCs) in 1800 RBCs in thin smear.

## Findings

During the period of April 2013 to March 2014, a total of 12849 blood smears of suspected cases were examined, among these 506 had malaria. Slide positive rate and the slide falciparum rate was 3.9% and 3.5% respectively. Among the falciparum positive cases 47 cases had cerebral malaria and 34 had non-cerebral severe malaria (Table 1.10.1).

The Figure 1.10.1 shows the overall regional distribution of severe and complicated cases for the entire study period (2010-2014). The analysis showed that 278 cases were from the Jagdalpur district (55 in 2010, 99 in 2011, 50 in 2012 and 74 in 2013) and the remaining 99 cases were from surrounding districts/ states (Andhra Pradesh/Orissa). Further, the data revealed that the proportions of SM (non cerebral) did not vary between different blocks (range 7 to 10.8%; except Darbha, 0.8%). However, the proportion of CM cases and associated mortality was highest in Bakawand block (23.5%, 11.4% death) followed by Bastar (18.3%, 10.8%), Bastanar (17%, 9.8%) and Lohandiguda (19.8%, 5.8%) respectively. The data also revealed that CM survivors (30.6 KM) and non survivor patients (34.9 KM) travelled significantly longer median distance to receive tertiary care treatment than SM (non cerebral) (18 KM) and MM (mild malaria) patients (18.3 KM) [total CM vs MM/SM: $P<0.001$].

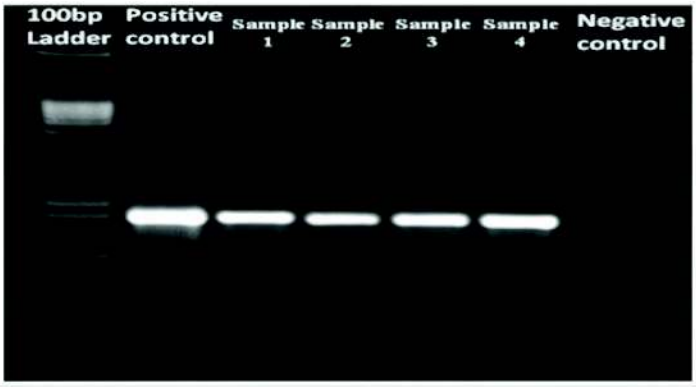
**Figure 1.10.1: Distribution of severe malaria cases**




India (A), state of Madhya Pradesh (B), Chhattisgarh (C) and study site in Bastar (malaria clinic RMRCT). Distribution of severe malaria cases (N = 349) in Jagdalpur block (survivors = 101 and died = 31) is shown in enlarged view (D). Distribution of severe cases in other regions of bastar (survivors = 147 and died = 70 ) is shown in (E).

**Sympatric distribution of *P.ovale curtisi* and *P.ovale wallikeri*:** A total of 450 microscopically confirmed *P. falciparum* cases under different categories of malaria were tested by species specific nested PCR, of which *P. ovale* infection was identified in five cases (Figure 1.10.2) and further confirmed by DNA sequencing (GenBank database accessing number KC 866363). Out of five, only one was mono-infection of *P. ovale*, 4 were found mixed with *P. falciparum* or *P. vivax* or both.

**Figure1.10.2: PCR amplification of *Plasmodium ovale***



These samples were further analyzed with specific PCR using primers of the small sub-unit ribosomal gene and sequenced to classify *P. ovale* species in the study area and out of these five, four were confirmed as *P. ovale curtisi* (Gene bank database accessing number KM 288710, Figure 1.10.3) and one was *P. ovale wallikeri* **(**KM873370, Figure 1.10.4**)**. *P. ovale* is rarely found in India. All the five cases were found in patients from dense forest villages which are inaccessible.

**Figure 1.10.3: Nucleotide alignment of *Plasmodium ovale curtisi (*KM288710*)***

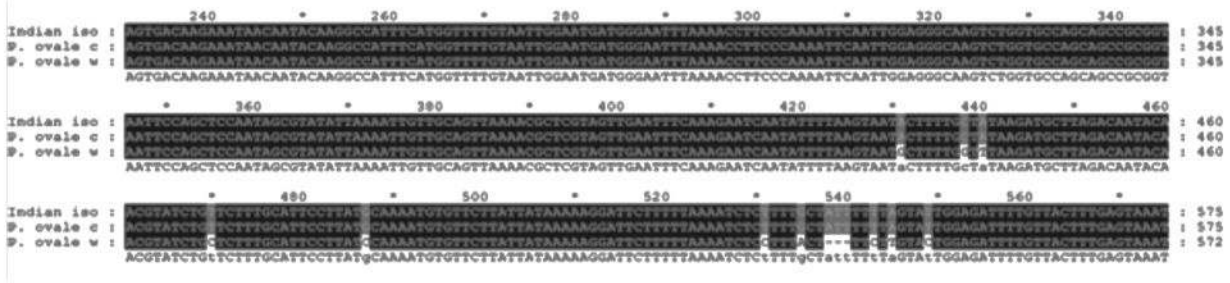


**Figure 1.10.4: Nucleotide alignment of *Plasmodium ovale wallikeri (*KM873370*)***

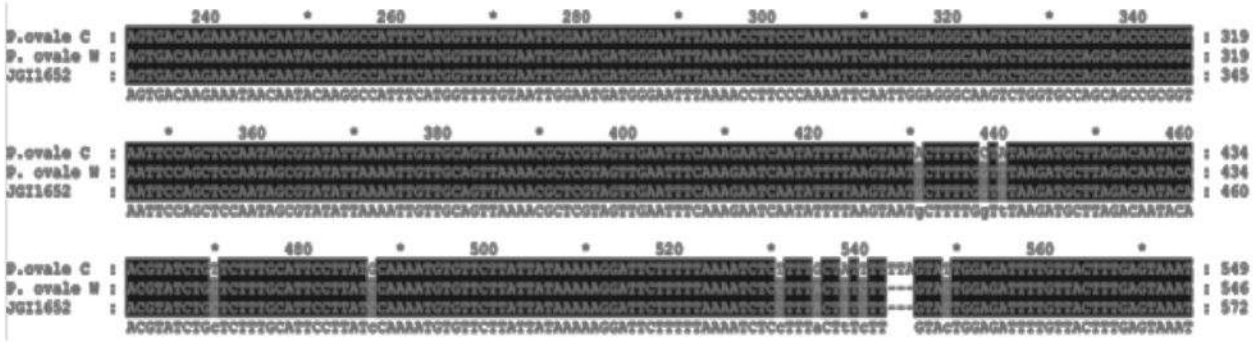


**Table 1.10.1: Month wise distribution of Malaria Cases**

| Months | BSE | Positive | PF | PV | Mixed | SPR | SFR | SVR | Pf% | Pv% | CM | NCSM | Mortality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2013** | | | | | | | | | | | | | |
| **Apr** | 920 | 22 | 18 | 4 | 0 | 2.4 | 2.0 | 0.4 | 81.8 | 18.2 | 1 | 2 | 0 |
| **May** | 1054 | 17 | 13 | 2 | 2 | 1.6 | 1.2 | 0.2 | 88.2 | 11.8 | 3 | 1 | 1 |
| **Jun** | 1008 | 17 | 17 | 0 | 0 | 1.7 | 1.7 | 0.0 | 100 | 0.0 | 3 | 3 | 1 |
| **Jul** | 1172 | 78 | 75 | 3 | 0 | 6.7 | 6.4 | 0.3 | 96.2 | 3.8 | 8 | 11 | 3 |
| **Aug** | 1108 | 73 | 63 | 8 | 2 | 6.6 | 5.7 | 0.7 | 89.0 | 11.0 | 9 | 9 | 4 |
| **Sep** | 1167 | 39 | 36 | 3 | 0 | 3.3 | 3.1 | 0.3 | 92.3 | 7.7 | 8 | 1 | 5 |
| **Oct** | 1050 | 39 | 32 | 7 | 0 | 3.7 | 3.0 | 0.7 | 82.1 | 17.9 | 3 | 0 | 0 |
| **Nov** | 990 | 38 | 36 | 2 | 0 | 3.8 | 3.6 | 0.2 | 94.7 | 5.3 | 1 | 0 | 0 |
| **Dec** | 944 | 36 | 31 | 5 | 0 | 3.8 | 3.3 | 0.5 | 86.1 | 13.9 | 0 | 2 | 0 |
| **2014** | | | | | | | | | | | | | |
| **Jan** | 1257 | 46 | 35 | 11 | 0 | 3.7 | 2.8 | 0.9 | 76.1 | 23.9 | 0 | 0 | 1 |
| **Feb** | 1160 | 54 | 47 | 7 | 0 | 4.7 | 4.1 | 0.6 | 87.0 | 13.0 | 8 | 2 | 4 |
| **Mar** | 1019 | 47 | 43 | 4 | 0 | 4.6 | 4.2 | 0.4 | 91.5 | 8.5 | 3 | 3 | 1 |
| **Total** | **12849** | **506** | **446** | **56** | **4** | **3.9** | **3.5** | **0.4** | **88.9** | **11.1** | **47** | **34** | **20** |

CM- Cerebral Malaria; NCSM-Non Cerebral Malaria; SPR- Slide Positivity Rate; SFR-Slide Falciparum Rate; SVR-Slide Vivax Rate

# 1.11. SITUATION ANALYSIS OF MASS DRUG ADMINISTRATION (MDA) IN THE CONTROL OF FILARIASIS IN PANNA DISTRICT OF MADHYA PRADESH

| | | |
|---|---|---|
| **Date of start** | : | April 2012 |
| **Duration** | : | Two years |
| **Status** | : | Ongoing |
| **PI** | : | Dr. Gyan Chand |
| **Funding** | : | Intramural |

In order to achieve the goal of Filariasis elimination by 2015 mass drug administration of Diethylcarbamazine citrate (DEC) & Albendazole is being given annually in 11 endemic districts of Madhya Pradesh, assuming that 5-8 rounds of MDA with >70% of the compliance rate (ingestion of drug), infection will be reduced to a level where transmission is unsustainable. Eight rounds of MDA have been completed till June 2013. Status of infection in human population and infection and infectivity in vector was assessed to understand the current situation of microfilaria rate and transmission of disease for continuation of MDA. Presence of any developmental stage of filarial worm in vector indicates the presence of circulating microfilaria in the community and the presence of infective larvae is an indication of active transmission.

## Objectives

- To assess the impact of MDA on the microfilaria rate in selected population and filarial antigenemia in children of 5-7 years of age.
- To study the impact of MDA on infection and infectivity rate of vector.
- To study the coverage & the compliance rate of MDA and the factors that influence compliance and non compliance of MDA in selected population.

## Methodology

Villages were selected bearing in mind high disease rate with historically higher chronic cases in consultation with DMO of the respective districts. In addition to these endemic areas, district Shivpuri was also surveyed on receipt of information regarding presence of chronic symptomatic cases which are generally associated with filarial disease. Thick smear was prepared by taking 60 ul of finger prick blood on a clean glass slide. Slides were prepared between 8.00 PM to 11.00 PM. Dehaemoglobinised and stained with Giemsa stain. Mosquitoes were collected from human dwellings in the morning hour between 6:00AM to 9:00AM. Only *Culex quinquifasciatus* specimens were dissected for determination of infection and infectivity rate. Head, thorax and abdomen of the mosquitoes were teased separately in normal saline and examined for the presence of infection of any stage of developing filarial larvae and

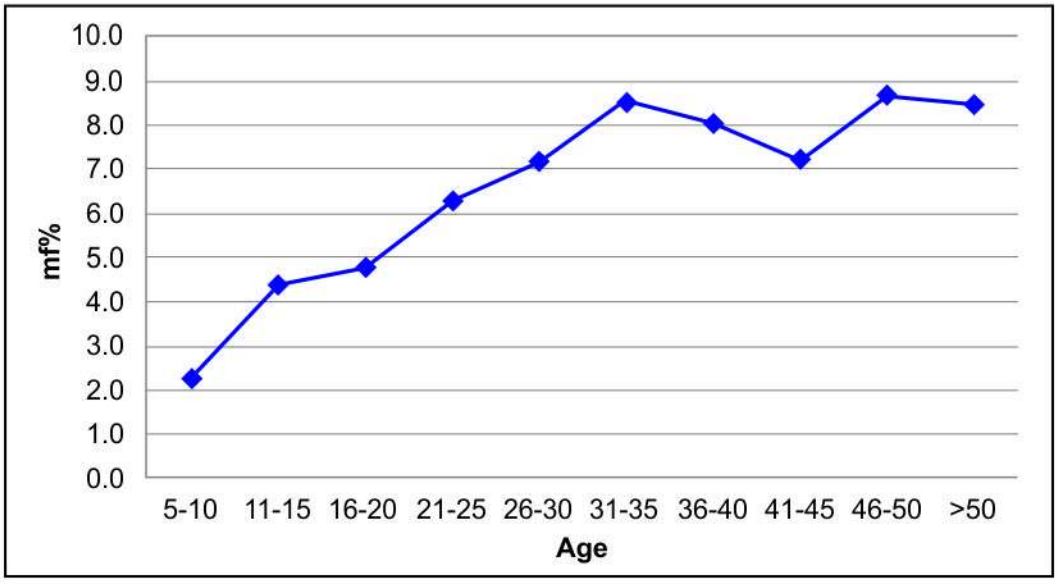
infective stage larvae. For coverage and compliance rate of MDA 8 villages of Chhatarpur district were surveyed using structured schedule and in districts where mf survey was carried out in 2 months of MDA, persons examined were questioned for consumption of drugs.

## Findings

**Microfilaria prevalence in endemic districts:** Total of 5852 blood slides were collected from 11 districts covering 25 villages. The overall mf rate was 6.1% and it varied from 0.0% in district Satna to 13.2% in district Chhatarpur. Among these 25 villages no microfilaria was found in 5 villages. In the remaining 20 villages, mf rate varied from 0.4 (Majhgawan of Umaria to 22.1% and Kanwara of Katni district). Age group wise analysis revealed that mf rate increase with the advancement of age and attained peak in the age of 31-35 years and stabilized thereafter (Fig.1.11.1). mf rate was higher among in males (7.5%) than females (4.1%) and the difference was highly significant ($Z=5.7$, $p<0.05$). In Shivpuri district, 1400 persons were examined for the presence of microfilaria and the mf rate was 3.2%.

**Infection and Infectivity rate:** A total of 1871 specimens of *Culex qinquifasciatus* were dissected from 10 known endemic districts and Shivpuri district. Of this 146 mosquitoes carried developing stages of filaria while 39 were having infective stage larvae. Overall infection and the infectivity rate was 7.8% and 2.1% respectively. Only in district Umaria, Sagar and Chhindwara, no infection was found in vector population which may be due to very low numbers of vectors found. Month wise analysis revealed the presence of infection and infectivity in all months of the year. In Shivpuri infection rate was 5.3% and infectivity rate was 1.3% which supports the mf prevalence in human population and active transmission of disease.

**Figure 1.11.1: Age group wise microfilaria prevalence**



# 1.9. ASSOCIATION OF HOST CELL DERIVED MICRO PARTICLES WITH CEREBRAL MALARIA SEVERITY IN CENTRAL INDIA

| | | |
|---|---|---|
| **Date of start** | : | December 2013 |
| **Duration** | : | Three years |
| **Status** | : | Ongoing |
| **PI** | : | Dr. Vidhan Jain |
| **Funding** | : | Intramural |

Cell derived microparticles (MPs) are receiving increasing attention as a diagnostic and investigative tool for many infectious and noninfectious conditions in biomedical sciences. They carry surface markers of their parent cell of origin and thus provide an opportunity to study cells that are otherwise difficult to obtain. Higher levels of endothelial MPs have been shown to be associated with cerebral malaria (CM) as opposed to severe malaria anemia cases without CM signs. Platelet MPs have also been considered important in CM pathology likewise their origin cells.

## Objective

To assess the utility of host cell derived microparticles as an investigative tool (diagnostic and prognostic) to better understand severity due to cerebral malaria in central India.

## Methodology

Centrifugation protocol was stan-dardized to isolate micro-particles.

Separation procedure: Whole blood in citrated plasma was centrifuged at 5000g for 5 minutes followed by spinning of upper 90% layer at 5000g for another 5 minutes. Upper 90% plasma was centrifuged again at 13700 g for 3 minutes. Thirty µL of centrifuged sample was mixed with 16 µL of binding buffer and 2/3µL of mAbs for staining.

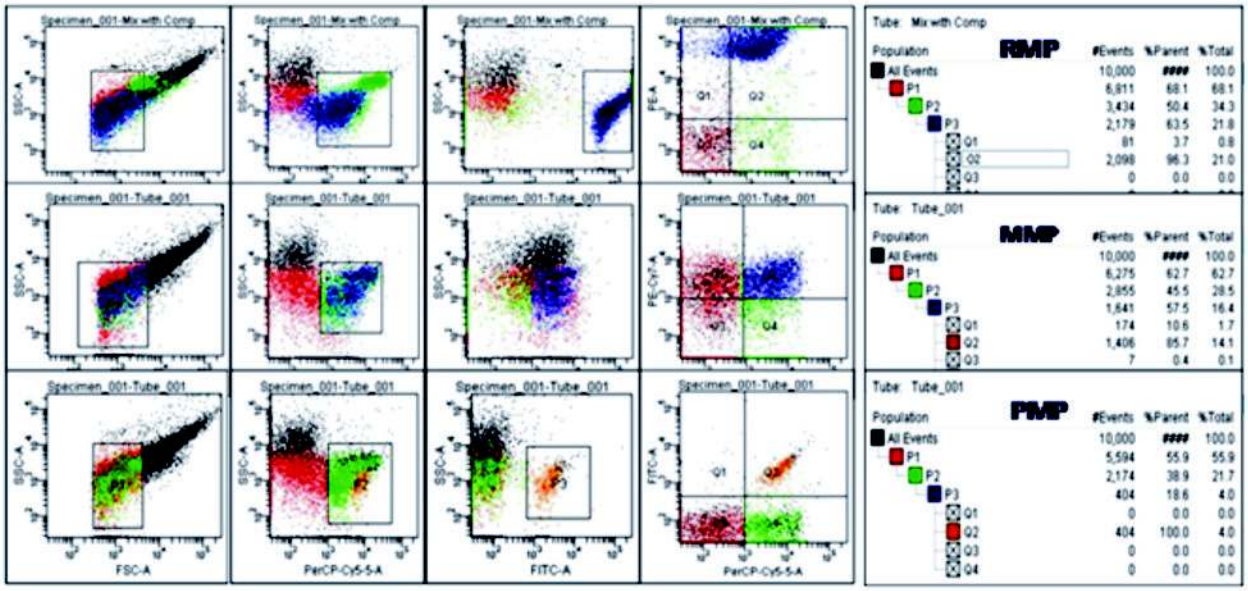
Immuno stains used are as follows:

- Anti human CD41 (MPs of platelet origin)
- Annexin V-FITC (Total MPs)
- AntiCD3 (lymphocyte MPs) and Anti CD14 (monocyte M
- Anti CD235a/Antiglycophorin A (MPs of RBCs origin)
- Anti CD 144 and Anti CD62E (endothelial MPs)
- Latex beads of 3 micron/1 micron were used for gating of the microparticles

## Findings

Double positive MPs (annexin V + marker of cell of origin) are shown in the figure 1.9.1. Protocol has been successfully standardized for red cell, monocyte and platelet microparticles. Further standardization for other microparticles is ongoing.

**Figure 1.9.1: Double positive microparticles shown in Q2 region after confirmation of gating using latex beads**




## 1.10. EVALUATION OF BIOMARKERS TO ASSESS MALARIA SEVERITY DUE TO *P. FALCIPARUM* IN CENTRAL INDIA

| | | |
|---|---|---|
| **Date of start** | : | May 2010 |
| **Duration** | : | Three years and six months |
| **Status** | : | Completed |
| **PI** | : | Dr. Neeru Singh |
| **Funding** | : | TSP ICMR |

Cerebral malaria (CM) is a quickly diffusible and reversible encephalopathy. Most of the hospitalized cerebral malaria cases die within 24-48 hours of admission. This makes it a challenging task for the attending physicians even at the tertiary health care centre as in the treated cases mortality rate 15-30%. Markers of inflammatory/angiogenic origin have been shown to be useful in assessing severity of the disease. An early identification of patients at risk of severity with the help of these markers would be useful in the clinical management of these patients.

### Objective

To determine the biomarkers associated with distinct pathology in different severe forms of *P. falciparum* malaria and to develop relevant prognostic and diagnostic markers for early recognition of complications and for improving the treatment outcomes.

## Methodology

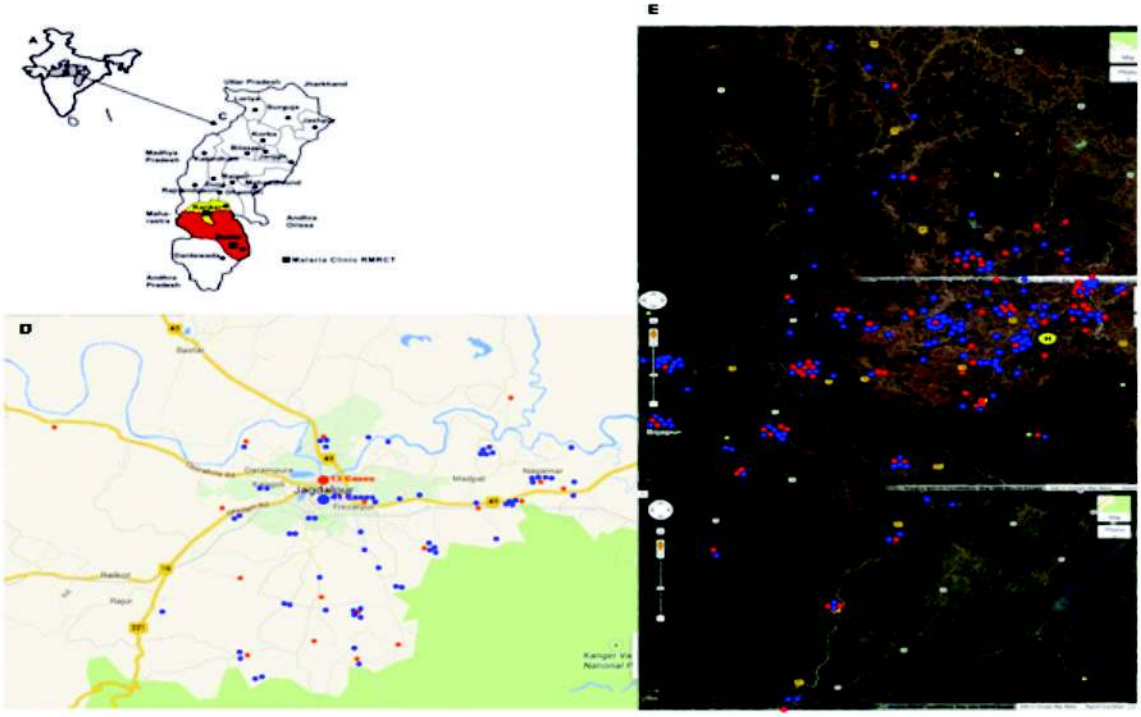
This study was carried out in Medical College associated Maharani hospital Jagdalpur, Chhattisgarh (site 1) and District Komaldev hospital Kanker, Chhattisgarh, Central India (site 2). All the admitted patients in adult/pediatric general medicine wards at both the study sites were screened for malaria parasite by microscopy (JSB stained thick and thin smears). Only *P. falciparum* positive malaria subjects were recruited under different enrollment categories i.e., mild malaria (MM), cerebral malaria (CM) and non cerebral severe malaria (SM) after obtaining written consent. Clinical details were obtained from hospital records. CM patients were further classified into two groups (CM survivors = CMS, and non survivors = CMNS) based on the treatment outcomes. Similarly SM patients were classified into two groups (SM survivors = SMS, and non survivors = SMNS). Additionally healthy controls (HC) were also enrolled for comparison. Follow-ups of the cases were done after 48 hours of treatment and at the time of discharge from the hospital and samples were collected. Percent parasitemia has been derived after counting the number of PRBCs (parasitized RBCs) in 1800 RBCs in thin smear.

## Findings

During the period of April 2013 to March 2014, a total of 12849 blood smears of suspected cases were examined, among these 506 had malaria. Slide positive rate and the slide falciparum rate was 3.9% and 3.5% respectively. Among the falciparum positive cases 47 cases had cerebral malaria and 34 had non-cerebral severe malaria (Table 1.10.1).

The Figure 1.10.1 shows the overall regional distribution of severe and complicated cases for the entire study period (2010-2014). The analysis showed that 278 cases were from the Jagdalpur district (55 in 2010, 99 in 2011, 50 in 2012 and 74 in 2013) and the remaining 99 cases were from surrounding districts/ states (Andhra Pradesh/Orissa). Further, the data revealed that the proportions of SM (non cerebral) did not vary between different blocks (range 7 to 10.8%; except Darbha, 0.8%). However, the proportion of CM cases and associated mortality was highest in Bakawand block (23.5%, 11.4% death) followed by Bastar (18.3%, 10.8%), Bastanar (17%, 9.8%) and Lohandiguda (19.8%, 5.8%) respectively. The data also revealed that CM survivors (30.6 KM) and non survivor patients (34.9 KM) travelled significantly longer median distance to receive tertiary care treatment than SM (non cerebral) (18 KM) and MM (mild malaria) patients (18.3 KM) [total CM vs MM/SM: $P<0.001$].

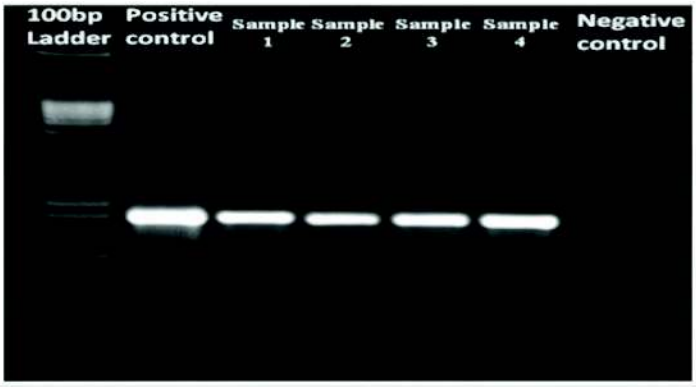
**Figure 1.10.1: Distribution of severe malaria cases**




India (A), state of Madhya Pradesh (B), Chhattisgarh (C) and study site in Bastar (malaria clinic RMRCT). Distribution of severe malaria cases (N = 349) in Jagdalpur block (survivors = 101 and died = 31) is shown in enlarged view (D). Distribution of severe cases in other regions of bastar (survivors = 147 and died = 70 ) is shown in (E).

**Sympatric distribution of *P.ovale curtisi* and *P.ovale wallikeri*:** A total of 450 microscopically confirmed *P. falciparum* cases under different categories of malaria were tested by species specific nested PCR, of which *P. ovale* infection was identified in five cases (Figure 1.10.2) and further confirmed by DNA sequencing (GenBank database accessing number KC 866363). Out of five, only one was mono-infection of *P. ovale*, 4 were found mixed with *P. falciparum* or *P. vivax* or both.

**Figure1.10.2: PCR amplification of *Plasmodium ovale***



These samples were further analyzed with specific PCR using primers of the small sub-unit ribosomal gene and sequenced to classify *P. ovale* species in the study area and out of these five, four were confirmed as *P. ovale curtisi* (Gene bank database accessing number KM 288710, Figure 1.10.3) and one was *P. ovale wallikeri* **(**KM873370, Figure 1.10.4**)**. *P. ovale* is rarely found in India. All the five cases were found in patients from dense forest villages which are inaccessible.

**Figure 1.10.3: Nucleotide alignment of *Plasmodium ovale curtisi (*KM288710*)***

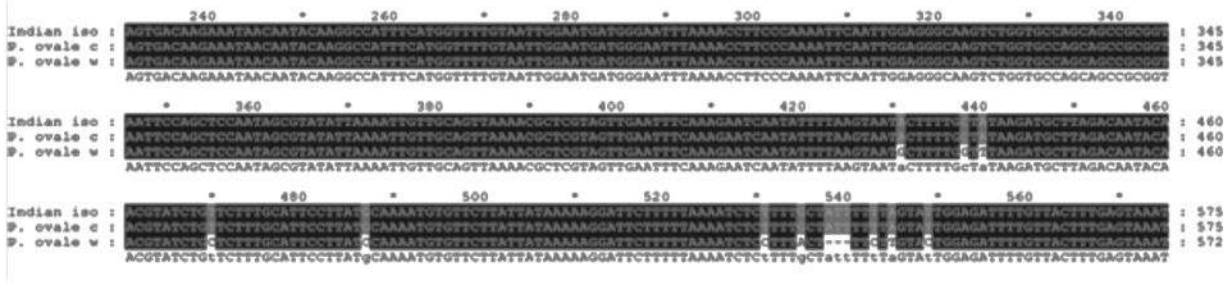


**Figure 1.10.4: Nucleotide alignment of *Plasmodium ovale wallikeri (*KM873370*)***

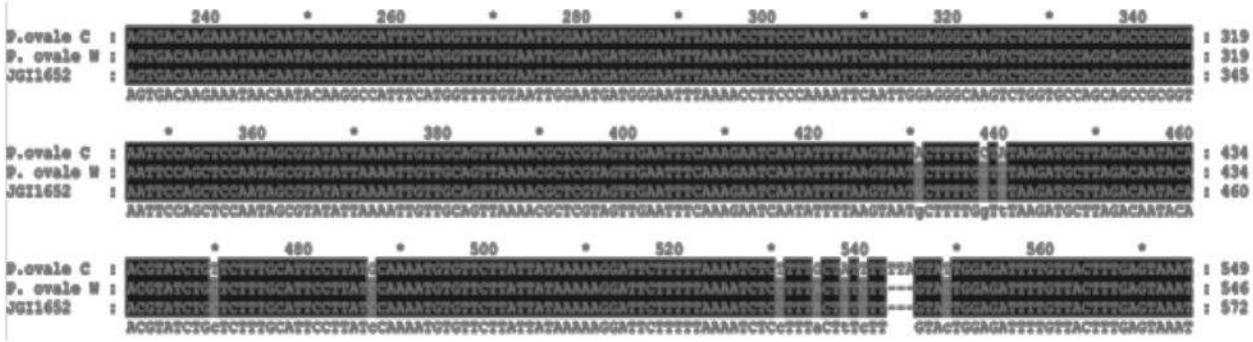


**Table 1.10.1: Month wise distribution of Malaria Cases**

| Months | BSE | Positive | PF | PV | Mixed | SPR | SFR | SVR | Pf% | Pv% | CM | NCSM | Mortality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2013** | | | | | | | | | | | | | |
| **Apr** | 920 | 22 | 18 | 4 | 0 | 2.4 | 2.0 | 0.4 | 81.8 | 18.2 | 1 | 2 | 0 |
| **May** | 1054 | 17 | 13 | 2 | 2 | 1.6 | 1.2 | 0.2 | 88.2 | 11.8 | 3 | 1 | 1 |
| **Jun** | 1008 | 17 | 17 | 0 | 0 | 1.7 | 1.7 | 0.0 | 100 | 0.0 | 3 | 3 | 1 |
| **Jul** | 1172 | 78 | 75 | 3 | 0 | 6.7 | 6.4 | 0.3 | 96.2 | 3.8 | 8 | 11 | 3 |
| **Aug** | 1108 | 73 | 63 | 8 | 2 | 6.6 | 5.7 | 0.7 | 89.0 | 11.0 | 9 | 9 | 4 |
| **Sep** | 1167 | 39 | 36 | 3 | 0 | 3.3 | 3.1 | 0.3 | 92.3 | 7.7 | 8 | 1 | 5 |
| **Oct** | 1050 | 39 | 32 | 7 | 0 | 3.7 | 3.0 | 0.7 | 82.1 | 17.9 | 3 | 0 | 0 |
| **Nov** | 990 | 38 | 36 | 2 | 0 | 3.8 | 3.6 | 0.2 | 94.7 | 5.3 | 1 | 0 | 0 |
| **Dec** | 944 | 36 | 31 | 5 | 0 | 3.8 | 3.3 | 0.5 | 86.1 | 13.9 | 0 | 2 | 0 |
| **2014** | | | | | | | | | | | | | |
| **Jan** | 1257 | 46 | 35 | 11 | 0 | 3.7 | 2.8 | 0.9 | 76.1 | 23.9 | 0 | 0 | 1 |
| **Feb** | 1160 | 54 | 47 | 7 | 0 | 4.7 | 4.1 | 0.6 | 87.0 | 13.0 | 8 | 2 | 4 |
| **Mar** | 1019 | 47 | 43 | 4 | 0 | 4.6 | 4.2 | 0.4 | 91.5 | 8.5 | 3 | 3 | 1 |
| **Total** | **12849** | **506** | **446** | **56** | **4** | **3.9** | **3.5** | **0.4** | **88.9** | **11.1** | **47** | **34** | **20** |

CM- Cerebral Malaria; NCSM-Non Cerebral Malaria; SPR- Slide Positivity Rate; SFR-Slide Falciparum Rate; SVR-Slide Vivax Rate

# 1.11. SITUATION ANALYSIS OF MASS DRUG ADMINISTRATION (MDA) IN THE CONTROL OF FILARIASIS IN PANNA DISTRICT OF MADHYA PRADESH

| | | |
|---|---|---|
| **Date of start** | : | April 2012 |
| **Duration** | : | Two years |
| **Status** | : | Ongoing |
| **PI** | : | Dr. Gyan Chand |
| **Funding** | : | Intramural |

In order to achieve the goal of Filariasis elimination by 2015 mass drug administration of Diethylcarbamazine citrate (DEC) & Albendazole is being given annually in 11 endemic districts of Madhya Pradesh, assuming that 5-8 rounds of MDA with >70% of the compliance rate (ingestion of drug), infection will be reduced to a level where transmission is unsustainable. Eight rounds of MDA have been completed till June 2013. Status of infection in human population and infection and infectivity in vector was assessed to understand the current situation of microfilaria rate and transmission of disease for continuation of MDA. Presence of any developmental stage of filarial worm in vector indicates the presence of circulating microfilaria in the community and the presence of infective larvae is an indication of active transmission.

## Objectives

- To assess the impact of MDA on the microfilaria rate in selected population and filarial antigenemia in children of 5-7 years of age.
- To study the impact of MDA on infection and infectivity rate of vector.
- To study the coverage & the compliance rate of MDA and the factors that influence compliance and non compliance of MDA in selected population.

## Methodology

Villages were selected bearing in mind high disease rate with historically higher chronic cases in consultation with DMO of the respective districts. In addition to these endemic areas, district Shivpuri was also surveyed on receipt of information regarding presence of chronic symptomatic cases which are generally associated with filarial disease. Thick smear was prepared by taking 60 ul of finger prick blood on a clean glass slide. Slides were prepared between 8.00 PM to 11.00 PM. Dehaemoglobinised and stained with Giemsa stain. Mosquitoes were collected from human dwellings in the morning hour between 6:00AM to 9:00AM. Only *Culex quinquifasciatus* specimens were dissected for determination of infection and infectivity rate. Head, thorax and abdomen of the mosquitoes were teased separately in normal saline and examined for the presence of infection of any stage of developing filarial larvae and

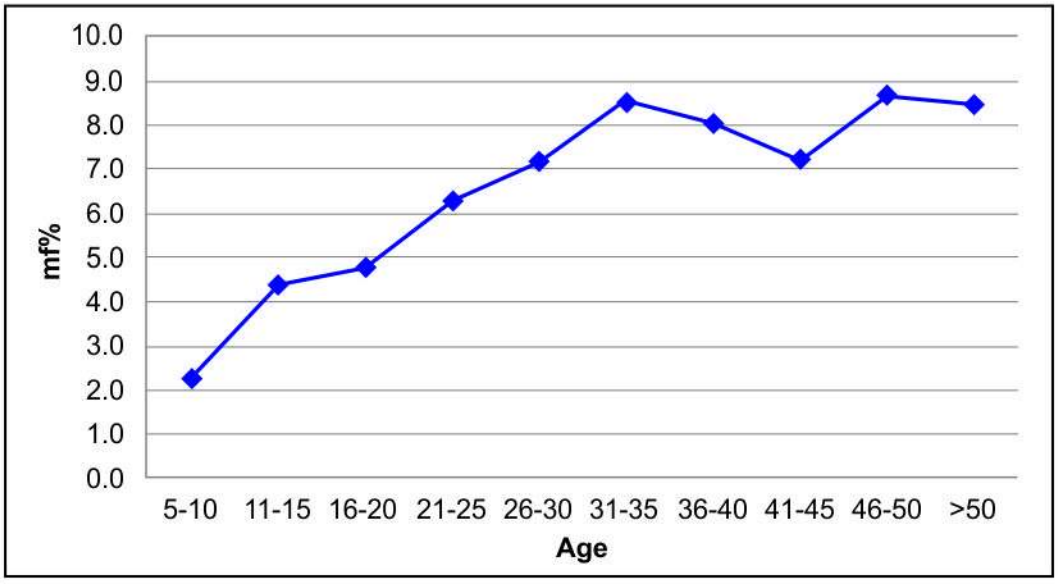
infective stage larvae. For coverage and compliance rate of MDA 8 villages of Chhatarpur district were surveyed using structured schedule and in districts where mf survey was carried out in 2 months of MDA, persons examined were questioned for consumption of drugs.

## Findings

**Microfilaria prevalence in endemic districts:** Total of 5852 blood slides were collected from 11 districts covering 25 villages. The overall mf rate was 6.1% and it varied from 0.0% in district Satna to 13.2% in district Chhatarpur. Among these 25 villages no microfilaria was found in 5 villages. In the remaining 20 villages, mf rate varied from 0.4 (Majhgawan of Umaria to 22.1% and Kanwara of Katni district). Age group wise analysis revealed that mf rate increase with the advancement of age and attained peak in the age of 31-35 years and stabilized thereafter (Fig.1.11.1). mf rate was higher among in males (7.5%) than females (4.1%) and the difference was highly significant ($Z=5.7$, $p<0.05$). In Shivpuri district, 1400 persons were examined for the presence of microfilaria and the mf rate was 3.2%.

**Infection and Infectivity rate:** A total of 1871 specimens of *Culex qinquifasciatus* were dissected from 10 known endemic districts and Shivpuri district. Of this 146 mosquitoes carried developing stages of filaria while 39 were having infective stage larvae. Overall infection and the infectivity rate was 7.8% and 2.1% respectively. Only in district Umaria, Sagar and Chhindwara, no infection was found in vector population which may be due to very low numbers of vectors found. Month wise analysis revealed the presence of infection and infectivity in all months of the year. In Shivpuri infection rate was 5.3% and infectivity rate was 1.3% which supports the mf prevalence in human population and active transmission of disease.

**Figure 1.11.1: Age group wise microfilaria prevalence**



### Antigenamia survey

A total of 204 children below the age of 7 years were examined for circulating filarial antigen (CFA) using the ICT card (Binax) in 5 districts. Thirteen children were found positive for CFA. Among them 100 children were under the age of 5 years and 6 were found positive for CFA.

**MDA compliance rate:** In 8 villages, 252 households were surveyed for compliance of MDA. Of which 169 (67%) received the drug and of them only 118 (46.8%) consumed the drug. The population of these 252 households was 1620 and only 850 (52%) received the drug. Only 417 persons actually consumed the drug. The overall compliance rate was 25.8%. Compliance of MDA among household having filaria patient in their family was also analyzed. Overall compliance in this group was 21.7%.

Reason cited for noncompliance was not suffering from any illness; drug distributor did not inform how to consume medicine, casual approach of the population towards MDA and filariasis, and fear of side reactions. During the survey no poster or wall writing regarding MDA or any publicity material was seen in the villages. During the mf survey immediately after MDA, in Chhindwara (431), Damoh (387), Katni (525) and Chhatarpur (182) participants were questioned about MDA compliance. The compliance rate was 35%, 14.5%, 4.6% and 1.3% respectively. Data collected so far indicate that compliance rate is very poor in the Madhya Pradesh and most of the districts have mf rate more than 1% necessitating continuation of MDA. Vigorous efforts are needed to improve the compliance of MDA. Proper training and adequate publicity are required before each round of MDA.

# 2. GENETIC DISORDER

## 2.1. MORBIDITY PROFILE OF SICKLE CELL DISEASE IN CENTRAL INDIA

| | | |
|---|---|---|
| **Date of start** | : | January 2001 |
| **Status** | : | Ongoing |
| **PI** | : | Dr. Rajiv Yadav |
| **Funding** | : | Intramural |

Sickle Cell Disease (SCD) is an inherited disorder of haemoglobin that results in haemolytic anemia in the homozygous condition. Risk factors for early mortality of patients with SCD are stroke, painful crisis and infection. Although SCD is a monogenic disorder, there is variability in clinical manifestation due to many factors and influence the outcome of the clinical presentations. These include environmental, psychological, cultural, and the socio-economical factors. However, the epigenetic mechanisms seem to play a primordial role in determining different SCD phenotypes. In India, this disease is mainly reported from the tribal predominant belt of central and southern India. In the evaluation of clinical status or prognosis of disease progression especially for the evaluation of therapeutic intervention, a precise assessment of the severity of the disease is useful.

### Objectives

- To study the clinical and hematological profile of the sickle cell disease.
- To develop strategies for management and prevention of the sickle cell disease in the context of central India.

### Methodology

Patients referred from various outpatient departments of the NSCB Medical College, Jabalpur to genetics laboratory of RMRCT for needful investigations. The patients identified as SCD were registered in this sickle cell clinic for detail clinical assessment and follow up. The clinical history, biochemical investigations and anthropometry were collected in the structured proforma.

### Findings

Forty nine SCD patients were registered in the Sickle cell clinic during April 2013 to March 2014. These patients belong to Balaghat, Damoh, Dindori, Jabalpur, Katni, Mandla, Narsinghpur, Seoni and Singrauli districts. Fifty nine percent of patients were males and the majority of the (69.4%) patients were below 15 years of age. Fifty one per cent of these patients belonged to the Scheduled Castes (51%) and 12.3%

were from tribal communities (Gond and Pradhan). The details of clinical characteristics are given in table 2.1.1. Splenomegaly was observed in 69.4% of patients. Twenty one percent of these patients had a history of multiple blood transfusions (more than 2) and 32.6% had no history of blood transfusion. About half the patients had onset of the disease prior to 3 years of age (Table 2.1.2).

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 ailment. They were administered folic acid (5 mg daily) and anti-pyretic and anti-inflammatory when required. There was a marked reduction in the clinical severity through these simple interventions.

**Table 2.1.1: Common signs and symptoms observed in SCD patients (N=49)**

| Symptoms | % of cases |
|---|---|
| Joint pain | 91.8 |
| Fever | 98.0 |
| Abdominal pain | 49.0 |
| Fatigue | 87.8 |
| Joint swelling | 44.9 |
| Body pain | 69.4 |
| Bony pain | 61.2 |
| Pallor | 100.0 |
| Icterus | 98.0 |
| Chest pain | 59.2 |

**Table 2.1.2: Distribution of patients according to age at onset of the disease (N=49)**

| Age in years | % of patients |
|---|---|
| 0-3 | 51.0 |
| 3-6 | 12.2 |
| 6-9 | 18.4 |
| 9+ | 18.4 |

## 2.2. NEW BORN SCREENING (NBS) FOR SICKLE CELL DISEASE AND PROVIDING COMPREHENSIVE CARE TO UNDERSTAND THE NATURAL HISTORY OF SICKLE CELL DISEASE IN TRIBAL POPULATIONS IN MADHYA PRADESH AND GUJARAT (MULTICENTRIC STUDY)

| | | |
|---|---|---|
| **Date of start** | : | January 2013 |
| **Status** | : | Ongoing |
| **PI** | : | Dr. S. Rajasubramaniam |
| **Funding** | : | TSP ICMR |

Haemoglobinopathies are one of the most common groups of single gene disorders in the Indian subcontinent and pose a major drain on our health resources. Sickle Cell Disease is an important public health problem in India with the highest prevalence amongst the tribal ethnic groups. Haemoglobinopathies including Thalassemia major with an estimated 10,000 live births each year and with an estimated more than 5,000 live births occurs each year in India. Madhya Pradesh has the most sickle homozygotes, followed by Gujarat, Maharashtra, Andhra Pradesh, and Orissa. SCD in India has a very varied clinical presentation ranging from a severe to mild or asymptomatic. Early diagnosis and treatment is critical in SCD because of the possibility of lethal complications in early infancy in pre-symptomatic children. The present multicentric study is aimed at identifying the various morbidities associated with SCD and aims to avoid the further birth of sickle homozygous babies in the families at risk identified after new born screening by offering genetic counseling.

### Objectives

- To undertake a targeted newborn screening program for SCD in tribal populations in 2 states.
- To follow up all newborns with SCD along with a similar number of Sickle Cell Trait and Normal newborns to evaluate morbidity and mortality.
- To provide care for any complications in the first few years of life.
- To evaluate the contribution of genetic factors like alpha thalassemia and the Xmn 1 polymorphism in the presentation of the disease.
- To understand the natural history of SCD among tribal populations in these 2 states.
- To prevent the further birth of sickle homozygous babies in these families at risk by offering prenatal diagnosis.

## Methodology

A newborn screening clinic was established at the Netaji Subhash Chandra Bose Medical College (NSCB), Jabalpur on September 12, 2013 in collaboration with Gynaecology Department of NSCB Medical College. The blood samples were collected either through heel prick or finger prick methods in EDTA vials in the case of newborns and peripheral blood in case of pregnant woman or the spouse of the pregnant woman. Cases of SCA, HbS trait and sickle β thalassemia were identified by HPLC/Hb- electrophoresis. The clinic is functional on 3 days a week. At this clinic targeted screening is being carried out among pregnant women attending the Gynaecology Out Patient Department. For this screening pregnant women (preferably in the early pregnancy/first trimester) are tested for various hemoglobinopathies. If any pregnant women were found to be positive for Sickle Cell Trait/Disease or β-thalassemia trait/major, then their spouses were tested. If the husband was also found to be positive for the trait or disease, then these couples were considered to be at "high risk". Their pregnancy was followed up and cord blood/fetal blood was collected at the time of delivery for testing of the suspected hemoglobinpathy.

## Findings

Since the initiation of the NBS clinic at the NSCB Medical College, 1021 pregnant women have been tested for various hemoglobinopathies, among them 59 women were found to sickle cell carriers, 9 women homozygous for SCD and 10 women were β-thalassemia carriers (Table 2.2.1). The spouses of these women were screened for carrier/disease status. So far 6 high risk couples have been identified and are being followed up regularly. In addition, cord blood/fetal blood samples collected from the NSCB Medical College. Till March 31, 2014, one hundred cord blood samples have been collected and screened. Among the newborn children, 6 sickle cell trait children and 1 SCD (Hb SS homozygous) child were identified and are being followed up every 3 months.

**New Born Screening Clinic, Jabalpur**

**Follow up at New Born Screening Clinic**

**Table 2.2.1: Haemoglobin variant detection based on HPLC or Hb-electrophoresis in pregnant women, newborn and suspected carrier couple**

| **Pregnant ladies tested** | **1021** |
|---|---|
| Normal | 987 |
| HbAS | 59 |
| HbSS | 09 |
| β thalassemia trait | 10 |
| Husbands tested | 34 |
| Normal | 28 |
| HbAS | 06 |
| HbSS | Nil |
| HbAE | 02 |
| β thalassemia | Nil |
| Number of high risk couples detected | 06 |
| Cord Blood Tested/Baby blood | 100 |
| HbAS | 06 |
| HbSS | 01 |

# 3. COMMUNICABLE DISEASES

## 3.1. ESTABLISHMENT OF GRADE II VIROLOGY LABORATORY UNDER ICMR VIROLOGY NETWORK LABORATORY AT RMRCT, JABALPUR, MADHYA PRADESH

| | | |
|---|---|---|
| **Date of start** | : | December 2011 |
| **Duration** | : | Five years |
| **Status** | : | Ongoing |
| **PI** | : | Dr. Pradip V Barde |
| **Funding** | : | ICMR |

The viral infections especially emerging and re-emerging viral infections are a constant threat to public health. The Indian Council of Medical Research (ICMR) established 'Viral Diagnostic Laboratory Network' to monitor the situation in the country. Grade II laboratory under this project is now functional and equipped to diagnose 15 different viruses using 35 different molecular and serological tests. The project also aims to investigate the outbreaks of suspected viral origin.

### Objectives

- To establish serological (ELISA and IFA) and molecular (PCR, RT-PCR) diagnostic services for important arboviral diseases (Dengue, Chikungunya, Japanese encephalitis) present in the central part of India.
- To establish serological and molecular diagnostic facilities for Influenza viruses, Respiratory Syncytial virus, Hepatitis viruses, Measles, Rubella, Herpes Simplex virus, Herpes Zoster virus and Mumps.
- To attend the outbreaks of suspected viral origin in the region.

### Methodology

The laboratory, following Biosafety level II and good lab practices, was established in the year 2012. All necessary equipments required for serological and molecular diagnosis have been setup. Viral diagnostic services remain connected with the society through different communication modes like the state health authorities, tertiary care units such as Medical Colleges and District Hospitals, IDSP, NVBDCP and CMHOs of the districts of Madhya Pradesh by informing them about our services and encouraging them to utilize the facilities on a regular basis for diagnosis. This has enabled us to receive the samples from nearly every district of Madhya Pradesh and few districts of Chhattisgarh as well. The laboratory has increased the number of diagnostic tests for viruses, up to 15 different viruses currently, including Respiratory Syncytial Virus (RSV), Herpes Simplex Virus (HSV)

and Herpes Zoster Virus (HZV) are being diagnosed serologically as well as using molecular approaches. More than 4400 samples from the patients suspected of suffering from viral diseases have been tested this year following the standard operating procedures and reagents recommended by WHO, CDC, NIV and NVDCP *etc.* The laboratory has also responded to the outbreaks and has provided necessary diagnosis and assistance in curbing the outbreaks. The lab has excelled in both diagnostic services and research areas. Detail of work performed in the respective areas is stated below.

At present the virology lab is performing diagnosis for 15 different viruses including the addition of 3 new viruses in the panel. More than 5000 tests on the samples suspected of viral infection were conducted during the report period. On an average about 430 tests were conducted each month with a maximum number of tests done in September because of the upsurge of dengue. The month wise details of the samples tested are shown in the graph (Figure 3.1.1).

## Arboviruses

**Dengue:** The IgM capture ELISA kit, manufactured by the National institute of Virology recommended by NVBDCP is being used for diagnosis of dengue for suspected samples collected after 5$^{th}$ day of illness. The NS1 antigen detection ELISA and nRT PCR described by Lanciotti *et. al.* (1992) tests were standardized and used for diagnosis of samples collected in the acute phase of illness (Figure 3.1.3). A total of 1517 samples were tested for dengue infection. A major outbreak of Dengue virus 2 was investigated in tribal district Mandla.

Out of the total 1517 samples tested, 480 were positive. Earlier years, the upsurge of Dengue cases was noted during mid and post monsoon season, however, this year the cases were detected from the month June onwards. This year Dengue virus 2 and Dengue virus 3 were found to be circulating in Central India (Figure 3.1.3).

**Figure 3.1.1: Month wise samples tested for different viral diseases**

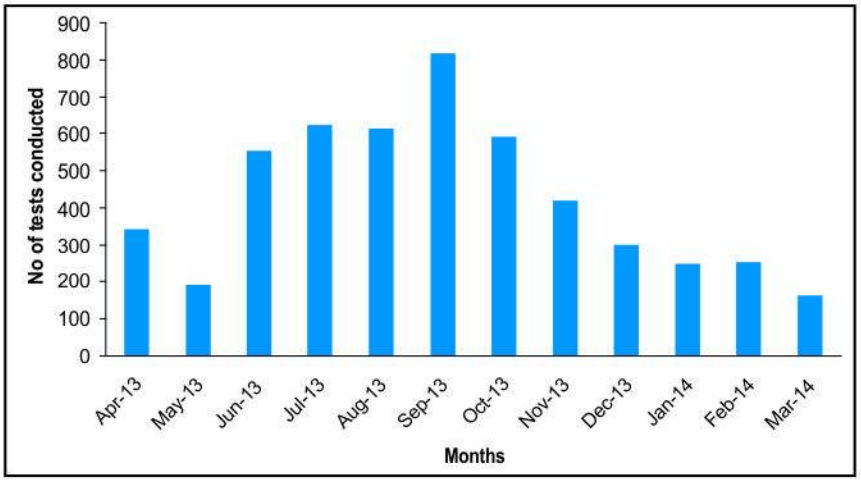


**Figure 3.1.2: Dengue samples tested (T) and found positive (P) month wise from April 13-March 14**

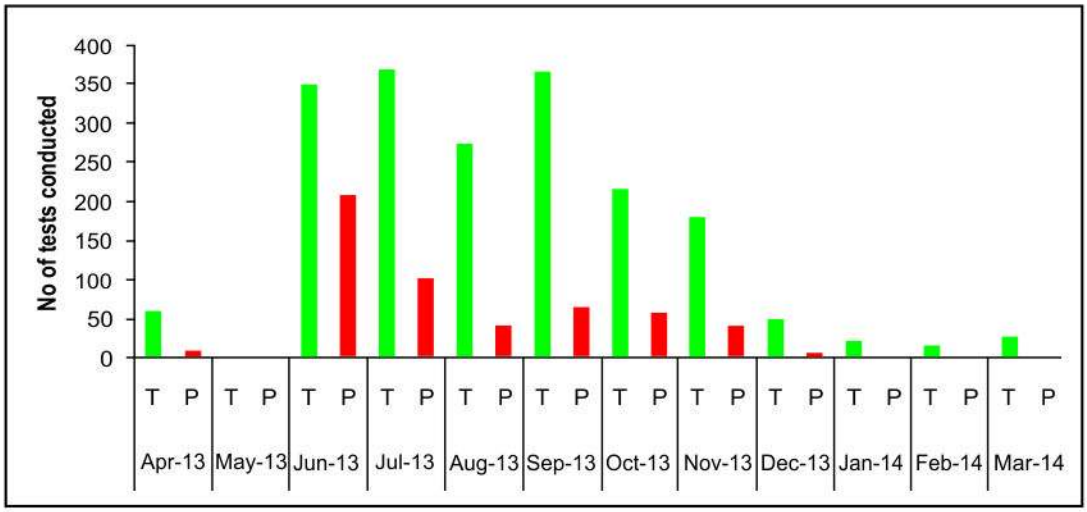
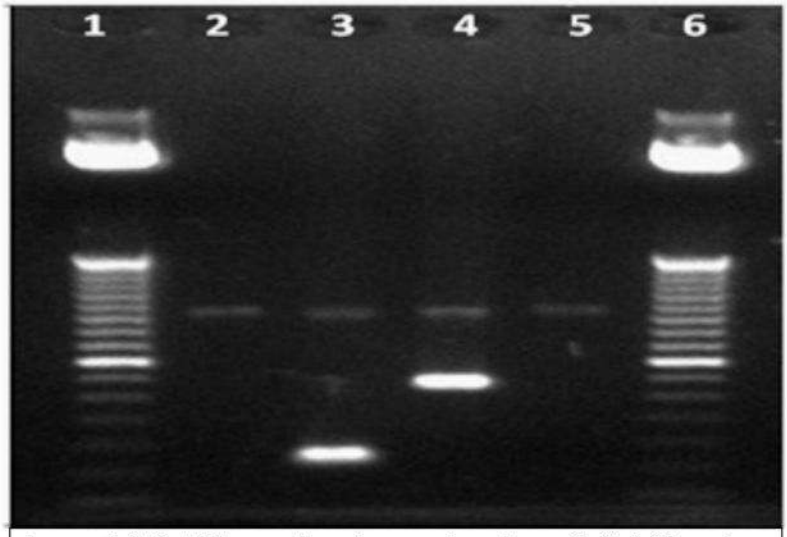



**Figure 3.1.3: Gel picture showing amplification of DEN 2 and 3**




**Lane 1 & 6: 50bp molecular marker, Lane 3 & 4 Showing Nasted PCR product of serotype DEN-2 (119bp) & DEN-3 (290).**

## Dengue outbreak in tribal areas of Madhya Pradesh

Dengue is not reported among tribal populations in central India earlier. In June 2013, outbreak of fever occurred in the tribal village Bakori of district Mandla. Based on the clinical symptoms samples were tested for Dengue IgM, NS1 protein, Chikungunya IgM and Hepatitis A and E.

Subsequently, samples from 17 villages were referred and dengue activity was detected in 11 villages. Out of 648 samples tested, 321 were found positive for dengue. These villages were spread over

periphery of 50 Km from the epicenter of the outbreak, i.e., village Bakori. The nested RT PCR and sequencing confirmed the outbreak was due to dengue virus serotype 2. The virus was also detected from vector mosquito *Aedes aegypti* collected from the same village. Although all the age groups were affected, the age group of 15-24 years was maximally affected (OR=2.0) and more males were found to be affected than females. Overall positivity for dengue was 49.5%. Of the 321 positive cases, 58 were admitted to hospitals in Jabalpur and Mandla. Cases of hemorrhagic fever were noted during this outbreak for the first time in this area. Five deaths were attributed to dengue and all were adult males. This is the first report of major a outbreak of Dengue in tribal areas of Madhya Pradesh.

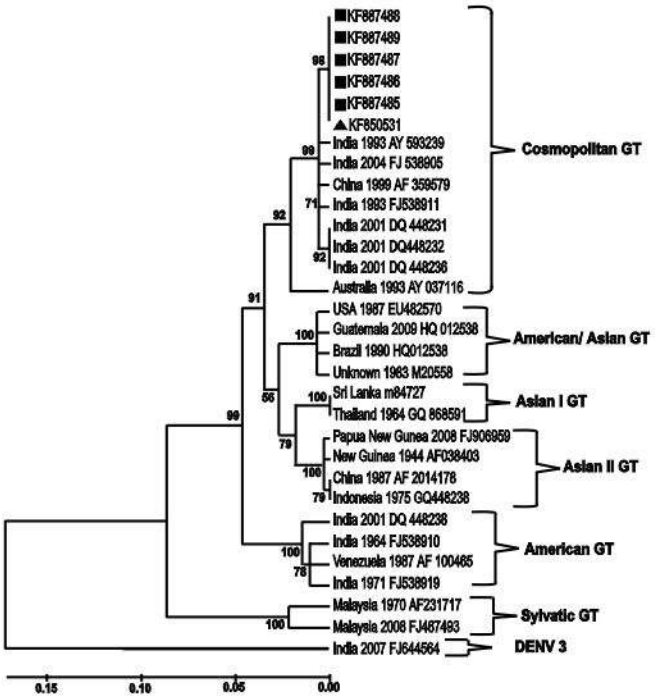
We also conducted Molecular and Bioinformatics study on samples collected during a recent Dengue outbreak to identify serotype and their genotype responsible for outbreaks in central India. The data generated in this study would be instrumental in understanding the epidemiology of Dengue virus in Central India. The outbreak of Charcha & Narsinghpur occurred in 2012 and DEN-1 was the aetiology. In the 2013 outbreak, DEN-2 was investigated in Mandla. Serum samples collected from patients in the acute phase of illness and showing positive results for the NS1 protein test were included in the study. Samples were selected from different time periods during an outbreak. RNA was extracted from 140µl acute serum. Mosquitoes collected were also tested for the presence of viral RNA. The primers of Envelop-Non-structural gene junction region were used in nRT-PCR for phylogenetic analysis. The obtained sequences of nRT-PCR were compared with the NCBI database sequences for phylogenetic analysis. Ten sequences were submitted to Gen Bank.

## Findings

In 2012-13, samples collected in 3 outbreaks were included in this study. The outbreak of Charcha & Narsinghpur occurred in 2012 and DENV-1 was the aetiology. In the 2013 outbreak, DENV-2 was investigated in Mandla. The maximum-likelihood phylogenetic tree with Kimura two-parameter corrections model was constructed. Trees were validated using 1000 bootstraps. The analyses demonstrated that DENV-1 belongs to genotype III (Figure. 3.1.4) and DENV-2 was from cosmopolitan genotype (Figure 3.1.5).

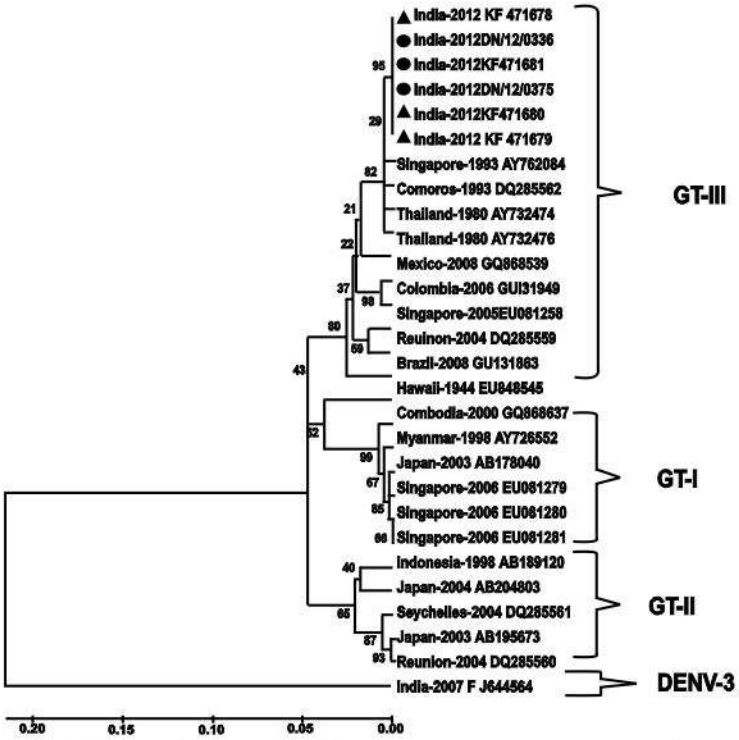
This is the first study in the central part of the country which revealed the genotype of circulating Dengue serotypes. In Dengue outbreak situations, it is not only important to know active prevalence but there is always an urgent need to know serotype and genotype which directly influence the epidemiology of the disease. The capacity to identify genotype will help to understand pattern of the virus activity in central India.

**Figure 3.1.4: The maximum likelihood phylogenetic tree of DENV 2.**




Twenty four reported sequences of DENV-2 were downloaded from NCBI and were assembled with the six cured (marked with ■ = human, ▲ = mosquito) sequences DENV-3 was used as out group

**Figure 3.1.5: The maximum-likelihood phylogenetic tree**




The maximum-likelihood phylogenetic tree with Kimura two-parameter corrections using the E/NS1 gene junction of DENV-1 detected from Charcha, indicated by ▲; DENV-1 from Narsinghpur district indicated by ●.

**Chikungunya:** This year 99 samples were referred for Chikungunya diagnosis of which 4 were detected positive by NIVs IgM ELISA, none were detected positive by nRT PCR.

**Japanese encephalitis:** The IgM capture ELISA kit procured from NIV was used for diagnosis of JE from suspected samples. Thirty eight samples from Madhya Pradesh and Chhattisgarh were tested using IgM capture ELISA kit, however, no positive case was detected.

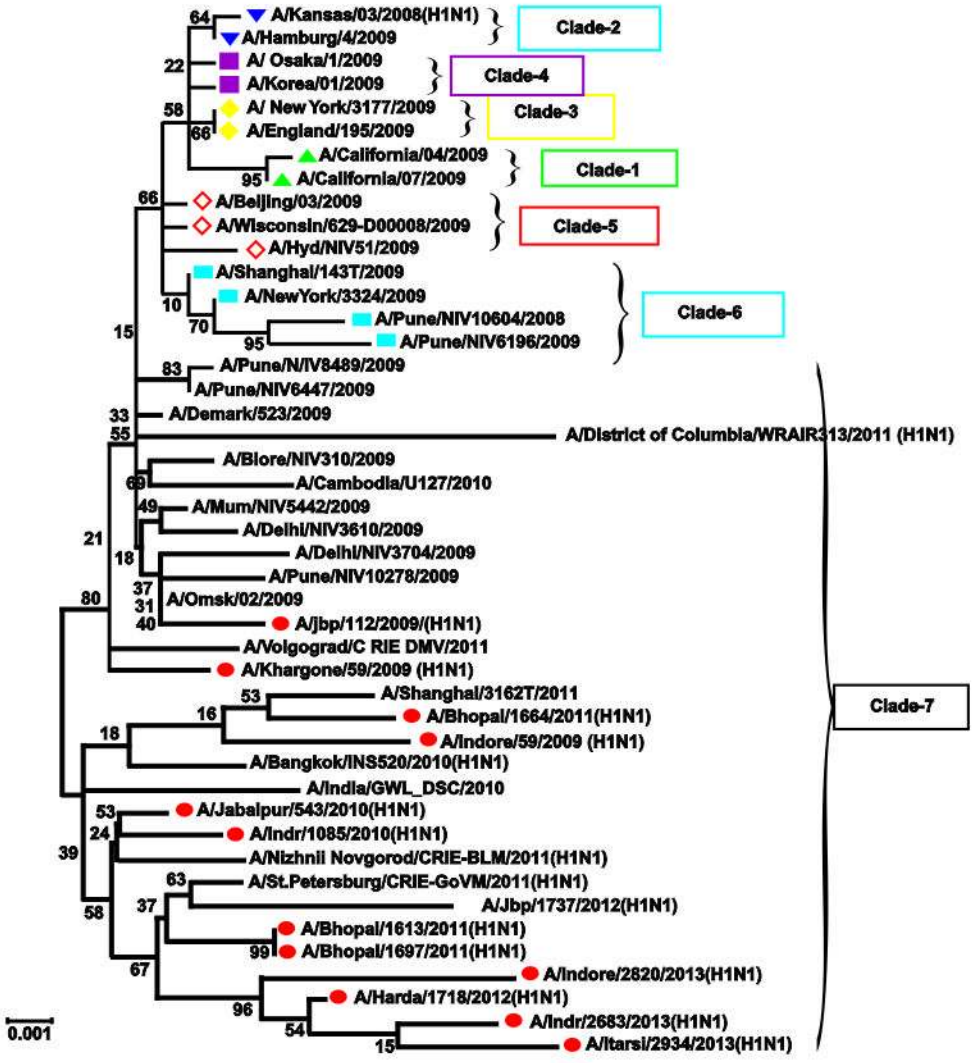
**Influenza and Respiratory Syncytial Virus:** We continued to support state health services by providing the diagnosis of H1N1 09pdm and other influenza viruses. This year, after conducting a pilot study for Respiratory Syncytial Virus (RSV), the test was added to the diagnostic panel for ILI cases. The WHO recommended real time RT PCR or RT PCR test was employed to diagnose influenza. A total of 413 samples were tested for influenza viral infection, of which 59 samples were positive for influenza A viral RNA. Maximum number of positive samples were found in the month of April (n=28) followed by August (n=14) and July (n=6). Unseasonal rain during the month of March–April could be a probable reason for this unusual peak of cases in April. A total of 275 samples were screened for the presence of RSV by RT PCR and 10 were detected positive. Most of the patients were children. Both RSV A and B were detected. RSV type A was found in almost 75% of the cases further studies are in progress on both these important airborne etiological agents. It is demonstrated that clade 1, 2, 6 and 7 viruses of H1N1 pdm09 influenza are circulating in India. We undertook a study to characterize the H1N1 pdm09 influenza A virus circulating in Central India. RNA was extracted using QIAamp Viral RNA mini kit (Qiagen, GmbH Hilden) from the samples received and stored at -70°C after providing the diagnosis, according to manufacturer's instruction. Amplification of complete HA gene was performed by RT-PCR using 6 sets of overlapping primers. Primers described by the World Health Organization were used. After amplification PCR product of specific size were checked by gel electrophoresis using 1.5% agarose gel. Sequencing of amplified products was done using BigDye Terminator and Phylogenetic analysis was performed by alignment visualization software BioEdit and MEGA. During the report period 6 samples were selected and analyzed successfully and incorporated into the phylogenetic tree and 3 of them were submitted to GenBank (Acc. No KF886294, KF886295, KF886296). The phylogenetic tree was constructed using a nationwide database in collaboration with the Influenza Division of the National Institute of Virology, Pune. The tree revealed that the viruses circulating in central India were closely related to their contemporary counterparts in India and clustered in clade 7 (Figure 3.1.6) the most widely circulating H1N1 pdm09 clade.

In influenza A virus strains, minor changes in the protein structure occur frequently, which pose the possibility of circulation of different strain in same or different geographical regions. Regular

monitoring helps in detection of currently circulating virus and subtype, however analysis at the molecular level can also detect changes at nucleotide level that will further help in explaining changing epidemiology of the virus. Phylogenetic investigation helps in better understanding of circulating virus sub types and their relatedness to other viruses. Thus, there is a need for regular monitoring that can also help public health authorities in developing better strategies.

**Hepatitis:** The diagnosis of Hepatitis A B C and E infection was done using commercially available kits and RT PCR/PCR tests established earlier. In all 1720 samples of patients having hepatitis symptoms were tested. Maximum number of samples (n=841) were tested for HBV and 96 (11.4%) were found positive for HBsAg (Table 3.1.1). The PCR and sequencing done on 12 randomly selected samples revealed that different subgenotypes of genotype D of HBV were

**Figure 3.1.6: Phylogenatic tree showing influenza A H1N1 pdm 09 viruses detected in Madhya Pradesh (Marked with ● ) belonging to Clade 7**



circulating in central India. Five hundred and fifty two samples of HAV were tested of which 43 (17%) were positive by IgM ELISA (Table 3.1.2). Out of 260 samples tested either by IgM+IgG ELISA and RT PCR for HCV, 8 (3%) samples were positive. Three hundred and seventy nine samples of HEV were tested of which 46 (12.1%) were found positive (Table 3.1.3).

**Table 3.1.1: Table showing age and gender wise positive samples of Hepatitis B**

| Age | Male | | Female | | Total | |
|---|---|---|---|---|---|---|
| | Tested | Positive | Tested | Positive | Tested | Positive |
| 00 - 01 | 14 | 2 | 3 | 0 | 17 | 2 |
| 02 - 05 | 16 | 1 | 6 | 0 | 22 | 1 |
| 06 - 15 | 61 | 5 | 46 | 1 | 107 | 6 |
| 16 - 45 | 244 | 36 | 235 | 23 | 479 | 59 |
| 46 - 60 | 89 | 15 | 57 | 6 | 146 | 21 |
| 60+ | 49 | 5 | 21 | 2 | 70 | 7 |
| Total | 473 | 64 | 368 | 32 | 841 | 96 |

*One sample with no information of age and sex was detected positive.

**Table 3.1.2: Table showing age and gender distribution of Hepatitis A**

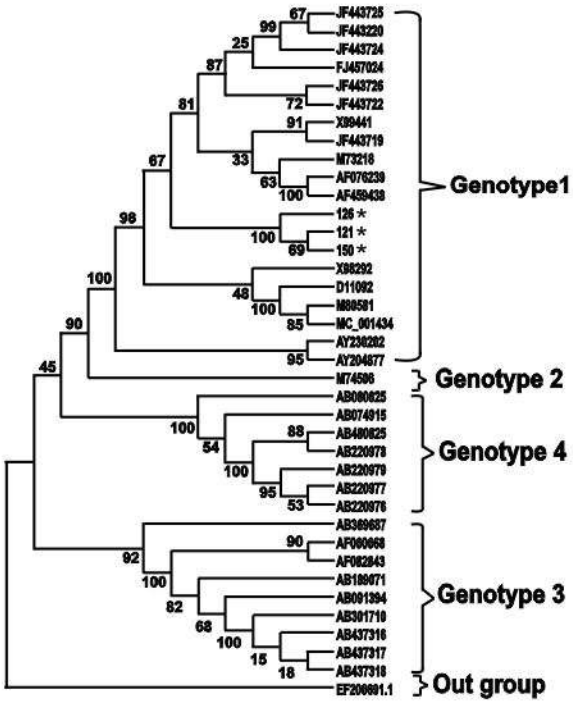
| Age | Male | | Female | | Total | |
|---|---|---|---|---|---|---|
| | Tested | Positive | Tested | Positive | Tested | Positive |
| 00 - 01 | 5 | 0 | 2 | 0 | 7 | 0 |
| 02 - 05 | 21 | 14 | 12 | 8 | 33 | 22 |
| 06 - 15 | 55 | 4 | 48 | 12 | 103 | 16 |
| 16 - 25 | 25 | 2 | 31 | 3 | 56 | 5 |
| 26 - 60 | 23 | 0 | 28 | 0 | 51 | 0 |
| 60+ | 0 | 0 | 2 | 0 | 2 | 0 |
| Total | 129 | 20 | 123 | 23 | 252 | 43 |

**Table 3.1.3: Table showing age and gender wise positive samples of Hepatitis E**

| Age | Male | | Female | | Total | |
|---|---|---|---|---|---|---|
| | Tested | Positive | Tested | Positive | Tested | Positive |
| 00 - 15 | 59 | 4 | 48 | 4 | 107 | 8 |
| 16 - 25 | 33 | 7 | 41 | 4 | 74 | 11 |
| 26 - 45 | 70 | 15 | 58 | 6 | 128 | 21 |
| 46 - 60 | 35 | 4 | 19 | 1 | 54 | 5 |
| 60+ | 10 | 0 | 6 | 1 | 16 | 1 |
| Total Sample | 207 | 30 | 172 | 16 | 379 | 46 |

Hepatitis E is endemic in large parts of Asia, Africa and Latin America where epidemic and sporadic disease are reported throughout the year. It is enterically transmitted mainly through fecal contaminated water. Hospitalization is required for people with fulminant hepatitis. No vaccine or specific immunoglobulin prophylaxis is available; The present study was taken up to establish circulating genotype of HEV. The viral RNA was isolated from the serum samples of the patient's suscepted of having HEV infection and was subjected to RT PCR for identification of circulating genotypes, using specific primers of the conserved RNAP region as described by Arankalle *et al*. The nested PCR products were extracted from the gel and sequenced directly using Big Dye Terminator Cycle Sequencing kit (Applied Biosystems, CA). The resulting sequences were analyzed for their homologies using BLAST. Phylogenetic analysis of nucleotide sequences were performed using the BioEdit software. Then sequences were compared with published sequences in GenBank. Phylogenetic analyses conducted of the 3 representative sequences showed the virus belonged to genotype IA (Figure 3.1.7). Genotype IA is circulating in Central India, further monitoring and clinical and epidemiological studies are in progress to understand the disease epidemiology.

**Figure 3.1.7: Phylogenetic tree of Hepatitis E viruses generated using the NJ method, based on the RNAP region of ORF1 (405bp). The strains in this study No. 126,121 and 150 are marked with asterisk**




## Measles, Mumps and Rubella

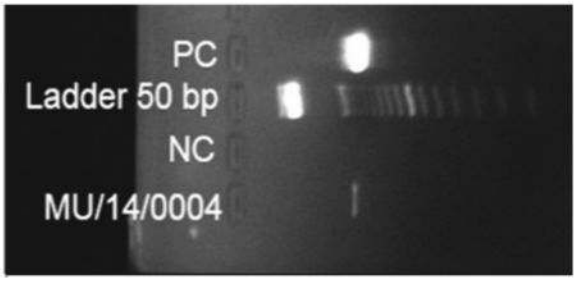
**Measles:** Commercially available ELISA based diagnostic kit for detection of IgM antibody of measles is used. Nine samples were tested however none was positive.

**Mumps:** Six samples were tested by RT PCR for detection of Mumps virus RNA, 3 samples were positive, all the samples were from children (Figure 3.1.8)

**Rubella:** Commercially available ELISA based diagnostic kit for detection of IgM and IgG antibody of rubella was used. One hundred and twenty nine samples were tested by either of the tests. A total of 58 samples were tested for IgM and 02 were found positive.

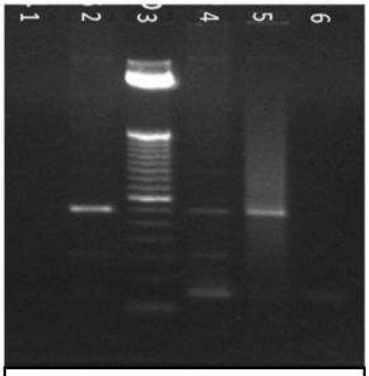
**Herpes Simplex virus and Herpes Zoster virus:** This year HSV 1 and HSV 2 along with HZV were added to panel of diagnosis. 171 samples were tested by PCR for HSV1 & 2 of which 5 were detected positive (Figure 3.1.9). Twenty three samples were referred to this laboratory for HZV diagnosis among these 5 were detected positive (Figure 3.1.10).

**Figure 3.1.8: Gel picture showing RT PCR product samples tested for Mumps**



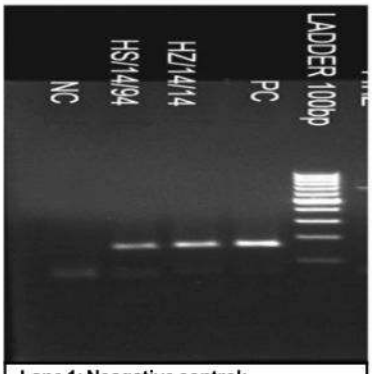

**Lane 1: Unknown sample showing RT-PCR product (675bp);**
**Lane 2: Neagtive control;**
**Lane 3: 50bp Molecular marker and Lane 4: positive control**

**Figure 3.1.9: Gel picture showing PCR product samples tested for HSV**




**Lane: 1, 2 & 4 Unknown sample showing 290bp PCR product**
**Lane: 3 50bp molecular marker**
**Lane: 5 Positive control (290bp)**
**Lane: 6 Negative control.**

**Figure 3.1.10: Gel picture showing PCR product samples tested for HZV**




**Lane 1: Neagative control;**
**Lane 2 & 3: unknown sample showing PCR product (161 bp);**
**Lane 4: Positive control (161 bp);**
**Lane 5: 100bp molecular marker**

## 3.2. MOLECULAR DETECTION OF RESPIRATORY SYNCYTIAL VIRUS (RSV) IN CHILDREN WITH INFLUENZA LIKE ILLNESS DURING INFLUENZA A (H1N1) pdm09 PANDEMIC

Acute respiratory tract infection (ARTI) is one of the leading causes of global child mortality with 2.6 million deaths in infants and 1.4 million deaths in children aged 1-4 years every year. Studies from developing countries have indicated RSV as a major cause and as is responsible for 27 to 96% hospitalization in cases with Acute Lower Respiratory Tract Infection (ALRTI). According to WHO, globally this virus is responsible for about 64 million cases and 160,000 deaths every year. This virus is a single stranded negative sense RNA virus which belongs to genus Pneumovirus within family Paramyxo-viridae. Based on glycoprotein G the virus is classified into type A and B. Although both are known to cause similar symptoms, infection with RSV-A is believed to be more severe especially among children below 2 years of age. RSV mainly transmitted person-to-person by close contact, droplets, and fomites. Clinical manifestations of RSV vary from mild disease of the upper respiratory tract to severe bronchiolitis or bronchopneumonia and it is difficult to clinically distinguish from Influenza.

### Objective

- To evaluate the occurrence of RSV in hospitalized children, during the Influenza-A (H1N1) pdm09 pandemic and to develop algorithm for laboratory diagnosis of ILI.

### Methodology

During the pandemic period of influenza A(H1N1)pdm09 samples of patient (category-C) from central India for diagnosis were sent to viral diagnostic laboratory (VDL) of the institute. After providing diagnosis of (H1N1)pdm09 within 24 hrs, throat/nasal swab samples were stored at ultra low temperature freezer (-70$^0$C) for further use. Seventy five stored samples were selected randomly following criteria as: (A) having severe ILI (B) negative for influenza A and influenza B (C) ≤ 2 years of age. The RNA was extracted from the samples using QIAamp Viral RNA mini kit (Qiagen, GmbH Hilden) according to manufacturer's instruction. Detection of RSV specific RNA was performed by RT PCR. For further sub-typing of the RSV as A and B, nested PCR was done. Primers used were of N and P gene as described by Abels *et.al,* 2001. The amplified products of 836 bp in external PCR and 334 bp, 184 bp in nested PCR of RSV A and RSV B respectively was visualized by separating the products on 1.5% agarose gel by electrophoresis and staining with ethidium bromide (Figure 3.2.1).

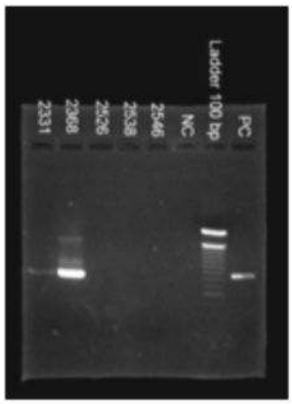
### Findings

A total 2549 samples were received during Oct 2009 - Dec 2012; of these 398 were of patient's ≤2 years of age. Out of randomly selected 75 samples, 33 (44%) were found positive for RSV, specifically 25 (75.8%)

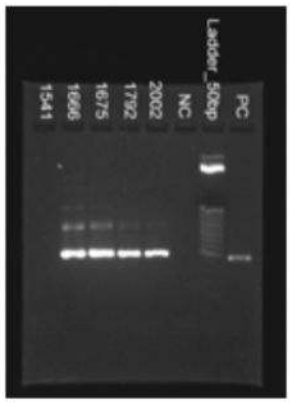
cases as RSV-A and 8 (24.2%) as RSV-B. Percentage of infant in sample size as well as in positivity was higher as 69.3% (52/75) and 42% (22/52) respectively (Table 3.2.1). The majority of infants had RSV A infection [20/22 (90.9%) (p<0.001)] and demonstrates that RSV-A, as a major cause of hospitalization (P<0.001) for infants in central India. However, RSV-B was detected in only 8 samples, 75% of which fall under age group 13 to 24 months.

In the present study, it was found that the RSV was responsible as a major cause of ILI, and was detected about 3 times more in comparison to influenza from the children ≤2 years of age. This high positivity signifies that even during a pandemic, there was dominance of RSV in influenza suspected cases, which was totally neglected. It would be worthwhile to diagnose the RSV as there is very less information available from India and no information particularity from central India. In view of this we developed an algorithm for RSV and influenza wherein the patient with age ≤ 2 years was 1st diagnosed for RSV, rather than influenza. This algorithm is currently being validated by testing samples received by our laboratory.

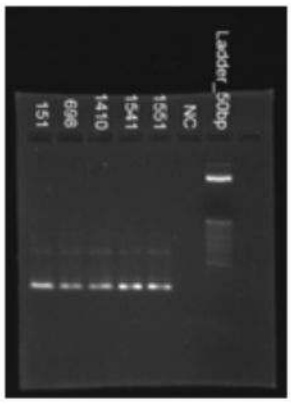
**Figure 3.2.1: RSV PCR results**




**(A) RSV main RT-PCR depicting one sample in lane-2, positive for RSV (836bp)**




**(B) Nested PCR for RSV-A showing all samples positive for RSV-A (334bp) except the sample in lane-1**




**(C) Nested PCR for RSV-B depicting the entire samples positive for RSV-B (184bp).**

**Table 3.2.1: Distribution of RSV cases according to age group**

| Age group in months | Total cases | Positive cases | Cases positive for RSV -A (%) | Cases positive for RSV -B (%) |
|---|---|---|---|---|
| ≤ 01 | 9 | 2 | 02 (100%) | 00 (0%) |
| 02-06 | 23 | 13 | 12 (92.3%) | 01 (7.7%) |
| 07-12 | 20 | 7 | 06 (85.7%) | 01 (14.3%) |
| 13-24 | 23 | 11 | 05 (45.5%) | 06 (54.5%) |
| Total | 75 | 33 | 25 (75.8%) | 08 (24.2%) |

## 3.3. IEC INTERVENTION TO IMPROVE KAP RELATED TO TUBERCULOSIS AND ITS IMPACT ON RISK FACTORS AND TB DISEASE BURDEN AMONGST SAHARIA - A PRIMITIVE TRIBE OF MADHYA PRADESH

| | | |
|---|---|---|
| **Date of start** | : | October 2012 |
| **Duration** | : | Three years |
| **Status** | : | Ongoing |
| **PI** | : | Dr. VG Rao |
| **Funding** | : | TSP ICMR |

A very high prevalence of infection (20.4%) and TB disease (1,518 per 100,000) has been reported among Saharia, a primitive tribe in the state. The result of the endline KAP survey under RNTCP also showed the poor knowledge about TB disease, cause of transmission, treatment and accessibility, particularly among the tribal communities. In view of this, the study is planned to execute a need based IEC intervention in the area and to assess its impact on KAP and risk factors for pulmonary tuberculosis.

### Objectives

- To identify the risk factors for pulmonary tuberculosis amongst Saharia primitive tribe
- To generate a baseline data on Saharia's knowledge, attitude, behaviour and practices pertaining to TB.
- To execute a need based IEC intervention in the study area.
- To assess the impact of IEC activities on KAP and risk factors.

The secondary objective is to estimate the prevalence and incidence of TB disease after the IEC intervention in the area.

### Methodology

This cross sectional study is being carried out in Saharia dominated study and control villages in a Pohri Block of Shivpuri district of the state. It is being undertaken in 3 phases viz. baseline, intervention and endline survey. Baseline survey included TB disease survey, risk factor assessment and KAP. Based on the findings of the baseline survey, a need based IEC program is being executed in the study area. Finally the endline survey would be conducted to assess the impact of intervention in terms of KAP, risk factors and TB disease burden among them.

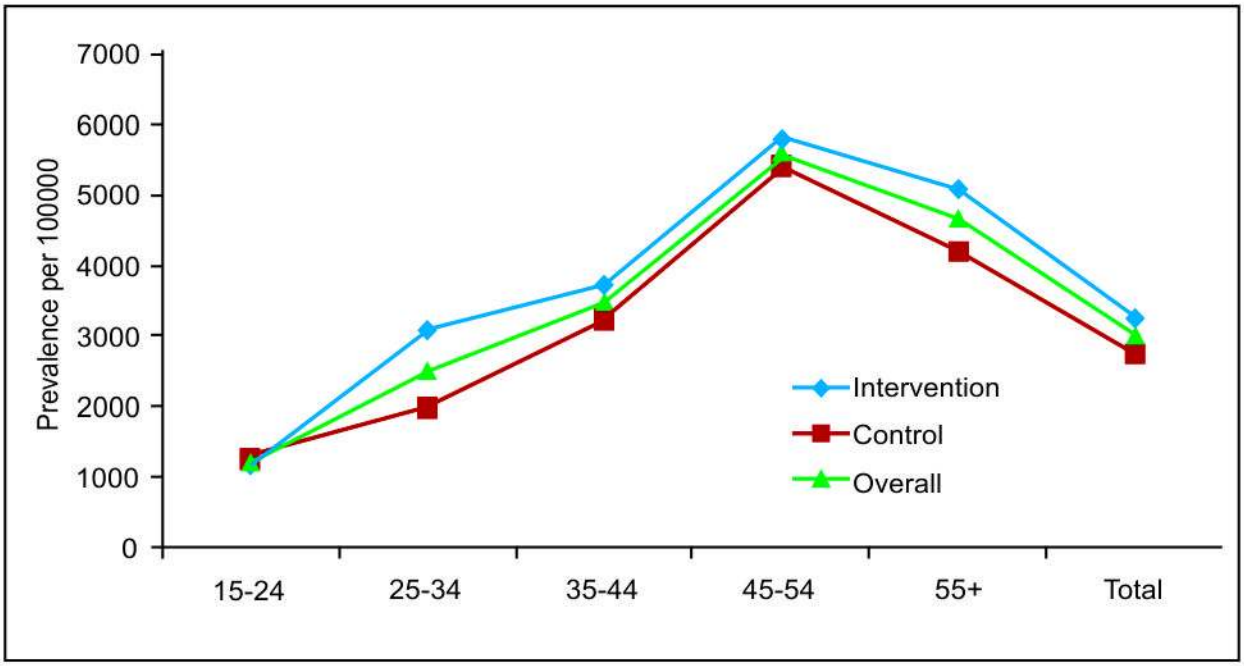
### Findings

The baseline survey has been completed. The findings showed alarmingly high TB disease prevalence of 3003 per 100,000. It was more than twice amongst males (4832 /100,000) compared with females (1246/100,000). The findings also indicate poor knowledge about various aspects related to tuberculosis. Tobacco smoking and alcohol consumption was found to be highly prevalent particularly among men

(76.4% and 49.7% respectively). Malnutrition was also found to be prevalent with 47.0% underweight adults. The majority of the houses (93.1%) had only one room and was used as living as well as cooking. The fuel used for cooking by the majority of the households (95.8%) was wood/crop residuals leading to indoor air pollution, a risk factor for tuberculosis. The situation was nearly similar in both studies as well as control areas.

Based on the findings, IEC intervention is being executed in the study villages during the intervention phase begin from October 2013. Various components of the IEC programme are - Training to ASHA, Anganwadi workers and other volunteers; Group / Community meetings; Street plays / Nukkad natak in their local language; Calendars/ pamphlets containing various messages on tuberculosis; Health Camps; Film shows; Rallies; School children involvement in awareness programmes; Wall paintings with slogans and messages in the local language and patient visits. The target groups for IEC activities are patients and their families, village community including opinion leaders, school teachers, students and health providers including ASHA and Anganwadi workers. The IEC intervention activities (phase II) are in progress.

**Figure 3.3.1: Age wise prevalence of pulmonary tuberculosis**



## 3.4. STUDY OF PULMONARY TUBERCULOSIS AND ITS RISK FACTORS IN SAHARIA: A PRIMITIVE TRIBE IN GWALIOR DISTRICT OF MADHYA PRADESH

| | | |
|---|---|---|
| **Date of start** | : | December 2012 |
| **Duration** | : | 17 Months |
| **Status** | : | Completed |
| **PI** | : | Dr. VG Rao |
| **Funding** | : | Tribal Welfare Dept., Gwalior, Govt. of MP |

A study conducted among Saharias of Sheopur in Madhya Pradesh showed a very high prevalence of tuberculosis (1,518 per 100,000). This community also resides in Gwalior district of the state. There is however, no information on tuberculosis situation among them. The baseline data on tuberculosis situation is essential to know the extent of the problem and to plan appropriate control measures.

### Objectives

- To estimate the prevalence of pulmonary tuberculosis in the Saharia tribal community in Gwalior district of Madhya Pradesh.
- To study the drug susceptibility pattern of tubercle bacilli.
- To identify the risk factors for pulmonary tuberculosis amongst them.
- To generate a baseline data on Saharia's knowledge, attitude, behaviour and practices pertaining to TB.
- To suggest appropriate intervention measures.

### Methodology

This is a cross sectional study and was carried out to assess the tuberculosis situation and the risk factors for tuberculosis amongst Saharia tribal population of Gwalior district, Madhya Pradesh. The sample size was estimated to be 9130 adults aged ≥15 years. The survey methodology included registration of all individuals, screening of symptomatic and collection & transportation of sputum samples for smear, culture and DST. The information on risk factors and their KAP related to tuberculosis was collected using pre-tested structured schedules by trained investigators. All diagnosed cases were referred to the DOTS centre for anti-TB treatment as per the RNTCP guidelines.

### Findings

#### Prevalence of pulmonary TB

Overall prevalence was found to be 3294 per 100,000. The prevalence of TB was significantly higher amongst males (5497 /100,000) than females (1376/100,000) (OR = 4.17; P<0.001). The prevalence ranged from 2309/100,000 in Dabara block to 4010/100,000 in Barai block. The MDR prevalence was 10.8% in re-treatment cases and 3.2% in new cases (Figure 3.4.1).

#### Knowledge, Attitude and Practices (KAP)

Of the 1381 individuals interviewed, 744

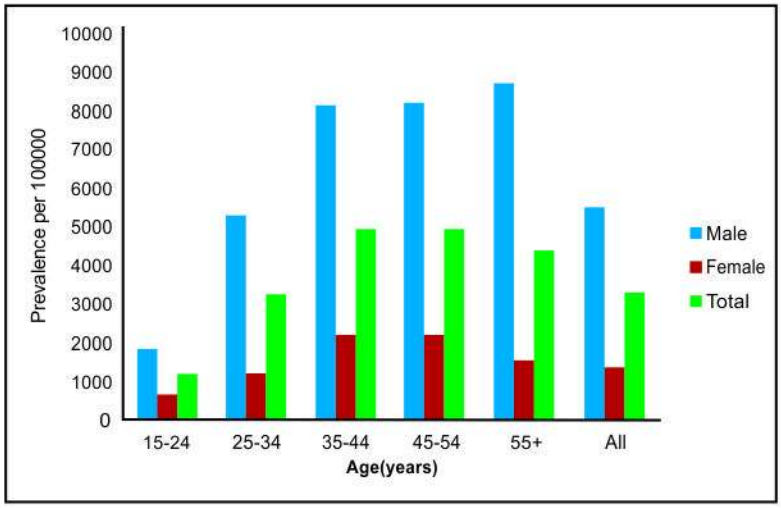
(54.0%) said that they have heard about TB and of these, the majority (88%) said that TB is fully curable by modern treatment. However, the majority did not know the duration of treatment for TB. The majority of the individuals did not have knowledge regarding its spread. Forty seven percent respondents reported that sputum examination is the tool for diagnosis of TB whereas 49% and 44% reported blood test and X-ray as the tool for diagnosis respectively. Regarding knowledge on prevention of TB, 34% reported that covering nose/mouth while sneezing/ coughing prevents TB and very few knew that BCG can prevent TB.

## Risk factors for TB

The overall prevalence of tobacco smoking was 23% (N=1381), and was higher amongst males (61%; N=509) compared with females (1%; N=872). The most common form of tobacco smoking was 'beedi' (93%). The prevalence of alcohol consumption was 15.0%, and was higher amongst males (41.0%) compared with females (1.0%). 51.2% individuals were found to be underweight (BMI ≤ 18.5) with higher prevalence among males (60.5%) as compared to females (45.7%). Of the 255 TB patients tested for HIV, no case was found to be HIV reactive. Thirty three of the 261 TB cases (12.6%) had abnormal blood glucose levels.

The results indicate that the TB disease is a major public health problem amongst Saharia primitive tribal community in Gwalior district of Madhya Pradesh with alarmingly high TB disease prevalence of 3294 per 100,000. The MDR rate however, is similar to that reported from other parts of the country. The findings on their knowledge and perception about tuberculosis indicate that there are many gaps regarding various aspects of tuberculosis such as mode of transmission, prevention and treatment. In view of the alarmingly high TB prevalence in this community, urgent control measures need to be immediately instituted preferably through active case finding followed by prompt treatment to interrupt the transmission of TB infection in this population.

**Figure 3.4.1: Age and sex wise prevalence of pulmonary tuberculosis**



# 3.5. PILOT STUDIES FOR RAPID MOLECULAR DETECTION AND CHARACTERIZATION OF BACTERIAL VAGINOSIS

| | | |
|---|---|---|
| **Date of start** | : | April 2012 |
| **Duration** | : | Two years |
| **Status** | : | Completed |
| **PI** | : | Dr. S. Rajasubramaniam |
| **Funding** | : | Intramural |

Bacterial vaginosis (BV) is one of the most common genital infections among women of reproductive age, yet its precise etiology and mode of transmission are unknown. BV is characterized by a disturbance of normal vaginal flora, with a loss of $H_20_2$-producing Lactobacillus species and an increase in gram-variable coccobacilli, anaerobic organisms, and genital mycoplasmas. It is clinically defined and identified by the presence of a thin homogenous vaginal discharge, a vaginal pH of more than 4.5, presence of 'clue cells', and an amine odour after addition of 10% of potassium hydroxide and with a 'Nugent' score greater than 6. Importantly, BV is associated with chorioamnionitis, spontaneous abortion, preterm delivery, low birth weight, postpartum and post-abortion endometritis, and increased susceptibility to HIV infection and other sexually transmitted infections (STIs). Current treatments result in high recurrence rates. Thus identification and characterization of the factors and infecting organisms is a prerequisite for developing an effective therapy.

## Objectives

- To assess the incidence of BV in females of reproductive age group
- Develop Culture Independent molecular tools for rapid identification of constituent infective organisms.

## Methodology

A prospective study was conducted among patients attending GOPD of N.S.C.B. Medical College, Jabalpur. Detailed history on socioeconomic status, literacy, occupation, presenting complaints, menstrual history, obstetric history, history of contraception, present illness, surgery and sexual history was obtained in the tested proforma. Inclusion Criteria – Patients of age group 18-40 years with positive history & positive signs for 'Amsel's clinical criteria'& symptoms, bad obstetric history.

After obtaining a proper history and examination, vaginal pH was checked and documented by litmus paper. Two swabs from lateral vaginal wall and fornices were collected, placed in sterile tubes. One was processed for Amsel's criteria and Nugent's score and Swab 2 was used for molecular characterization. For the microbiological testing, an unfixed vaginal smear was Gram stained by standard methods. The stained slide was read, and the numbers of morphotypes evaluated based on a

standardized scoring method of Nugent et al. (1991). A score of 0 to 3 was considered to be normal, 4 to 6 is considered intermediate, and 7 to 10 was defined as BV. Preparation of Nucleic Acids: DNA/RNAs from samples from BV positive patients were carried out as follows. Briefly, vaginal swabs will be vigorously agitated in 1mL of PBS (phosphate buffered saline, pH 7.1) to dislodge cells. The cells pelleted by centrifugation at 10,000g for 5 minutes, washed with PBS. The pellet so obtained was processed further according to the manufacturer's instruction using Genomic DNA Kit (Qiagen). The DNA obtained was stored at –20°C or used for PCR analysis.

A "universal" Oligonucleotide primer targeting conserved regions of the 16S rRNA gene was designed to detect following bacteria, i.e. *Gardernella vaginalis*, *Lactobacillus* spp, *Mobiluncus* spp, and *Atopobium vaginae* (broad range primer). A positive amplification with broad range primer was followed by PCR with species specific primers to identify the constituent organisms. Further, due to lack of homology in 16S rRNA, separate primers were designed to identify *Prevotella spp*. or *Mycoplasma hominis*.

## Findings

One hundred twenty-two samples were obtained for molecular analysis. All samples were processed for Genomic DNA isolation and tested for various bacterial species present. Three samples showed no detectable DNA and 11 samples yielded no cell pellets. Amplification of 290bp product using universal 16sRNA primer was obtained (Fig 1A) in 100 samples tested. Among 100 16sRNA positive samples, 18 showed the presence of *G. vaginalis* (Figure 1B) and 70 indicated presence of *A. vaginae* (Figure 1C). Seventy-six samples were *Prevotella* (Figure 1D) positive and 32 samples were *Mycoplasma* (Figure 1E) positive. Table 1 shows the different bacterial species detected by PCR and Table 2 depicts the abundance of various Lactobacillus species detected. Four Lactobacillus species were observed namely *L. crispatus, L. iners, L. gasseri* and *L. jensenii*. Ninety-seven per cent samples showed the presence of *Lactobacillus jensenii* while only 31%s samples indicated the presence of *L. gasseri.*

The sample collection has concluded and the molecular identification data is being compared with Micro-biological findings and efficiency of detection of the constituent organisms will be calculated paving way for the production of a rapid detection procedure for Bacterial vaginosis.

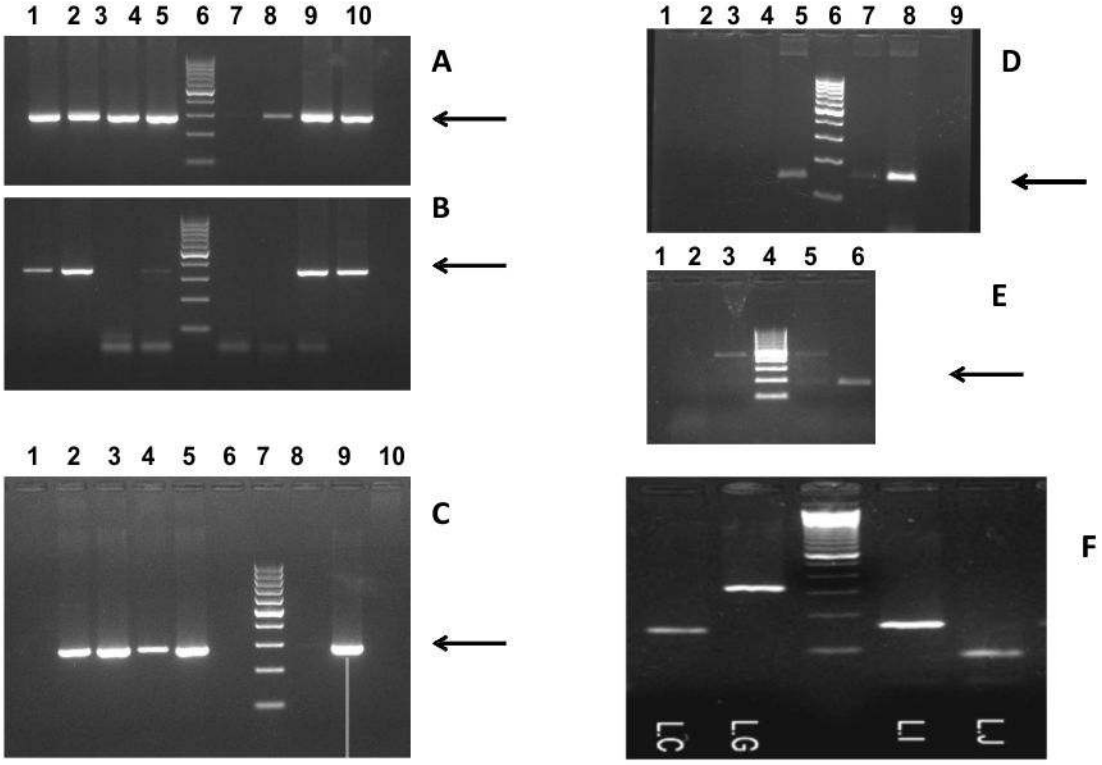
**Table 3.5.1: PCR positive DNA samples for various bacterial spp**

| Total Samples | DNA Samples Isolated | Universal 16sRNA (+) | *G. vaginalis* (+) | *Mycoplasma* (+) | *Prevotella* (+) | *A. vaginae* (+) |
|---|---|---|---|---|---|---|
| **122** | **108** | **100** | **18** | **32** | **79** | **70** |

**Table 3.5.2: Abundance of Lactobacillus spp detected**

| Universal 16sRNA (+) | *Lactobacillus crispatus* | *Lactobacillus iners* | *Lactobacillus jensenii* | *Lactobacillus gasseri* |
|---|---|---|---|---|
| 100 | 85 | 31 | 97 | 55 |

**Figure 3.5.1: PCR amplification of various vaginal organism detected**




A. Lane 1- 4 (Samples); 5 DNA ladder (100 bp); 6 -NTC; 7-9 (Samples). Note 290 bp amplicon indicating presence of Lactobacillus spp, G. vaginalis, *A. vaginae or Mobilincus spp*.

B. Lane 1-4 (Samples); 5 DNA ladder (100 bp); 6 -NTC; 7-9 (Samples). Note 322 bp amplicon indicating presence of G. vaginalis.

C. Lane NTC; 2-6 (Samples); 7 DNA ladder (100 bp); 8-10 (Samples). Note *A. vaginae positive* amplification in lane 9.

D. Lane 1-5 (Samples); 6 DNA ladder (100 bp); 7 -NTC; 8-9 (Samples). Note 150 bp amplicon indicating *Prevotella* in lanes 5 & 8.

E. Lane 1 NTC; 2-3 (samples);46 DNA ladder (100 bp); 5-6 (Samples). Note 167 bp *amplicon* indicating *Mycoplasma spp.* in lane 5, 6.

F. Lane 1-2 and 4-5 (Samples); 3 DNA ladder (100 bp). Species specific *amplification* indicating presence of Lactobacillus crispatus, , *L. gasseri, L. iners and L. jensenii.*

# 4. COMMUNITY HEALTH

## 4.1. ASSESSING PREVALENCE OF HYPERTENSION IN RELATION TO URINARY EXCRETION OF SODIUM AND SERUM CREATININE AND BLOOD UREA IN A TRIBAL DISTRICT OF MADHYA PRADESH

| | | |
|---|---|---|
| **Date of start** | : | October 2012 |
| **Duration** | : | 18 Months |
| **Status** | : | Completed |
| **PI** | : | Dr. Tapas Chakma |
| **Funding** | : | Nutrition Division ICMR |

High blood pressure is a common concern in all developing countries irrespective of their present stage of health transition and both sexes are equally affected in large numbers. A widely spread misconception among the community about the cardiovascular diseases in developing countries is that it only affects the rich persons. However, as the cardiovascular disease epidemic matures, the disease burden shifts from richer and better educated segments of a society to the poorer and less educated individuals. Screening Indian Twin Epidemic (SITE) Study, 2011 by Aventis Pharma in eight states revealed that 25% patients of hypertension were also suffering from kidney complications.

National Nutrition Monitoring Bureau, NIN Hyderabad conducted 2nd tribal repeat survey in 9 states of the country in 2008–09. It revealed that the prevalence of hypertension was 25.3% among men and 23.1% women. Studies carried out by RMRCT, Jabalpur on Baiga tribes shows that hypertension is equally present among the tribals in all 4 districts. However these studies lack information on salt intake, renal function or 24 hour urinary sodium output.

Studies carried out in the recent past have revealed that the prevalence of hypertension is increasing significantly in urban and rural India, while in tribals community based studies on hypertension are very few. Hence the present study was planned to study the prevalence of hypertension and other associated risk factors in population ≥ 20 years among tribals of the Mandla District of Madhya Pradesh. This data will serve as baseline data for future studies and will also help the policy makers in formulating various programmes aimed at prevention of hypertension among tribal population.

## Objectives

- To assess the prevalence of hypertension in a tribal community
- To assess various risk factors of high blood pressure
- To assess the daily salt intake and its association with high blood pressure
- To assess the urinary sodium excretion and its association with high blood pressure

## Methodology

This was a cross sectional study carried out in 3090 sampled individuals from 33 villages of Mandla District and the 12 urban wards. For the purpose of this study subjects were divided in to 3 categories.

1. Tribals exposed to urban life style: These are the people who have been living in the urban area for more than 10 years.
2. Tribals those are migrated to urban areas for a limited period (Occasional exposure): These are the people who only go to urban area in search of employment for a period of 15 days or so but returns to the village within a month.
3. Tribals never exposed to urban lifestyle: These are the people who have never migrated to urban area or never stayed in an urban area for more than a week.

Clearance from Institutional Ethics Committee was obtained before initiation of the study. Informed consent was obtained from all the subjects, who participated in the survey. One day wage loss was given to those who provided 24 hour urine samples.

Demographic and socioeconomic particulars, such as family size, type of dwelling, age, sex, occupation, income and literacy level of all the individuals, household possession of agricultural land etc were collected from all the households selected for the survey. Anthropometric measurements such as height, weight were taken by standard procedure. In addition waist and hip circumference was measured (excluding pregnant women) by a trained investigator applying the standard technique and instruments (SECA digital balance and anthropometric rod). Body Mass Index (BMI), the nutritional status of adult was assessed according to BMI. Waist circumference was measured at the midpoint between the lower rib margin and the prominence of iliac crest by using the measuring tape (excluding pregnant women).

Systolic and diastolic blood pressures were measured in sitting posture using digital sphygmomanometer (OMERON, Singapore). The measurement was done for 3 consecutive reading, with a gap of 3 minutes between measurements and mean BP was recorded. Twenty four hour urine sample was collected for estimation of sodium output. Urine Sodium was estimated using commercially available kit (Accucare, India). 5mL of venous blood was collected for estimation

of serum urea and serum creatinine by using commercially available kit (Enzopak, India) in order to study the renal function.

Univariate analysis was done to find out the prevalence of high blood pressure in various age groups and gender. Cross tabulation was done to study any association between high blood pressure and salt intake or sodium output. Cross tabulation was also done to find out any association of high blood pressure with anthropometric measurements. 't' test was used to test the level of significance. Non parametric test were also applied wherever required.

## Findings

The study was carried out between 2012-14 in 33 selected villages and 12 urban wards of Mandla District. A total of 3090 Individuals of different age groups from 1258 households in 33 villages and 12 urban wards were surveyed (Figure 4.1.1). Ninety eight percent households belonged to Hindu religion and the majority (56.3%) of houses was 'kachha'. More than 25% houses were 'pucca' and 19% houses were 'semi pucca'. Twenty six percent of the population was illiterate, while 26% had primary education, 17% obtained middle and 17% had a high school education. Only 17% households had safe drinking (tap) water and one third households had sanitary latrine and all of them were in the urban tribal group. Sixty two percent households possessed separate kitchen and three fourth of households were electrified. Twenty two percent males and 18% females had high blood pressure. Five percent individuals below 30 years of age (Figure 4.1.2) had high blood pressure (Systolic BP more than 160 or diastolic BP more than 90 mmHg). Overall hypertension among urban tribal groups was more as compared to never exposed and occasional migration group (Figure 4.1.3). Sixty five percent of individuals were using tobacco in the form of chewing. Thirty nine percent of males consumed alcohol regularly. The prevalence of hypertension was significantly higher among tobacco smokers (66%) as compared to non smokers (13%) and among alcoholics (54%) as compared to non alcoholics. The overall prevalence of abdominal obesity according to waist circumference was 8% among males and 19% among females. The prevalence of obesity according to Waist Hip Ratio (WHR) was about 61% among females and 35% among males. Abdominal obesity based on waist to hip ratio and hypertension was found significantly associated in both males and females. The intake of salt was directly related to blood pressure. As the salt intake increases, blood pressure also increases (Figure 4.2.4). About 8% urine samples were found with high value of urinary sodium, there was a positive linear association of urinary sodium with blood pressure. As the blood pressure increases sodium output also increases (Figure 4.1.5). We also observed that more than 80% of the urinary Iodine samples from urban tribes and never exposed group had excessive iodine in the urine (Figure 4.1.6).

**Figure 4.1.1: Age and sex distribution of the study population (>20 Years) N=3090**

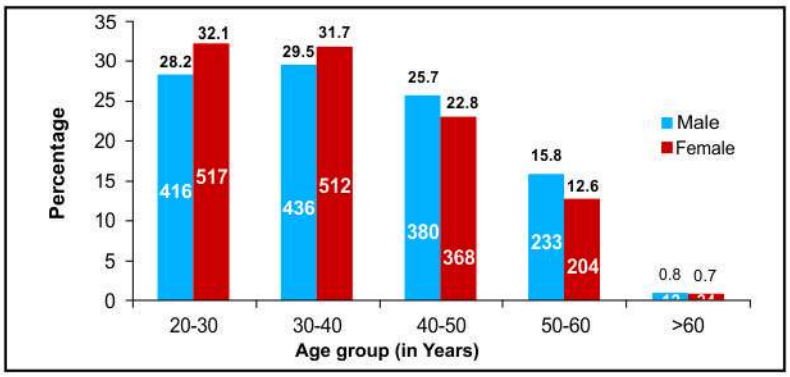



**Figure 4.1.2: Age group wise distribution of systolic and diastolic blood pressure among various tribal groups according to JNC VII criteria**

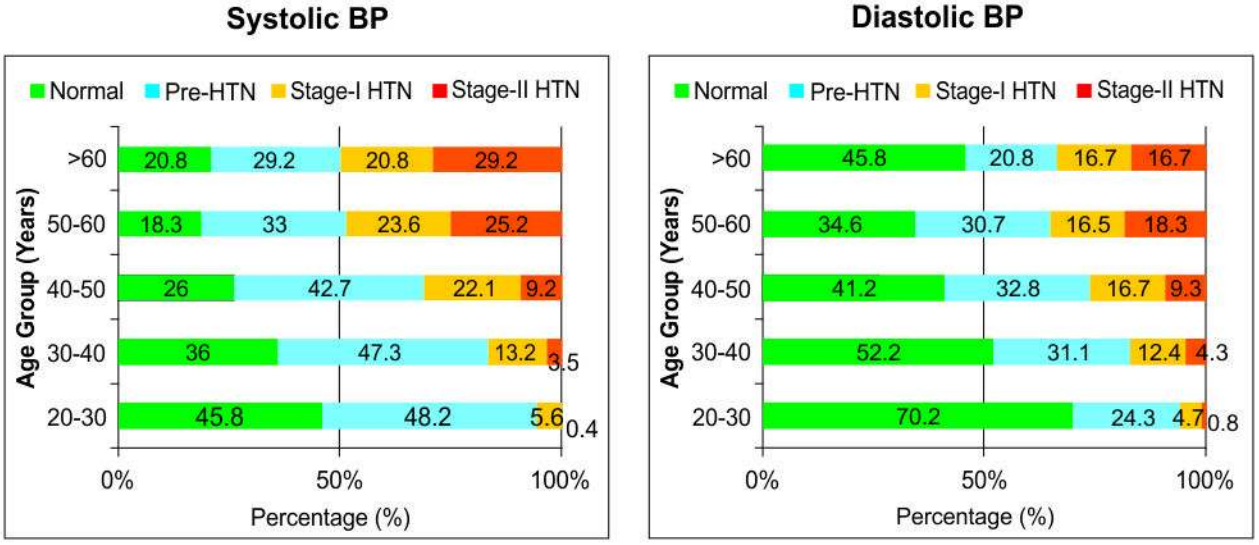



**Figure 4.1.3: Distribution (%) of blood pressure >20 years age among tribes of Mandla according to migration characteristics or life style**

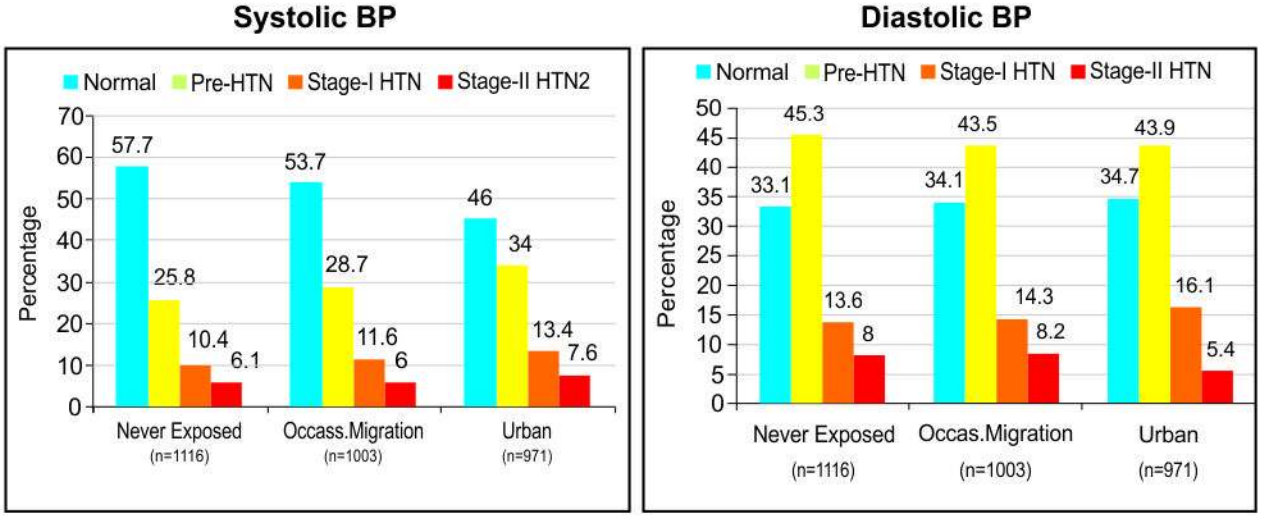
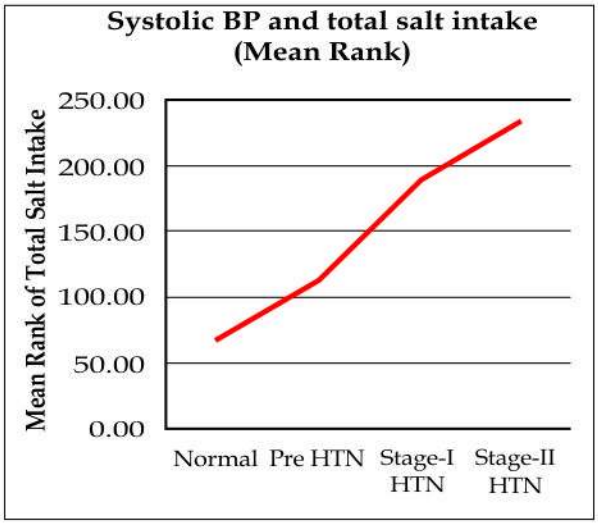
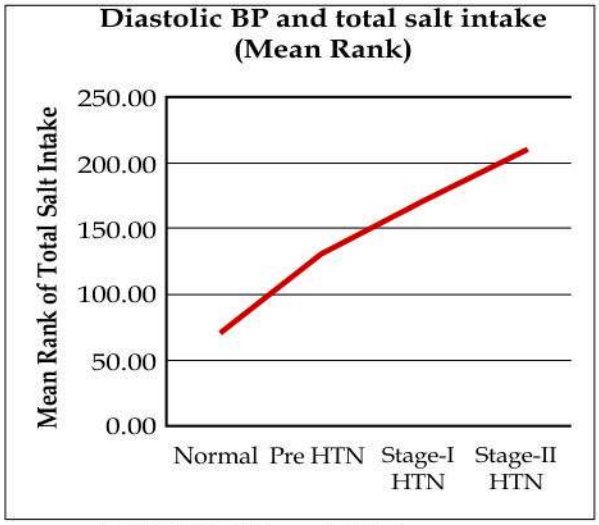


**Figure 4.1.4: Relationship of salt intake and blood pressure (Kruskal-Wallis Test)**

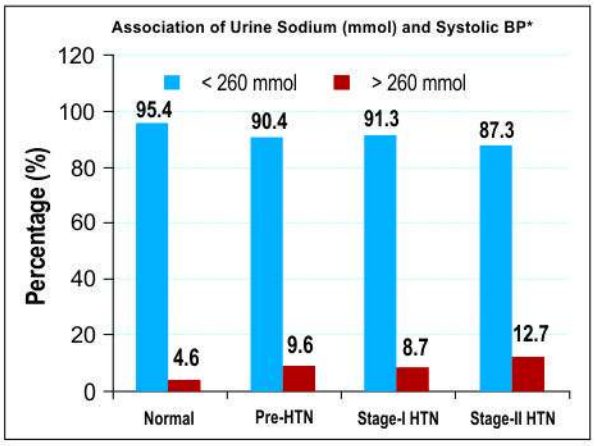


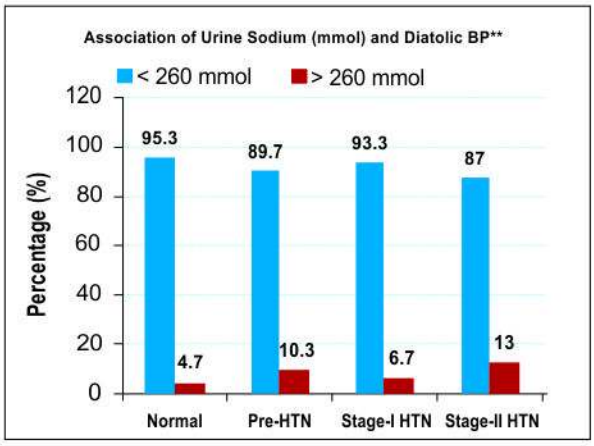

$\chi^2$-1522.5, df-3, p<0.0001




$\chi^2$-1100.05, df-3, p<0.0001

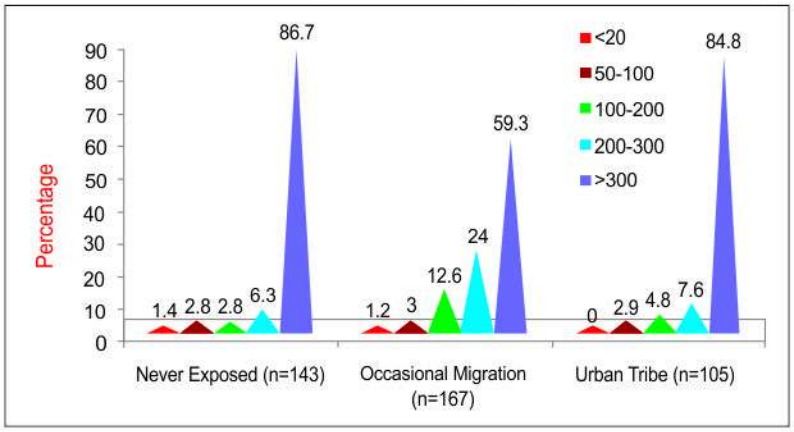
**Figure 4.1.5: Association of 24 hour urinary sodium output and blood pressure (n=412)**




*Extended Mantel-Haenszel chi square for linear trend= 6.81, d.f -1, p <0.01
**Extended Mantel-Haenszel chi square for linear trend= 8.13, d.f -1, p <0.01

**Figure 4.1.6: Distribution (%) of urinary iodine (µg/L) in various tribal groups of Mandla**



To conclude the prevalence of hypertension among adult tribal populations as per JNC VII Criteria was 22% among males and 18% among females. Six percent individuals <30 years age group had high blood pressure. Hypertension was significantly more in smokers and alcoholic than non smokers and non alcoholics. Stage II hypertension was more among the urban tribes and the Migratory tribe as compared to never exposed groups. Blood pressure is directly related to salt intake. As the salt intake increases blood pressure also increases. The present study revealed that prevalence of hypertension was significantly associated with higher BMI, higher waist circumference and WHR and general obesity. There is a positive linear association of urine sodium with blood pressure, as the blood pressure increases sodium output also increases. The majority of the individuals were excreting excessive Iodine in the urine.

Though many risk factors have been found to be associated with high blood pressure a longitudinal study should be carried out to establish the cause effect relationship of these risk factors. An IEC based target oriented intervention should be launched to reduce the various risk factors like smoking, alcohol consumption etc. and salt intake should be reduced.

## 4.2. HEALTH AND NUTRITION SURVEY OF BAIGA PRIMITIVE TRIBE OF DINDORI DISTRICT, MADHYA PRADESH

| | | |
|---|---|---|
| **Date of start** | : | October 2011 |
| **Duration** | : | Two years |
| **Status** | : | Completed |
| **PI** | : | Dr. Surendra Kumar |
| **Funding** | : | Dept. of Tribal Welfare, Govt. of MP |

Baigas are one of the aboriginal tribe and are classified as a particularly vulnerable tribal group of Madhya Pradesh. Baigas of Dindori district reside in hilly areas covered with forest. Their economy is still dependent on primitive agriculture and modern methods of the agriculture have not yet been adopted by them. They are marginal land holders. The earlier studies on this tribe has revealed poor health status and under utilisation of health services.

### Objectives

- To assess the prevalence of various morbidities
- To assess the nutritional status of individuals, in terms of anthropometry and prevalence of clinical signs of nutritional deficiency disorders
- To estimate the prevalence of anemia
- To estimate the prevalence of worm infestation among school going children.

## Methodology

Dindori district is divided into 7 blocks namely Dindori, Shahpura, Mehandwani, Amarpur, Bajag, Karanjia and Samnapur. A cross sectional survey was carried out in 21 randomly selected villages in 7 blocks. Demographic and socioeconomic information were collected from the head of the households by using a pre-coded interview schedule. Clinical examinations were carried out by a medical officer for the presence of nutritional deficiencies and other morbidities. Blood pressure was measured in sitting posture using digital sphygmomanometer. Anthropometric measurements such as height and weight were taken by using digital balance and anthropometry rod by trained investigators. Haemoglobin estimation was done by modified cyanmethaemoglobin method. Rapid Diagnostic Test (RDT) was used to diagnose malaria. Stool samples were collected from school going children for identification of ova and cyst. Data was analyzed using SPSS software.

## Findings

A total of 2319 individuals of different age groups and gender from 540 households were covered for clinical examination and anthropometry. About 667 males and 616 females were covered for estimation of haemoglobin. Also 200 stool samples were collected from the school going children for identification of worm infestation. All the households belonged to Hindu religion and Baiga tribe. It was observed that the majority of households lives in 'kachha' houses (99%) followed by 'semi-pucca' (0.4%) and only 0.6% households lived in 'pucca' houses. Among the study subjects about 28% had completed primary level of education, 10.5% completed secondary level education and only 7% had completed higher level education. About 80% head of households were agriculture labourers, 20% were engaged in other works such as government or private services.

Acute respiratory infection (ARI) was found the most common morbidity (25.7%) among pre-school children, while 8.15% of pre-school children were suffering from scabies followed by other infections like diarrhea/dysentery and other morbid conditions; whereas 49.8% children were found normal at the time of the survey. The percent distribution of nutritional deficiency disorders among pre-school children is given in the table 4.2.1.

The World Health Organization recommended the SD classification to categorize the children into different grades of nutritional status. The percent distribution of pre-school children according to under nutrition, underweight (weight for age) stunting (low height for age) and wasting (low weight for height) are given in table 4.2.2. The prevalence of anaemia was 86% and about one third of pre-school female children had malnutrition. The overall intestinal infestation in children was 49.5%. The study revealed poor utilisation of government health services by these tribe. Improvement in households' food security through public distribution systems, food intakes, socioeconomic condition, literacy of parents and personal hygiene may help in improving the nutritional status of tribal children.

**Table 4.2.1: Distribution of nutritional deficiency disorders among pre-school children (N=314)**

| Nutritional Deficiency | No | Percentages |
|---|---|---|
| Marasmus | 1 | 0.3 |
| Bitots spot | 2 | 0.6 |
| Angular Stomotitis | 4 | 1.2 |
| Goiter | Nil | - |
| Night Blindness | Nil | - |
| Other | 21 | 6.6 |
| NAD* | 286 | 91.0 |
| Total | 314 | 100 |

*Note: NAD=No abnormality detected

**Table 4.2.2: Nutritional status among pre-school children by SD Classification**

| Index | Sex | < -3SD | -3SD to -2SD | -2SD to -1SD | -1SD to Median | More than Median |
|---|---|---|---|---|---|---|
| Weight for age (N=297) | Boys | 28.4 | 29.1 | 31.2 | 6.4 | 5.0 |
| | Girls | 32.1 | 26.3 | 31.3 | 4.5 | 5.8 |
| Height for age (N=297) | Boys | 35.5 | 24.1 | 19.9 | 8.5 | 12.1 |
| | Girls | 36.5 | 15.4 | 29.5 | 7.7 | 10.9 |
| Weight for height (N=275) | Boys | 12.6 | 14.8 | 33.3 | 21.5 | 17.8 |
| | Girls | 12.9 | 11.4 | 27.9 | 36.4 | 11.4 |

**Child with Marasmus**

## 4.3. HEALTH AND NUTRITIONAL STATUS OF SAHARIA TRIBE OF GWALIOR DISTRICT, MADHYA PRADESH

| | | |
|---|---|---|
| **Date of start** | : | June 2012 |
| **Duration** | : | Two years |
| **Status** | : | Completed |
| **PI** | : | Dr. Ravendra K Sharma |
| **Funding** | : | Dept. of Tribal Welfare, Govt. of MP |

The Saharia tribe is the largest particularly vulnerable tribal group (PVTG) among 3 PVTGs of Madhya Pradesh. They are mainly residing in the Chambal division of the state and according to 2011 census, out of 153.16 lakh total tribal population of the state, Saharia contribute about 6.14 lakh (4%). Total tribal population in the Gwalior district was 72,133 as per 2011 census and out of this 9289 (12.9%) belonged to Saharia tribe. Saharia means 'inhabitants of the jungle' (from the Persian word *Sehr*), and most of these people live in small villages called 'sahrana'. Agriculture is the predominant occupation among Sahairas and they are also dependent on the forest for produce and shelter. About 3 months in the summer of the year the tribe travels in search of work. At this time they are more vulnerable to infections and other health hazards. With this background the study was undertaken in the Saharia tribe of Gwalior district.

### Objectives

The main objective of the study was to assess the health and nutrition status of the Saharia tribe of Gwalior district.

### Methodology

A cross sectional survey was carried out in 22 randomly selected Saharia tribe dominated villages. The villages were selected from all 4 blocks of Gwalior district in proportion to the tribal population of respective blocks. From a selected village, 30 households were randomly selected for door-to-door survey. Demographic and socioeconomic particulars were collected by personal interview in a pre-coded proforma. Clinical examinations were carried out by a medical officer for the presence of general morbidities and nutritional deficiencies. Systolic and diastolic blood pressures were measured in sitting position using digital sphygmomanometer of all available adults. All fever cases were subjected for Rapid Diagnostic Test (RDT) kits for both species of malaria using combo HRP-2 and pLHD based test. Stool specimens were collected from school going children in double lid containers and preserved in 10% formaldehyde before the examination. Stool specimens are examined by two methods for the presence of parasite and ova/eggs; direct microscopy of specimen with Saline wet mount and other by Sugar-Flotation Method. Anthropometric measurement such as weight and height were taken by using SECA digital balance and the anthropometric rod by trained investigators. Haemoglobin level was

estimated using modified Cyanmethae-moglobin method.

## Findings

Out of 22 villages selected for the survey, 8 villages were from Barhai-Ghatigaon block, 7 villages from Dabra, 6 villages from Bhitarwar block and one village was selected from Murar block of Gwalior district, Madhya Pradesh. Overall 696 households were covered in the survey comprising 3269 populations with an average family size of 4.7. Among these 1320 individuals (300 children less than 6 years, 332 children aged 6-15 years and 688 adults aged 15+ years) were interviewed and clinically examined for general morbidities and nutritional disorders.

## Household characteristics

All surveyed households belong to Hindu religion and Saharia tribe. All household owned a house (99.4%) and most of these houses comprising only one room (55.3%) or two rooms (36.6%). The most of families were nuclear families (90.9%) and only a few were joint families (9.1%). The majority of houses were 'kaccha' houses (72.6%) followed by 'semi pucca' (17.5%) and 'pucca' (6.6%) houses. Only 3.3% houses had thatched roof/wall. Most of the houses (85.3%) did not have a separate kitchen and were cooking at their place of abode. Hand pumps (84.3%) followed by open well (11.7%) were the main source of drinking water. Nearly all households (97.8%) had no toilet facility in their house and they used open ground for defecation. Little more than half (55.7%) of the households were electrified and the rest (44.3%) were using Kerosene for lighting their houses. Almost all of them were using wood (94.1%) as fuel for cooking food. More than half of the households (53.7%) owned agricultural land and majority of landholdings were less than five acres (89.3%). Availability of any kind of livestock was found in less than half of the household surveyed (42.5%).

## Population Characteristics

The population profile of the studied tribe showed that out of 3269 surveyed population, 52.5% and 47.5% were males and females respectively. Overall sex ratio (907) and child sex ratio in age group (0-6 years) (848) was skewed and relatively much unfavorable to females. Age and sex distribution of the studied population shows that 42% of population belonged to 0-14 years depicting younger age population. Another 53% and 5% belongs to working age group (15-59) and old age population (60 years and above) respectively. Total literacy rate in the population (6+ yeas) was only 41% and majority (91.4%) had studied up to primary level only. Marital status of population aged 15 year or above showed that only 13.2% population was unmarried and 7.2% was formerly married (widow/widower) at the time of survey. Main occupation of the population (15+ years) was cultivation (23.0%), followed by agricultural labour (51.8%) and manual labour (8.79%).

## Fertility and mortality

Information about any death occurred in the household during last one year preceding the date of survey was collected in the survey. Overall, 36 deaths (21 males and 15 females) were reported in the study

population. Out of these deaths, 14 occurred during one year of the birth. Overall, estimated crude death rate (CDR) in study population was 11.0 per 1000 population. Similarly the information on birth occurred during last one year was also collected and estimated crude birth rate (CBR) was 28.1 per 1000 population.

## General morbidities & nutritional disorders

Overall cough (23.1%) was the most common morbidity in Saharia tribe followed by weakness (20.1%), body pain (13.2%), fever (12.3%), and acute respiratory infection (9.4%). Among preschool children (< 6 years) acute respiratory infection (ARI) (18.3%), fever (18.0%), cough (15.3%) and diarrhoea (5.7%) were the main common morbidities. Among school going children (6-15 years), cough (24.1%), fever (11.7%), ARI (9.0%) and diarrhoea (6.0%) were commonly found. Whereas among adults (15+years), weakness (30.5%), cough (26.0%), body pain (23.4%) and joint/knee pain (14%) were commonly observed morbidities. Pallor (18.9%) and malnourishment (PED) (4.2%) were two main nutritional disorders observed among Saharia population. Out of 38 individuals suffering from fever on the day of the survey, 10 were positive for malaria by RDT. Among adults, about 9% and 8% were having higher (stage I or II) systolic and diastolic blood pressure. Relatively more females (11.3%) had stage-I or stage-II systolic blood pressures as compared to males (8.3%).

## Haemoglobin estimation

Out of total 1320 individuals from different age groups interviewed and clinically examined in the study, blood sample could be collected only from 926 individual for haemoglobin estimation. As per WHO recent anaemia classification, about three-fourth children (<15 years) and 57% adults (15+ years old) were suffering from some kind of anemia. About 13% children less than 12 years were suffering from severe anemia. Overall about 8%, 38% and 17% individuals were suffering from severe, moderate and mild anemia respectively. The proportion of severe anemia was higher among females (9.1%) as compared to males (6.4%), however in younger age-groups (< 5 years & 5-11 years) more male children were suffering from anemia than female children.

## Worm infestation among children (6 – 15 years)

Out of 332 children in age group (6-15 years) interviewed during survey, the stool samples could be collected from 188 participants only. The result shows that about half of them (52%) were positive for parasitic infestation/cysts/eggs. The commonly found worm infestations were *Entaeomeba histolytica*, *Ascaris lumbricoides*.

## Anthropometric measurement

Among pre-school children (≤5 years), about 36% children were severely (<-3SD) under weight and 49% were severely stunted as per WHO standard. Overall 13.5 children were severely wasted in study tribal population. The proportion of underweight, stunting and wasting was

severely lower among male children as compared to female children (Figure 4.3.1). Among adults (15+ years) about 43% had chronic energy deficiency (CED) (BMI<18.5), the proportion of CED was about 49% among males and 38% among females. About 12% males and 10% females were suffering from grade-III chronic energy deficiency (Table 4.3.1).

**Figure 4.3.1: Prevalence of severe (<-3SD) under weight, stunting and wasting among pre-school children (≤ 5 years)**

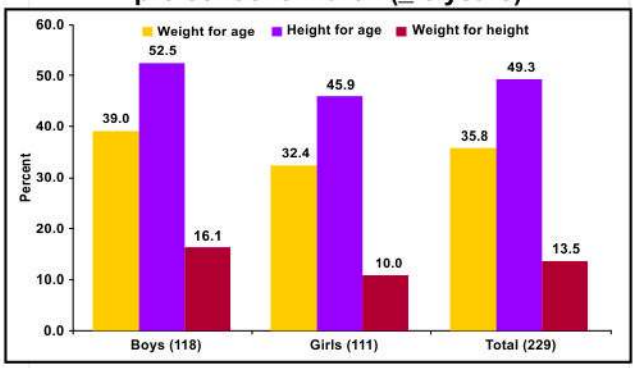



**Table 4.3.1: Distribution of adult males and females according to BMI classification**

| BMI | <16.0 CED III | 16-17 CED II | 17-18.5 CED I | 18.5-20 Low Wt Normal | 20-25 Normal | 25-30 pre-obese | >=30 Obese | N |
|---|---|---|---|---|---|---|---|---|
| Males | 11.7 | 13.2 | 24.2 | 21.7 | 23.1 | 5.7 | 0.4 | 281 |
| Females | 9.7 | 6.9 | 21.1 | 23.4 | 32.3 | 6.1 | 0.5 | 393 |
| Total | 10.5 | 9.6 | 22.4 | 22.7 | 28.5 | 5.9 | 0.4 | 674 |

## 4.4. ANNUAL HEALTH SURVEY-CAB COMPONENT

**Date of start** : January 2014
**Duration** : One year
**Status** : Ongoing
**PI** : Dr. Tapas Chakma
**Funding** : RGI Office, GOI through NIHFW

Annual Health Survey is a compre-hensive survey designed to provide district specific data on some important health, demographic and nutritional indicators in 9 states of India. The study has been designed by Office of the Registrar General of India (ORGI), Government of India. The centre is participating as nodal centre for Madhya Pradesh. The centre is also involved in the training and monitoring of the field survey agencies identified by ORGI. In addition centre is also assigned to estimate the hemoglobin from the dry blood samples collected by the field survey agencies.

### Objectives

Designed to provide district specific information on the magnitude of under and over nutrition, micronutrient deficiencies, hypertension and diabetes in all the districts in the 9 states.

### Findings

Till March 6 batches of supervisors (about 90) and field staff have been trained. Apart from the field staff 5 state junior consultants and one senior consultants of the Directorate of census operation, Madhya Pradesh were also trained. Hemoglobin estimation of about 14670 has been done.

# 5. SOCIAL AND BEHAVIOURAL STUDIES

## 5.1. REACHING PRIMITIVE TRIBAL GROUP WITH IEC TO IMPROVE AWARENESS TO MALARIA: APPRAISAL OF BAIGAS OF BAIGACHAK AREA OF DINDORI DISTRICT OF MADHYA PRADESH

| | | |
|---|---|---|
| **Date of start** | : | April 2011 |
| **Duration** | : | Four years |
| **Status** | : | Ongoing |
| **PI** | : | Dr. K B Saha |
| **Funding** | : | Govt. of MP under special assistance from Ministry of Tribal Affairs, Govt. of India |

The prevalence of malaria is likely to be higher in tribal areas than in other areas/population. Traditional beliefs and practices in tribal area, their traditions, inaccessibility to health posts and their backwardness both educationally and economically risk their life to malarial infection. The condition is more precarious among the primitive tribal groups. There is a need to educate these people to protect many lives from the deadly effects of malaria. The present study is an attempt in this direction.

### Objective

To establish ground communication mechanism for prevention of malaria in Baiga dominated villages in Baigachak area of Dindori district of MP by using local school going children.

### Methodology

IEC strategy is developed by using different tools of communication incorporating local folk traditions. The strategy was implemented by using local school going students of standard VIII to XII and unemployed youths as agent of change. These agents of change were trained by organizing 36 sensitization workshops on different themes for 84 days and are organized in 12 contact locations in the three study blocks in collaboration with a Kolkata based non-governmental cultural organization i-Land Informatics Ltd (Bangla Natak Dot Com). The effect of the IEC was evaluated by undertaking baseline survey and a re-evaluation survey within four months of the implementation of the IEC strategy by adopting a before and after with control design. During the period we have collected qualitative information by adopting different techniques of Participatory Rural Appraisal Methods organizing focus group discussions (FGDs) and also matrix ranking techniques in few study villages. During the period we have also initiated the endline quantitative survey.

### Findings

For both baseline survey and resurvey after four months a sample size of 2350

households were covered each time. The baseline survey reveals that little more than 50% of the studied population was aware of malaria and even among this group there existed misconception regarding transmission of the infection and treatment seeking. Non Baiga population were better aware of malaria (59%) compared to Baigas (49%). It is observed that IEC intervention could improve the level of awareness to malaria significantly among intervention group compared to controls with net intervention effect of 22%. Further those who were aware of malaria there exist wrong perception on the transmission mechanism of malaria such as malarial infection may spread by contact with malaria infected individuals, drinking dirty water, stagnation of dirty water or by black magic. IEC intervention could significantly reduce their misconception on the breeding place of mosquitoes. The intervention also leads to improvement in the source of treatment preference for malaria from government health facilities, malaria workers/ASHA and local private doctors. Further IEC intervention could improve significantly the utilization of treatment services from government health facilities. During the period the regular IEC activities were in progress in all the study villages.

Ten FGDs were also organized in 6 villages and the results revealed that misconceptions on the transmission of malaria have removed to a great extent in the study area. The residents learn the symptoms of malaria and believed that it is not transmitted by black magic but by mosquito bite and mosquitoes breed in stagnant water and transmit the disease mostly after rains. There is also preference for government health services for treatment seeking. The best preventive measure expressed against malaria was the use of bed nets during sleeping and not to allow water to stagnate for long. These interpretations of FGDs were supported by the findings of three matrix ranking technique organized in two villages to assess the perception on transmission mechanism of malaria, perception on its diagnosis and utilization of health services for fever during last one year. The matrix ranking reveals that 96% of the participants felt that malaria is transmitted by infected mosquito bite (Figure 5.1.1). Further 94% of the participants believe that malaria could be diagnosed by blood test (Figure 5.1.2). The health utilization of government health facilities, ASHA/malaria workers and trained doctors in private clinics has also improved while there is a reduction in the preference for services of traditional healers (Figure 5.1.3). The above results indicate the effectiveness of the IEC strategies implemented. At the same time some participants during FGDs expressed grievances / concern that bed nets are not uniformly distributed, they fear side effects of Insecticide Treated Bed Nets, feel spraying is ineffective and government health workers neglect their villages. They also complained that it is the older people in the villages who spread the misconception on malaria and other diseases.

Fig 5.1.1: Perception on transmission of malaria (N=99)

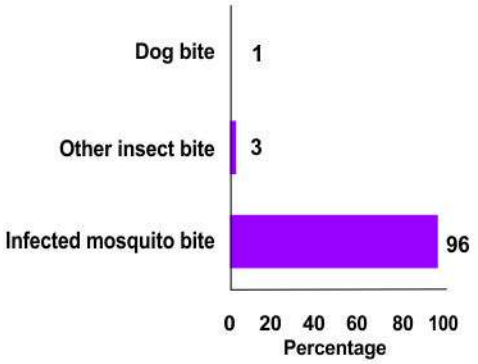



Fig 5.1.2: Perception on diagnosis of malaria (N=99)

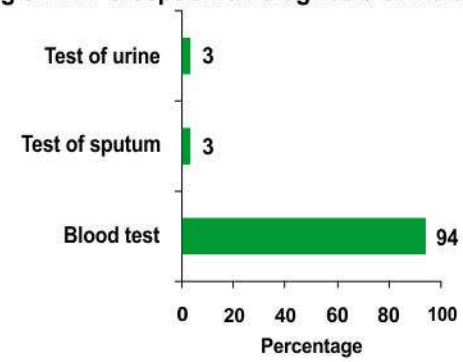
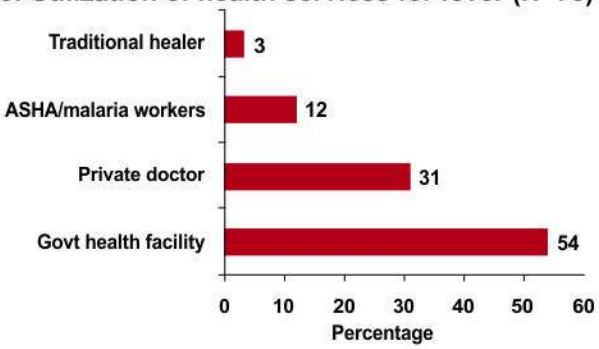



Figure 5.1.3: Utilization of health services for fever (N=78)




## Matrix Ranking

## Focus Group Discussions

## 5.2. IMPACT ASSESSMENT OF AN INTERVENTION PACKAGE TO IMPROVE MATERNAL AND CHILD HEALTH SERVICES AMONG PRIMITIVE BAIGA TRIBE OF DINDORI DISTRICT IN MADHYA PRADESH

| | | |
|---|---|---|
| **Date of start** | : | May 2013 |
| **Duration** | : | Three years |
| **Status** | : | Ongoing |
| **PI** | : | Dr. Dinesh Kumar |
| **Funding** | : | RHN Division ICMR |

Improving maternal health is one of the eight Millennium Development Goals (MDGs). It is widely accepted that the use of maternal health services helps in reducing maternal morbidity and mortality. The maternal health care services that a mother receives during pregnancy and at the time of delivery are important for the well-being of the mother and her child. As particularly vulnerable tribes have poor socioeconomic status, and poor understanding of illness, health care practices and safe child birth, often child births occur at home and are assisted by medically untrained persons leading to maternal morbidity and mortality. The findings of baseline data showed that the tribes have low awareness and result in under utilization of maternal and child health care services. It is well known fact that improved awareness will increase the utilization of any health care services. It could be increase utilization of maternal health care services also.

### Objectives

- To provide intervention for improving the utilization of maternal and child health care services.
- To generate the awareness for proper pregnancy care and promote institutional delivery
- To determine the level of utilization of maternal and child health care services and its benefits.

### Methodology

The study is being carried out in Baiga tribe in Dindori District for implementing Information, Education and Communication (IEC) intervention for creating awareness among women in 12 intervention villages (study group) with the support of Block Medical Officer, Health worker, Anganwadi worker, ANM, ASHA, etc. The research design is a case control study with the sample of 500 women. The study has planned to complete in two phases. Phase-I is the implementation of IEC in intervention villages (12) and Phase-II is the impact evaluation survey of both study and control villages (24) which are equally designed. The IEC materials were developed for mass communication such as banners containing different messages about registration for ANC, regular ANC checkups, promoting intuitional deliveries, postnatal checkups and child immunization. Pamphlets used contain 11 point messages on the importance of maternal and child health services. In addition, slogans on these issues were also used on walls to educate the community. The group discussion and interpersonal

communication was also conducted among women.

## Findings

### Phase-I: Imparting IEC Intervention

The implementation of IEC inter-vention is for creating awareness among women in the reproductive age group of the intervention group with the support of Block Medical Officer, Health worker, Anganwadi worker, ANM, ASHA, etc. The following IEC activities/events were done in intervention villages.

**Village level Committee formulated:** The Village Level Committees was formulated in all study villages consisting of ASHA, Anganwadi worker, Dai, one Baiga women and one person from our study team. The aim of this committee was to create awareness among women in study villages as a volunteer. Training was imparted to these committee members. So far we have formed 12 committees, one from each village. This committee will work as a link between the study team, health system and the community.

**Health Education Camp Conducted:** The study team met with local community members and village level committees to explain the purpose of the study and to identify participants, time and place of the group discussion in one day advance for conducting health education camps. It was organized in each village, assembling at pre-decided place (Anganwadi/ community meeting place). This was a lecture mode training to give explanation about maternal health care services such as: utilization of PHC/CHC services, regular antenatal check-up, immunization and motivation for institutional deliveries. So far a total of 36 camps, three camps in each village were conducted.

**Slogans written on the walls:** For spreading the messages on maternal and child health care about 24 slogans were written on the walls of each intervention village. All these slogans were developed by the study team with the help of existing IEC materials developed by NRHM. The women who are able to read are requested to read and convey the message to others. A common place like Anganwadi center, ASHA's residence, entry road to village, Village Dai residences, community meeting place, etc, were selected for writing slogans. So far it has been written in 290 places.

**Banners Displayed in Villages:** Similar to the slogans writing, banners were also displayed in common places where people met frequently such as community meeting, Anganwadi center, etc. The prime messages were (Get registration immediately after confirmation of pregnancy, Four antenatal checkup is compulsory for pregnant women, Ensure Hospital delivery, Ensure health checkup of both mother and child within 42 days after delivery and Ensure child immunization on time). So far, five types of banners have been displayed in 75 common places.

**Pamphlets Pasted & Distributed:** We distributed pamphlets to ever married women who are able to read. Also pamphlets are pasted on their houses to remind them. Additional pamphlets were also pasted in local markets, nearest PHCs, Sub-centers, etc. So far 960 pamphlets were distributed / pasted in all the intervention villages.

**Group Discussions:** All group discussions were conducted in Anganwadi center where the tribal groups predominantly reside. Three group discussions in each village were conducted among women during the IEC implementation. So far 36 group discussions in three rounds have been completed in all 12 intervention villages. In the first round 206 women participated in the group discussions and subsequent rounds participants numbers increased to 242 and 253. This is an interesting result from this study, indicating women are willing to participate, accepting our interventions strategy.

**Interpersonal Discussion:** We selected women who are currently pregnant, recently delivered (previous 12 months) women for personal discussion. In the first round of IEC we discussed with 60 women on an average 5 women per village. Subsequently, the coverage was increased to 80 women and 84 women in the second and third rounds. Implementation of IEC is now completed.

**Phase-II:** Initiated Impact Evaluation Survey: Initiated impact evaluation survey in both study and control villages (24 villages). The study is in progress.

Announcement of IEC intervention program

Slogan writing

Creating awareness through discussion

Committee formation

Banner display

Creating awareness through lecture

# 6. NEW INITIATIVES

## 6.1. TRIBAL HEALTH RESEARCH UNIT

| | | |
|---|---|---|
| **Date of start** | : | September 2013 |
| **Duration** | : | Five years |
| **Status** | : | Ongoing |
| **PI** | : | Dr. Neeru Singh |
| **Funding** | : | TSP ICMR |

The Tribal Health Research Forum (THRF) is a flagship programme of ICMR which was established on the August 2010 with an aim to address and provide holistic solutions to alleviate all the health issues pertaining to the tribal population of the country. The prestigious forum is headed by Dr. V. M. Katoch, Secretary DHR & DG ICMR as Chairman and Lt. Gen (Dr.) D. Raghunath as advisor. The detailed activities and thrust area of this flagship programme is available at the RMRCT website on (http://www.rmrct.org/ICMR_forum%20Tr...Health/index_THRF_new.htm).

- Sixteen centres/institutes of ICMR are participating under this flagship programme to reduce the health burden of tribal communities in the country.
- Six new Tribal Health Research Units (THRU) were established in different ICMR institutes/ centres such as RMRCT Jabalpur, RMRC Bhubaneswar, RMRC Port Blair, RMRC Dibrugarh, NIN Hyderabad, and NIIH Mumbai.
- At RMRCT, THRU was established on September, 2013 and it acts as a nodal unit/ coordinating the THRF activities across 16 partner ICMR institutes.

### Objectives

The overall objective is to carry out research and documentation based on primary and secondary data to improve tribal health.

### Activities under THRU

Initiation of a new study on the association of haemoglobinopathies and malaria in tribal forested district Jagdalpur.

The field clinic was established at the Government Maharani Medical College and Hospital, Jagdalpur (Figure 6.1.1) for screening haemoglobinopathies and malaria.

**Figure 6.1.1: RMRCT field clinic at Government Maharani Medical College & Hospital, Jagdalpur, Chhattisgarh**


RMRCT team working at Maharani Medical College & Hospital, Jagdalpur

Collecting blood sample and patient information

Processing of blood samples at the field clinic

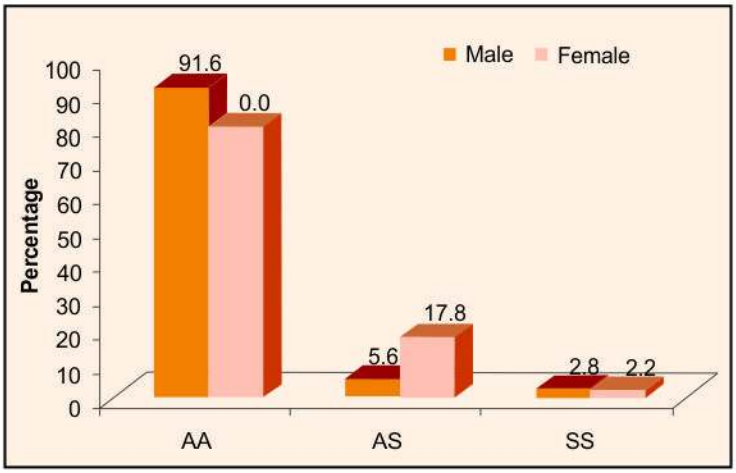
View of Microscopy at the clinic

Electrophoresis machine with accessories

Blood sample preparation for Electrophoresis

A total of 373 (male=143, female=230) individuals were screened for sickle cell disease till 31st March 2014. Amongst them 84.5% showed normal haemoglobin pattern, 13.1% sickle cell trait and 2.4% were found to be sickle cell disease. The rate of sickle cell disease was nearly similar in both males and females (2.8% and 2.2%). However, the rate of sickle cell trait was significantly higher among females than males (17.8% vs 5.6%, $p<0.01$). The numbers of female subjects were high because majority of the patients had been referred from gynaecology department (Figure 6.1.2).

**Figure 6.1.2: Distribution of sickle cell trait (AS) and sickle cell disease (SS) by sex**



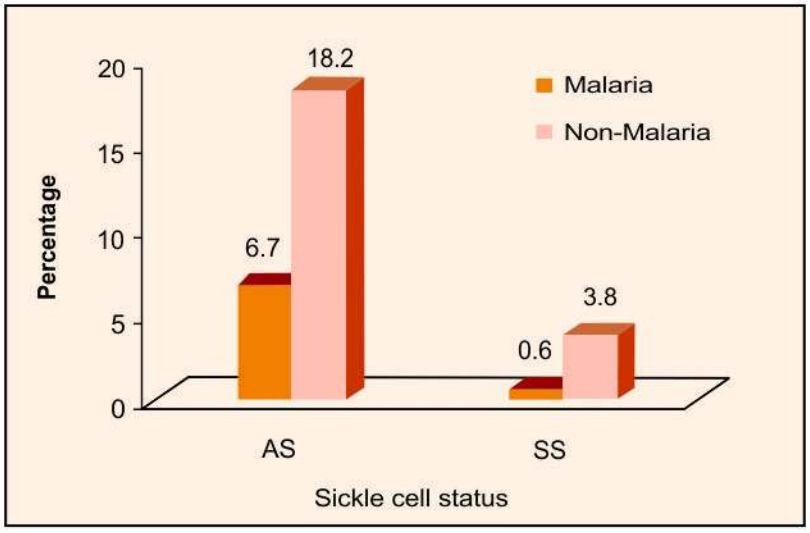
Out of total 373 patients, 44% were found malaria positive. Of this 86.6% was *P.falciparum* and 13.4% was *P.vivax*. Among malaria positive patients 6.7% and 0.6% were found to be sickle cell trait and sickle cell disease respectively. The corresponding rates for sickle cell trait and sickle cell disease among non-malaria patients (209) were 18.2% and 3.8%. It was observed that the proportion of sickle cell trait was significantly lower among malaria patients than non-malaria patients ($p<0.01$). The relationship between malaria and sickle cell trait is presented in figure 6.1.3.

**Prepared document on distribution of tribal population in India**

Tribal Health Research Unit of RMRCT, Jabalpur has prepared a document on "An overview of tribal population in India" based on secondary data and it has been published as a Special Issue of the Tribal Health Bulletin, Volume 20, January 2014.

As member of expert committee on tribal we are assisting the health ministry in preparation of new programme to address the health issues of tribals as part of the National Health Mission.

**Figure 6.1.3: Relationship between malaria and sickle cell**



# 7. REGULAR ACTIVITIES

## 7.1. TRIBAL HEALTH RESEARCH FORUM

ICMR initiated Tribal Health Research Forum (THRF) with the mandate to address and discuss health issues pertaining to indigenous people and to improve the health and socioeconomic conditions. The forum was established on 9th August 2010, the International Day of the World's Indigenous People. The Director, RMRCT is the Coordinator of this forum. THRF has been constantly working on achieving its target. Meetings are held every three months to review the progress in defined areas of importance. The priority


Third annual meeting of Tribal Health Research Forum Meeting at DMRC, Jodhpur

research areas of the forum are: Non-communicable diseases such as Hypertension, Cancer, Diabetes, Nutritional Disorders, Fluorosis, Hemo-globinopathies like Sickle Cell Disorders, G6pd Deficiency, Thalassemia; Vector Borne Diseases such as Dengue, Malaria, Lymphatic Filariasis, Chikungunya; and communicable diseases like Tuberculosis, Cholera, Viral Hepatitis. THRF has been instrumental in initiating and funding multi-centric studies on newborn screening and pre-natal diagnosis for various hemoglobinopathies, study of hyper-tension in relation to urinary sodium output, IEC intervention to improve KAP related to tuberculosis and its impact on risk factors and TB disease burden amongst Saharia - a primitive tribe of Madhya Pradesh etc.

## 7.2. SICKLE CELL CLINIC

The centre offers facilities for routine diagnosis of haemoglobinopathies to the patients of the NSCB Medical College, Jabalpur and other public sector hospitals of the area. The public sector hospitals of the area lack facilities for such investigations. Forty nine sickle cell disease patients were registered in the sickle cell clinic (operated in collaboration with the NSCB Medical College, Jabalpur) during April 2013 to March 2014. These patients belong to various districts such as Balaghat, Damoh, Dindori, Jabalpur, Katni, Mandla, Narsinghpur, Seoni and Singrauli. Symptomatic treatment was given to these patients.

Doctor examining patient at Sickle Cell Clinic

## 7.3. STATE REFERENCE LABORATORY (SRL) FOR HIV

A total of 59 ICTC's and 29 blood banks are linked to the State Reference Laboratory (HIV). Two workshops were held for proficiency testing whereby panel obtained from NRL was aliquoted and distributed to the ICTC's and Blood Banks. The laboratory is pursuing discordant samples and takes action on it. This activity is under the National AIDS Control Program.

HIV Testing in SRL

## 7.4. INTEGRATED COUNSELING AND TESTING CENTRE (ICTC)

Integrated Counseling and Testing Centre at RMRCT is providing counseling and testing for HIV under NACO. In the ICTC, total of 2439 individuals were tested for HIV, of which 169 (7%) were positive for HIV antibodies.

Counseling

## 7.5. INTERMEDIATE REFERENCE LABORATORY (IRL) FOR TUBERCULOSIS

Being an Intermediate Reference Laboratory for TB samples from districts is received for follow up culture. The laboratory is presently linked to 14 districts of the state. Prompt reports are provided and trainings and EQA are taken up as desired by program. This year the laboratory processed 544 follow up specimens. The laboratory has recently acquired Gene Xpert machine from RNTCP and is now providing sensitivity testing by CBNAAT technology as well to 6 districts.

TB Culture Laboratory

## 7.6. NATIONAL NUTRITION MONITORING BUREAU, MP UNIT

In the year 2013-2014 NNMB continued the project titled “Assessment of diet and nutritional status of urban population and the prevalence of determinants of hypertension, diabetes and dyslipidemia among adults in NNMB states”. The objective is to assess diet and nutritional status of urban population, prevalence and determinants of obesity, hypertension, Type–2 diabetes mellitus and dyslipidemia among adults more than 18 years of age.

During the year 2013-2014, two wards in Bhopal city, 15 wards in Dewas city and 06 wards in Jabalpur city have been covered. From these wards about 1104 households were covered for clinical, anthropometry and diet survey. About 1966 blood samples were collected for blood sugar examination and 859 blood samples for lipid profiles examination. Bioelectrical Impedance Analysis (BIA) was done among 900 targeted households.

## 7.7. EVALUATION OF RAPID DIAGNOSTIC TESTS KITS (RDT)

The malaria laboratory is the diagnostic testing lab (F.No. 29/Misc/ 4/2013-DC (53) dated 25/2/2014) prior to issue import and manufacturing license as per the directions of Central Drugs Standard Control Organisation, Food and Drugs Administration (CDSCO), New Delhi.

## 7.8. LIBRARY

The library continues acts as a source of documentation and information to needs of the scientists, staff and students of the centre as well as other institutes like NSCB Medical College, Veterinary College, Home Science College, Rani Durgavati Vishwavidyalaya etc. It also extends services to research personnel from other Universities/Institutes. Library is equipped with modern furniture, air-conditioners, compactors and display racks for display of latest arrivals, i.e. books and periodicals for its readers. Library is a member of consortium of the National Medical Library, New Delhi (J-Gate@ERMED). The objective of this e-resource is to provide/retrieve full text of online articles and conduct specific searches relevant to the user from multiple publishers. Library is also a member of E-J Server provided by Total IT Solutions, New Delhi which has access to 595 E-Journals, 313 E-Books. 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. Besides above facilities, Library also provides information regarding various links as below for free

| New additions | (from 01/04/2013 to 31/03/2014 |
|---|---|
| Books / Journals | 81 |
| Subscribed Periodicals<br>1. International Periodicals<br>2. Indian Periodicals | <br>44<br>22 |
| **Total Library Collection** | 4195 |
| Books | 1378 |
| WHO Publications | 762 |
| Bound Foreign Journals | 1266 |
| Bound Indian Journals | 789 |
| MEDLINE CDs | 21 |
| Census + Other CDs | 07 |
| Census Floppies | 60 |
| CDs on Other Subjects | 69 |
| Member of Following Consortia - | |
| ICMR Consortia & Subscribed - E Journals | 21 |
| www.nmlermed.in | 1516 |
| Total IT E_J_Server | E_Journals = 595 |
| Total IT E_J_S erver | E_Books = 313 |
| Total IT E_J_Server | Databases = 20 |

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

| Providers | No. of E-Journals |
|---|---|
| Directory of Open Access Journals<br>http://www.doaj.org/doaj?func=home&uiLanguage=en | **9897** journals<br>**5579** journals searchable at article level<br>**1514971** articles listed |
| BioMed Central's Open Access Journals<br>http://www.biomedcentral.com/content | **1053** total open access journals listed<br>**144350** articles listed |
| Free Medical Journals<br>http://www.freemedicaljournals.com/index.htm | **4007** Journals |
| Bentham Science Publishers<br>http://www.benthamscience.com/open/a-z.htm#A | **250** Journals |

Glimpse of Library reading rooms

## 7.9. HUMAN RESOURCE DEVELOPMENT

The centre and its scientists are recognised by the Rani Durgavati Vishwavidyalaya, Jabalpur for guiding Postgraduate dissertation work and also research work leading to the Ph.D. degree. During the period 11 students from various universities/institutes completed their M.Sc. dissertation under the guidance of the scientists of the centre. Eight students are pursuing their doctoral work in the centre. Trainings and workshops were also conducted on various aspects of health and morbidity.

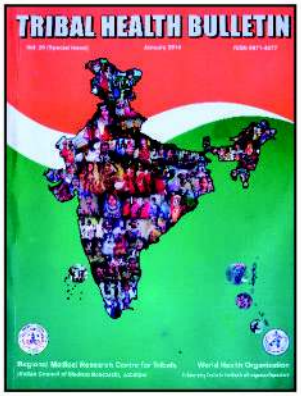
## 7.10. RMRCT PUBLICATIONS

### Tribal Health Bulletin

The centre publishes a biannual and bi-lingual publication 'Tribal Health Bulletin', carrying peer reviewed articles in the area of tribal health. This year Vol.20 Special Issue and Vol 21: Issue No. 1 was published.

## 7.11. EVALUATION OF PROPOSALS AND REPORTS

The scientists of the centre had reviewed


online research proposals and reports of undergraduate students (MBBS/BDS) under the ICMR's Short Term Studentship.

## 7.12. REVIEW OF MANUSCRIPTS FOR SCIENTIFIC JOURNALS

The scientists of the centre are members of the review board of various national and international peer reviewed journals, viz. PloS One, Malaria Journal, WHO Bulletin, Journal of Parasitology, Lancet, Journal of Infectious Diseases, Climacteric, Indian Journal of Medical Research, Current Science, Indian Journal of Medical Sciences, Rural and Remote Health, etc.,

# 8. PUBLICATIONS OF RESEARCH PAPERS IN JOURNALS

## PAPERS IN INDEXED JOURNALS

1. Barde PV, Kori BK, Shukla MK, Bharti PK, Chand G, Gageshkumar N . Ukey MJ, Ali N, Singh N. Maiden outbreaks of dengue virus 1 genotype III in rural central India. Epidemiol Infect. 2014; 1-7. **IF=2.491**
2. Barde PV, Shukla MK, Pathak R, Bharti PK. Circulation of Hepatitis A genotype IIIA virus in pediatric patients in tertiary care hospital in central India. Indian J Med Res. 2014; 139(6): 940-4. **IF=1.661**
3. Bhat J, Rao VG, Yadav R, Gupta V, Tiwari G, Karforma C, Luke C. Situation of drug resistant tuberculosis in indigenous people with high prevalence of Tuberculosis in Madhya Pradesh, India. Int J Tuberc Lung Dis. 2013; 17(12): 2:S1–S564. **IF=2.756**
4. Bhat J, Rao VG, Muniyandi M, Yadav R, Karforma C, Luke C. Impact of sputum quality and quantity on smear and culture positivity: findings from a tuberculosis prevalence study in central India. Trans R Soc Trop Med Hyg. 2014; 108 (1):55-6. **IF=1.931**
5. Chand G, Barde PV, Singh N. Emergence of new foci of filariasis in Madhya Pradesh, India. Trans R Soc Trop Med Hyg. 2013; 107:462-464. **IF=1.9**
6. Jain V, Agrawal A, Singh N. Malaria in a tertiary health care facility of Central India with special reference to severe vivax: Implications for malaria control. Pathog Glob Health. 2013;107(6):299-304. **IF=0.841**
7. Kang G, Desai R, Arora R, Chitamabar S, Naik TN, Krishnan T, Deshpande J, Gupte MD, Venkatasubramaniam S, Gentsch JR, Parashar UD. Indian Rotavirus Strain Surveillance Network, Mathew A, Anita Sr, Ramani S, Sowmynarayanan TV, Moses PD, Agarwal I, Simon A, Bose A, Arora R, Chhabra P, Fadnis P, Bhatt J, Shetty SJ, Saxena VK, Mathur M, Jadhav A, Roy S, Mukherjee A, Singh NB. Diversity of circulating rotavirus strains in children hospitalized with diarrhea in India, 2005-2009. Vaccine. 2013; 12; 31(27):2879-83. **IF=4.21**
8. Kumar A, Sahu SK, Mohanty S, Chakrabarti S, Maji S, Reddy RR, Jha AK, Goswami C, Kundu CN, Rajasubramaniam S, Verma SC, Choudhuri T. Kaposi Sarcoma Herpes Virus latency associated Nuclear Anitigen protein release the G2/M cell cycle blocks by modulating ATM/ATR mediated checkpoint pathway. PLoS One. 2014; 27; 9(6): e100228. **IF=3.534**
9. Rao VG, Bhat J, Yadav R, Muniyandi M, Bhondeley MK, Sharada MA, Chadha VK, Wares DF. Tobacco smoking: a major risk factor for pulmonary tuberculosis –evidence from a cross-sectional study in central

India Trans R Soc Trop Med Hyg. 2014; 82: 1-8. **IF=1.931**

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# 9. CONFERENCE/WORKSHOP/MEETINGS

## Workshops / Symposium / Training / Meeting / Camps Attended

**Dr. Neeru Singh, Director**

- Attended Tribal Health Research Forum Quarterly Meeting on 15th April 2013 at VCRC Puducherry
- Attended 55th CCM Meeting on 30th April, 2013 at New Delhi.
- Attended Brainstorming Meeting under Vector Science Forum on 1st May 2013 at ICMR, New Delhi.
- Attended Malaria Group Meeting on 3rd May 2013 at NIMR, New Delhi.
- Attended Expert Group Meeting on "Insecticides" on 8th May 2013 at NIMR, New Delhi.
- Attended Task Force Meeting to review protocols received under Task Force on Insecticide Resistance Monitoring in different disease vectors on 10th May 2013 at NIMR, New Delhi.
- Attended "Second Malaria RTAG Meeting" as Temporary Adivser to the Regional Director to be held during 14-16th May 2013 at New Delhi.
- Attended the national consultation on the Developmental Challenges specific to Particularly Vulnerable Tribal Groups (PVTGs) in collaboration with the Ministry of Tribal Affairs, Govt. of India, and the NIRD, Hyderabad, in the Planning Commission on 15th May 2013 in the Planning Commission, New Delhi.
- Delivered a lecture/presentation on topic entitled, "Health Research in Tribal Communities: key findings and policies implications" on 17th May 2013 at New Delhi.
- Attended Task Force on "Biology and bionomics of malaria and dengue/ chikungunya vectors" has been initiated under Vector Science Forum on 20th May 2013 at ICMR, New Delhi.
- Attended Tribal workshop on consultation with State & (Tribal) District Level Officers regarding – Tribal Health Strategy, during 30-31st May 2013 at NRHM Bhopal.
- Attended third Iron and Malaria Research Review Committee (RRC) meeting during 13-14th June 2013 at Rockville, Maryland, USA.
- Delivered a lecture and discussion on Indo-Canada collaborative project during 15-18th June 2013 at University of Toronto, Canada.
- Attended Meeting with Commissioner, Directorate of Health Services and State Programme Officer on 26th July 2013 Raipur
- Attended Vector Science Forum Meeting on 24th July 2013 at ICMR, New Delhi.

- Attended 4th Annual Meeting of THRF during 8-11th Aug 2013 at DMRC, Jodhpur.
- Attended meeting regarding "Regulatory check for issuing commercial licence of Malaria Rapid Diagnostic Tests" during 9-11th September 2013 at Central Drugs Standard Control Organization, Food & Drugs Administrative Bhawan, Kotla Road, New Delhi.
- Attended meeting on "Priority areas of research for Malaria, Leishmaniasis, Filarisis, Dengue, Chikungunya and Japenese encephalitis under Vector Borne Disease Science Forum held during 08th-10th October, 2013 at ICMR, New Delhi.
- Attended meetings under World Health Organization (WHO) Global Technical Strategy (GTS) for Malaria Control and Elimination 2016-2025 Country Typology meeting during 14–15th October 2013 at Geneva, Switzerland.
- Attended Roll Back Malaria Partnership Work Plan (PWP) Dialogue meeting on 16th October, 2013 at Geneva, Switzerland.
- Attended Operational Research Planning meeting during 17–18th October 2013 at Geneva, Switzerland.
- Attended 1st Meeting Committee of experts on Tribal Health, Ministry of Health & Family Welfare, on 22nd November 2013 at New Delhi.
- Attended Meeting on Informal consultation on "operational research to support accelerating malaria elimination in the context of artemisinin resistance falciparum malaria in the Greater Mekong Sub-Region" during 9-10th December 2013 in Bangkok, Thailand.
- Attended Second collaborative meeting of collaborative project (NPRP 5-098-3-021) entitled "Molecular Epidemiology of Malaria in India and Qatar with an emphasis on parasite diversity, drug resistance and immune response" funded by Qatar National Research Fund, Qatar Foundation with RMRCT, Jabalpur, RMRC (NE) Region, Dibrugarh and PGIMER, Chandigarh, during 14-17th December 2013 at Weill Cornell Medical College in Qatar.
- Attended Meeting of "Need for Regulatory check for issuing commercial license to manufactures of Malaria Rapid Diagnostic Tests", held on 18th December 2013 at ICMR, New Delhi.
- Attended Training workshop for microbiologists/pathologists of sentinel surveillance hospitals and ARL, on 7th Feb 2014 at RMRCT, Jabalpur.
- Attended Two day National Seminar on "Dialogue between Globalization and Tribes" is held during 7-8th February 2014 at RDVV, Jabalpur.
- Attended Official meeting with the Principal Secretary, Ministry of Tribal Welfare, Govt. of M.P. on 12th Feb 2014 at Bhopal.

- Attended Joint Monitoring Mission on Vector Borne Diseases in India, during 1-10th March at WHO SEARO, New Delhi.
- Attended meeting on APW Forest Malaria WHO SEARO during 19-20th March 2014 at New Delhi.

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

- Attended 24th National Congress of Parasitology at Regional Medical Research Centre for Tribals (ICMR), Jabalpur during April 27-29, 2013.
- Attended National Operational Research Dissemination Workshop organized by the International Union Against TB and Lung Disease (The Union) in collaboration with Central TB Division, Ministry of Health and Family Welfare, Govt. of India, New Delhi during August 26-27, 2013.
- Attended International Science Symposium on HIV & Infectious Diseases organized by YRG Centre for AIDS Research and Education, Chennai at Chennai during 30th January – 1st February, 2014.
- Presented a paper in the 68th National Conference on Tuberculosis and Chest Diseases (NATCON 2013) organized jointly by Tuberculosis Association of India and National Institute of Tuberculosis and Respiratory Diseases (NITRD), New Delhi during 23-26th February, 2014.

**Dr. Tapas Chakma, Scientist 'F'**

- Attended investigators meetings of the Annual Health Survey project at NIHFW on 15th April 2013 at New Delhi.
- Attended NNMB Steering Committee Meeting on 30th August 2013 at NIN Hyderabad.
- Attended meeting of ICMR Task Force on Hypertension on 6th September 2013 at New Delhi.
- Attended National Seminar or Achieving Healthy Tribal Community on 25-26th September 2013, organized by MANT Kolkata and delivered a lecture on "Role of Nutrition in Fluorosis Mitigation" at Kolkata.
- Attended a meeting of "ICMR Task Force on Fluorosis" on 3rd December 2013 at New Delhi.
- Attended meeting of "Empowered Group on Tribal Health" and presented the "Tribal Health Scenario of the Country" on 23rd December 2013 at Nirman Bhawan, New Delhi.
- Attended a workshop on Research Methodology as resource person and delivered three lectures on different aspects organized by "Central Council of Research in Yoga and Naturopathy" from 4-7th February 2014 at New Delhi.
- Attended one day "National Workshop on Safe Water" on 25th February 2014, organized by Kerala Water Authority and delivered a lecture on "Fluorosis Mitigation Through Nutrition Supplementation and Safe Water" at Kochi.
- Attended and delivered 2 lectures on "Health Effect of Fluorosis" and

"Role of Nutrition in fluorosis mitigation" in a Training workshop of Medical Officers under "National programme for Fluorosis Prevention and Control" on 24-25th March 2014 organized by CMHO office, Chhindwara.

**Dr. K. B. Saha, Scientist 'D'**

- Presented paper on IEC activities for prevention of malaria at 24th National Congress on Parasitology organized at RMRCT, Jabalpur during 27th to 29th April 2013.
- Attended the meeting on Endline Household Survey related to malaria with NVBDCP at New Delhi on 28th June 2013.
- Attended the TOT meeting on Endline survey on malaria at NIMR Delhi during 15th to 17th July 2013.
- Attended the meeting on IEC project on malaria in Dindori District of Madhya Pradesh with Secretary, Ministry of Tribal Affairs, Government of India at Shastri Bhawan, New Delhi on 9th October 2013.
- Delivered lecture on research methodology to the Pre PhD students at Rani Durgawati Vishwavidyalaya, Jabalpur on 11th December 2013.

**Dr. Gyan Chand, Scientist 'D'**

- Presented a paper entitled "Presented a paper entitled" Lymphatic filariasis elimination – Assessment of impact of eight round of MDA strategy in Madhya Pradesh" in Lymphocon XI organized by Regional Medical Research Centre (ICMR), Bhubneshwar, 13-14th December 2013

**Dr. Jyothi Bhat, Scientist 'D'**

- Attended Sensitization Workshop for the RNTCP TB Xpert Project supported by WHO, STOP TB Partnership and UNITAID on 10-11th September 2013 at NIRT, Chennai
- Attended review meeting on Hospital Based Rotavirus Surveillance Network study on 12-13th September 2013 at NIE, Chennai
- Presented a paper titled "Visual verification of sputum & its association with smear and culture positivity of *M. tubercuolosis" in* NATCON 2013 held during 23-26th February 2014 at NITRD, New Delhi.

**Dr. S. Rajasubramaniam, Scientist 'D'**

- Attended Tribal Health Research Forum Quarterly Meeting on 15th April 2013 at VCRC Puducherry
- Attended 4th Annual Meeting of THRF during 8th to 11th August 2013 at DMRC, Jodhpur.

**Dr. Pradip Barde, Scientist 'C'**

- Attended one week training in March 2014 on ELISA for Viral diagnosis at NIV, Pune.

**Dr. R. K. Sharma, Scientist 'C'**

- Attended workshop on Clinical Trials & Epidemiological Methods held at

Dept. of Biostatistics and Health Informatics at SGPGIMS, Lucknow during 3rd-8th March 2014.

- Attended the meeting on Endline Household Survey related to malaria with NBDCP at New Delhi on 28th June 2013.
- Attended the TOT meeting on Endline survey on malaria at NIMR Delhi during 15th to 17th July 2013.

**Dr. Praveen Bharti, Scientist 'C'**

- Attended Second collaborative meeting of collaborative project (NPRP 5-098-3-021) entitled "Molecular Epidemiology of Malaria in India and Qatar with an emphasis on parasite diversity, drug resistance and immune response" funded by Qatar National Research Fund, Qatar Foundation with RMRCT, Jabalpur, RMRC (NE) Region, Dibrugarh and PGIMER, Chandigarh, during 14-17th December 2013 at Weill Cornell Medical College in Qatar.

**Dr. M. Muniyandi, Scientist 'B'**

- Participated in the Workshop entitled "Pharmaceutical Policies in India: Balancing Industrial and Public Health Interests" organised by the Institute for Studies in Industrial Development (ISID), Indian Council of Social Science Research (ICSSR) and Public Health Foundation of India (PHFI) during 03-07th March 2014 at New Delhi.
- Presented paper on "Addressing tuberculosis control in the context of promoting economic growth". Third Conference on "Health for all to universal health coverage: Journey so far and challenges ahead" organised by Indian Health Economics and Policy Association in Gokhale Institute of Politics and Economics, Pune during 6-7 January 2014.
- Invited to participate in the National Operational Research Dissemination Workshop on 'Operational Research on TB in India' organised by International Union Against Tuberculosis & Lung Disease, USAID and treat TB, during August 26-27, 2013 in New Delhi.

**Mr. M. J. Ukey, Technician 'C'**

- Attended one week training in March 2014 on ELISA for Viral diagnosis at NIV, Pune.

**Ms. Mahima Sahu, Ph.D. Scholar**

- Presented a poster in the national seminar on "Frontier Discoveries and Emerging Opportunities in Life Sciences" held during 13-15th February 2014 at Dr. H. S. Gour University, Sagar.

**Ms. Ruchi Pathak, Ph.D. Scholar**

- Presented a poster in the national seminar on "Frontier Discoveries and Emerging Opportunities in Life Sciences" held during 13-15th February 2014 at Dr. H.S. Gour University, Sagar.

# 10. EVENTS

## 10.1. WORKSHOPS/SYMPOSIUM/TRAINING/MEETING CONDUCTED

The centre hosted 24th National Parasitology congress in April 2013; more than 150 participants were present. Oral lectures by the renowned scientists, interaction of budding parasitologists with subject experts and poster presentations by the students were the highlights of the conference.


NVPDPC Workshop of Microbiologists/ Pathologists of Sentinel Surveillance Hospitals (SSHs) and Apex Referral Laboratories (ARLs) for Dengue and Chikungunya at RMRCT during 7th February 2014

Five day induction/refresher training on Testing of HIV was conducted in seven batches for laboratory technicians of ICTC & FICTC; One hundred and thirty five laboratory technicians were trained for testing of HIV/AIDS as per NACO guidelines.

Eight consecutive training programmes for Annual Health Survey (CAB) were conducted at RMRCT from 2013 to 2014

Nine successive training programmes on "Training of Health Professionals for Identification and Management of Sickle Cell disease in Madhya Pradesh" were conducted between 6th May 2013 to 14th March 2014

As a part of the project "Reaching primitive tribal group with IEC to improve awareness to Malaria: Appraisal of Baigas of Baigachak area of Dindori district" (Baiga Malaria Jagrukta), a exposure programme was conducted in RMRCT


Shri Deepak Khandekar I.A.S. Divisional Commissioner Jabalpur Division, Jabalpur visited the centre on 16th July 2013 as a Guest of honour for concluding ceremony of sickle cell training

Dr. Neeru Singh, Director, RMRCT was felicitated as eminent women scientist in India during International Women's Day 2014

Bhumi Pujan for Animal House Building on 10th October 2013

Construction of Animal House Building

## 10.2. INDEPENDENCE AND REPUBLIC DAY

Independence Day on 15th August 2013 and Republic Day on 26th January 2014 was celebrated with great fervor. Director, RMRCT, hosted the National Flag.

## 10.3. HINDI FORTNIGHT 14-28TH SEPTEMBER 2013.

During 'Hindi Fortnight' various Hindi Competitions were organized for the scientists/officers and employees Hindi Typing and Hindi Shrutlekh, Hindi Essay Writing, 'Hindi Kavita Path' and 'Hindi Vad-Vivad (Debate)'. After the closing of the 'Hindi Fortnight', 'Rajbhasha Prize Distribution Programme' was organized on 1st October 2013. Cash prizes were distributed to the winners.


## 10.4. VIGILANCE WEEK

The national vigilance week was observed during 20th October to 2nd November 2013 to generate awareness among the employees for sincere and dedicated service free from corruptions. Oath was taken by all the employees of the centre not to indulge in corrupt practices.

## 10.5. FOUNDATION DAY

The Foundation Day celebration of the centre was organized on 1st March 2014. On the occasion Dr. Kanjaksha Ghosh, Director, National Institute of Immuno-haematology, Mumbai, graced the occasion as chief guest and delivered the Foundation Day lecture.


## 10.6. SCIENTIFIC ADVISORY COMMITTEE MEETING

26th Scientific Advisory Committee Meeting of the centre was held on 20-21st January 2014 and ongoing projects and new proposals were discussed in the meeting.

# 11. APPENDICES

## 11.1. PROMOTION /RETIREMENT

### Promotion

- Shri L.S. Kaushal was promoted as 'Technical Assistant' on 1st July 2013
- Shri Mohan Lal Patel was promoted as 'Technical Assistant' on 5th August 2013
- Shri R.K. Thakur was promoted as 'Section Officer (Stores)' on 19th March 2014
- Shri R.K. Handa was promoted as 'Assistant' on 27th March 2014
- Shri D.C. Khatarkar was promoted as 'Technician B' on 19th March 2014

### Retirement

- Mr. Pramod K Garg, Attendant Services, retired on superannuation on 31st December 2013

### Voluntary Retirement

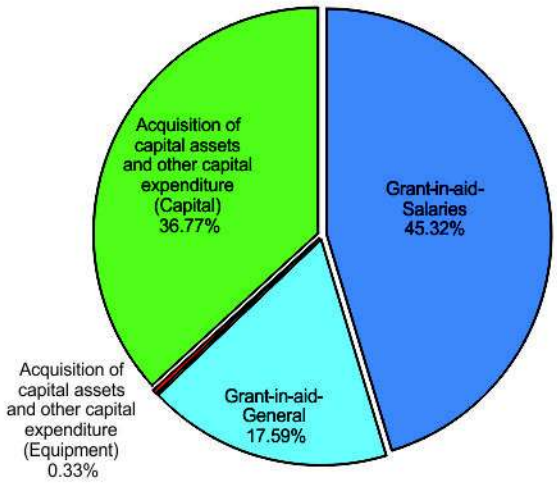
- Mr. Jagadish Singh, Technician B, opted for VRS on 11th November 2013
- Mr. P K Bhalerao, Section Officer, opted for VRS on 28th February 2014

## 11.2. FOREIGN VISITS

- Dr. Neeru Singh, Director, RMRCT visited Rockville, Maryland, U.S.A. to attend 'Third Iron and Malaria Research Review Committee (RRC) Meeting' during 13-14th June 2013.
- Dr. Neeru Singh, Director, RMRCT delivered a lecture and discussion on 'Indo-Canada collaborative project' during 15-18th June 2013 at University of Toronto, Canada.
- Dr. Neeru Singh, Director, RMRCT attended meetings under World Health Organization (WHO) Global Technical Strategy (GTS) for Malaria Control and Elimination 2016-2025 Country Typology meeting during 14–15th October 2013 at Geneva, Switzerland.
- Dr. Neeru Singh, Director, RMRCT attended Roll Back Malaria Partnership Work Plan (PWP) Dialogue meeting on 16th October, 2013 at Geneva, Switzerland.
- Dr. Neeru Singh, Director, RMRCT attended Operational Research Planning meeting during 17–18th October 2013 at Geneva, Switzerland.
- Dr. Neeru Singh, Director, RMRCT attended Meeting on Informal consultation on "Operational Research to support accelerating malaria elimination in the context of artemisinin resistance falciparum malaria in the Greater Mekong Sub-Region" during 9-10th December 2013 in Bangkok, Thailand.
- Dr. Neeru Singh, Director, RMRCT and Dr. Pravin Bharti, Scientist 'C' attended second meeting of collaborative project (NPRP 5-098-3-021) entitled "Molecular Epidemiology of Malaria in India and Qatar with an emphasis on parasite diversity, drug resistance and immune response" funded by Qatar National Research Fund, Qatar Foundation with RMRCT, Jabalpur, RMRC (NE) Region, Dibrugarh and PGIMER, Chandigarh, during 14-17th December 2013at Weill Cornell Medical College in Qatar.

## 11.3. BUDGET 2013-14

**Total Budget: (Rs. 15, 32, 65, 000)**




## 11.4. IMPORTANT COMMITTEES

**Scientific Advisory Committee**

| | | |
|---|---|---|
| 1 | Lt. Gen. (Dr.) D. Raghunath<br>Ex-Director General, Armed Forces Medical Services | Chairman |
| 2 | Dr. D. S. Agarwal<br>Ex-Dean, Maulana Azad Medical College, New Delhi | Member |
| 3 | Dr. S.K. Mishra<br>Director, Ispat Hospital, Rourkela, Orrisa | Member |
| 4 | Dr. S. C. Dubey<br>Ex-Joint Director, HSADL, Bhopal | Member |
| 5 | Dr. Rashmi Arora<br>Scientist 'G' & Head ECD, ICMR, New Delhi | Member |
| 6 | Dr. Kiran Katoch<br>Former Director, National JALMA Institute for Leprosy & Other Mycobacterial Diseases, ICMR, Agra | Member |
| 7 | Dr. K. Ghosh<br>Director, NIIH, Mumbai | Member |
| 8 | Dr. Manju Rahi<br>Scientist 'D' ICMR, New Delhi | ICMR Representative |
| 9 | Dr. Sarla K Subbarao<br>Emeritus Scientist, ICMR, New Delhi | Member |
| 10 | Dr. Arvind Pandey<br>Director, NIMS, ICMR, New Delhi | Member |
| 11 | Dr. S.K. Kar<br>Director, RMRC, ICMR, Bhubaneswar | Member |
| 12 | Dr. J. Mahanta<br>Director, RMRC, ICMR, Dibrugarh | Member |

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|---|---|---|
| 13 | Dr. D.T. Mourya<br>Scientist 'F', NIV, Pune | Member |
| 14 | Dr. P. L. Joshi<br>Former Director, National Vector Borne Disease Control Programme, New Delhi. | VBDSF Expert<br>(Vector Borne Disease Science Forum) |
| 15 | Dr. A. C. Mishra<br>Former Director, NIV, Pune | VBDSF Expert |
| 16 | Dr. G. S. Sonal<br>Additional Director, NVBDCP, New Delhi | VBDSF Expert |
| 17 | Dr. P. K. Shrivastava<br>Joint Director, NVBDCP, New Delhi | VBDSF Expert |
| 18 | Dr. Sher Singh Kashyotia<br>Assistant Director, NVBDCP, New Delhi | Representative |
| 19 | Dr. Soumya Swaminathan<br>Director, NIRT, Chennai | Special Invitee |
| 20 | Dr. J Bhattacharjee<br>Consultant Filaria, NVBDCP | Representative |
| 21 | Dr. D. Majumdar<br>Professor & HOD, Department of Microbiology<br>Govt. Medical College, Jagdalpur | Special Invitee |
| 22 | Dr. S.L. Adile<br>Dean, Govt. Medical College, Jagdalpur | Special Invitee |
| 23 | Dr. Mohan Singh<br>Joint Director, Vector Borne Disease, Directorate of Health Services, M.P, 6 th Floor,Satpura Bhawan, Bhopal | Special Invitee |
| 24 | Dr. J. C. Paliwal<br>State Consultant, Bhopal | Special Invitee |
| 25 | Dr. Neena Valecha<br>Director, National Institute of Malaria Research, New Delhi | Member |
| 26 | Dr. Pradeep Das<br>Director, Rajendra Memorial Research Institute of Medical Sciences, Patna | Member |
| 27 | Dr. P. Vijayachari<br>Director, Regional Medical Research Centre, Port Blair | Member |
| 28 | Dr. B. K. Tyagi<br>Director, Centre for Research in Medical Entomology, Madurai | Member |
| 29 | Dr. G. S. Toteja<br>Director, Desert Medicine Research Centre, Jodhpur | Member |
| 30 | Dr. P. Jambulingam<br>Director, Vector Control Research Centre, Puducherry | Member |
| 31 | Dr. R.C. Dhiman<br>Scientist 'G', National Institute of Malaria Research, New Delhi. | Representative |
| 32 | Dr. Neeru Singh<br>Director, RMRCT, Jabalpur | Organizing Secretary |

## Ethics Committee

| | | |
|---|---|---|
| 1. | Dr. Arun Sharma<br>Professor & Head, Department of Radiodiagnosis<br>NSCB Medical College, Jabalpur | Chairman |
| 2. | Dr. (Mrs.) Pushpa Kirar<br>Professor, Department of Radiotherapy,<br>Cancer Hospital, NSCB Medical College, Jabalpur | Member |
| 3. | Dr.S.P. Pandey<br>Associate Professor & Head, Department of Pharmacology<br>NSCB Medical College, Jabalpur | Member |
| 4. | Prof. Karuna Verma<br>Department of Biological Sciences,<br>Rani Durgavati University, Jabalpur | Member |
| 5. | Prof. Gayatri Sinha<br>Department of Philosophy,<br>Rani Durgavati University Jabalpur | Member |
| 6. | Mr. Jamal Akhtar Baig<br>Director ENFORCE (NGO), Bhopal | Member |
| 7. | Mr. Ashish Shroti<br>Advocate, High Court of Madhya Pradesh, Jabalpur | Member |
| 8. | Shri. Komal Prasad Vishwakarma<br>Jabalpur | Member |
| 9. | Prof. B.K. Sahu<br>Department of Education, Rani Durgavati University Jabalpur | Member |
| 10. | Dr. V.G. Rao<br>Scientist 'F' | Member Secretary |

## Technical Purchase Committee

| | | |
|---|---|---|
| 1. | Dr. A. S. Rathaur<br>Former Head Dept. of Radiology,<br>NSCB Medical College, Jabalpur | Chairman |
| 2. | Dr. Sushil Kumar<br>Principal Scientist, SWSR, Adhartal, Jabalpur | Member |
| 3. | Dr. S. Sambath<br>Officer-in-Charge, Zoological Survery of India, Jabalpur | Member |
| 4. | Dr. Jyothi Bhat<br>Scientist 'D', RMRCT, Jabalpur | Member |
| 5. | Dr. S. Rajasubramananiam<br>Scientist 'D', RMRCT, Jabalpur | Member |
| 6. | Dr. Surendra Kumar<br>Scientist 'C', RMRCT, Jabalpur | Member |
| 7. | Dr. Pradip V. Barde<br>Scientist 'C', RMRCT, Jabalpur | Member |
| 8. | Dr. Praveen K Bharti<br>Scientist 'C', RMRCT, Jabalpur | Member |
| 9. | Mr. Gyanchand Jain<br>Administrative Officer, RMRCT, Jabalpur | Member |

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| 10. | Mr. Promod Kumar<br>Accounts Officer, RMRCT, Jabalpur | Member |
| 11. | Mr. Prafulla K Bhalerao<br>Section Officer (Stores), RMRCT, Jabalpur | Member |

**Institute Building Committee (Capital Works)**

| | | |
|---|---|---|
| 1. | Dr. Tapas Chakma<br>Scientist 'F', RMRCT, Jabalpur | Chairman |
| 2. | Shri S.S.Mehta<br>Suprintending Engineer (Retd.), PWD, Govt. of M.P. | Member (outside) |
| 3. | Shri. A. K. Soni<br>Suprintending Engineer (Retd.), MBSEB, Jabalpur | Member (outside) |
| 4. | Dr. P.V.Barde<br>Scientist 'C', RMRCT, Jabalpur | Member |
| 5. | Shri Gyan Chand Jain,<br>Administrative Officer, RMRCT, Jabalpur | Member Secretary |
| 6. | Shri Pramod Kumar<br>Accounts Officer, RMRCT, Jabalpur | Member |

**Library Committee**

| | | |
|---|---|---|
| 1. | Dr. V.G.Rao, Scientist 'F' | Chairman |
| 2. | Dr.K.B.Saha, Scientist 'D' | Member |
| 3. | Dr. Jyothi Bhat, Scientist 'D' | Member |
| 4. | Dr.Rajasubramaniam, Scientist 'D' | Member |
| 5. | Dr.Ravendra Sharma, Scientist 'C' | Member & Libr. Officer |
| 6. | Shri Gyan Chand Jain, Administrative Officer | Member |
| 7. | Shri Pramod Kumar, Accounts Officer | Member |
| 8. | Shri K.V.K.Rao, AL & IO | Member Secretary |

**Staff Grievance Committee**

| | | |
|---|---|---|
| 1. | Dr. V.G.Rao, Scientist 'F' | Chairman |
| 2. | Dr. Dinesh Kumar, Scientist 'C' | Member |
| 3. | Shri Gyan Chand Jain, Administrative Officer | Member |
| 4. | Shri Pramod Kumar, Accounts Officer | Member |
| 5. | One Representative of TEWA | Member |
| 6. | Mr. R.K. Thakur, Assistant | Member |

**Anti-Sexual Harassment at Workplace Committee**

| | | |
|---|---|---|
| 1. | Dr.Jyothi Bhat, Scientist 'D' | Chairman |
| 2. | Dr. K. B. Saha, Scientist 'D' | Member |
| 3. | Dr. R. K. Sharma, Scientist 'C' | Member |
| 4. | Dr. Alpana Abbad, Technical Assistant (R) | Member |
| 5. | Smt. Nazia Anwar Ali, Technician 'C' | Member |

**Annual Report Committee**

| | | |
|---|---|---|
| 1. | Dr. Jyoti Bhatt, Scientist 'D' | Chairman |
| 2. | Dr. Rajasubramaniam, Scientist 'D' | Member |
| 3. | Dr. M. Muniyandi, Scientist 'B' | Member |
| 4. | Dr. Samiran Bisai, Consultant (THRU) | Member |
| 5. | Dr. Jyotirmoy Roy, Technical Officer (A) | Member |
| 6. | Dr. Arvind Verma, Technical Assistant (R) | Member |

# 11.5. राजभाषा नीति के कार्यान्वयन एवं अनुपालन से संबंधित प्रगति रिपोर्ट

क्षेत्रीय जनजाति आयुर्विज्ञान अनुसंधान केन्द्र (भा0आ0अ0प0), जबलपुर में भारत सरकार, गृह मंत्रालय, राजभाषा विभाग की राजभाषा नीति के समुचित कार्यान्वयन एवं अनुपालन के लिए सतत प्रयास किए जा रहे हैं। प्रतिवेदन अवधि के दौरान इस केन्द्र में हिंदी के प्रगामी प्रयोग एवं सरकारी कामकाज में हिंदी के प्रयोग को बढ़ावा देने हेतु किए गए प्रयासों का संक्षिप्त विवरण इस प्रकार है :–

## 1. राजभाषा कार्यान्वयन समिति

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

| | | | |
|---|---|---|---|
| 1. | डॉ. नीरू सिंह, निदेशक | – | अध्यक्ष |
| 2. | डॉ. व्ही0जी0राव, वैज्ञानिक 'एफ' | – | सदस्य |
| 3. | श्री ज्ञानचंद जैन, प्रशा. अधिकारी | – | सदस्य |
| 4. | श्री प्रमोद कुमार, लेखा अधिकारी | – | सदस्य |
| 5. | श्री द्वारका प्रसाद लोधी, अनुभाग अधिकारी, (स्थापना) | – | सदस्य |
| 6. | श्री राजेन्द्र कुमार ठाकुर, अनुभाग अधिकारी (भंडार) | – | सदस्य |
| 7. | श्री हाकिम सिंह ठाकुर, कनिष्ठ हिंदी अनुवादक | – | सदस्य |

प्रत्येक तीन माह में इस समिति की बैठक होती है, जिसमें इस अनुसंधान केन्द्र में राजभाषा कार्यान्वयन एवं अनुपालन की स्थिति की समीक्षा की जाती है तथा सरकार द्वारा निर्धारित लक्ष्यों को प्राप्त करने हेतु आवश्यक उपायों की संस्तुति की जाती है। अभी तक इस समिति की कुल 77 तिमाही बैठकें आयोजित की जा चुकी हैं।

## 2. हिंदी पत्राचार

प्रतिवेदन अवधि के दौरान इस केन्द्र द्वारा 'क' क्षेत्र को मूलतः हिंदी में लगभग 50% और उससे अधिक पत्राचार किया गया। साथ ही सरकार द्वारा निर्धारित लक्ष्य के अनुरूप हिंदी पत्राचार को 'क' क्षेत्र के अलावा 'ख' एवं 'ग' क्षेत्रों के साथ भी मूल हिंदी पत्राचार को बढ़ाने के लिए प्रयास किए जा रहे हैं।

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

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

## 4. प्रशिक्षण

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

राजभाषा विभाग के निर्देशों के अनुसार जिन कर्मचारियों को हिंदी टंकण एवं हिंदी आशुलिपि के सेवाकालीन प्रशिक्षण की आवश्यकता थी, उन सभी को हिंदी शिक्षण योजना, राजभाषा विभाग, जबलपुर कार्यालय से हिंदी टंकण/हिंदी आशुलिपि का प्रशिक्षण दिलाया गया है, जो एक आशुलिपिक हिंदी आशुलिपि प्रशिक्षण के लिए शेष हैं, उन्हें भी शीघ्र ही हिंदी आशुलिपि 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 केन्द्र में अनुसंधान कार्य से संबंधित प्रशिक्षण कार्यक्रमों और वैज्ञानिक व्याख्यानों आदि में हिंदी को प्रमुखता प्रदान की जाती है, जिससे अधिक से अधिक लोगों तक इसका लाभ पहुँच सके।

**7. प्रकाशन** : इस अनुसंधान केंद्र द्वारा जनजाति स्वास्थ्य के बारे में हिंदी में 'आदिवासी स्वास्थ्य पत्रिका' एवं अंग्रेजी में 'TRIBAL HEALTH BULLETIN' एक साथ प्रकाशित किए जाते हैं। इसका पिछला अंक

(खंड 19 अंक 1 एवं 2, जन. व जुला. 2013) दिसम्बर, 2013 में प्रकाशित हुआ है।

## 8. 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 केन्द्र में प्रति वर्ष हिंदी–दिवस एवं हिंदी–पखवाड़ा मनाया जाता है। इस दौरान निदेशक महोदया द्वारा केन्द्र के 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 क्षेत्रीय जनजाति आयुर्विज्ञान अनुसंधान केन्द्र, जबलपुर में हिंदी–पखवाड़े (14–28 सितम्बर, 2013) के दौरान आयोजित हिंदी प्रतियोगिताओं के विजेताओं को 01–10–2013 को 'राजभाषा पुरस्कार वितरण समारोह' का आयोजन किया गया, जिसमें निदेशक महोदया की द्वारा नीचे दिए विवरण के अनुसार विजेता अधिकारियों व कर्मचारियों 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 अधिकारी / कर्मचारी | नकद पुरस्कार |
|---|---|---|---|
| 1. | **हिंदी टंकण** | | |
| | प्रथम | श्री नरेन्द्र कुमार झारिया, हिंदी टंकक | रु. 5000 / – |
| | द्वितीय | कु. संध्या शर्मा, आशुलिपिक | रु. 3000 / – |
| | तृतीय | श्री शरद कुमार कोष्टा, अवर श्रेणी लिपिक | रु. 2000 / – |
| | सांत्वना (I) | श्री सुवाष चंद्र मुदुलि, निजी सहायक | रु. 1000 / – |
| | सांत्वना (II) | श्रीमती फिलोमिना लकड़ा, सहायक | रु. 1000 / – |
| 2. | **हिंदी श्रुतलेखन** | | |
| | प्रथम | श्री जगदीश प्रसाद कोष्टा, क्षे.प्रयोग.परिचा. (NIMR) | रु. 5000 / – |
| | द्वितीय | श्री प्रेमलाल दाहिया, परिचारक (सेवाएं) (NIMR) | रु. 3000 / – |
| | तृतीय | श्री कामता प्रसाद जायसवाल, परिचारक (सेवाएं)(NIMR) | रु. 2000 / – |
| | सांत्वना (I) | श्री सुखलाल विश्वकर्मा, परिचारक (सेवाएं) | रु. 1000 / – |
| | सांत्वना (II) | श्री शंकर लाल झा, परिचारक (सेवाएं)(NIMR) | रु. 1000 / – |
| 3 | **हिंदी टिप्पण एवं प्रारूप–लेखन** | | |
| | प्रथम | श्री अविनाश दुबे, तकनीशियन–ए | रु. 5000 / – |
| | द्वितीय | श्री नरेन्द्र कुमार झारिया, हिंदी टंकक | रु. 3000 / – |
| | तृतीय | श्री के. वेणुगोपाल राव, परिचारक (सेवाएं) | रु. 2000 / – |
| | सांत्वना (I) | श्री रामकुमार वर्मा, तकनीशियन 'ए' (इंजी.सपोर्ट) | रु. 1000 / – |
| | सांत्वना (II) | श्री सुवाष चंद्र मुदुलि, निजी सहायक | रु. 1000 / – |
| 4. | **हिंदी निबंध–लेखन (वैज्ञानिक / अधि. वर्ग)** | | |
| | प्रथम | डॉ. अशोक कुमार मिश्र, वैज्ञानिक 'ई'(NIMR) | रु. 5000 / – |
| | द्वितीय | डॉ. दिनेश कुमार, वैज्ञानिक 'सी' | रु. 3000 / – |
| | तृतीय | श्री नितीश सिंह परिहार, तक.अधि.(एचआईवी परियो.) | रु. 2000 / – |
| | सांत्वना (I) | डॉ. रविन्द्र कुमार शर्मा, वैज्ञानिक 'सी' | रु. 1000 / – |
| | सांत्वना (II) | डॉ. नरेन्द्र कुमार चौधरी, तकनीकी अधि. 'ए' | रु. 1000 / – |

**5. हिंदी निबंध–लेखन (कर्मचारी वर्ग)**

| | | |
|---|---|---|
| प्रथम | श्री अजय कुमार गोयल, तक.सहा.(अनुसं.) | रु. 5000/– |
| द्वितीय | श्रीमती नाजिया अली, तकनीशियन 'सी' | रु. 3000/– |
| तृतीय | श्री लक्ष्मण सिंह कौशल, तकनीकी सहायक | रु. 2000/– |
| सांत्वना (I) | श्री प्रदीप कुमार मेश्राम, तकनीकी सहायक (अनुसंधान) | रु. 1000/– |
| सांत्वना (II) | श्री एस.के. उपाध्ययाय, क्षे.प्रयोग.परिचा. (NIMR) | रु. 1000/– |

**6. हिंदी कविता–पाठ (वैज्ञानिक/अधिकारी वर्ग)**

| | | |
|---|---|---|
| प्रथम | श्री नितीश सिंह परिहार, तक.अधि.(एचआईवी परियो.) | रु. 5000/– |
| द्वितीय | डॉ. प्रदीप व्ही. बर्डे, वैज्ञानिक 'सी' | रु. 3000/– |
| तृतीय | डॉ. मनमोहन शुक्ला, वैज्ञानिक 'ई' (NIMR) | रु. 2000/– |
| सांत्वना (I) | डॉ. अशोक कुमार मिश्र, वैज्ञानिक 'ई'(NIMR) | रु. 1000/– |
| सांत्वना (II) | डॉ. भूपेश कोरी, वैज्ञानिक–।।(वायरोलॉजी परियो.) | रु. 1000/– |

**7. हिंदी कविता–पाठ (कर्मचारी वर्ग)**

| | | |
|---|---|---|
| प्रथम | श्री हीरालाल चौधरी, फील्ड वर्कर (NIMR) | रु. 5000/– |
| द्वितीय | श्री दीपचंद खातरकर, तकनीशियन ए | रु. 3000/– |
| तृतीय | श्री एस.के. उपाध्ययाय, क्षे.प्रयोग.परिचा.(NIMR) | रु. 2000/– |
| सांत्वना (I) | श्रीमती नाजिया अली, तकनीशियन 'सी' | रु. 1000/– |
| सांत्वना (II) | श्री सुधीर कुमार सेन, कीट संग्राहक, (NIMR) | रु. 1000/– |

**8. हिंदी वाद–विवाद (वैज्ञानिक/अधिकारी वर्ग)**

| | | |
|---|---|---|
| प्रथम | डॉ. नरेन्द्र कुमार चौधरी, तकनीकी अधिकारी 'ए' | रु. 5000/– |
| द्वितीय | डॉ. रविन्द्र कुमार शर्मा, वैज्ञानिक सी' | रु. 3000/– |
| तृतीय | डॉ. भूपेश कोरी, वैज्ञानिक–।।(वायरोलॉजी परियो.) | रु. 2000/– |
| सांत्वना (I) | श्री नितीश सिंह परिहार, तक.अधि.(एचआईवी परियो.) | रु. 1000/– |
| सांत्वना (II) | डॉ. एम. मुनियांदि, वैज्ञानिक 'बी' | रु. 1000/– |

**9. हिंदी वाद–विवाद (कर्मचारी वर्ग)**

| | | |
|---|---|---|
| प्रथम | श्री समर बहादुर सिंह, तकनीकी सहायक (अनुसंधान) | रु. 5000/– |
| द्वितीय | श्री सुधीर कुमार सेन, कीट संग्राहक (NIMR) | रु. 3000/– |
| तृतीय | श्री प्रदीप कुमार मेश्राम, तकनीकी सहायक (अनुसंधान) | रु. 2000/– |
| सांत्वना (I) | श्रीमती नाजिया अली, तकनीशियन 'सी' | रु. 1000/– |
| सांत्वना (II) | श्री लक्ष्मण सिंह कौशल, तकनीकी सहायक | रु. 1000/– |

योग– रु. 1,08,000/–

(कुल राशि – एक लाख आठ हजार रुपए मात्र)

## 11.6. STAFF LIST

### Director & Scientist 'G'

Dr. Neeru Singh, MSc, PhD, FNASc

### Scientist Cadre

| | | |
|---|---|---|
| Dr. R S. Balgir, MSc, PhD | Scientist 'F' | Bio-Chemistry & Immunology |
| Dr. V. G. Rao, MBBS, MD | Scientist 'F' | Community Medicine |
| Dr. Tapas Chakma, MBBS, MAE | Scientist 'F' | Community Medicine |
| Dr. Kalyan B. Saha, MSc, MPS, PhD, PGDBE | Scientist 'D' | Demography |
| Dr. Gyan Chand, MSc, PhD | Scientist 'D' | Entomology |
| Dr. Jyothi Bhat, MBBS, MD | Scientist 'D' | Microbiology |
| Dr. S. Rajasubramaniam, MSc, PhD | Scientist 'D' | Biotechnology |
| Dr. Dinesh Kumar, MSc, PhD | Scientist 'C' | Statistics |
| Dr. Surender Kumar, MBBS | Scientist 'C' | Community Medicine |
| Dr. Ravendra K. Sharma, MPhil, PhD | Scientist 'C' | Statistics |
| Dr. Pradip V. Barde, MSc, PhD | Scientist 'C' | Microbiology |
| Dr. Praveen K. Bharti, MSc, PhD | Scientist 'C' | Biotechnology |
| Dr. Rajiv Yadav, MBBS, MD | Scientist 'B' | Genetics |
| Dr. M. Muniyandi, MA, MPS, M.Phil, PhD | Scientist 'B' | Health Economics |
| Dr. Vidhan Jain, MA, MSc, PhD | Scientist 'B' | Microbiology |

### Administration

| | | |
|---|---|---|
| Shri Gyan Chand Jain, BA | Administrative Officer | |
| Shri Pramod Kumar, M.Com, ICWA | Accounts Officer | |
| Shri P.K. Bhalerao, M.Com | Section Officer | VRS on 28/2/2014 |
| Shri D.P. Lodhi, MA, LLB, PGDCA | Section Officer | |
| Shri Rajendra K. Thakur, B.Sc. | Section Officer | Joined on 19/03/2014 |

### Library

| | |
|---|---|
| Shri K.V.K. Rao, M.Com, B. Lib | Asst. Lib & Inf. Officer |
| Shri S.N. Singh, MA, M. Lib | Library Information Asst. |

### Technical Cadre

| | |
|---|---|
| Shri V. Soan, MSc | Technical Officer A |
| Dr. N. K. Choudhary, MA, PhD | Technical Officer A |
| Dr. R. C. Mishra, MA, PhD | Technical Officer A |
| Dr. Jyotirmoy Roy, MA, PhD | Technical Officer A |
| Dr. D. C. Jain, MSc, PhD | Technical Assistant (R) |
| Shri P. Vinay Rao, MSc | Technical Assistant (R) |
| Shri Arvind Kavishwar, MSc, PGDCA | Technical Assistant (R) |
| Dr. Arvind Verma, MSc, PhD | Technical Assistant (R) |
| Dr. Bal Krishna Tiwari, MA, PhD | Technical Assistant (R) |
| Dr. Alpana Abbad, MA, PhD | Technical Assistant (R) |

| | | |
|---|---|---|
| Shri Praval Srivastava, MA | Technical Assistant (R) | |
| Shri Ajay K. Goel, MA | Technical Assistant (R) | |
| Shri Samar Bahadur Singh, MA, LLB | Technical Assistant (R) | |
| Shri M.P.S.S. Singh, MSc | Technical Assistant (R) | |
| Dr. Manoj K. Bhondeley, MSc, MPhil, PhD | Technical Assistant (R) | |
| Shri Vijay S. Gadge, MSc, DMLT | Technical Assistant (R) | Expired on 20/01/2014 |
| Shri Mohan Lal Kori, MA | Technical Assistant (R) | |
| Shri Pradeep K. Meshram, MA, MPhil | Technical Assistant (R) | |
| Smt. Maya Pandey, MA | Technical Assistant (R) | |
| Shri Chandan Karforma | Technical Assistant | |
| Shri Rajendra K. Minocha | Technical Assistant | |
| Shri Surendra Jatavath | Technical Assistant | |
| Shri Subash Godbole | Technical Assistant | |
| Shri L.S.Kaushal | Technical Assistant | Promoted on 01/07/2013 |
| Shri Mohan Lal Patel | Technical Assistant | Promoted on 05/08/2013 |
| Smt Reena Shome | Technician C | |
| Shri Ashok K. Gupta | Technician C | |
| Shri Anil Gwal | Technician C | |
| Shri Lalit K. Sahare | Technician C | |
| Smt. Canina Luke | Technician C | |
| Shri Mahendra J. Ukey | Technician C | |
| Shri Purshottam Patel | Technician C | |
| Shri Rajju Lal Neelkar | Technician C | |
| Shri C.P.Vishwakarma | Technician C | |
| Shri Shiv Kumar Singh | Technician C | |
| Smt. Nazia Anwar Ali | Technician C | |
| Shri Subash Kumbhare | Technician C | |
| Shri Prakash Shrivastava | Technician C | |
| Shri Dhan Singh Thakur | Technician C | |
| Shri Vijay Kachhi | Technician B | |
| Shri Jagdish P. Mishra | Technician B | |
| Shri Jagdish Singh | Technician B | VRS on 11/11/2013 |
| Shri B.S.Patel | Technician B | |
| Shri D.C. Khatarkar | Technician B | Promoted on 19/03/2014 |
| Shri S.R.Mishra | Technician A | |
| Shri R.K. Jaiswal | Technician A | |
| Shri M.P.Tiwari | Technician A | |
| Shri Ghanshyam Ahirwar | Technician A | |
| Shri D.K.Mishra | Technician A | |
| Shri Ajesh K. Dubey | Technician A | |
| Shri Avinash Dubey | Technician A | |
| Shri P.K.Namdev | Technician A (Engg. Support) | |
| Shri Ram K. Verma | Technician A (Engg. Support) | |

## Administrative Staff

| | | |
|---|---|---|
| Shri Subash C. Muduli | Personal Assistant | |
| Ms Sandhya Sharma | Stenographer | |
| Shri Hakim S. Thakur | Junior Hindi Translator | |
| Smt. Pushpa Umate | Assistant | Reinstated on 04/02/2014 |
| Shri Rohit Agrawal | Assistant | |
| Smt Filomina Lakra | Assistant | |
| Shri P.K. Shrivastava | Assistant | |
| Shri Raj Kumar Handa | Assistant | Promoted on 27/03/2014 |
| Shri Bhagwani Prasad Kol | Upper Division Clerk | |
| Shri Raghubir P. | Upper Division Clerk | |
| Shri Baisakhu Lal | Upper Division Clerk | |
| Shri Pramod Choubey | Lower Division Clerk | |
| Shri Sharad Kosta | Lower Division Clerk | |
| Shri Narendra K. Jharia | Hindi Typist | |
| Shri Ramnarayan | Driver | |
| Shri Ashok Kumar Saini | Driver | |
| Shri Paramjeet Singh | Driver | |
| Shri Ramesh Kumar Gond | Driver | |
| Shri Gendalal | Driver | |
| Shri Ravindra Kumar Katraha | Driver | |

## Multi Tasking Staff

| | | |
|---|---|---|
| Shri Sheikh Saleem | Attendant (Services) | |
| Shri Suresh K. Burman | Attendant (Services) | |
| Shri Sukhlal Vishwakarma | Attendant (Services) | |
| Shri Rajendra P. Gond | Attendant (Services) | |
| Shri Jagdish P. Thakur | Attendant (Services) | |
| Shri Prakash Sangle | Attendant (Services) | |
| Smt Shashi Prabha Mishra | Attendant (Services) | |
| Shri Shamshad Ali Ansari | Attendant (Services) | |
| Shri Vinay Kumar Balmik | Attendant (Services) | |
| Shri Santosh Kumar Haldkar | Attendant (Services) | |
| Shri Ganga Bahadur | Attendant (Services) | |
| Shri Pramod K. Garg | Attendant (Services) | Retired on 31/12/2013 |
| Shri Laxman Prasad | Attendant (Services) | |
| Shri Baidraj Kachhi | Attendant (Services) | |
| Shri Madan Singh Maravi | Attendant (Services) | |
| Shri Preetam Lal Gond | Attendant (Services) | |
| Shri Suresh K. Pareha | Attendant (Services) | |
| Shri K. Venugopal Rao | Attendant (Services) | |
| Shri Ramesh Kumar Ahirwar | Attendant (Services) | |
| Shri Suresh Jaiswal | Attendant (Services) | |

| | |
|---|---|
| Shri Umesh Gautam | Attendant (Services) |
| Shri Anil Vinodia | Attendant (Services) |
| Shri Malkhan Singh | Attendant (Services) |
| Shri Ajay K Soni | Attendant (Services) |
| Shri Santosh K. Kol | Attendant (Services) |
| Shri Prem Singh Gond | Attendant (Services) |
| Shri Ram K. Mehra | Attendant (Services) |
| Shri Summat Singh | Attendant (Services) |
| Shri Munna Lal | Attendant (Services) |
| Shri Arakh C. Malik | Attendant (Services) |
| Shri Vishnu Prasad | Attendant (Services) |
| Shri Sone Lal Dumar | Attendant (Services) |
| Shri Pappu Lal Dumar | Attendant (Services) |

**National Nutritional Monitoring Bureau (MP Unit)**

| | |
|---|---|
| Dr. Rakesh Babu, MBBS | Assistant Research Scientist |
| Shri Gajanan Dhore | Social Worker |
| Shri Santosh Maravi | Attendant (Services) |
| Shri Sushil Patel | Driver |

**Integrated Counseling & Testing Centre & SRL (HIV)**

| | |
|---|---|
| Shri Nitish Parihar, MSc | Technical Officer |
| Smt Shraddha Shrivastava | Counselor |
| Shri Manish Vishwakarma | Lab. Technician |
| Ku Pinky Kanojiya | Lab. Technician |

**Tribal Health Research Unit (THRU)**

| | |
|---|---|
| Dr. Samiran Bisai, M.Sc., Ph.D., PGDPHN | Consultant |
| Shri Ram Gopal Prajapati, M.Sc | Research Assistant |
| Shri Mithun Kumar Vishwakarma | Data Entry Operator |
| Shri Arun Kumar Meshram | Lab Technician |
| Shri Pragyasheel Dongre | Lab Technician |