annual report
2008-09

REGIONAL MEDICAL RESEARCH CENTRE

Indian Council of Medical Research

Bhubaneswar

ANNUAL REPORT

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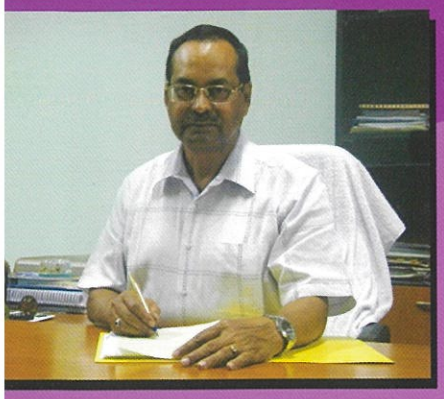
PREFACE



This centre has continued its research effort in areas of vector borne diseases, diarrhoeal disorders, hepatitis and nutrition, besides taking new initiatives in area of virology and culture of multi drug resistant tuberculosis. Focus was also made in the area of translational research while strengthening its linkage with local health authority of Govt of Orissa. During the year the centre has addressed research issues on applied as well as in operational areas. There are 21 projects, of which 6 have been completed and most of which are extramural in nature.

During the period the centre has addressed research issues on protective immunity in lymphatic filariasis to identify the candidate antigen for immunoprophylaxis. Multi-centric clinical trials are being addressed in the area of lymphatic filariasis under Gates' Foundation grant to address key issues for evaluating appropriate drug regimens for MDA. Host parasite interactions were addressed in both malaria and filariasis to generate knowledge in the area of cerebral malaria and host immune responses in filariais. Multiplex PCR assays were developed to facilitate diagnosis of vector borne infection. That process is now being used to map the vectors of Orissa in a translational research mode in collaboration with VCRC, Pondicherry. This centre has reported a strain of *V.cholerae* Eltor variant isolated from Langigarh block of Kalahandi district of Orissa, during investigation of the epidemic of severe diarrhoeal disorder in Kalahandi district.

The Institute has established linkages with other ICMR Institutes in area of technology transfer, training and scientific exchange of knowledge. The technology of in vitro TB culture of MDR TB was established after the training obtained by our staff at TRC, Chennai. Scientists received training for the diagnosis of H1N1 influenza at NIV, Pune & NICED, Kolkata. Haemoglobinopathy disorders with new variants were identified and published. Initiation of development of Food Testing Laboratory at Orissa was made in collaboration with NIN, Hyderabad. Women & Child Development Department has been requested to collaborate in this endeavour that can be taken up in project mode. Linkages are established with WHO/TDR & GATES' foundation for sponsoring research projects at this Centre in the area of filariasis and pilot introduction of Oral Cholera vaccine in collaboration with International Vaccine Institute, NICED and Govt of Orissa. Linkages with DBT and DST and other non-ICMR institutes are also continuing during the year.

Linkage with local Govt. and NVBDCP was augmented in national and state run programmes in areas of malaria and filariasis while maintaining the research focus. The therapeutic efficacy and biomarker of CQ resistance studies of this Centre has helped the State to introduce 2nd line drug in CQ resistant areas so identified. For diarrhoeal disorders the local government is referring to this centre for diagnosis during epidemic and inter epidemic period. For lymphatic filariasis control programme, this centre has provided training to medical officers of the State. On request of the Orissa State AIDS Control Society (OSACS), diagnostic facility for CD4 count for referral cases of HIV/AIDS was undertaken.

This Centre has added new areas of research during the year like of TB culture facility and Virology lab which are being established. These facilities will subsequently help in area of research besides complementing towards services in this region. The reported epidemics in Daringbadi of Kandhamal, Malkangiri and Koraput district of Orissa in Sept.-October 2009 was investigated by RMRC in collaboration with NIV, Pune. The activity

PREFACE

was found to be of Chandipura virus origin. Outbreak of rash and fever investigated by our scientists has shown to be of Hand, Foot and Mouth disease of viral origin.

Training was imparted to MTS workers of Orissa & Jharkhand States on malaria control programme and surveillance. Besides these, an attempt on technology transfer from laboratory to field was made with active participation of the Bhubaneswar Municipal Corporation and Cuttack Municipal Corporation. In this all the field staff were trained in identification of larval breeding sites, how to take dips and introduce the larvicidals in the drains/pits etc. This field demonstration was carried out by the scientists of RMRC. Similar activity were also carried out in Cuttack Municipal Corporation as a translational approach in vector control.

On the occasion of the Foundation Day of RMRC a Symposium on "Health Challenges of Orissa" was organised which was graced by Dr.V.M. Katoch, the Secretary, DHR & Director General of ICMR along with Scientists of International & National repute. On this occasion the books were released by Hon'ble DG of ICMR.

Human Resource Development facility was augmented by imparting training to the existing manpower in the advanced area of bio-medical research including JRF/SRF. Around 30 M.Sc students from various reputed universities had undertaken 6 months M.Sc. dissertation work. Summer training was imparted to 40 university-sponsored students during the year.

Symposium on H1N1 infection was organized and H1N1 lab was inaugurated by, Sj. P.K. Acharya, Hon'ble Minister of Health & Family Welfare, Govt. of Orissa. Besides several scientific interactive meetings involving Professors of medical colleges and other reputed institutes locally were organised. Human Ethical Committee and Animal Ethical Committee meetings, invited lectures by the outside experts and regular weekly seminars, journal clubs were organised. Six monthly News Bulletin and Library News letter were published.

With the total sanctioned staff strength of 102, only 90 are in position of these only 12 scientists are now in position. During the year, this Cente has already generated funds around Rs.1.85 crore through extramural projects and fellowship programme. There are several other projects that have been taken up with foreign collaboration which are to be initiated this year and will add to the resource generation besides above.

The auditorium (240 seated) and Guest House cum Ph.D. Scholar hostel facility were taken over from CPWD in 2009.

The Centre published 17 research papers in 2008 and in 2009 till date 21 research papers have been published or in press. All publications are published in Indexed journals. The library subscribes 32 foreign journals and 30 Indian print journals for the year 2009. Besides, this year as per SAC recommendation the library subscribes on line journal Science Direct which covers 87 Biomedical Journal titles. Also library subscribes 5 online journals through ICMR online journal consortia. Besides, the Centre's library is a member of ERMED E- Journal consortia of DGHS, Ministry of Health & Family Welfare, Govt. of India.

The scientists and staff of this Centre have made continuous effort and contributed to significant output of the centre. We are deeply aggrieved on the premature demise of one of our brilliant scientist colleague late Dr.M.K. Beuria of this Centre. I sincerely thank scientists and staff for their endeavour and contributions. I am also thankful to the State Health Department and other agencies and collaborating institutes for their assistance and co-operation. I extend my deep gratitude to Council for its continuous support, guidance and encouragement. With all round support, the Centre can continue its endeavour to achieve its goal.

S.K. Kar
DIRECTOR

HIGHLIGHTS OF RESEARCH ACTIVITIES

The centre has addressed various research issues on diseases of regional importance during the period 2008-09. Total twenty-three research projects have been implemented relating to lymphatic filariasis, malaria, hepatitis, diarrhoeal disorders, haemoglobinopathies and nutritional disorders, of which nine are ongoing/ continuing and fourteen are new.

Studies on human lymphatic filariasis are continuing with multidisciplinary approach. Mass drug administration (MDA) programme to eliminate LF is ongoing,which is based on mass administration of a single dose of DEC in the recommended dosage of 6mg/kg body weight averaged for three age groups of populations i.e. 2-5,5-14 and >14 years. However, the population compliance of the programme is limited because of the fear of side reactions of the drug and by confusion of the drug dosage distributed by volunteers in various age groups. The centre has undertaken a study to test the efficacy and tolerability of single dose DEC of 100mg,200mg and 300mg strength given uniformly in all age groups in a filariasis endemic community of Orissa. The 100mg dose has been observed to be as effective in the uniform dose given to all age groups as with 200 and 300mg strengths.In addition to retaining the efficacy the lower dose (100mg) has shown lower frequency of side reaction ,which would be helpfull in enhancing compliance . Further, the immunoprophylactic potential of Glutathione-s-transferase (GST) antigen in *S. digitata* infected *Mastomys* has been demonstrated. Immunization with GST antigen not only resulted in significant reduction min Mf density but also cleared microfilaria completely from the circulation. Complete clearance of circulating microfilaria was achieved in pre-immunized and post immunized animals by 90 and 115 days following implantation respectively, indicating the protective efficacy of GST antigen in the infected *Mastomys*. Interestingly, the study on prevalence of microfilaraemia and antigenemia in paired maternal and cord sample in a filarial endemic area has demonstrated placental transfer of circulating filarial antigen(CFA) from mother to the child. The centre is developing the filarial risk map for two endemic districts (Khurda and Puri) by mapping the breeding habitats of *Cx quinquefasciatus,* the major vector of filariasis caused due to *Wuchereria bancrofti,* through remote sensing (RS) and geographical information system (GIS).

Malaria is widespread in the state and the malariometric indices remains high in some pockets. Our study on the therapeutic efficacy had shown the early treatment failure to be as high as 63.5%, late clinical failure as 13.2% and late parasitological failure to be 38.5% in four selected endemic districts of the state. The PfCRT gene (marker for CQ drug resistant) found in *P falciparum* isolates of Orissa are mrelated to Southeast Asian as well as South American strains of parasites .This is a unique situation. The health seeking behavior of the malaria endemic population surveyed indicated that at least 37.4% of the people prefer treatment from government hospitals/set up, where as 25.8% go to private practitioner and 24.5% to quack including medical stores. The pathogenesis of severe malaria is not known properly. We have observed a strong association between Glu^{298}'!Asp substitution / "C-b-Asp" haplotype in eNOS gene and cases not developing severe malaria. These mutations might be enhancing the eNOS expression and NO production leading to protection against cerebral malaria. Preliminary results indicates that expression of the PfEMP1 "B" subtypes by *P falciparum* in infected RBCs induces cytoadherence of iRBCS with vascular endothelium

during severe manifestation of the disease. Sometimes it is difficult to identify the malaria vectors of the genus Anopheles, since both the potential vectors and the non-vectors exhibit similar features and overlapping characteristics. Realizing the need, we have developed a single tube multiplex PCR technique for the detection of *Anopheles fluviatilis* cryptic species, their human host preference, and *Plasmodium falciparum* presence in the mosquito. At the same time, a filter paper based PCR method has been developed to process the mosquito species collected from the field. Survey conducted in 5 tribal districts reveals the presence of *A .culicifacies*, *An fluviatilis* , *An philipinensis* , *An varuna* and *An annularis* ,the known malaria vectors.The *An.culicifacies* adults are found to bite in the out door bait and also rest out side. The biting rhythm of *An.annularis* was crepuscular most of the biting was between dusk and 20.30hrs.Insecticide assay indicated that the *An culicifacies* and *An annularis* species found in these areas are resistant to DDT but susceptible to synthetic pyrethroids, but *An fluviatilis* are susceptible to both DDT and synthetic pyrethroids. One of the plant extract from *Cinnamomum zeylanicum* (Code name RRL010) is showing promising mosquitocidal activity.

A study has been undertaken to find out the prevalence of viral hepatitis (A, B, C&E) infection and associated risk factors in five primitive tribes (Lodha, Saora, Khadia, Mankidia and Juanga) of Orissa. Evidence of exposure to Hepatitis A virus infection (i.e HAV IgG) was 75-85% and to that of HEV was 18-49% in the above tribes. HBsAg positivity varied from 1-5% in these tribes. HCV infection was very high in two primitive tribes (Mankidia: 9.8% and Juanga: 13.8%) compared to national average (<1%).Majority of the individuals with HBV/HCV infections were within the age group of 20-50 years, although the infection was noted in children below 10years. All HBV DNA isolates were of genotype D subtype and of low virulence because majority of the cases were asymptomatic. Sharing of razor,tattoing and history of multiple injections were some of the dominant risk factors prevalent for HCV transmission in the above tribes. In depth risk factor, analysis is being carried out to develop a strategy for prevention of HCV transmission.

Bacteriological analysis of water samples collected from different sources (river, nala, chua and stream) in Kashipur, Dasmantpur, Jaipur and Th. Rampur area revealed the presence of *V cholerae* non-O1 and non-O139 serogroups in a big stream of Kashipur area. However, no rectal swab was positive for *Vibrio* and no outbreak of cholera was reported during this period in these blocks. A new hybrid strain of *V. cholerae* (*V. cholerae* O1 Ogawa biotype El Tor with classical characteristics) has been reported during the investigation of 2007cholera epidemic in Kashipur block. Subsequentl analysis of the stool/ rectal swabs referred from DHS, Govt. of Orissa indicates that the new hybrid strain of *V. cholerae* has spread to at least 6 other districts of Orissa. Diarrhoeal and environmental water samples were monitored for the presence of *Vibrio cholerae* in the tribal .The centre has rendered timely assistance to the local health authorities of Government of Orissa for control of epidemic.

Thalassaemia is considered the most common monogenic disorder in Orissa. Molecular analysis of β gene mutation in 431 β thalassaemia cases revealed the presence of IVS I-5(G'!C) mutation in 71% cases, FS 41/42(-TTCT) in12% cases ,CD 15(G→A) 7% cases, CD 30(G→C)in 4.8% cases, FS 8/9 (+G)in 3% cases, IVSI-1(G→T) in 2% cases. The tribals possess only IVS I-5(G→C) mutation whereas nontribals possess FS 41/42(-TTCT) , FS 8/9 (+G), IVS I-1(G→T), CD30(G→C) and IVS I-5(G-C) mutation . Clinically the anemia was mild to moderate in β thal traits and were found to be associated with majority of abnormalities such as pyrexial episodes, fatigue, headache , lethargy and pallor.

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Regional Medical Research Centre, Bhubaneswar

ON GOING STUDIES

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1. EFFICACY AND TOLERABILITY OF SINGLE DOSE DEC OF 100MG, 200MG & 300MG STRENGTH IN FILARIASIS ENDEMIC COMMUNITY IN ORISSA.

Principal Investigators	: Dr. B.Dwibedi
Co investigators	: Dr.S.K.Kar, Dr.N.Mahapatra
Duration	: Four Years
Starting date	: March 2006
Closing date	: April 2010
Status	: Intramural

Objectives:

1. To compare efficacy of single dose mass administration of DEC in 100mg, 200mg & 300mg strength in three defined filarial endemic population.
2. To observe the side reactions in three dosage levels as above.

Application of the research for National Health Policy

Mass drug (DEC) administration is being undertaken in the country targeting for elimination of lymphatic Filariasis by 2015. The programme is based on mass administration of single annual dose of DEC in the recommended dosage of 6mg/kg body weight averaged for three age groups of populations i.e. 2-5, 5-14 & >14 years. But the population compliance of the programme is limited largely because of the fear of side reaction of the drug and also by confusion of the drug dosage distributed by volunteers in various age groups. The present study aims at generating evidence for low dose DEC given in uniform doses for all age groups which may be equally efficacious and well tolerated. This results may help the national programme for elimination of filariasis in increasing the population compliance of the drug.

Background:

Three endemic villages from 2 districts (Cuttack & Khurda) with a population around 2000 were selected after screening several endemic villages based on Mf status (>6%) and clinical disease. After baseline examination for microfilarimia and antigaenimia two successive annual rounds of mass DEC administration either 100, 200 or300 mg was undertaken in uniform dose to all age groups in the study villages for successive years, 2007 and 2008. The study population were subjected to reassessment of filarial infection status periodically during the year following the first annual round of DEC. It was planned to continue the assessment of effectiveness of the three dosages for three successive annual rounds of MDA while observing side reaction and compliance.

Table 1: Baseline Characteristics of the Population in selected site.

Parameters	Site A 100 mg	Site B 200 mg	Site C 300 mg
Total Population(dejure)	1808	2124	1907
Eligible Population (excluded < 2 yrs, pregnant, very ill subjects)	1493	1710	1613
2-5 yrs	213(14.6)	250(14.6)	224(13.8)
6-14 yrs	299(20)	342(20)	275(17.04)
> 14 yrs	981(65.7)	1118(65.3)	1114(69)
Population covered	1126(75.4)	1191(70)	1225(76)
ICT +Ves (%)	(23.4)	(27.3)	(17.1)
Mf +Ves	86(9.8)	98(8.7)	82(6.6)
Lymphoedema Cases	42(2.4)	89(4.3)	84(4.5)
Hydrocele Cases	93(5.3)	101(4.8)	96(5.2)

*Nos in parentheses are in percentage
Mf rate and density calculated in 40ul peripheral blood slides.

Table 2: Entomological indices of three study sites

Entomological Indices			
	Site A(100mg)	Site B (200mg)	Site C (300mg)
Cx quinquefasciatus			
Density(PMHD)	11.8	11.0	10.1
Infection rate (%)	0.5	1.5	0.5
Infectivity rate (%)	0.5	1.5	0.5

The study population was comparable and covered all ages and both sexes

During the first two annual rounds of mass administration, DEC compliance was 86%, 85% and 80% in the year 2007 and 79%,73% and 75% in the year 2008 in 100mg,200mg and 300mg regimen sites respectively (Fig 1). Side reaction frequency was noted to be higher in the 300mg dose and the frequency was reduced in the second round of the MDA (Fig 2). Majority of the side reactions were mild and no severe reaction observed.

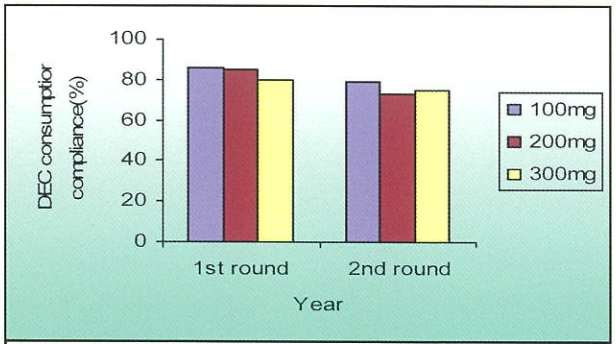


Fig 1: Population coverage in 3 regimen sites in 2 annual rounds

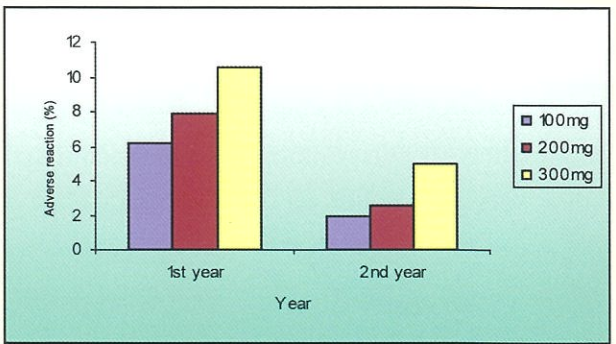


Fig 2: Frequency of side reaction to DEC in three regumen groups in 2 successive annual rounds (2007 and 08)

Microfilaria clearance and reduction in Mf count was assessed in all the three regimen sites. Post MDA follow-up in all three study sites for Mf status with mean duration at 4th month has shown 48.7% , 44% & 64% Mf clearance in the 100mg, 200mg & 300mg dosages respectively & that at 12 months follow-up was 54%, 52% & 62% respectively (Fig 3) which indicated efficacy of DEC in clearance of microfilaria. Mf clearance was also comparable in all the three regimens in the population above 14 years.(Fig 4) The difference was not significant statistically.

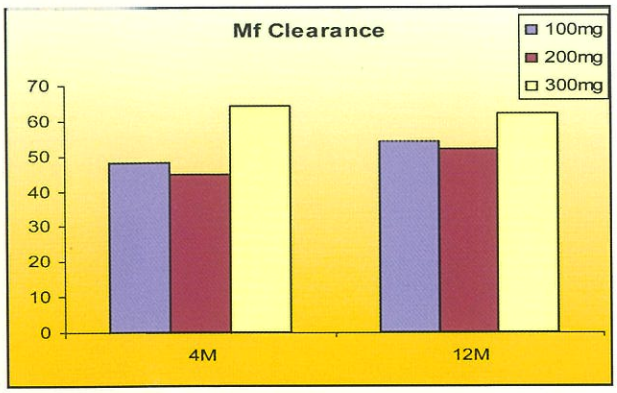


Fig 3- Mf clearance in the three regimens

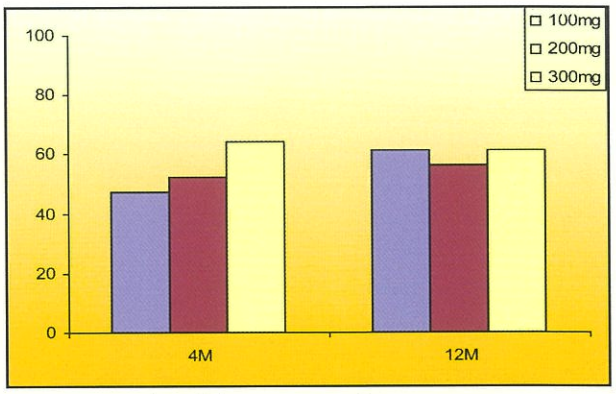


Fig 4- Mf clearance in>14 years age group

Progress:

The study population was reassessed for Microfilaria at 24th month, and the third annual round of MDA was instituted in the year 2009.

The percentage compliance of DEC consumption in the third round (2009) MDA was 76, 71 and 72% in the 100mg, 200mg and 300mg sites respectively and the frequency of side reaction was 0.9, 1.7 and 2.5% in the above sites.

Microfilarial clearance was seen to be 83%, 81.4% and 87% in the 100mg, 200mg and 300mg sites respectively. Currently found microfilaria rate was 4.27%, 3.04% and 2.03% in the above three sites respectively against the baseline microfilaria rate of 9.8%, 8.7% and 6.6% respectively.

Figure 5 & 6 shows the effect of two rounds of MDA on Microfilarial clearance among Mf positives and Mf rate in the community at baseline and after MDA(1st year & 2nd year).

Figure-5

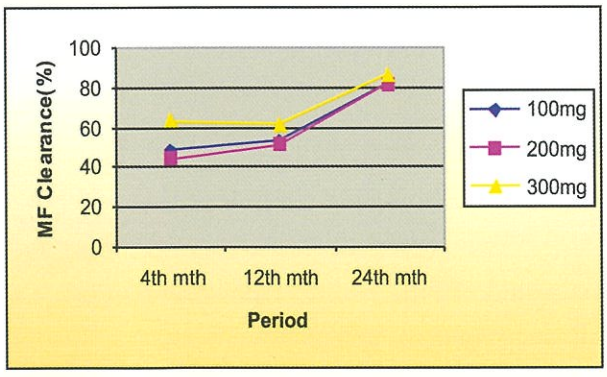
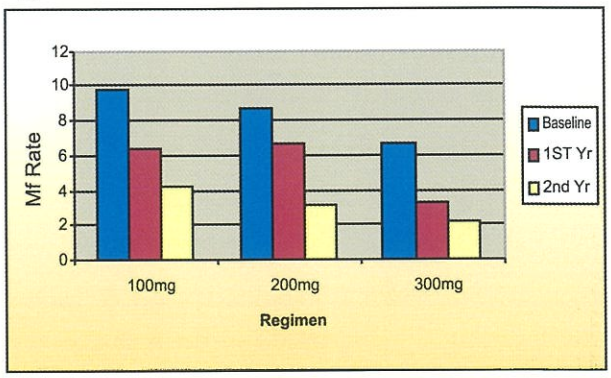


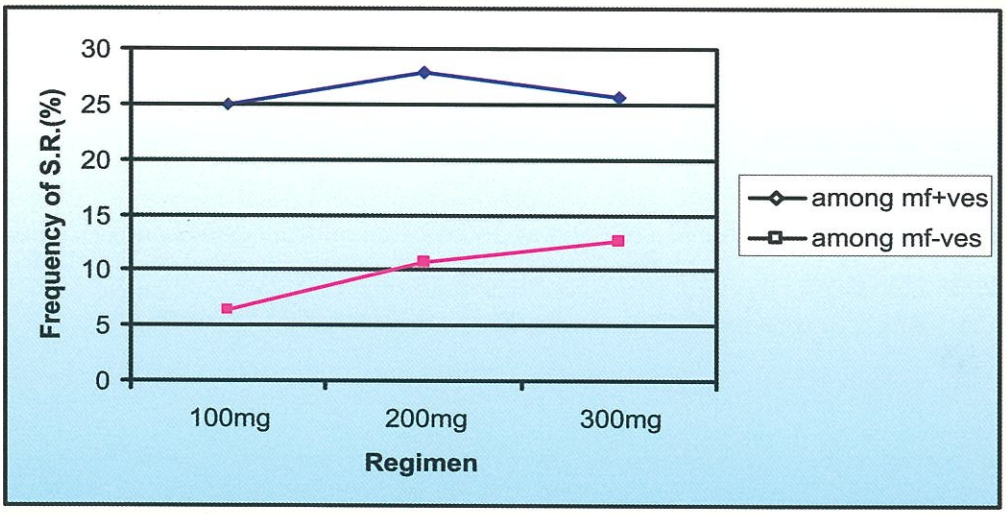
Figure-6



Occurrence of side reaction among microfilaraemic and amiccrofilaraemic individuals, who received DEC during 1st annual round of MDA (2007) was analysed, which has shown that, there was no significant difference within the Mf+ve individuals in the 100, 200 or 300mg dosage group, whereas the frequency of side reaction was higher with higher dosages (200 & 300mg) in comparison to 100mg dose within the amicrofilaremic subjects ($P < .05$). Fig.-7 shows the comparative frequency of side reactions in the above three regimen sites. It is also indicated that proportion of individuals reporting side reaction was higher among the Mf+ves then the Mf-ve individuals in the corresponding treatment group.

Figure-7

Frequency of Side Reaction (%) among of mf+ves & mf-ves (after 1st round of DEC intake)



Entomological Evaluation for Vectorial transmission

Entomological investigation were carried out to assess the impact of three different doses of DEC (100mg, 200mg and 300mg) cited above on transmission parameters after each round of single dose administration in all the three cited villages by molecular xenomonitoring and dissection of *Cx. quinquifasciatus.* A total of 1247 vectors were collected. Out of them 952 were dissected for the presence of larval stages of *W.bancrofti* and rest of the mosquitoes were processed for xenomonitoring (Fig-8). The baseline data on vector density, infection and infectivity rate were calculated.

There was a sharp reduction on infection and infectivity rate in all the three regimen. the mean infection rate after 1st round of DEC administration were 2.16, 2.9 & 1.8%, which came down to 1.0, 1.1 & 0.8% in 100mg. 200mg & 300mg regimens respectively after 2nd round of DEC (Fig-9)

The mean infectivity rates were 2.16, 2.3 & 1.2% after 1st round of DEC, which came down to 0.7, 1.0 & 0.4% during the 2nd round in the above mentioned three regimens (Fig-10)

The percentage reduction in infection rates were 53.8, 62.1 & 55.6% & of infectivity rate 68.0, 57.6 & 67.7% and for L3 this was 43%, 17% & 28.6% in 100, 200 & 300mg regimens (Fig-11)

No significant difference in percentage of reduction was observed in the three different doses of drug administration.

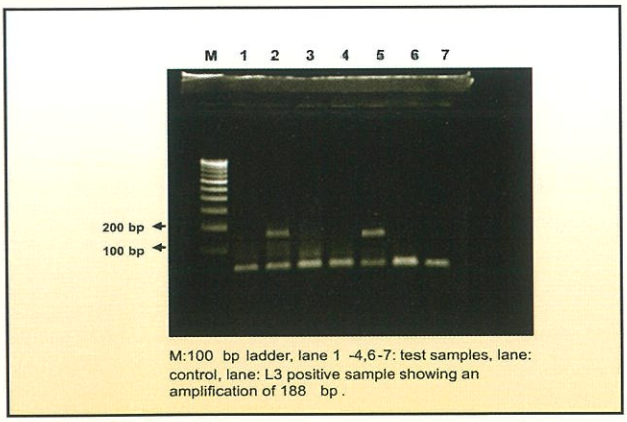


Fig-8 Xenomonitoring of *Cx.quinquefascitus*. Gel photograph of L3 showing amplification at 188 bp

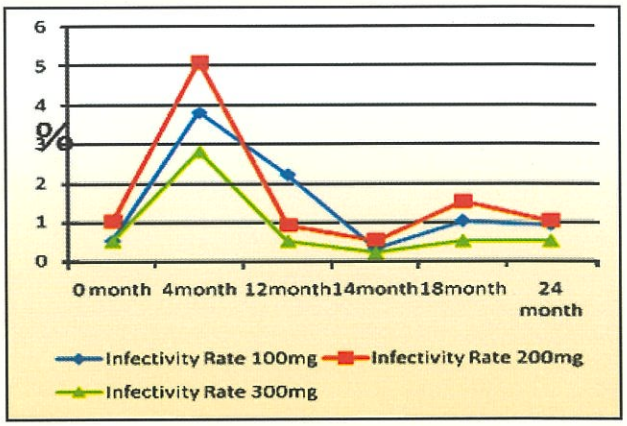


Fig.-9 Infection rate variation during 24 months.

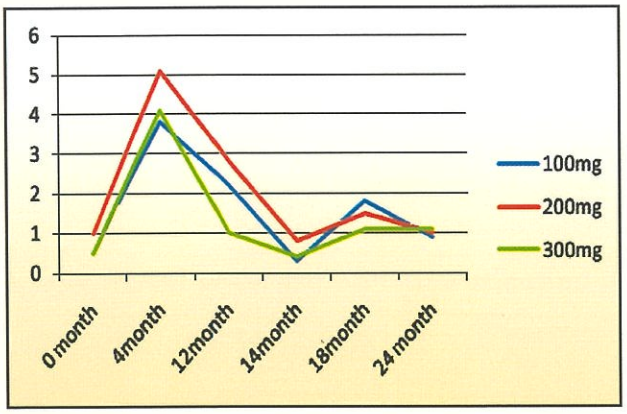


Fig.-10 Infectivity rate variation in during 24 moths of MDA

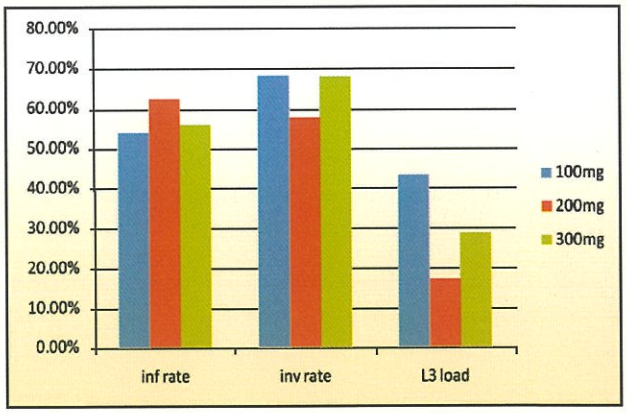


Fig.-11 Percentage of Reduction of transmission parameters in 3 regimen sites.

Subsequent plan of activity

The study population will be subjected to night blood examination for microfilarimia at 30 and 36th months and CFA at 36th month following third annual round of MDA for evaluation. The effect of third round of MDA will be assessed for both the above parameters to check sustainability of the drug efficacy at three dosage levels.

2. EFFECT OF ALBENDAZOLE DOSE AND INTERVAL ON *WUCHERERIA BANCROFTI / BRUGIA MALAYI* MICROFILARIAL CLEARANCE IN INDIA: A RANDOMIZED, OPEN LABEL STUDY.

Investigators	:	Dr. S.K.Kar
Co-Investigator	:	Dr. B. Dwibedi, Dr.A.S.Kerketta , Dr. A. Maharana Prof. S.S.Panda, Professor, Department of Medicine, KIIMS, Bhubaneswar
Duration	:	Three years
Starting date	:	October 2008
Duration	:	October 2011
Status	:	Extramural (Gates Foundation, USA)

Primary Objectives

To determine whether increasing the albendazole dose or the frequency of treatment with DEC/albendazole is more effective than the current WHO-approved mass treatment regimen at clearing microfilaremia as assessed by night time microfilarial counts in *Wucheraria bancrofti / Brugia malayi* microfilaria-positive patients.

Secondary Objectives

1. To assess the effect of the study treatments on adult worm burden, in those subjects with Doppler sonography detected worm nests at baseline, at 12 and 24 months

2. To assess the effects of the study treatments on microfilaremia and adult worm burden after 2 years.

Background

Lymphatic filariasis (LF) remains one of the leading causes of disability in tropical areas worldwide. Most cases of lymphatic filariasis are caused by the filarial nematode, *Wuchereria bancrofti* (Wb) although *Brugia malayi* (Bm) accounts for approximately 10% of the ~129 million estimated cases worldwide. Adult parasites reside in the human lymphatics, where they can elicit an inflammatory response that can result in lymphangitis acutely. Symptoms usually appear 5-18 months after exposure to an infected mosquito. Long-term exposure and repeated infections can lead to lymphedema, hydrocele, and/or elephantiasis. Microfilariae, produced by the adult parasites, circulate in the bloodstream.

Currently, single dose albendazole (400 mg) and DEC (6mg/kg) is administered annually for 4-6 years, a regimen approved by the World Health Organization (WHO), to interrupt transmission in all filariasis-endemic

regions except Africa where ivermectin and albendazole is used. Although some of the medications (albendazole and ivermectin [in Africa]) have been donated by GlaxoSmithKline and Merck, distribution has been stymied in many countries, including India, because of the cost and practicalities of implementation of the program. Domestic governments provide a large proportion of resources for projects, in addition to the costs associated with personnel training and volunteer time. Both financial and non-financial costs for program coordination and implementation constitute a major investment for the treated communities. The largest impediment to mass treatment lies in individual countries' inability to sustain mass treatment for 5-7 years. Since microfilarial levels in the blood are directly responsible for continued transmission, a more effective suppressive regimen could shorten the overall duration of the mass treatment programs, decrease cost, and increase compliance.

Progress

Following approval of the Council (ICMR) & Health Ministry Screening Committee (HMSC), Govt. of India and ethical committee of this Centre , funds were received by the Centre (RMRC, Bhubaneswar) during Oct. 2008. The project activity was initiated for enrollment of 100 eligible microfilaraemics in to the four arm study, (25 subjects in each arm) as under:

1) S1 –DEC 300 mg + ALB 400 mg –annual
2) S2 - DEC 300 mg + ALB 400 mg –semi annual
3) H1 – DEC 300 mg + ALB 800 mg – annual
4) H2 - DEC 300 mg + ALB 800 mg – semi annual

Methods

Study site selection

Villages endemic for *W. bancrofti* infection around Bhubaneswar have been selected for the study. The Villages situated around 30 -50 kms from the Centre, has been visited by the team to undertake rapid survey for endemicity of filarial disease. Nine villages (Madanpur, Kaimatia, Deulipatna, Jagasara, Paniora, Saranga, Giringaput, Kujimahal, Panchupalli) were chosen during the survey for assessment of microfilaraemia by night blood examination.

Pre-screening field preparation

Before initiating Mf screening in the selected villages, community meetings were arranged to impart knowledge on filarialiasis, process & benefit of the study programme in the community.

Community meetings were held in presence of the village heads, panchayat members & the villagers. Awareness was created through group discussion, audiovisual aids, printed leaflets etc. During this process individuals were made aware of and sensitized about the research study and need for the study to encourage voluntary participation into the study.

Identification of microfilaraemics

Following field IEC activity, the team organized screening camps in the villages to identify microfilarimics individuals in the age group of 18 -55 yrs requisite for the study. The finger prick blood (30 micro liter)

was collected from volunteers at night between 9 PM – 11 PM after taking informed consent, and thick smear prepared for Mf detection, Primary health care was also provided by physician to the individual participants, attending the screening camp.

Amongst approximately 4000 subjects screened, 1716 individuals were within the age range of 18 – 55 yrs from 9 villages investigated by finger prick mf survey. Out of them, 92 microfilarimics are identified based on the presence of mf in their thick smear and were found apparently healthy with or without filarial signs, who are apparently eligible for the study.

Screening for eligibility for enrollment:

Microfilaraemic individuals(in batches) within the prescribed age group(18 – 55 yrs) were explained in detail about the study procedure, risk and benefits of the participation, utilization of the study outcome, autonomy of the participants for inclusion or withdrawal from the study etc. by the team physician in local language. Informed written consent was obtained from the willing individuals for screening investigations required for the study. After getting the consent the individuals were examined clinically and intravenous blood (4- 5ml) collection done after 9 PM under supervision of the doctor. The samples were coded aliquoted in the field and transported to RMRC laboratory and investigations performed. Investigation included serum alanine transaminase (ALT), Creatinine, Mf count and Hemogram.

Thirty one subjects out of 92 microfilaraeamics identified were screened so far and all found eligible for enrollment according to the inclusion and exclusion criteria of the study.

Randomization

For the four armed study drug allocation was based through randomization of allocation number. Random numbers were generated by statisticians through computer based random list for the four arms. A random number table was prepared, according to the enrollment ID numbers. An individual would then be allotted to the respective arm, allotted in the random list.

Enrollment, Drug allocation and follow up at Hospital

The subjects so screened at field were contacted in their villages and were transported to Bhubaneswar for further scrutiny and enrollment in the study. Subjects were admitted to the hospital (KIMS, Bhubaneswar) for drug allocation .Before enrollment in to study informed written consent was obtained from the eligibles after screening. Baseline clinical examination done and history of illness recorded. The subjects were investigated for adult filarial worm by ultrasonography, of inguino-scrotal and axiliary region. Intravenous blood (3 – 4 ml) collected between 9-10 PM in the hospital. Blood samples were then transported to RMRC lab. Baseline Mf count was done by membrane filtration form I.V. blood and hemogram performed as per protocol, prior to allocation of drug. Baseline ultrasonography (USG) examination was done on all 31 enrolled individuals which have shown Filarial Dansing Signs(FDS) positive in 24 subjects.

Subjects enrolled to study fulfilled all clinical and hematological criteria of eligibility. Drug allocation to each subject was done next day morning at 9 AM, half an hour after breakfast as per allocation number, supervised by physician investigator. After drug intake vital signs monitored 6 hourly and side reactions if any recorded. Symptomatic management of the side reactions were done by the team doctor and recorded. Ultrasonography was re performed within three day of drug allocation on the subjects showing positive FDS at baseline. Subjects were discharged after 48 hrs post drug follow up in the hospital and followed up in the village daily for 7 days for any adverse reaction. Additional visits were done when felt necessary. Subjects were advised to report of any side reaction they experienced at home.

Observation

Thirty one subjects have been enrolled till date for treatment, assigned into four arms (given in table).The pre and post treatment investigations are given in following table-2.

Table 1: Number of patient enrolled to each treatment arm

Treatment Arm	Dosage	No. enrolled	
		Male	Female
S1	DEC 300 mg + ALB 400 mg - annual	10	0
S2	DEC 300 mg + ALB 400 mg - semi annual	15	0
H1	DEC 300 mg + ALB 800 mg - annual	02	0
H2	DEC 300 mg + ALB 800 mg - semi annual	04	0
	Total	31	0

Table 2: Pre drug assessment of enrolled patients

Sl.	Parameters tested	Test Result^{o}	Eligibility criteria for enrollment	Normal Laboratory Range
1	Hemoglobin(gm%)	10.2-16.9(13.9)	>9.0	14-16 gm%
2	Eosinophil (%)	2-16(12.6)	*	2-6 %
3	Serum ALT(U/L)	13.6-29.8(15.8)	Not > 30	5-40% IU/L
4	Serum Creatinine(mg/dl)	0.4-1.2 (0.8)	Not > 1.2	0.8-1.3 mg/dl
5	Stool helminth	Nil	*	No helminth
6	Urine Pregnancy test	Not applicable**		Negative

* The parameters are not covered under investigations for eligibility
** All were male subjects
* Figures in parentheses indicate mean value

Table 3: Age, Sex, Infection and Disease Status in the population enrolled (n=31)

Age inYrs	Male (n=)	Female (n=)	Total	Mf Count Range(GM)	Antigen (OG4C3)		Disease Status	
					No tested	Units Range(Mean)	Asymptomatic carrier	With Mf & H/O Disease
18-24	11	0	11	56-3000+ (585.4)	9	168-34134(6770.5)	5	6
25-40	13	0	13	56-3000+ (261.0)	9	224-21294(2965.4)	5	8
41-55	7	0	7	54-1691 (258.6)	4	168-21426(5748.1)	0	7
Total	31	0	31	54-3000+ (344.1)	22	168-34134(5027.8)	10	21

Table 4: Pre and Post drug observation of adult worms by ultrasonography

Parameters	Treatment Arm		
	S1+S2	H1+H2	Total
No of subjects enrolled	25	06	31
No with FDS positive at baseline	20(80 %)	4(66.6%)	24(77%)
Post Rx FDS absence out of baseline positives	3(15 %)	1(25%)	4(16%)

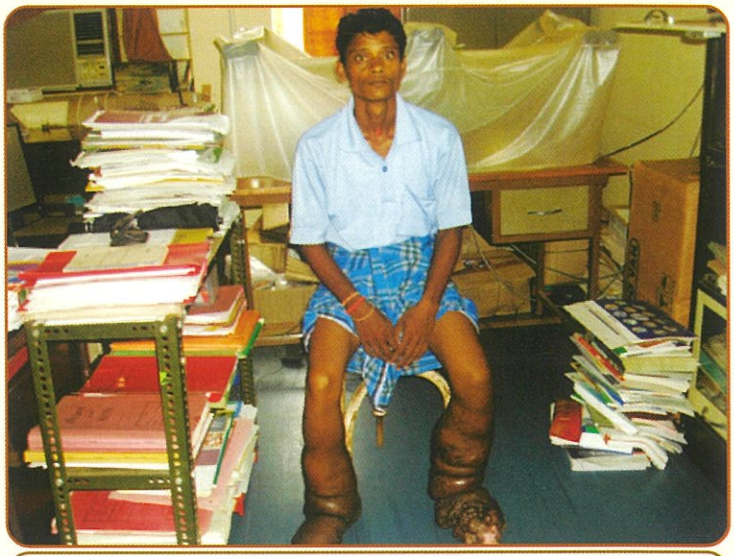
Table 5: Side reaction following drug intake

Treatment Arm	No. of subjects	No. With A.Es (%)	No. With SAE
S1+S2	25	15(60%)	0
H1+H2	6	3(50%)	0
Total	31	18(58%)	0

The baseline Mf count of the enrolled subjects ranged between 54 to 3000+ Mf/ml of blood (Table-3). Post drug evaluation by ultrasonography has shown disappearance of FDS in four out of 24 subjects positive for FDS at baseline (table-4).Eighteen individuals out of 31 studied so far reported side reactions following drug intake (Table-5). Side reactions reported were fever (n = 9), headache (n=4), head reeling (n=2), fatigue (n=1), testicular inflammation (n=9) subcutaneous nodule (n =1), increase in hydrocele size (n =1) and dizziness (n=1). No severe Adverse Event (SAE) has been noted.

Onset of fever, reeling of head and fatigue was observed onset within 6-24 hr, and persisted for 10-36 hr. Testicular inflammation and appearance of nodule in extremity was noted within 3-9 days post drug and persisted for 3-7 days. The adverse events were managed with paracetamol and oral fluids as and when required. All the side reactions disappeared within 10 hrs to 7 days of initiation of the side reaction.

Plan for next year



Filaria OPD: A patient with grade IV elephantiasis

Further 69 subjects are to be enrolled into the study to complete the first round for 100 subjects in the next 2 months period. For this already identified microfilarimic individuals will be further screened for eligibility and only the eligibles will be enrolled into the study after obtaining their informed written consent. Then, drug allocation will be done as per random list and follow up will be done for any side reaction and adverse events. Subsequently the individuals will be followed up six monthly. Repeat drug administration and follow up investigations will be undertaken as per protocol following the treatment arm assigned to the enrolled individuals.

3. ROLE OF CD5+ B-LYMPHOCYTES IN HUMAN LYMPHATIC FILARIASIS

Principal Investigator	:	Dr. A.K. Satapathy
Co-Investigator(s)	:	Dr. B. Dwibedi
		Dr. P.K.Sahoo
		Dr. S.K.Kar
Duration	:	Three years
Starting date	:	Jan 2009
Status	:	Extramural (DST)

Objectives:

1. To study the profile of B1 cell populations and its association with poly reactive antibodies in filarial infected human population.
2. To study the role of B1 cells in cytokine responses by filarial proteins and carbohydrates antigens in filarial infected human cells.

Background

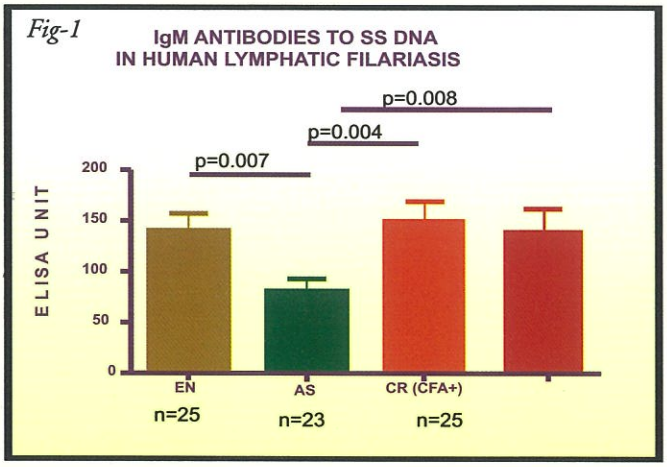
The importance of T cells in host protection against filarial infection is well documented. In contrast, the role of B cells in host protection against filariasis remains unclear. B-lymphocytes exist in two subsets

termed as B-1 and B-2 cells. In normal humans and mice, B-1 cells are committed to production of poly reactive natural antibodies. In contrast, conventional B-cells (B-2) are mainly involved in the production of antigen driven antibodies. Several findings in literatures point towards a host protective role for antibodies in filariaisis. Limited studies have shown that B1 cells play an important role in the outcome of infection in experimental filariasis, Schistosomiasis and S. pneumonie. XID mice, which lack B-1 cells, have been found to be susceptible to Schistosomaisis and filariasis. However, no information regarding status of B-1 cells in clinical manifestation of human bancroftian filariasis exists. Further, absence of naturally occurring poly reactive antibodies (produced by B-1 cells) has been associated with susceptibility to filarial infection in XID mice. Jirds, the most susceptible animal models for B.malayi, are found to be significantly deficient in eliciting antibodies to naturally occurring antibodies to single stranded DNA, Lipopolysaccharides (LPS) and phospholipids. These observations point towards the possibility of poly reactive antibodies playing a significant role in the parasitological outcome in the exposed population. An attempt has been made to quantify polyreactive antibodies in human filarial infection.

Progress of work:

The project has been approved by DST and the fund is yet to be released . Preliminary work is initiated with the intramural fund since August 2008. Endemic population in Khurda district (Village Tiramala) were divided into different clinical categories of endemic normals, asymptomatic microfilariaemic carriers, acute and chronic on the basis of clinical, parasitological status and presence or absence of circulating filarial antigens. Efforts are being made to collect samples from the filarial endemic areas. Plasma were separated which were used for quantification of antibodies reacting to various antigens. We quantified antibodies reacting to the SS-DNA in the spectrum of clinical manifestations. As shown in Fig-1 the IgM antibodies to SS-DNA were significantly low in cryptic cases in comparison to endemic normals and chronic cases. No significant difference in the antibodies levels to SS-DNA was observed in chronic patients in relation to endemic controls. Antibodies levels to other antigens such as actin, myosin, LPS etc are being evaluated in the filarial sera.

Fig-1



Plan for Next Year

The profile of B-1 cells population in filarial infected human population and its association with poly reactive antibodies will be studied. The role of B1 cells in cytokine responses by filarial antigens in filarial infected human cells will be analyzed.

4. EFFECT OF MATERNAL INFECTION ON NEONATAL IMMUNE RESPONSES IN BANCROFTIAN FILARIASIS.

Principal Investigator	:	Dr. A.K.Satapathy
Co-Investigator(s)	:	Dr. M.S.Bal , Dr. N.N.Mandal, Dr. S.K. Kar
Duration	:	Three Years
Starting date	:	August 2008
Status	:	Extramural (Immunology Task Force, ICMR)

Objectives

1. To study the B cell response (antibody isotype) filarial antigens in cord blood samples of offspring and in corresponding mothers.
2. To evaluate the influence of maternal filarial infection on mitogen and filarial antigen induced cellular responsiveness and cytokine production in cord blood of neonates.
3. To compare the expression profile of T regulatory cells in cord blood of neonates born to infected and uninfected mothers.

Background

The study has been approved by Immunology Task Force of ICMR for funding but fund is yet to be released. The work has been initiated with the intramural funding of the centre. Lymphatic filariasis caused by filarial nematode *Wuchereria bancrofti, Brugia malayi* or *Brugia timori* and continues to be a major public health problem, in many tropical countries. The manifestation varies from asymptomatic infection to severe pathology. Although host genetic polymorphism and other environmental factor may influence susceptibility to infection and disease, maternal filarial infection has been considered a risk factor for increased susceptibility and facilitated parasite persistence in offspring. A number of studies have shown that children whose mothers were microfilaraemics during gestation were more likely to be microfilaraemics compared to children whose mothers were amicrofilaraemics during gestation. Children borne of filarial infected mothers have been shown to impair filarial Ag-specific T cell responses. Children of infection free mother have been shown to respond vigorously to filarial antigen with lymphocytes proliferation, production of IL-2 and IFN -g. The above observation lead to the hypothesis that prenatal exposure may affect the subsequent immune responses and the ultimate out come in the later period of their life.

Results

To find out the effect of maternal infection on transplacental transfer of circulating filarial antigens (CFA), cord blood along with the corresponding mother blood samples were collected from District hospital ,Khurda. The prevalence of microfilaraemia and antigenemia in paired maternal and cord sample were determined. Fourteen mothers (11.8%) out of 119 studied were observed to be microfilaraemic. Mf counts among microfilaraemic mothers varied from 3 to 210 per 60 ml blood. All the cord sera found to be negative for microfilariae. Presence of circulating filarial antigen (CFA) was determined in

both maternal and corresponding cord blood samples using Og4C3 enzyme linked imunosorbent assay kit. All the microfilaraemic mothers tested were antigen positive. Interestingly, 39 of 105 amicrofilaraemic mothers were also found positive for CFA indicating the presence of adult worm within them. An overall CFA positivity among mothers was noted to be 44.5%. None of the cord samples from CFA negative mothers were CFA positive. Where as, 24.5% of neonates from CFA positive mothers were tested for CFA positive suggesting placental transfer of CFA from mother. An overall prevalence of antigenemia among all the cord samples was observed to be 10.9 %.

Table 1.
Prevalence of microfilaraemia and antigenemia in maternal and cord samples.

Maternal infection status		No. tested	Cord blood infection status			
			Microfilaraemia		Antigenaemia	
			N	(%)	N	(%)
Microfilaraemic	CFA +ve	14	0	(0)	11	(78.6)
Amicrofilaraemic	CFA +ve	39	0	(0)	2	(5.1)
	CFA-ve	66	0	(0)	0	(0)

Immunological evaluation of humoral responses (IgG, IgM and IgE) to filarial antigen was determined in paired maternal and cord samples to evaluate the influence of maternal infection on the development of antifilarial immunity in offsprings. IgG antibody was detected in 60.5% of maternal and 21.8% of cord samples. Filaria specific IgM antibodies in mother and cord were 62.2% and 5.04% respectively. IgE antibodies could be detected in 63.9% mother and 12.6% of their cord samples. No significant difference was observed in prevalence of IgG, IgM & IgE antibodies in CFA positive and negative mothers, emphasizing the extensive exposure to infective larvae in a high filarial endemic region. Filaria specific IgM and IgE isotype that do not cross placenta have been detected significantly higher in cord blood from infants born to infected than uninfected mothers suggesting that sensitization to filarial antigens developed in utero.

5. MAPPING OF VECTOR HABITATS FOR FILARIASIS THROUGH REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEM (GIS)

Principal Investigator	:	Dr. N.Mahapatra,
Co-Investigator(s)	:	Dr. R.K.Hazra, Dr.S.K.Parida
		Mr. N.S.Marai
Duration	:	Two years
Starting date	:	March 2007
Closing date	:	February 2010
Status	:	Extramural (ICMR Task force)

Objectives

1. Mapping of vector habitats of filariasis in two endemic districts of Orissa through Remote Sensing and GIS.
2. Development of filariasis risk map

Background

Identification of landscape element that predisposed human to risk of filariasis transmission is important for understanding and controlling lymphatic filariasis. Features in landscape such as vegetation provide food and resources such as shelter, resting and developmental sites for mosquitoes. Geographic information system (GIS) technology allows the examination of remotely sensed land elements that relate to vector abundance and therefore transmission risks. For mapping mosquito breeding habitats with associated health risk using remote sensing was not precisely studied much. However Hassa & Onsi(2004) used remote sensing as a tool for mapping mosquitoes breeding habitats and associated health risk to assist control effort and development plan. Therefore the present study was initiated to use GIS & RS as a tool for mapping filariasis vector breeding habitat.

Progress

Based on the preliminary survey done by the investigators in some villages, three blocks in two endemic districts(Jatni of Khurda and Satyabadi of Puri district) and one block in a nonendemic district (Angul of Angul district) are selected for the study. All three blocks are covered in two scenes of LISS-III(Multi spectral sensor) and five scenes of Pan chromatic sensor of IRS-IC/ID Satellite.

Last year after geo-environmental zonation of the blocks adult mosquitoes and larval collection were done from the selected villages for the whole year. Vectors breeding sites survey done with GPS till September 08 were extended to all the index villages and larval density data were obtained . Last year data showed the infection and infectivity rate of Jatni and Satyabadi blocks to be 10 % and 5.4 % respectively in the above villages. Non spatial data base on soil and water were generated and remote sensing data for Angul block were done. Further progress during the last year is being cited below.

Ground data

The microfilaria rate of Jatni and Satyabadi, the two endemic blocks, were 12.4 and 10.2% respectively. Satyabadi block is endemic for both *Wuchereria bancrofti* and *Brugia malayi* infection whereas only *bancrftian* filariasis is seen in Jatani. Initially the landuse parameters of endemic blocks were compared with non-endemic blocks for parameter like water bodies, aquatic vegetation, rainfall and less forest coverage, low elevation (Table 1).

Larval survey carried out in sampled breeding places in all three blocks , showed 58.4 and 61.7% breeding places to be positive for *Cx.quinquefasciatus* larvae in endemic blocks Satyabadi and Jatani respectively and the same was found to be 22.4% in Angul (Non-endemic) block. The distribution of *Cx.quinquefasciatus* larvae in different breeding habitats is shown in Table 3. *Ma.annulifera* and *Ma. uniformis* larvae were found in ponds of Satyabadi block, which are consided as the vectors of *B.malaui* .In both the endemic block, it was seen that most of the houses are surrounded by either paddy fields or at close proximity to the pond. The

drainage system of these households opens to the rice field or pond. These meeting points of drain to the rice field or pond becomes breeding place for *Cx.quinquefasciatus* .In villages people store the cow dung for the manure purpose in a pit near their house. Before rainy season they use this in the paddy fields. In the rainy season the water accumulate in these pits and it becomes the main sources of mosquito breeding source in the rainy season. This was observed in all the three blocks.

The larval distribution of *Cx.quinquefasciatus* was found more in drains followed by cesspit in both the endemic blocks but in non endemic block the presence of larvae were more in cesspool than in drain.

The adult mosquito collection revealed the presence of five genera i,e. *Anopheles, Aedes, Culex ,Mansonioides ,Armigeres. Cx. quinquefasciatus* were found to be the most dominant species in Jatani (56%) and Satyabadi block(44%) respectively. The *Mansonioides* contributed 21% of the total mosquitoes collected from Satyabadi Block.

Anopheline mosquitoes were found more in numbers than *Cx. quinquefasciatus* . The per man hour density (PMHD) of *Cx. quinquefasciatus* was high in Jatani(W.b) compared to Satyabadi (W.b+B.m)and very low in Angul. The PMHD of *Ma.annulifera* and *Ma.uniformis* were 19.4 and 12.1. Details of the vector collected, infection, infectivity rate and L3load are presented in Table-4. The infectivity rate of *Cx. quinquefasciatus* were **10.01%** (Jatani) and **5.4%** in Satyabadi. *Ma.annulifera Ma.uniformis* showed infectivity rate of 12% and 6.8% respectively in Satyabadi block.

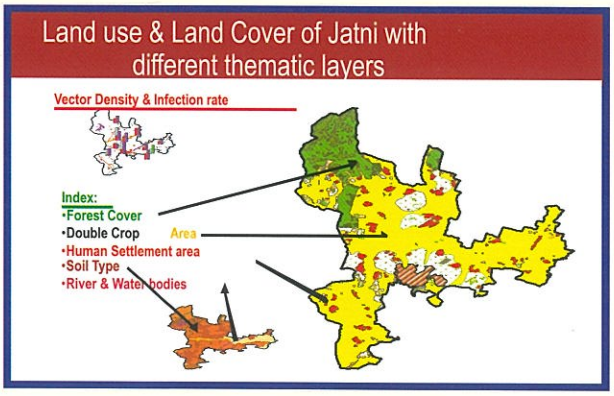


Fig-1

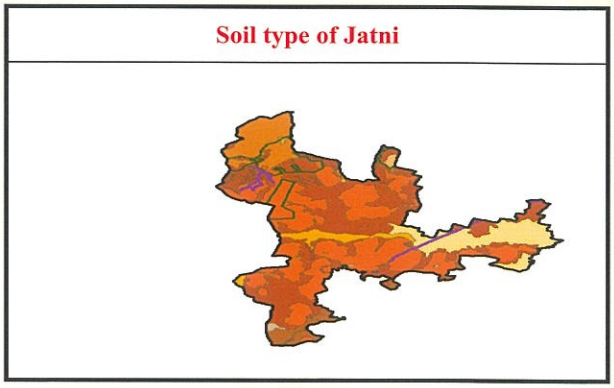


Fig-2

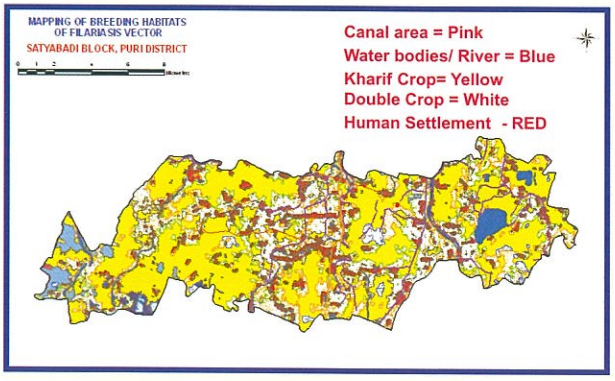


Fig-3

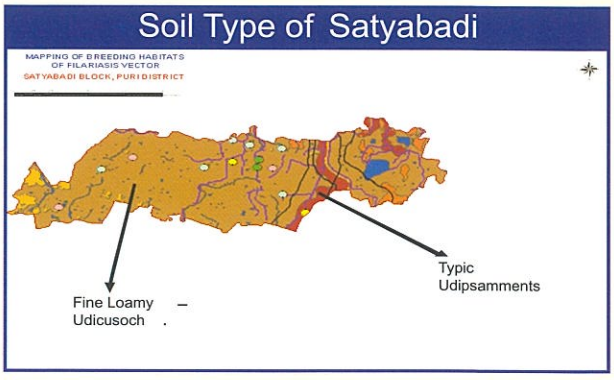


Fig-4

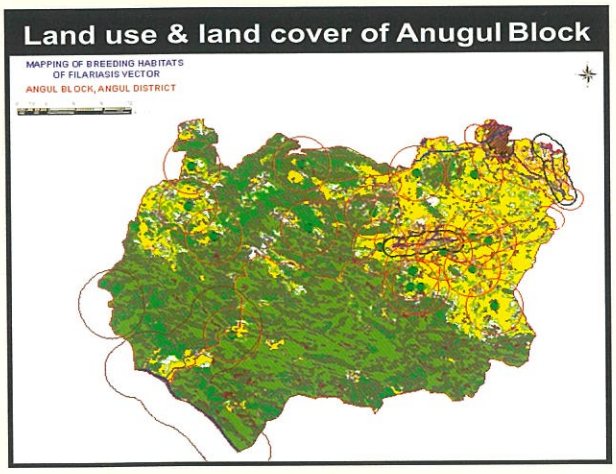


Fig-5

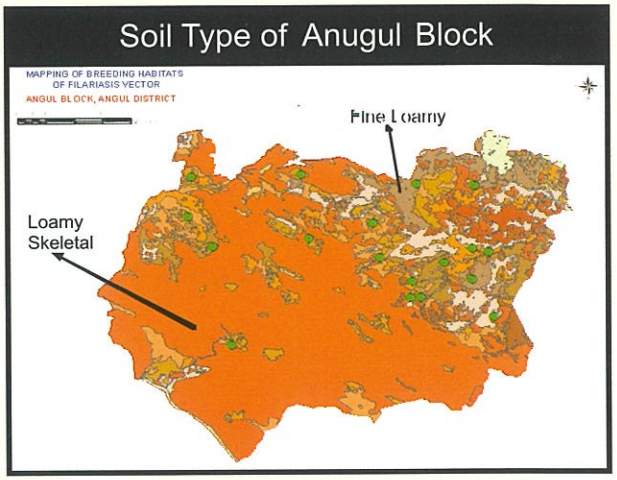


Fig-6

Geo-environmental parameters and Tranmission indices of the three Studied blocks.

	Jatni (W.b.)	Satyabadi (W.b+B.m)	Anugul (NE)
Forest coverage	1.506%	0.0009%	30.503%
Ag. Vegitation	0.057%	0.097%	0.003%
Water bodies	0.289%	0.317%	0.16%
Elevation	>20MSL	>10MSL	>600MSL
Total Rainfall in mm	1841	1627	1138
Temperature (°C)	27.9	26.7	29.2
Relative Humidity (%)	75.5	81.01	61.1

Entomological Data

	Jatni	Satyabadi	Anugul
Mf rate	12.4	10.2	0
Larval Density	31.1	14.8	1.6
Breeding site positive	(Drain-76%)	(Drain-54%)	(Drain-48%)
Vector Density	47.1 (Cq-56%)	24.9 (Cq- 44%)	2 (Cq- 19%)
Infection rate	11.68	8.16, 14.07, 10.13	0
Infection rate	10.0	5.4, 12. 6.8	0
L3 Load	3.08	3.88, 1.2, 1.1	0

Romote Sensing Date

	Jatni	Satyabadi	Anugul
Soli type (fine Loamy)	>60%	>90%	<10%
Soil Moisture Index	0.02-0.35	0.02-0.43	0.02-0.43
NDVI			

	JATNI	SATYABADI	ANGUL
Fine Loamy	>60%	>90%	<10%
Soil Moisture Index	0.02- 0.35	0.02- 0.43	0.02- 0.43
NDVI			

Remote Sensing Survey and GIS Based Database Generation

The spatial and non spatial information layers were generated from satellite data after rectification with standard Survey of India Topo maps and masking the digital data by the district boundaries The administrative boundaries like blocks & villages were collected from census data and were digitized using RzV software .The administrative database were generated through ARC/INFO GIS software package. The data set specific to study was derived from remote sensing (IRC-10/LISS III), topographic maps (1:50,000), survey, ground truth and epidemiological data from the district. Thematic layer developed were block and village map, land use and land cover, soil type, river & canal system, water bodies, double crops. Land use map was further used to derive another thematic layer like forest cover, soil moisture index and Normal differential vegetation index (Fig 1-6).The analysis was done within Arc/view GIS to stratify the district. Thematic maps of ecological parameters were overlaid on filariasis prevalence map (Mf rate) to identify the parameter responsible for different level of filarial prevalence .The current study clearly identified the risk factors to be the soil type, soil moisture index, normal differentiation vegetation index, large network of canal and water bodies which influences the breeding of vector mosquitoes and proliferation of the vector which directly influences the disease transmission. Taking into account the above factors, risk map of the two endemic and one nonendemic blocks are developed.

Thematic layer generation

1. The climatological data like rainfall, temperature and humidity will be analysed and choropleths will be generated.
2. Three dimensional terrain model of the study areas will be generated using GPS derived altitude data and SOI toposheet derived spot heights.
3. All the remote sensing data derived themes like NDVI, drainage, settlement, soil moisture will be integrated with each other through GIS.

Plans for Next year:

Terrain parameters derived from RS will be linked with entomological, epidemiological and climatological parameters through GIS software modeling. Filariasis risk maps will be generated through superimposition of the aforementioned layers and ground level information database.

6. A STUDY ON IMMUNOREGULATION AND GENOTYPING FOR CYTOKINE POLYMORPHISM IN HUMAN CEREBRAL MALARIA

Principal Investigator (RMRC)	:	Dr. A. K. Satapathy
Principal investigator	:	Dr. B.Ravindran, Institutes of Life Sciences
Collaborators	:	Dr. Shobona Sharma, TIFR, Mumbai
		Dr. B.K.Das, VSS Medical College, Burla
Starting date	:	Jan 2006
Closing date	:	Dec 2008 (Extended up to Jun 2009 by ICMR)
Status	:	Extramural (ICMR Task Force)

Objectives:

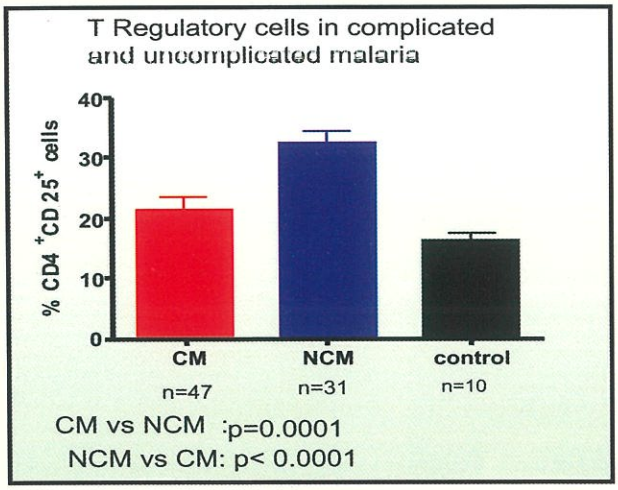
1. To study B-cells responses (IgG and IgE) to malarial phospoproteins, Viz. PfPO, Pf2, Pf9 and MSP1, MSP3, AMA 1 and GPI in cerebral and/or in multiorgan dysfunction in human P.falciparum malaria.
2. To quantify T-regulatory cells a) CD4+ CD25+ b) CD4+ CTLA 4+ cells in circulation and CSF in human cerebral malaria
3. To type the following host gene polymorphism and to correlate predisposition to develop cerebral and/ or Multi-organ dysfunction in P.falciparum malaria: a) TLR-4; b) TGF-β; c) TNF-α d) inos and e) IFN-γ.

One of the severe pathological manifestations of P.falciparum infection is the cerebral malaria and more crucially patients developing multiorgan dysfunction involving renal and hepatic dysfunction along with cerebral symptoms. However, only a subset of P.falciparum infected patients suffer from such clinical symptoms. The factors responsible for precipitation of cerebral malaria amongst P. falciparum patients are not yet clearly identified. Various T-cells associated factors have been ascribed to precipitation of and/or protection from cerebral malaria. Development of cerebral malaria (in both humans and mice models) is attributed to inflammatory Th1 types of responses leading to production of high levels of TNF-α. Such hyperactivity of T-cell responses are now known to be down-regulated by regulatory T lymphocytes which have been characterized in recent years and phenotypic markers on these cells have been identified.

Progress of work

In our previous year annual report we measured T-regulatory cells (CD4+and CD25+cells) in complicated and non-complicated malaria. CD4+ and CD25+ cells were found to be significantly low in complicated malaria in comparison to non-complicated malaria. Moreover, T regulatory cells were found to be significantly low in endemic control compared to both complicated and uncomplicated malaria.

Fig-1



plicated malaria. The CD4+ and CD25+ high cell population was significantly low in complicated malaria in comparison to uncomplicated malaria .

T regulatory cells were assessed further for expression of other activation markers. Additional markers to define regulatory T-cells included CTLA-4 (Cytotoxic T-lymphocytes antigen) and GITR (Glucocorticoid induced Tumor necrosis factor receptor). GITR is a surface receptor molecule that has been shown to be involved in inhibiting the suppressive activity of regulatory T-cells.

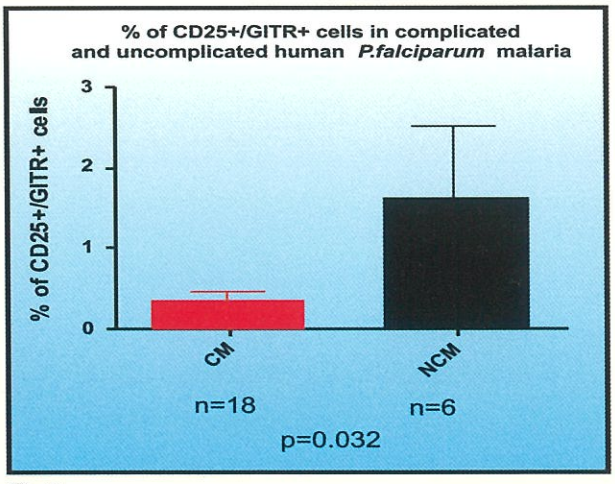
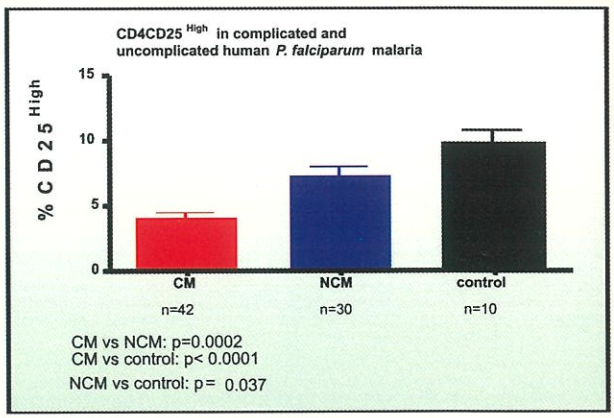


Fig-3

T regulatory cells (CD4+ CD25+) are known to exert their functions through a number of mediators such as fork head transcription factor (FOXP3), Cytotoxic T-lymphocyte antigen 4 (CTLA-4) and glucocorticoid-induced tumor necrosis factor receptor (GITR). These cells are anergic to proliferative responses in vitro and do not express key cytokines including IL-2 or IFN-γ in response to stimulation. The CD4+ T cells expressing highest levels of CD25+ (FOXP3cells) were also quantified in complicated and uncom-

Fig-2



Assessment of expression of GITR in $CD25^{+}$ cells in complicated and uncomplicated malaria (fig-3) reveals the increased expression of GITR in non-complicated malaria compared to complicated malaria. The observed low levels of $CD4^{+}CD25^{+}$, $CD4^{+}CD25^{hi+}$ and $CD25^{+}GITR^{+}$ in complicated malaria in comparison to non-complicated malaria indicating that reduced T-regulatory cells could be responsible for enhanced inflammatory responses observed in complicated malaria. The $Foxp3^{+}$ cells expressing intracellular CTLA4 was not significantly low in complicated malaria in

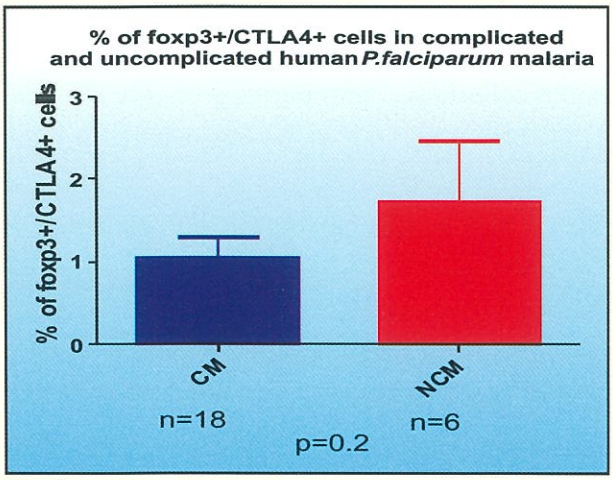


Fig-4

comparison to uncomplicated malaria (Fig-4) suggesting that these cells may have no role in developing the severity of the disease.

Plan for Next Year

To check the possibility of host factors playing a role in the clinical outcome of malaria infection, the prevalence of TLR-4, TLR-2 and TGF–β was assessed in malaria patients displaying different clinical manifestations and reported in our earlier annual report. All these data analysis and preparation of report will be done during the next 3 months.

7. MOLECULAR ANALYSIS OF DRUG RESISTANCE GENES AND PREDICTION OF TREATMENT OUTCOME IN P FALCIPARUM INFECTIONS IN ORISSA.

Principal Investigator	:	Dr. M R Ranjit
Co-Investigator	:	Dr. A S Acharya
Duration	:	Two Years
Starting Date	:	March 2008
Closing Date	:	March 2010
Status	:	Extramural (NVBDCP, Govt of India)

Objectives

1. To observe the frequency of the genotypes of Pfcrt/Pfmdr1 and DHFR-DHPS associated with Chloroquine and Pyremethamine-Sulphadoxine resistance in natural P falciparum parasite populations of Orissa.
2. To study the origin and spread of resistance alleles through the parasite population in this region.

Background

The WHO has outlined three ways of measuring drug efficacy (i) the clinical responses of patients to drug treatment (ii) the sensitivity of parasites to drugs in-vitro or (iii) accepted molecular markers as complementary tools for monitoring drug resistance. Though the first two methods are specific and quite sensitive, yet these are time consuming and sometimes raise ethical issues for its application. However,

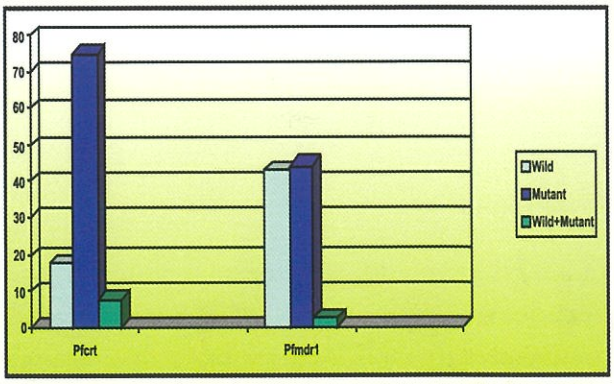
correlation of specific mutations in the P falciparum genes that encode targets of the antifolate drugs and exibit drug resistance, such as DHPS (targeted by Sulpha drugs) and DHFR (targeted by DHFR inhibitors), are well established; and certain mutations in the P.falciparum chloroquine transporter gene (PfCRT) and the P. falciparum multidrug resistance gene analog (PfMDR1) has been observed to be associated with the development of resistance to chloroquine in different studies. Despite certain difficulties the potential use of molecular markers as early warning signals and surveillance tool is clear. Since no systematic report is available on the frequency and distribution of CQ and S-P drug resistance markers in the state, the proposed study aims at generating a base line data on the frequency and distribution of CQ and S-P resistance markers in different physiographical regions of the state and predicting the origin and spread of these genotypes through P.falciparum populations in this particular regions of the country. This information will serve as a situation specific public health tool to develop a rational drug policy for combating spread of drug resistance.

Progress

During the period under report (April 2008 to March 2009) total 269 blood samples have been collected from patients with detectable malaria infection by blood slide examination at selected PHCs of Mayurbhanj(Badampahar and Mananda),Keonjhar(Banspal and Ghatagaon), Sundergarh(Bisra), Anugul(Bantala and Godibandha),Cuttack (Athagara) ,Kandhamal(Daringbari and Phiringia) and Raygara(Gunupur) district. However, the PCR analysis revealed that amongst 269 MP positive samples >10% are P malariae, >18% are P vivax and >70% are P falciparum. The genomic DNA was isolated and purified by phenol extraction and ethanol precipitation from P falciparum infected samples. The point mutations responsible for CQ resistance (Pfcrt K76T and Pfmdr1 N86Y) and Sulphadoxine/ Pyremethamine(DHPS/ DHFR) resistance were analyzed by PCR-RFLP methods using the primers described elsewhere and standardized in our laboratory.

The results indicateed that the over all frequency of Pfcrt(76T) allele is 82.7% and Pfmdr1(86Y) allele is 56.9% in P falciparum isolates circulating in Orissa(Fig1). The highest frequency of Pfcrt(76T) allele was observed in Rayagara (100%) followed by Kandhamal(90.5%), Anugul(89.9%), Cuttack(85.1%) Keonjhar (80%) Mayurbhanj (76.9%), Sundergarh(72.1%). But in case of the Pfmdr1 the highest frequency of the mutant allele(86Y) has been observed in Anugul (80%) followed by Cuttack(69.8%), Sundergarh(57.1%),

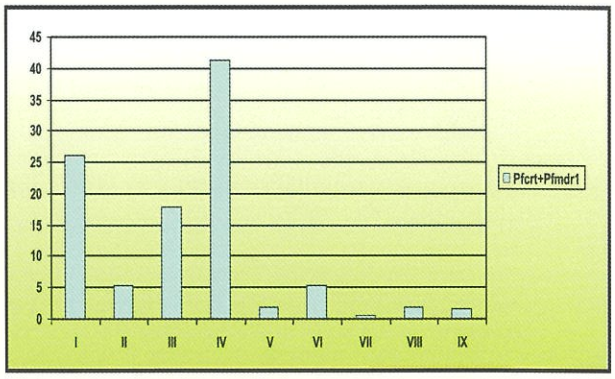
Fig1: Prevalence of Pfcrt & Pfmdr1 point mutations responsible for CQ resistance



Raygara(57.1%), Keonjhar (50%),Mayurbhanj (40%), Kandhamal(38.1%) district.

When the Pfcrt and Pfmdr1 point mutations responsible for CQ resistance were combined together, total nine genotypes were observed to be circulating among the parasite *P falciparum* parasite population of Orissa. Amongst them Pfcrt 76T + Pfmdr1 86Y genotypes were more prevalent (41.26%) than other genotypes (Fig 2). This indicates that the CQ resistance *P falciparum* isolates are more prevalent in number than wild types in Orissa.

Fig 2: Prevalence of P falciparum genotypes based on Pfcrt & Pfmdr1 point mutation



There are total 4 point mutations in DHFR(codon 51, 59, 108 and 164) and DHPS(codon 436, 437 ,540 and 581) genes are reported to be responsible for the development of resistance to Pyremethamine and Sulphadoxine drug combinations. Among these point mutations 108 in DHFR and 437 in DHPS are the primary mutations responsible for S-P drug resistance while occurrence of other mutations increases the degree of sensitivity resistance level of drug. Though, 51.7% and 17.1% of the *P falciparum* parasite populations in Orissa harbours the 108-point mutation and 437-point mutation in DHFR and DHPS genes respectively, yet only 1.05 % of the parasite population possesses both the mutations (Table 1). The maximum prevalence of 108-point mutation (77.3%) and 437-point mutation (42.8%) in DHFR and DHPS genes was found in *P falciparum* parasite populations circulating in Mayurbhanj.

Table 1: Frequency of DHFR & DHPS alleles in P *falciparum* isolGenotypeates of Orissa

Genotype	DHFR				DHPS			
	51 No %	59 No %	108 No %	164 No %	436 No %	437 No %	540 No %	581 No %
Wild	197 73.2	129 47.9	160 59.9	253 94.1	251 93.3	238 88.5	240 89.2	222 82.5
Mutant	62 23.1	135 50.2	139 51.7	16 5.9	18 6.6	46 17.1	26 9.7	26 9.7
Mixed	10 3.7	5 1.9	0 0.0	0 0.0	0 0.0	5 1.9	3 1.1	21 7.8

While analyzing the different combinations of point mutations in both DHFR and DHPS genes, it was observed that quadruple mutation was conspicuously absent. Only double mutation combination

has been observed in 4.4 % of the parasite population. This indicates that the parasite population of Orissa has not yet developed resistance to S-P drug combination .Therefore it can be used safely at this moment in combination with other potent antimalarial.

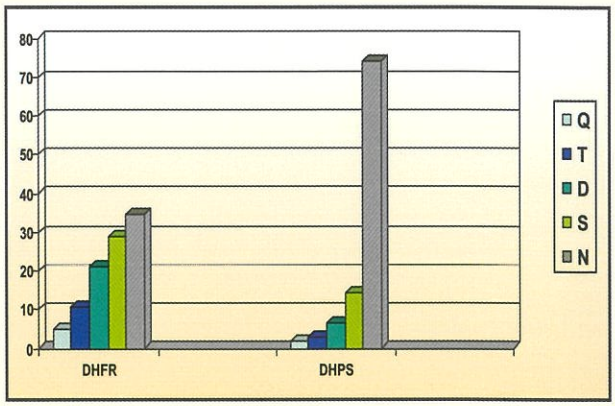
Plan for next Year

(i) The sample size will be increased to 500 in total and the study will be extended to three more districts (Kalahandi, Bolangir and Gajapati districts) as per the objective 1 of the proposed project protocol .Both uncomplicated and severe malaria cases will be included in the study.

(ii) The DNA sequence and Microsattellite analysis of the samples drawn from each district will be done to analyze to assess the origin and spread of CQ resistance as per the objective 2 of the proposed project protocol.

Fig 2: Frequency of DHFR & DHPS genotypes based on number of point mutations

Q : quadruple , T: triple , D: double , S: single , N : No mutation



8. MOLECULAR CHARACTERIZATION OF *ANOPHELES ANNULARIS* COMPLEX. DEVELOPMENT OF SPECIES SPECIFIC DIAGNOSTIC MARKERS AND MICROSATELLITE MARKERS.

Principal Investigator	:	Dr. R.K.Hazra
Co-Investigator	:	Dr. N. Mahapatra
Duration	:	Two Years (Extended to Dec 2010)
Starting date	:	March 2006
Closing date	:	Dec 2010
Status	:	Extramural (CSIR)

Objectives

1. To compare cytotaxonomic technique with new molecular technique to establish the accurate identification of the sibling species.
2. To develop microsatellite markers for *Anopheles annularis* species for population genetics analysis.
3. To develop multiplex PCR technique to achieve simultaneous detection of sporozoite identification, blood meal analysis and sibling species identification from single mosquito.

Back ground

For effective malaria control, proper identification of anophelines is very much essential. Precise identification is an essential component for better understanding of their potential role in malaria control strategies. Knowledge of biology and distribution of species has been limited by the absence of reliable diagnostic characteristics. However, there is variety of circumstances in which the molecular approach has greatly improved the accuracy of species identification. This not only applies to sibling species, but also to member of closely related groups with overlapping morphological characters. Vectorial and behavioral variations found among these species groups or complexes constitute the major reason for need of accurate and precise identification. The *Anopheles annularis* (*An. annularis*) group consists of potential malaria vector species classified in the Neocellia series of the sub genus Cellia. The group currently comprises five recognized species i.e. *An. annularis* Van der Wulp, *An. nivipes* (Theobald), *An. pallidus* (Theobald), *An. philippinensis* Ludlow and *An. schueffneri* Stanton. The last species is restricted to Java and Sumatra. The remaining four species *An. annularis*, *An. nivipes*, *An. pallidus* and *An. philippinensis* are wide spread and they occur in India also. In India, its role in malaria transmission has been established in Orissa, Assam, West Bengal, and Andhra Pradesh . Realizing the difficulties of morphological identification and the need to elucidate the role of individual species in malaria transmission, molecular methods have been introduced for distinguishing the members of the *An. annularis* group.

Work Progress

Mosquito samples of *Anopheles annularis* were collected from Keonjhar, Angul, Kendrapara, Boudh, Kandhamal, Mahanga, Gajapati area of Orissa. Out of total 186 *An. annularis* group mosquitoes, morphological character based identification showed 94 *An. annularis*, 38 *An. pallidus* and 54 *An. philippinensis* specimens.

Multiplex PCR

The lengths of amplified species-specific products were for *An. annularis* 287bp, *An. pallidus* 194bp, *An. philippinensis* 137bp along with a common band of 324bp in all the three. Novel primer sets were designed to detect the *P. falciparum* within the mosquito gave a 429bp PCR product. The human primer sequences used for analysis for human blood index were accessed from gene bank it gave 519bp PCR product. Of the total 186 *An. annularis* group of mosquitoes 91 were confirmed as *An. annularis*, 39 as *An. pallidus* and 56 as *An. philippinensis* species. This includes five species i.e. three species of *An. annularis* and two species of *An. pallidus* which were previously misidentified by morphological method were confirmed as *An. pallidus* and *An. philippinensis* respectively by the multiplex PCR assay. In first round PCR with mixed DNA template of head-thoracic and rest body parts showed, two of the 91 *An. annularis* species positive for *P. falciparum*, among these three gave positive result for human blood preference. Of the total 56 *An. philippinensis* and 39 *An. pallidus* none was positive for *P. falciparum* whereas one of the *An. philippinensis* was positive for human blood. The second round of PCR was carried out using the DNA template from the head-thoracic region from the two species of *An. annularis* found positive for *P. falciparum* in first round PCR. All two samples of *An. annularis* were positive for *P. falciparum* in second round PCR.

Isolation and characterization of Microsatellite loci:

High polymorphism and the relative ease scoring represent the two major features that make microsatellites of large interest for many genetic studies. The isolation of microsatellite markers began with a random amplified polymorphic DNA polymerase chain reaction (RAPD–PCR) enrichment. RAPD primers are already designed then after sequencing, the primers will be designed upstream and downstream of the repetitive DNA.

Phylogenetic relationship between the members of the Neocellia series.

The tree generated by the study gives the systematic relation between the Annularis group of species of different areas like Orissa, Assam, Uttar Pradesh, Madhya Pradesh, and Andaman Nicobar Island along with other species like *An. splendidus* of the Jamsii group and *An. maculatus* of Maculatus group . The phylogenetic tree generated in the current study has separated the Annularis group into distinct lineages (fig-1). The *An. annularis* species of Orissa, Assam and Madhya Pradesh are more likely same as compared to species of Uttar Pradesh which formed a sister clade. The species of *An. nivipes* Assam are showing very closest taxa to the species of Andaman Nicobar than Orissa which formed a sister clade. *An. philippinensis* of Assam shows very close proximity with *An. nivipes*, suggesting that the two species are similar in their molecular phylogenetic relationship where as *An. philipinensis* of Orissa is placed separately from the species of Assam. The *An. pallidus* species of Orissa and Andaman Nicobar are showing very close relationship. Whereas the *An. maculatus* of Maculatus group and *An. splendidus* of Jamesii group forming different clade with that of the members of the Annularis group which suggesting that the species are of different group of that of Neocellia Series which is as per the morphological classification. On the other hand, it is clear that because of the difference in the D3 sequence of *An. stephensi* as compared to the other members of the Neocellia series, the species is distinct from the members of the series and form as an out group.

The ITS2 sequences of the members of the Neocellia series from different area were retrieved from GenBank and used to generate phylogenetic tree and it is confirmed the systematic relation between the species. The *An. annularis* species of Orissa, Assam, Uttar Pradesh (Sahazhanpur), Punjab and Arunachal Pradesh showing very close association with each other than the species of Uttar Pradesh (Ghaziabad) which formed sister clade suggesting that the species may be the sub type of *An. annularis*. Whereas *An. philippinensis* species of Orissa and Assam lying in the same cluster. The *An. nivipes* of Andaman and Nicobar Island, Assam and Orissa are lying in the same clade showing high degree of similarities between their sequences. The *An. pallidus* of Assam and Orissa also are more likely same showing close relationship between the species. Whereas *An. maculatus* of Maculatus group and *An. splendidus* of Jamesii group forming a different clade with that of the members of the Annularis group suggesting that the species are of different group as per the morphological classification. (Harbach 2004). The *An. stephensi* was taken as an out group which forms a separate clade outside of the species of Neocellia Series.

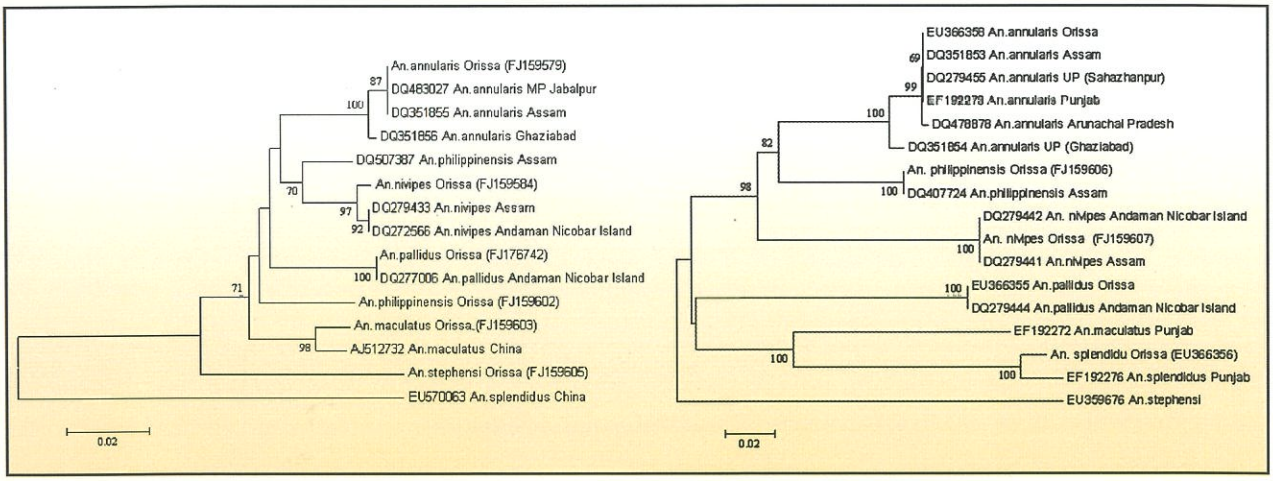


Figure 1 Phylogenetic tree constructed from the D3

Figure 2 Phylogenetic tree constructed from the ITS2 region

Plan for Next year

1. Development of Micro satellite Markers

Two methods will be adopted for development of microsattelite markers.

i. The vectors will be collected from different ecozones of this region. Basing on the incidence of malaria cases, vector abundance and different geographical features, the village will be selected. The aim will be to find out the prevalence of the species in all the seasons (rainy, winter and summer) in different villages which will provide a complete reference to anopheline fauna occurring in the region.

ii. The genomic DNA will be isolated from *A. annularis.* The genomic DNA will be digested using combination of restriction enzyme, which can produce majority fragment in it 200 to 2000 bp. The digested DNA will be ligated with SNX linker as described by Hamilton (1999). The linker-ligated DNA will be amplified by PCR and hybridize with biotin-labeled $(GT)_{15}$ and $(GA)_{15}$. The fragments containing GA/GT repeats will be isolated using straptavidin coated magnetic beads and magnet. The enriched DNA fragments with micro satellite marker will be cloned and sequenced. These clones will be tested for presence of GA/GT repeats using Photo Star detection kit. The clones with repeat regions will be sequenced. Suitable primers will be designed flanking micro satellite repeats. These primers will be tested for polymorphism in natural populations using one primer labeled with fluorescent dye (HEX, TAT, FAM). The markers that exhibit polymorphism in natural population will be selected for population genetic analysis.

iii. PCR isolation of microsatellite arrays: PCR based methodologies can be used to isolate many kinds of genomic components, although the lack of flanking sequence information has precluded many of these for microsatellite isolation. Here we will be developing a PCR isolation microsatellite arrays (PIMA), an approach to isolate and characterize microsatellite flanking sequences from small quantities of genomic DNA. This approach builds on previously described random amplified polymorphic

DNA (RAPD) enrichment procedures but develops the use of repeat specific PCR to detect microsatellite arrays in contrast to standard radioactive hybridization techniques. The protocol is cheap and efficient, with the advantage that it requires minimum specialized equipments.

iv. Polymorphism in field populations: *An. annularis* will be collected from different sites, where species A has earlier been found (Subbarao et al., 1994). *An. annularis* identified as species A cytotaxonomically and by molecular assays will be screened with selected microsatellite markers. Each selected marker will be screened for polymorphism in field-collected species for establishing polymorphism and allele frequency of each microsatellite locus.

2. Correlation between cytotaxonomic and molecular technique:

Cytogenetic analysis, in spite of some inherent difficulties has proved to be a powerful tool for the identification of sibling species of anophelines. The proposed study also planned to establish a correlation between cytotaxonomic and molecular technique for identification of sibling species which will help to used in mapping genes of interest, to study population structure, gene flow etc.

9. VECTOR MAPPING WITH ITS SUSCEPTIBILITY STATUS TO INSECTICIDES IN SEVEN HIGH-RISK DISTRICTS OF ORISSA.

Principal Investigator	:	Dr. R.K.Hazra
Co-Investigator	:	Dr. N. Mahapatra
		Mr. H.K.Tripathy
Duration	:	One Year
Starting date	:	March 2008
Closeing date	:	Feb 2009
Status	:	Extramural (NVBDCP)

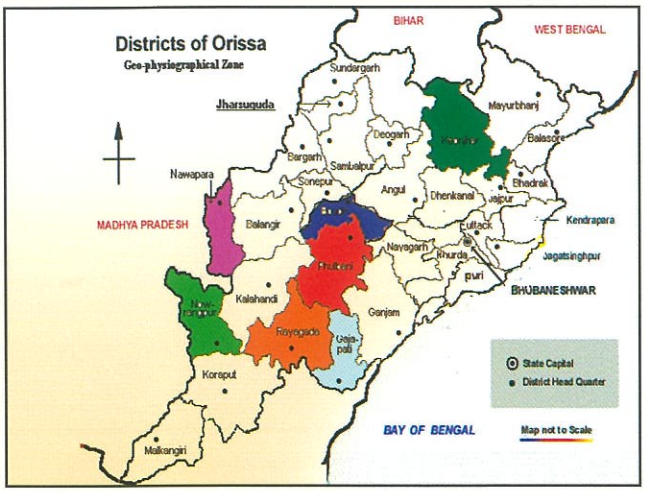
Objectives

1. To study the vector fauna, their habits and density and vector infection rate in the sample sites of seven high district of Orissa.
2. To study the susceptibility status of malaria vectors to different insecticides used in public health Programme.

Background:

Mosquito fauna that transmits malaria and its insecticidal susceptibility status in Orissa has not been precisely studied, although few reports exist from patchy regions of state. In view of high morbidity reported in Orissa due to malaria it is essential to identify the vector responsible for transmissions of malaria in

different region and its susceptibility to different insecticides so as to plan for appropriate insecticide spray and IEC to curtail the spread. As requested by State health Department, seven high risk districts are being studied to describe the above.



Work Progress

Out of seven districts, Baudh, Gajapati, Kandhamal, Keonjhar and Raygada ,Nawarangpur districts have been surveyed. Two-time mosquito collections were done in Konjhar,Gajapati, Rayagada, Baudh. .Other district will be repeated for three seasons and one season for these districts. The ecosystem of Keonjhar, Gajapati and Rayagada are of mixed type i.e. high altitude, dense forest, riverine base and irrigation. But ecosystem of Nawarangpur is different from the other three districts. Nawarangpur district has more plain land than hill and forests. Here the irrigation project is more and connected with Indrabati dam. The forests are thinner, valleys are shallow and wide. Paddy is more extensively cultivated. This disparity in vegetative and geographic conditions results in a diversity of mosquito breeding places.

Vector survey

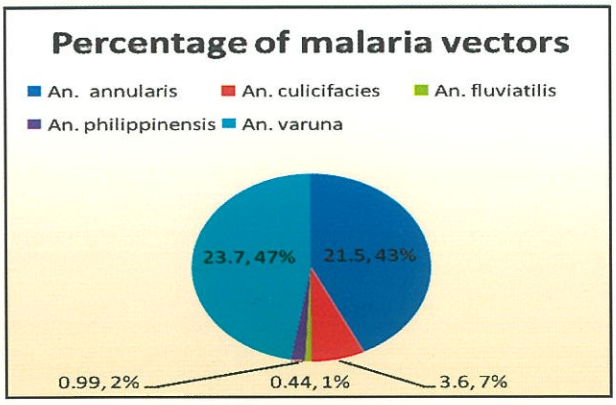
Mosquitoes were collected from five PHC of Keonjhar, seven PHC of Gajapati, two PHC of Rayagada and three PHC of Nawarangpur districts.

From the studied districts the three genera of mosquitoes are prevalent i.e. Anopheles, Culex and Mansonia. But in Rayagada some other genera like Aedes and Armigeries species are found during the collections.

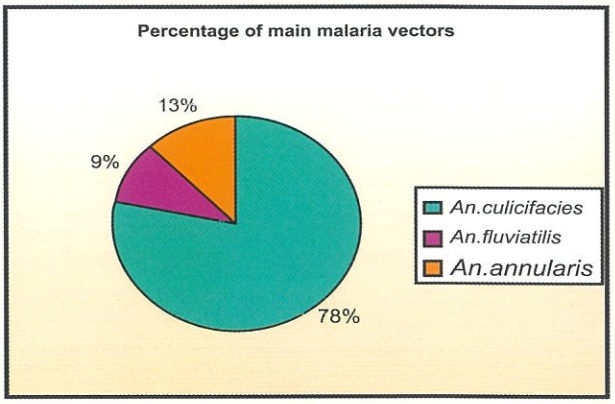
From Keonjhar total 1101 mosquitoes were collected among which 902 were Anophelines. Among fifteen species of anophelines collected, five were identified as vectors of malaria they are *An.annularis, An.culicifacies, An.fluviatilis, An.varuna* and *An.philippinensis* The main malaria vectors were collected from both cattle shed and human dwelling.

In Gajapati district among nine species of anophelines collected, three were identified vectors of malaria they are *An.annularis, An.culicifacies and An.fluviatilis. An.culicfacies and An.annularis* was collected from both cattle shed and human dwelling.

Rayagada district twelve species were from genus Anopheles, the rest were of other genera. Among twelve species of anophelines collected two were identified as vectors of malaria they are *An.annularis, An.culicifacies*. The main malaria vectors were collected from both cattle shed and human dwelling.

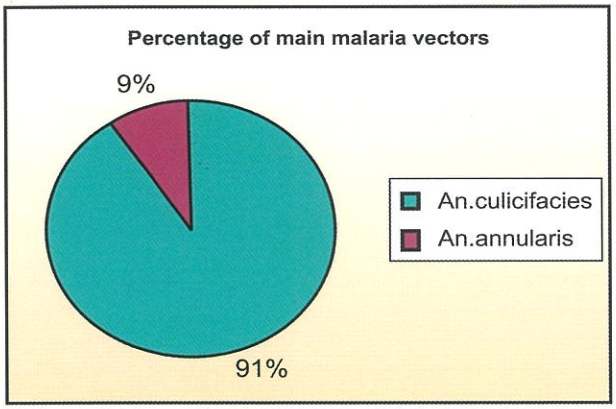


Keonjhar

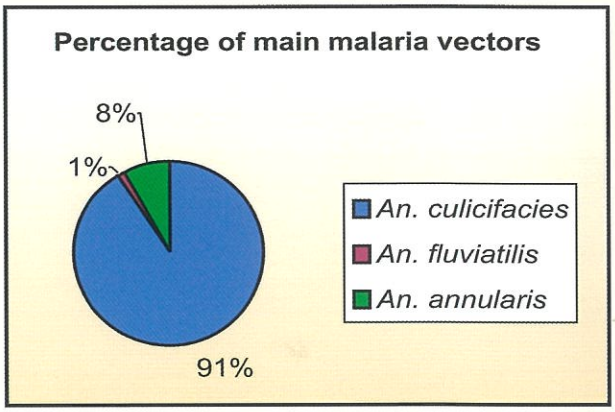


Gajapati

In Nawarangpur district 192 anophelines collected 142 (73.95%), 2 (1.04%) and 12 (6.25%) are *An. culicifacies* , *An. fluviatilis* and *An.annularis* respectively.



Rayagada



Nawarangpur

Bionomics of vectors

With a view to see favorite and characteristic outdoor resting places of the vector like *An. fluviatilis, An. culicifacies, An. annularis* and other mosquito out door mosquito collection was done. In out door collection *An. fluviatilis* was not collected from the studied area.

Biting time:

An. fluviatilis, An. annularis were found biting human in evening hours i.e. up to 7PM to 9PM in out door in Gajapati. *An. fluviatilis* were collected in last quarter of the night by the trap. In Keonjhar and Rayagada the peak feeding interval An. fluviatilis in this area was between 9PM to 10.30PM also same feeding took place between 2AM to 6AM.

Susceptibility status

The susceptibility status of *An.culicifacies* and An.annularis were resistance to DDT. All the species were observed susceptible to synthetic pyrethroid.

Plan for Next Year

The periodical information on vectorial status for malaria transmission like identification of vectors and its species complex, bionomics, feeding habits and susceptibility status in these districts of Orissa are essential to help evaluation of efficacy measures in the control programme. In future study the mosquito will be collected in three seasons. From each district minimum four blocks will be selected taking in view of ecological condition and malarial incidence and the sample villages will be selected by taking malaria incidence and from each village mosquito will be collected from 20%of the house hold.

Table-1 : Susceptibility Status Of *An. culicifacies, An. annularis* (vector of Malaria) in three districts of Orissa

Sl. No.	Name of the District	Name of the PHC/Village	Anopheles species tested	Insecticide	Death of Mosquito				% of control mortality	% of test mortality	Corrected mortality
					Control		Test	Dead/Alive			
					1 hr.	24 hrs.	1 hr.	24 hrs.			
1	Gajapati	Guma	*An. culicifacies*	DDT4%	Nil	Nil	Nil	3/15	Nil	20%	20%
			An. annularis	DDT4%	Nil	Nil	Nil	2/15	Nil	13.3%	13.3%
			An. culicifacies	Deltamethrin 0.05%	Nil	Nil	15/15	-	Nil	100%	100%
2	-do-	Mohana	*An. culicifacies*	DDT4%	Nil	Nil	Nil	4/15	Nil	26.6%	26.6%
			An. culicifacies	Deltamethrin 0.05%	Nil	Nil	14/15	1/15	Nil	100%	100%
3	Rayagada	Muniguda	*An. culicifacies*	DDT4%	Nil	Nil	Nil	2/15	Nil	13.3%	13.3%
			An. annularis	DDT4%	Nil	Nil	Nil	3/15	Nil	20%	20%
			An. culicifacies	Deltamethrin 0.05%	Nil	Nil	14/15	1/15	Nil	100%	100%
4	-do-	Bisamcuttack	*An. culicifacies*	DDT4%	Nil	Nil	Nil	4/15	Nil	26.6%	26.6%
			An. culicifacies	Deltamethrin 0.05%	Nil	Nil	15/15	-	Nil	100%	100%
5	Nawarangpur	Papadahandi	*An. culicifacies*	DDT4%	Nil	Nil	Nil	4/15	Nil	26.6%	26.6%
			An. annularis	DDT4%	Nil	Nil	Nil	2/15	Nil	13.3%	13.3%
			An. culicifacies	Deltamethrin 0.05%	Nil	Nil	15/15	-	Nil	100%	100%
6	-do-	Tentulikhunti	*An. culicifacies*	DDT4%	Nil	Nil	Nil	3/15	Nil	20%	20%
			An. culicifacies	Deltamethrin 0.05%	Nil	Nil	15/15	-	Nil	100%	100%
7	-do-	Nandahandi	*An. culicifacies*	DDT4%	Nil	Nil	Nil	3/15	Nil	20%	20%
			An. culicifacies	Deltamethrin 0.05%	Nil	Nil	15/15	-	Nil	100%	100%

10. MAPPING OF *P.FALCIPARUM* SUSCEPTIBILITY TO CHLOROQUINE, IN MALARIA ENDEMIC DISTRICTS OF ORISSA.

Principal Investigator	:	Dr. A S Kerketta
Duration	:	One year
Starting date	:	October 2008
Closing date	:	Sept. 2009
Status	:	Extramural (NVBDCP, Govt of India, New Delhi)

Background

Chloroquine resistance has become an issue of concern since it is spreading rapidly all over the country due to varied reason and resulting in high malarial death. In the state of Orissa, so far systematic mapping of all the endemic regions has not been done. The Regional Institute of Health and Family Welfare have undertaken studies in few districts in different years. But the data on CQ resistance at a single point of time is not available from the state. To curtail the malarial death a systematic study is of urgent need by the central as well as the state health department. The present study has been developed with the aim for mapping the resistance of the P. falciparum to chloroquine in seven high-risk districts of the state (as identified by state health department), which will contribute to the state as well as central health department in policy making for taking immediate action for changing to alternative drugs if needed.

Objective

1. To assess the parasite susceptibility to Chloroquine (CQ) in treatment of uncomplicated P.falciparum malaria in seven high malaria endemic districts of Orissa.

Progress

Out of the seven study districts, so four districts namely Keonjhar and Ganjam, Nawarangpur and Gajapati of Orissa have been studied for P falciparum susceptibility status. One PHC area in each district was selected for the study. The selection was made basing on the past three years malariogenic data indicating the area as high malaria endemic area. Thus the area under the PHC Harichandanpur of Keonjhar, Badagada PHC of Ganjam, Tentulikhunti PHC of Nawarangpur and Gumma PHC of Gajapati districts were included in the study. The study areas are mostly hilly forest area and inhabited by tribal population. The average of malariogenic data of last 3 years (2004-06) in given the study area Table-1

Table 1: Malariogenic surveillance data of the PHC studied

PHC/DIST	POPULATION	SPR	PF%	ABER	API
Jangira/Keonjhar	1697910	10.1	97. 3	26.8	27.1
Badagada/Ganjam	116116	9.11	88.0	11.1	10.0
Tentulikhunti/ Nawarangpur	89040	10.9	99.8	12.3	13.45
Gumma/Gjapati	74313	12.7	99.5	9.7	12.9

The *P falciparum* susceptibility to Chloroquine (CQ) was studied following the WHO guide line for monitoring the therapeutic efficacy of antimalarials (2001). The study was undertaken in close collaboration with the state health facility available in the area. The study villages selected on the basis of experience of the health personnel on maximum number of cases reported to the health facility. In the village door-to-door survey was made for the detection the fever cases. Patients having fever or history of fever in 24 hours prior to the examination and not taken treatment were asked to come to a central place in the village for screening for their eligibility for the study. After recording the detail address of the patient, the clinical examination was done by the medical officer followed by measurement of body weight and axillary temperature by the team. The finger prick blood was collected for preparation of thick and thin smear for identification of parasite and density counting. The smears were transported to the temporary laboratory established by the research team in the field and was stained with Giemsa statin. Microscopy was done by two technicians independently. The patient found to have asexual parasite density more than 1000-10000 ml of blood and fulfilling the other eligible criteria were enrolled for the study. Each study population was administered CQ in standard dose of 10 mg. Per/Kg body weight on 1st and 2nd day and 5mg/ Kg body weight on 3rd day incase of children and 1500 mg over 3 days for adults. The drug was given under the supervision of the team and after ensuring that the patient is not in empty stomach. Those who came without taking food were given biscuits to eat before administering the drug. The drug was given on 1st, 2nd and 3rd day thereafter followed on scheduled days like 7th, 14th, 21st and 28th day of enrolment. Each patient asked to stay in the camp at least for 30 minutes to ensure that she/he should not vomits out the drug. Incase of vomiting the same dose was repeated after ½ an hour. The cases found to have severe or complicated malaria during the follow up shifted to the nearest health facility for hospitalization and treatment accordingly.

A minimum number of villages studied in each area are 6-8 except in Nawarangpur district. Since in Nawarangpur district, the study was conducted in the month of May-June and the malaria incidence was low during that period. Around 100-150 fever cases had to be screened to get eligible study population. Thus the number of study population included in the study was 54, 55, 54, and 52 in Keonjhar, Ganjam, Nawarangpur and Gajapati district respectively. The baseline information like mean age, mean weight and average parasite density on day 0 is given in Table.2.

Table 2: Baseline Information of the study Population

Districts	No. of Cases studied	Mean Age (in year)	Mean Weight (Kg)	Average Body Temp (°C)	Average parasite count
Keonjhar	54	21.2	32.9	38.3	3962.4
Ganjam	55	16.38	29.0	38.1	18457.9
Nawarangpur	54	24.8	30.2	38.3	4714.0
Gajapati	52	16.3	29.9	38.4	10891.9
Total	215	19.7	30.5	38.3	9506.3

In Keonjhar districts 50 out of 54, in Ganjam 50 out of 55, in Nawarrngpur 51 of 54 and in Gajapati 48 of 54 could be followed up for the clinical and parasitological response. The study revealed, Adequate Clinical and parasitological response (ACPR) of merely 13%, 7.5%, 24%, 4% in Keonjhar, Ganjam, Nawarangpur and Gajapati district respectively. The Early Treatment Failure (ETF) was marked in 64.8%, 64.2% 61.1% and 64% with Late Treatment Failure (LTF) including both clinical and parasitological failure marked in 22.2%, 28.3%, 14.9% and 32% of the population (Given in Figure-1)

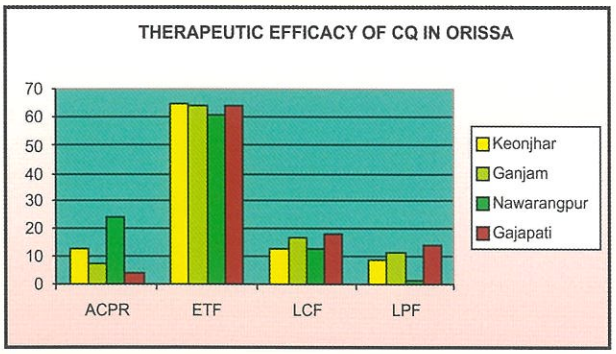


Figure-1: Therapeutic Response of CQ in Keonjhar, Ganjam, Nawarangpur and Gajapati districts of Orissa.

The study indicates the total treatment failure above cutoff value of more than 10% in all the study districts. Therefore steps taken by NVBDCP for changing over to second line of antimalarial drug for treatment of uncomplicated malaria needs to be implemented immediately to curtail malarial morbidity and mortality in all the area studied.

Plan for next Year

The study in other three will be conducted after receiving the fund sanctioned.

Field study: Collection of Blood samples for Malaria test.

11. DEVELOPMENT OF STRATEGY FOR OPTIMIZING THE ACCESSIBILITY AND UTILIZATION OF THE GOVERNMENT OPERATED MALARIA CONTROL PROGRAMME – AN OPERATIONAL RESEARCH STUDY.

Principal Investigator	:	Dr. A S Kerketta
Collaborator	:	Dr. B V Babu (ICMR)
Duration	:	Two years
Starting date	:	August 2007
Closing date	:	July 2009
Status	:	Intramural

Background

Early diagnosis and prompt treatment is a key strategy for malaria control. But for various reason this strategy has not yielded optimum result at community level leading to persistence of malarial morbidity and mortality in Orissa. For improvement of this strategy requires an understanding of community health seeking practices: how caregivers recognize and respond to community at large in particular to malaria symptoms, what kinds of home actions they take, what factors triggers their care-seeking behavior, the types of providers they consult and in what order, and how they choose among health providers and treatment options, the types and amounts of medications they give. Such patterns reflect both the health care context (e.g., the type and quality of facilities and health providers and ease of access to them) and individual or family factors (e.g., recognition of illness signs and knowledge of dosage schedules). Only when it is understood, what is working well in the care-seeking process and what is not, can interventions be designed to reduce barriers to optimal care. Sound behavioral research on management of malaria in the community can provide this information. The community the present study has been developed in order to explore the client-side as well as the provider-side factors influencing the optimal functioning EDCT programme.

Objectives

1. To understand the people's knowledge and perception on fever.
2. To assess the knowledge of the people to identify fever as malaria and triggering agent for treatment seeking.
3. To understand the treatment seeking behaviour of the community.
4. To assess the perception of the community regarding the existing health infrastructure and their functioning.
5. To examine the existing linkage between the health system and community

Progress

The base line information of the study block has been collected. The health functionaries in the study area are one area Hospital, Three PHC new, and one CHC. In the block PHC area there are five Sectors and 25 Sub-Centers with the strength of one Medical Officer, one Laboratory technician, Five Female Supervisors, four

Male Supervisors, 30 Female health workers, 18 Male health workers, 138 Anganwadi Workers (125 trained as FTD), 137 ASHA (25 trained as FTD). To understand the treatment seeking behavior of the community, eight villages located in different geographical location like villages in the bank of river, hilltop, foothill and plain area were surveyed for the fever cases and their treatment seeking. The population character in the different geographical location is, tribal in the hilly and foot hill villages, schedule caste the riverbank area and general caste population in the villages of plain area. A total of 542 households and 2646 were covered during the survey. On the day of survey 163 fever cases encountered. Of which 58 (35.6%) sought treatment from Government hospital, 42(25.8%) from private practicener, 40(24.5%) from quack including medical stores. A merely 1.8% sought treatment from the DDC and ASHA respectively. Seventeen did not start treatment since the fever was of mild grade. None of the patient went to the health workers. To understand the role performed and problem faced by the grass root health providers with regards to malaria control activities, interviews were made with 14 numbers of ASHA, Anganwadi worker 13 (AWW) and 15 Multipurpose health worker (MPHW). The basic qualification of each category is matriculate. Among ASHA, the lowest qualification is 7th standard. Each ASHA and AWW has been allotted one village for providing health services to the community and they stays in the same village. But the health workers have been allotted 10-12 villages and stay 12-15 KMs away from the place of work. Regarding malaria activities the ASHA and AWW collect 2 slides per day and MPHW collects an average of 5 slides per day. The ASHA and AWW hand over the slides to MPHW and once in a week, who hands over the slides to the technician on the day of sector meeting once in a week at PHC headquarter. The technician does the microscopy and gives back the report in next sector meeting. Thus the time lag between the blood slide collection and hand over to the upper tier provider is 4-7 days for ASHA and AWW and 7days for MPHW. The report of malaria test never reaches back to the grass root provider. The ASHAs expressed that due to non-availability of the report they cannot give the radical treatment to the patients. The patient goes to quacks or private practicener to get treatment for malaria and thus loses faith on the health system. The main problem the providers face in malaria control programme is delay in getting back the report.

Plan for next year: The formative research will be completed within 5-6 months and based on the findings of formative research, the strategy will be developed.

12. ROLE OF PFEMP1 SUBTYPES IN CLINICAL MANIFESTATIONS OF SEVERE FALCIPARUM MALARIA

Principal Investigator	:	Dr. M R Ranjit
Co-Investigator(S)	:	Dr. A. K Satpathy, Dr S K Kar
Duration	:	Two Years
Starting date	:	April 2009
Status:	:	Extramural (Applied to CSIR)

Objectives

1. To study the expression profile and rosetting properties of *PfEMP1* subtypes in *P falciparum* isolates inducing different grades of clinical manifestations.
2. To examine the antibody response to *PfEMP1*variants by different grades of clinical malaria cases.

Background

The virulence and pathogenecity of *P falciparum* has been linked to its expression of variant surface antigens (VSAs) that subvert acquisition of protective immunity and mediate infected RBC sequestration. Several studies have shown that parasites causing severe malaria in young children with little protective immunity tend to express VSA_{SM} which are serologically distinct from VSA_{UM} expressed by most parasites causing uncomplicated malaria and sub-clinical infection in older, and more immune, individuals. The PfEMP1expressed in the membrane of the late-stage-infected erythrocytes is a family of VSAs which binds to various receptors –such as CD36 or ICAM-1 on the vascular endothelium, CSA in the placenta, and CR on the red blood cells-that leads to microvascular obstructions in various organs. The PfEMP1 proteins are structured in to several semi conserved domains-namely an N terminal segment(NTS);various Duffy binding-like(DBL) domains, a cystein rich inter domain region (CIDR); in some instances ,a constant 2(C2) region; a trans membrane domain; and a conserved, C terminal acidic terminal segment(ATS), which represents the intra cellular part of PfEMP1 that anchors the protein to the cytoskeleton .In the *P falciparum* line3D7, PfEMP1 is encoded by approximately 59 *var* genes per haploid chromosome. Most var genes can be assigned to 1 of 3 types (var groups A, B and C) mainly according to their conserved 5' upstream sequences. In 3D7, the majority of *var* genes belong to the subtelomerically located *var* group B, whereas 13 *var* group C genes are arranged in chromosome internal clusters. Ten mostly larger, subtelomerically located *var* genes with a distinct domain structure belong to *var* group A. *Var* genes are exclusively expressed but undergo switching within parasite lineages .Recent molecular phenotypic studies conducted in Southern Tanzania and Papua New Guinea have found differential expression of *var* genes in severe (cerebral) and uncomplicated malaria cases. Since no studies has been done in this regard in India ,the present project proposal has been aimed to find out the association *var* gene sub groups with clinical manifestation of severe falciparum malaria expressed by the *P falciparum* isolates prevalent in Orissa.

Progress

This project proposal was submitted to DBT and later to CSIR for extramural funding. But funding is awaited. Therefore the project has been initiated with intramural fund since April 2008. During this period about 23 mild cases and 12 severe cases (cerebral malaria) have been selected for the study. About 2ml of venous blood was collected in EDTA and total RNA was isolated using TRI-reagent as recommended by the manufacturer (INVITROGEN).The RNA was purified and dissolved in DEPC water. The cDNA was synthesized using first strand cDNA synthesis kit (Fermentas) and random hexamer primers in a 20ul reaction mixture as recommended by the manufacturer. The quantitative estimation of the PfEMP1variant specific cDNA was done by Real Time PCR using QuantiTect SYBR Green PCR kit. Rox was taken as the internal reference dye and expression level was studied by relative quantification. The RT-PCR results indicate that the var group A of transcripts are more abundant in mild group of patients while var group B of transcripts are more abundant in severe group of patients in Orissa.

Plan for next Year

i) At least 50 *P falciparum* isolates from each group of patients (asymptomatic cases, mild malaria cases, severe malaria cases) will be studied for subtyping of PfEMP1

ii) The antibody response to *PfEMP1*variants by different grades of clinical malaria cases will be analysed.

Interaction with Ph.D students by DG-cum-Secretary DHR during his visit to the centre.

13. DEVELOPMENT OF INTERVENTION STRATEGIES TO REDUCE IRON DEFICIENCY ANAEMIA AMONG ADOLESCENT GIRLS THROUGH IRON-FOLIC ACID, DEWORMING, VITAMIN B_{12} SUPPLEMENTATION AND NUTRITION EDUCATION IN A TRIBAL BLOCK OF GAJAPATI DISTRICT, ORISSA.

Principal Investigator	:	Dr. G.Bulliyya
Co-Investigators	:	Dr. A.Moharana Dr. B.Dwibedi,
Duration	:	Two Years
Starting date	:	May 2009
Closing date	:	April 2011
Status	:	Extramural (ICMR Tribal Taskforce)

Objective

To carry out an intervention study on effectiveness of combined regimens with iron-folic acid, vitamin B_{12} supplementation, deworming and nutrition education in control of anaemia in tribal adolescent girls in Gajapati district.

Background

Anaemia is a significant public health problem in Orissa and iron deficiency is considered as the major contributory factor. Orissa has the highest rates of infant mortality and maternal mortality and anaemia becomes the major cause. Prevalence of anaemia among pregnant women and adolescent girls reported 81% and 96% respectively. Despite the national anaemia control program, anaemia continued to be universal among pregnant women. Pregnancy is too short period of time to reduce pre-existing anemia, when women do not seek prenatal care until 2-3rd trimester, although intervention channels already exist to target iron supplementation. This approach has been found not effective and possible reason could be

the preexisting iron deficiency anaemia in women at the time of conception. Adolescence, as a period of growth and development, is considered the best time to intervene in order to assist in physical and mental development, and to prevent later maternal anemia, thereby determine the well-being of the next generation. To achieve the goal of controlling anaemia in adolescent girls using 5-arm regimen approach is being adopted to compare the efficacy of iron and folic acid administration when combined with deworming, vitamin B_{12} and nutrition education through the existing ICDS network and routine monitoring.

Progress

This study was funded by ICMR Tribal Taskforce in May 2009 for two years. Meanwhile, the study was initiated with intramural funds in 2007 and baseline data was collected on 875 adolescent girls.

Study design is a randomized controlled field trial involving 1000 adolescent girls aged between 12 and 18 years in Serango, a tribal sector in Gumma black of Gajapati district, Orissa. There are 20 Anganwadi Centres (AWC) reasonably homogeneous in distribution of tribal population, having an average of 55 adolescent girls in each centre. The study area is divided into five clusters (having 4 AWC each) that are randomly assigned to either intervention arms or the control arm. In order to limit the potential effect of cross-contamination across regimens, several contiguous AWC grouped together to form a cluster, although no other means of specifically controlling for the proximity of control and regimen clusters.

Serango sector (Latitude: 19°1'0N, Longitude: 84°2' 60 E), in Gumma blocks of Gajapati district is selected for the study because it is pre-dominated by tribal people (77.6%) (Figure 1). Calculation of sample size is based on the anticipated increase in mean haemoglobin levels by 1.0 g (taking Hb= 10.7 g/dl and standard deviation [SD]=1.46 g/dl at 95% confidence and 80% power), the required sample number is 60, which is multiplied by 2 for allowing analysis to examine between age groups (12-14y and 15-18y) separately, considering 20% dropout rate to follow-up, and excluding 5% severe anaemia grade for referral treatment, thus, a total of 750 adolescent girls included.

A pre-tested questionnaire was used to collect the household data, socioeconomic information of parents, adolescent girls, age, sexual maturity, personnel hygiene practices, morbidity, clinical examination, KAP on anaemia and its control measures and food consumption patterns. Anthopometric measurements were taken using standard equipment and procedures. Venous blood samples were collected for haemoglobin and blood smear (thin and thick) for detection of malaria. Blood was centrifuged and serum samples were preserved at -20^{0}C till analysis. Serum ferritin and transferring receptor levels were determined using ELISA techniques. Anaemia was considered to be present if the Hb value was below 12 g/dL for adolescent girls. Levels of anaemia were classified further as severe (<7 g/dl), moderate (7-10 g/dl), or mild (10-12 g/dl) category. Serum ferritin <15 ug/L and soluble transferrin receptor <8.3ug/ml were considered to indicate depleted body iron stores and iron deficiency respectively. Stool samples were collected and examined for intestinal worm infestations.

A total of 141 adolescent girls aged 12-18 years were studied from four Gram Panchayats in Serango area of Gajapati district. Clinical examination by physician was carried out and illness history recorded to find out the common illness, which might contribute towards the anaemia and to exclusive other diseases in adolescent girls. History of fever due to malaria was reported by 44% of girls. While features of recurrent malaria and hepatosplenomegally were not of high magnitude (2%), intestinal helmenthesis as visible worm passage in stool was reported in 32% of individuals. Diarrhea and upper respiratory tract infections were the other common disorders, the prevalence of which was 3% and 9% respectively. Over 80% of adolescent girls had clinical sign of pallor. Worm infestation was the most common associated feature.

Clinical sign	No	Percent
History of fever	92	67.8
Malaria	61	43.6
Diarrheal disorders	4	2.8
R.T.I	12	8.5
Worm passage	45	32.1
Pallor	114	81.4
Liver enlargement	1	0.7
Spleen enlargement	2	1.4

Table 1. Clinical examination among adolescent girls in Serango area in Gajapati district

Iron deficiency anemia

The mean haemoglobin concentration of adolescent girls was 10.3+1.35 g/dl, ranged between 5.6 g/dL and 12.9 g/dL. Overall, 84.5% of adolescent girls had some level of anaemia, of which 44%, 32% and 3% had mild, moderate and severe grades of anaemia respectively. The proportion of girls having moderate and severe anaemia was relatively higher in younger (12-14 y) than in older age group (15-18 y).

Malaria slide examination

Microscopic diagnosis of malaria in blood smears revealed that out of 140 slides examined, 12.1% were found to be slide positive for malaria parasites. Of total positive cases for malaria, 2.1% were identified as having *P. vivax* and 10% as *P. falciparum* infections, while 1.4% of slides were interpreted as having mixed *P. vivax* and *P. falciparum* infections.

Haemoglobinpathies

The blood samples were subjected to run in the BioRad-Variant analyzer for assessing haemoglobinopathies. Out of for 126 cases, 18 (14.3%) were identified as sickle cell trait and none

homogygous sickle cell disease. â-thalassemia minor was seen in 5.6% cases, and none were detected to be â-thalassemia major.

Intestinal worm infestations

Out of 32 stool samples examined, the prevalence of intestinal parasites was 9.4% and mixed infestation was seen in 3% of samples.

Plan for next year

In addition to iron deficiency indictors (serum ferritin and soluble transferring receptor), vitamin A estimations by HPLC, vitamin B12, and folic acid will be assessed in a sub-sample of study population. Nutrition knowledge assessment will done prior to initiating intervention. The 5-arm regimen will be instituted for a period of one year through existing Anganwadi Workers and regular monitoring for compliance and coverage.

Interaction with Scientists by DG-cum-Secretary DHR during his visit to the centre.

14. EPIDEMIOLOGY OF VIRAL HEPATITIS IN TRIBAL POPULATIONS OF ORISSA, MADHYA PRADESH /CHHATISGARH AND JHARKHAND, INDIA: MULTICENTRE STUDY.

Principal Investigator	:	Dr. S.K.Kar
Co-Investigator(s)	:	Dr. B.Dwibedi, Dr. A.S.Acharya,
Collaborator	:	Dr. (Prof) S.P.Singh, (HOD, Gastroenterology), SCB Medical College, Cuttack
Duration	:	Four Years
Starting date	:	March 2006
Status	:	Extramural (ICMR Tribal Task Force)

Objectives:

The project aims at studying the epidemiology of viral hepatitis in tribal populations of Orissa. The objectives of the project were

1. To determine the prevalence of hepatitis A, B, C, D & E viruses along with the circulating genotypes of HBV & HCV.
2. To assess the risk factors of transmission of hepatitis viruses
3. Prevalence of pre-core and basal core promoter mutants of HBV

Background:

Viral hepatitis is caused by different viruses that belong to different taxonomical families and genera. Among them HAV & HEV are transmitted by faeco-oral route, HBV & HCV are blood borne viruses transmitted through contaminated blood, blood products and through improperly sterilised needles/ syringes. The prevalence of these viral infection in tribal areas of India mostly remains unknown. The present study would like to assess the prevalence of viral infection in three different tribal areas and to find out the contributory risk factors for transmission. It is assured that certain risk factors would be unique to practices followed in certain tribes. The primitive tribes are geographically isolated and quite shy of contact with community at large. Among all hepatitis viruses, HBV & HCV lead to chronic infections and super infections with other hepatitis viruses increases severity of the disease. Vaccines against HAV & HBV are now available but not yet been included in universal programme of immunisation due to its high cost. However, understanding the risk factors and prevalence rates might lead to inexpensive and appropriate intervention measures. Distribution of viral genotypes can also be useful in context of transmission within the tribes. It is known that the specific genotype is associated with severity in progression and then help in selecting appropriate therapeutic antiviral agent. The study will help comparing data at national level amongst primitive tribes and general population by comparing the data with available information at the national level

Progress:

Study has been initiated to assess the prevalence of hepatitis virus infections and associated risk factors for transmission in five primitive tribes (eg. Lodha, Saora, Khadia, Mankidia and Juanga) in Mayurbhanj and adjacent areas of Orissa. (Annual Report 2006-07) .Minimum sample size of 0.99% of the total population from each of the tribes was considered adequate at the initial phase, taking HBsAg prevalence of 5%. Representative samples covering all ages and both sexes were drawn from different clusters/inhabitations of the above tribes for inclusin in the study.

A total of 1426 individuals were covered initially during the study from the five tribes from Mayurbhanj and Keonjhar districts which were the study area specified for the study. The study has shown that prevalence of HCV infectin was high in two (Mankidia and Juanga) tribes and it was recommended to look for these tribes in other regions of the state, and the cited tribes from four more districts were added. Hence the total study population enrolled were 1765 after including the new areas (Table 1).

Clinical findings and history of illness were recorded. Predesigned risk factors questionnaire was filled up by interrogation with the individuals or guardians. Blood samples were collected aseptically and transported to RMRC laboratory in freezed condition. Serological screening test were done on all the samples and molecular diagnostic tests performed on HBV and HCV seropositives.

Table-2: Distrubution pattern of five primitive tribes.

Name of the tribe	Census Population	Estimated Minimum sample size 0.9%	Population covered	Block covered	District
Lodha	2405	22	242	Morada,Suliapada,Udala	Mayurbhanj
Saora	3740	34	212	Morada, Suliapada	
Khadia	15405	139	450	Karanjia, Jasipur, Udala	
Mankidia	713	6	262		
Mankidia	108	0.972	52	Nilagiri	Balesore
Mankidia	134	1.2	64	Deogarh	Deogarh
Mankidia	36	0.324	23	sukinda	Jajpur
Juanga	15719	141	260	Gonasika	Keonjhar
Juanga	16104	144	200	Dhenkanal	Dhenkanal
		Total	1765		

The prevalence of HBsAg was noted in 0.8%, 0.9%, 0.9%, 3.7% and 1.7% population in Lodha, Saora, Khadia, Mankidia and Juanga tribes respectively where as Anti HBc IgG positivity was 4.5%, 1.4%, 9.3%, 26.1% and 16% in those tribes(fig 1). HBV DNA was detected by PCR in 53% of HBsAg positive samples and the HBV viral load ranged from< 250 to 2.62 x 10^{8} copies/ml. Occult HBV DNA was detected in 17% of the samples tested amongst cases demonstrating HBc IgG but not showing any detectable HBsAg. All HBV DNA positive samples were subjected to genotyping and all were found to be Genotype D and all were wild type for pre-core DNA.

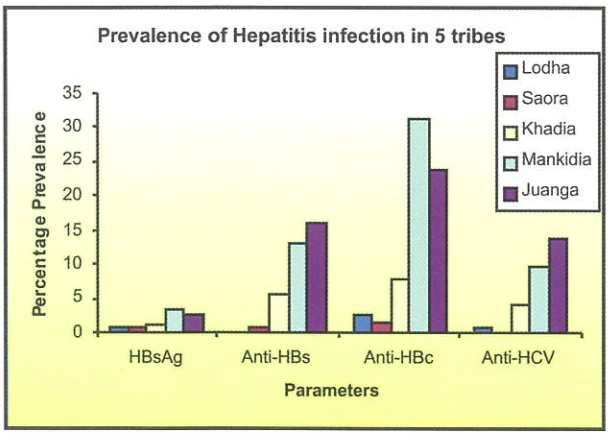


Fig 1

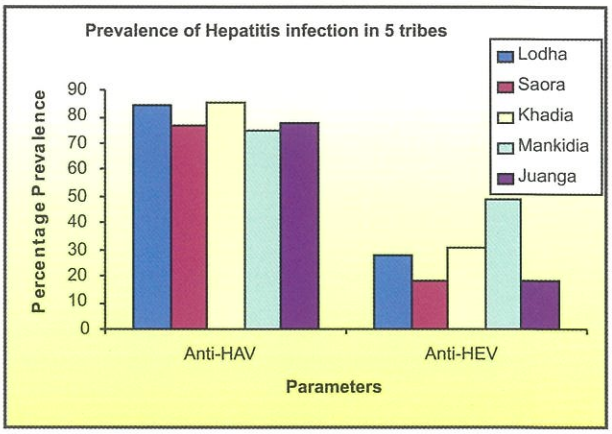


Fig 2

Antibody to HCV was detected in 3.7%, 0%, 5.7%, 13.4% and 8.47% in Lodha, Saora, Khadia, Mankidia and Juanga tribes respectively. Evidence of exposure to Hepatitis A virus infection (i.e HAV IgG) was 75-87% and to that of HEV was 18-60% in the above tribes.

Factors relating to both enteral & parenteral routes for transmission of hepatitis viruses were looked in. Unsafe drinking water, unhygienic preservation of cooked food (Rice & Kanji), was observed as a common in all the tribes. The observed risk factors for parenteral transmission were; tattooing (7-33%), Sharing of razor(7-30%), Body piercing(25-46%), H/O Multiple injection (1-36%) and Shaving in barber shop/by village barber (21-31%).(Table 2).

Association/contribution of these risk factors towards transmission of the infection will be analysed in-depth subsequently.

Table-2: Prevalent Risk Factors for Parenteral Transmission

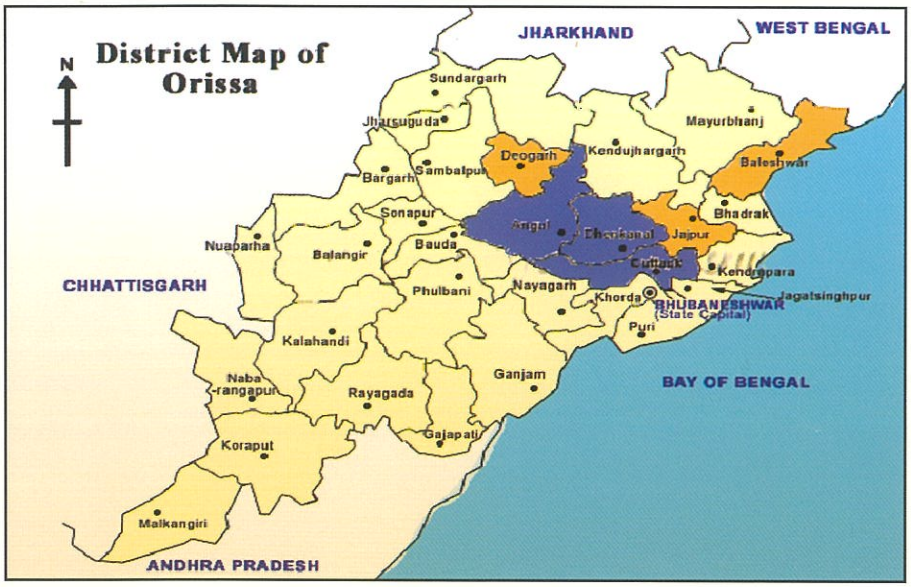
Tribe	Lodha (n=242)	Saora (n=212)	Khadia (n=450)	Juanga (n=460)	Mankidia (n=401)
Tattooing	18 (7.4%)	29 (13.6%)	59 (13.1%)	61 (13.2%)	135 (33.6%)
Sharing of Razor	18 (7.4%)	54 (25.4%)	139 (30.8%)	61 (13.2%)	86 (21.4%)
Body Piercing	62 (25.6%)	66 (31.13%)	203 (45.1%)	215 (46.7%)	181 (45.13%)
H/O Multiple Injection	89 (36.7%)	67 (31.6%)	79 (17.5%)	6 (1.3%)	18 (4.48%)
Shaving in Barber shop	77 (31.8%)	61 (28.77%)	141 (31.3%)	99 (21.5%)	86 (21.4%)

Prevalence of HBV and HCV infection and risk factors of transmission among Mankidia and Juanga tribe settlement in other districts of Orissa:-

The distribution of Mankidia and Juanga tribes outside the initially studied area in the state of Orissa (2001 census) was ascertained and given below.

Table-3: Distribution of Mankidia and Juanga tribes (in newly added districts).

			Total population in the district			
Tribe	Balesore	Deogarh	Jajpur	Anugul	Cuttack	Dhenkanal
Mankidia	108	134	36			
Juanga			707	926	480	16104



The serological investigation of Mankidia and Juanga tribes residing at other districts like Dhenkanal(n=197), Balesore (n=50) and Deogarh(n=65) has been studied. The prevalence of serological markers of HBV and HCV infection was analysed. Mankidia tribe of Deogarh district has shown 10% of HBsAg positivity followed by Mankidia tribe of Balesore district i.e. 2%. Antibody to HCV infection was detected in Mankidia tribe of Deogarh district 15% followed by Balesore district 4%. Juanga tribe residing at Dhenkanal district has shown HBsAg positivity of 0.4% and anti HCV 1.3%.

Table-4: Prevalent risk factors for parenteral transmission among HCV positives

Tribe	Mankidia			Juanga	
District	Mayurbhanj	Balesore	Deogarh	Dhenkanal	Keonjhar
Tattooing (%)	31	34	38	21	7
Sharing of Razor (%)	18	34	0	1.5	22
Body Piercing (%)	42	44	54	62	35
H/O Multiple Injection (%)	53	72	60	60	48
Shaving in Barber shop (%)	18	34	0	21	22

Quality control and technology transfer:

All positive and 5 % of negatives were tested at NIV Pune and external quality control assured. Transfer of molecular technology could be undertaken through man power training and successful implementation of the molecular diagnostic test related to HBV and HCV at the centre.

Subsequent plan of activity:

The above observations have shown that two tribes (Mankidia and Juanga) are having high prevalence of Hepatitis C virus infection hence the risk factor for transmission needs to be studied in depth. Questionnaire for addressing each of the risk factors has been developed for population groups, key informants etc which will be pretested and modified for utilisation during in-depth interview and focus group discussion. The data generated will be validated with the already collected individual information.

Release of books on achievments of RMRC

15. STUDIES ON DRUG SUSCEPTIBILITY PATTERN OF *MYCOBACTERIUM TUBERCULOSIS* IN ORISSA.

Principal Investigator:	:	Dr. D. Das
Co Investigator:	:	Dr. H. K. Khuntia
Collaborator:	:	Dr. N. Selvakumar, TRC, Chennai
Duration:	:	Two years
Starting Date:	:	October 2008
Status:	:	Extramural (Applied to Central TB Fund, ICMR)

Objectives

1. To establish the TB culture lab for isolation of MDR-TB pathogen
2. To assess the drug susceptibility pattern of Mycobacterium tuberculosis prevalent in Bhubaneswar area.

Progress

The centre has initiated establishment of TB culture laboratory for this region to help isolating Multi-Drug Resistant TB pathogens in cases reporting as suspected cases of TB to identified health facilities and to characterize the pathogens including their drug sensitivity pattern. At the initial stage, the investigators were trained at TRC, Chennai for 6 weeks, the lab space and equipments needed were identified in consultation with TRC, Chennai and several equipments are procured.

At the outset, the current epidemiological status of TB in the state was analyzed (Table 1 & Fig.1).

Table 1: The total no of TB cases treated and their treatment outcomes for the state of Orissa (RNTCP data)

Year	Total cases treated	No cured & completed treatment	No of deaths
1997	101	78	6
1998	3923	3360	243
1999	8151	7225	460
2000	9759	6591	377
2001	14743	12492	662
2002	17944	17313	1095
2003	24186	20344	1344
2004	43237	36205	2148
2005	44613	37900	2202
2006	44792	37630	2276
2007	49285	42061	2512

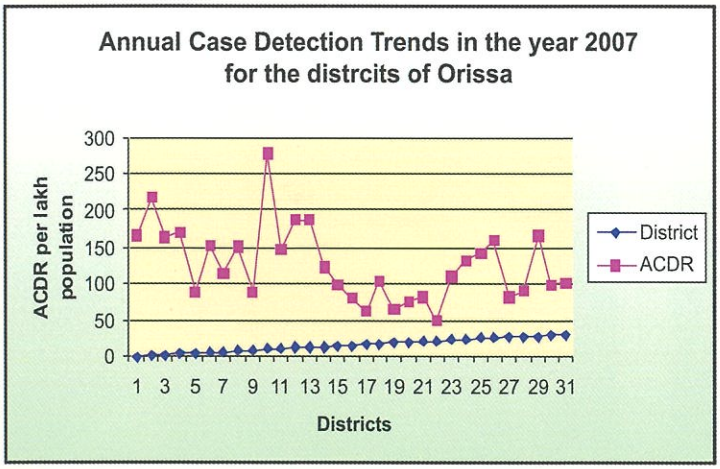


Fig.1 Annual case detection rate for all the distrcis of Orissa for the year 2007.

Districts with corresponding number, 1–Keonjhar, 2-Mayurbhanj, 3-Sundargarh, 4-Jharsuguda, 5-Deogarh, 6-Sambalpur, 7-Koraput, 8- Raygada,9-Nawarangpur,10-Malkangiri, 11-Kalahandi, 12-Nuapada, 13-Gajapati, 14Kandhamal, 15-Angul, 16-Baalasore, 17-Bhadrak, 18-Boudh, 19-Kendrapara, 20-Puri, 21-Cuttack, 22-Jagasinghpur, 23-Dhenkanal, 24-Baragarh, 25-Bolangir, 26-Ganjam, 27-Jajpur, 28-Khurda, 29-Nayagarh, 30-Sonpur, 31-Bhubaneswar.

Besides in collaboration with Capital Hospital, Bhubaneswar, Govt. of Orissa serving as nodal centre for diagnosis and treatment for TB, 237 heat fixed sputum slides from suspected cases reporting to OPD, Capital Hospital were collected during the period and examined by both routine microscopy (ZN staining) as well as compared with fluorescent microscopy. While ZN staining detection techniques exhibited 17.7% positive, fluorescent microscopy could detect 19.8%, indicating higher detection by the later technique.

The weekly collection of sputum slides in Capital Hospital averaged 60 samples, around 80% of new and 20% of previously diagnosed and no. positive who were on treatment. The patients reporting to Capital Hospital as suspected cases of TB were young (21-30 years) with less representation from children less than age ten years and older population with male preponderance. (Fig.2)

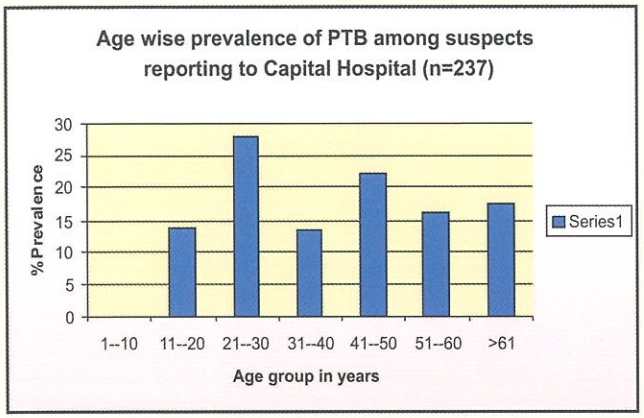


Fig.2: Age wise prevalence of PTB.

Effort has been made to culture the pathogen in Class II Type B_2 Biosafety cabinet using commercial media and the work is in progress.

Plan for next year

The lab space will be identified to full fledged TB culture lab and TB culture will be undertaken after lab standardization and quality will be checked while comparing the results with that of TRC, Chennai. Only after establishment of culture, the drug sensitivity pattern and other characteristics of pathogen prevalent in different clinical spectrum of TB cases will be studied.

Field study during Hepatitis outbreak

Inspection of Larval breeding spots during chikunguniya outbreak

COMPLETED STUDIES

1. HUMAN BANCROFTIAN FILARIASIS: IDENTIFICATION OF IMMUNOLOGICAL MARKERS OF MORBIDITY IN HYDROCELE AND ELEPHANTIASIS

Principal Investigators	:	Dr. A.K.Satapathy,
Co-Investigators:	:	Dr. A.S. Kerketta, Dr P.K. Sahoo,Dr. B.Ravindran (ILS)
Duration	:	Three Years
Starting Date	:	March 2006
Closing Date	:	December 2009
Funding	:	Intramural

Objectives

1. To evaluate filarial specific as well as mitogen induced T-cell proliferative responses in hydrocele and lymphoedema patients
2. To quantify inflammatory cytokines and chemokine levels in patients with hydrocele and lymphedema and correlating with severity of chronic manifestation.
3. To type genetic polymorphism of TNF receptors (TNFR I & TNFR-II) in hydrocele and lymphedema patients.

Background

Human lymphatic filariaisis displays diverse forms of clinical manifestations. It has been assumed that repeated episodes of acute attack could eventually lead to development of chronic forms of diseases. Hydrocele and elephantiasis are two major clinical manifestations associated with chronic Bancroftian filariasis. However, it is not clear why some individuals develop one form of pathology, and other develops another form of pathology. Although hydrocele and lymphedema / elephantiasis are two diverse forms of chronic manifestation, immunological features distinguishing patients with elephantiasis from that of hydrocele have not been very successful. Identifying immunological markers may be useful in differentiating the two forms of chronic diseases manifestations as well as crucial for understanding the mechanism of pathogenesis of the diseases. An attempt has been made to address these issues in this study.

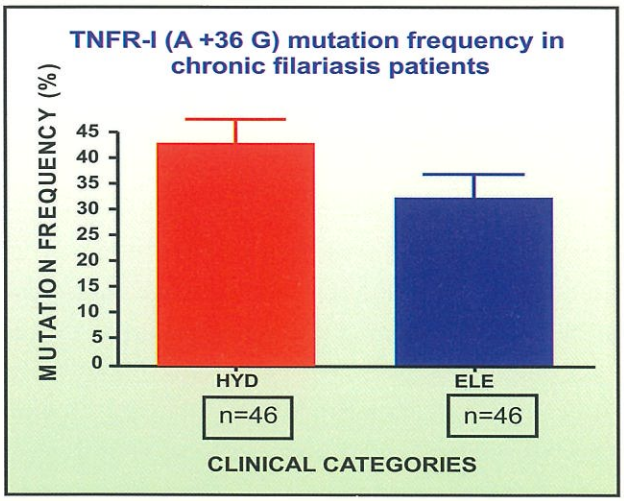
Observations

We had compared antibody levels the following five different recombinant filarial proteins in Elephantiasis and Hydrocele cases. The filarial recombinant proteins were Abundant Larval Transcript- 1) ALT-1; 2) ALT-2; 3) Serpin–2 (SPN-2); 4) Cystein Protease inhibitor–2 (CPI-2) and VAL. The first two molecules are produced by infective larval stages while SPN-2 is synthesized only by microfilarial stages and CPI-2 is present on the surface of adult filarial worms. The IgG antibodies responses to CPI-2 and SPN-2 were significantly more in Hydrocele cases in comparison to elephantiasis patients. Isotype analysis showed IgG1 antibody to ALT-1 and CPI-2, IgG2 antibodies to SPN-2 and IgG4 antibodies to CPI-2 were significantly high in hydrocele in comparison to lymphedema indicating significant differences in humoral immune responses of the two diverse forms of chronic diseases.

One of the objectives of this project is to quantify inflammatory cytokines and chemokine levels in patients with hydrocele and lymphedema and correlate with severity of chronic manifestation. Extensive studies have resulted in growing evidence in support of involvement of various inflammatory cytokines in parasite infection, where a central role for TNF-α has been attributed. TNF-α has been known as an important inflammatory mediator capable of producing symptoms such as chills, fever and myalgia. Since, hydrocele and elephantiasis are two diverse forms of chronic manifestation, quantification of plasma levels of TNF could be useful for the differentiating the both forms of chronic manifestations. No significant difference observed in the plasma levels of TNF-α between hydrocele and elephantiasis. Rantes is a chemokine, which play an active role in recruiting leucocytes into inflammatory sites. Rantes induces the proliferation. There is no significant difference in the plasma levels of Rantes between hydrocele and elephantiasis.

There was a dichotomy in plasma levels of two TNF receptors between infected subjects and patients with filarial disease. TNFR-I was found to be significantly elevated in patients with disease manifestations while TNFR-II on the other hand was significantly elevated in subjects with filarial patent infection. The two forms of chronic filarial diseases were significantly different from each other when the ratio of TNFR-I and TNFR-II were analyzed – elephantiasis patients displaying a significantly high ratio in comparison to hydrocele cases indicating that these immunological markers may be useful in differentiating the two forms of chronic disease manifestation. We analyzed genetic polymorphism of TNFR-I (A to G) and TNFR-II (M 196 R) gene in the two major forms of chronic manifestations of filariasis. We compared the polymorphism of TNFR-II (M 196 R) gene in hydrocele and elephantiasis. Genetic polymorphism of TNFR-II occurred at a lower frequency in elephantiasis cases and was significantly more in hydrocele cases. There was a significant difference in the mutation frequency between the two forms of chronic disease. TNFR-II mutation frequency was significantly more in endemic controls (95%) and hydrocele cases (87%) in comparison to patients with elephantiasis (45%). Genetic polymorphism of TNFRII (M 196 R) occurred at a higher frequency in hydrocele cases in comparison to elephantiasis cases.

Fig-1



We analyzed genetic polymorphism of TNFR-I (A to G) gene in the two major forms of chronic manifestations of filariasis. Fig-1 shows the frequency of TNFR-I (A to G) mutation in hydrocele and elephantiasis subjects - there was no significant difference between the two forms of chronic disease(Fig-1). These finding suggest that TNFR-I (A to G) mutation may not have significant role in development of chronic disease manifestation.

The endothelin system has a physiological vasoconstrcting role and sometimes a pathophysiological participation in systemic endothelial activation. Increased ET-1 levels have been associated with vascular hypertrophy and neighboring fibrosis. It has been presumed that progression of infection to chronic manifestations may be due to over expression of lymphangiogenic factors such as VEGF and endothelin. To check the possibility of endothelin–1 polymorphism playing a role in the outcome of diverse chronic manifestations, the prevalence of ET-1 (Ala 288 Ser) genotypes was assessed in subjects of filariaisis with different clinical chronic manifestations. The prevalence of wild genotype (Ala/Ala) was found to be significantly more in hydrocele case in comparison to elephantiasis. A significant difference was found in the distribution of heterozygous (Ala/Ser) individuals among the chronic categories. In elephantasis the Ala/Ser genotype was more prevalent in comparison to hydrocele case.

To assess the possible functional relevance of the Ala288Ser polymorphism on the in vivo production of endothelin-1, the plasma level of endothelin-1 with respect to different genotype of Endothelin-1(Ala288Ser) polymorphism were correlated. A significant difference was noticed in the plasma concentration of endothelin-1 when we compared wild type Ala/Ala verses mutant (Ala/Ser and Ser/Ser) individuals (P=0.0252) (Fig-2). Individuals with Ala/Ala genotype produce higher amount of plasma Endothelin-1 than Ala/Ser and Ser/Ser genotype. A significant difference was observed in between wild type Ala/Ala and homozygous Ser/Ser individuals (P=0.0220)(Fig-3). Though, the heterozygous mutant Ala/Ser produce less amount of Endothelin-1 than Ala/Ala and more from Ser/Ser but these differences could not reach significant level.

Fig 2

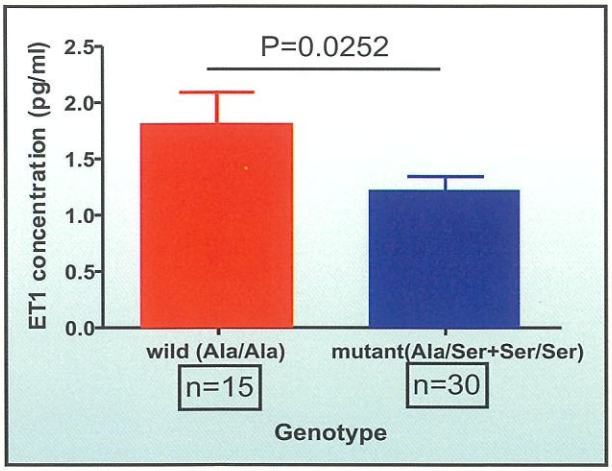
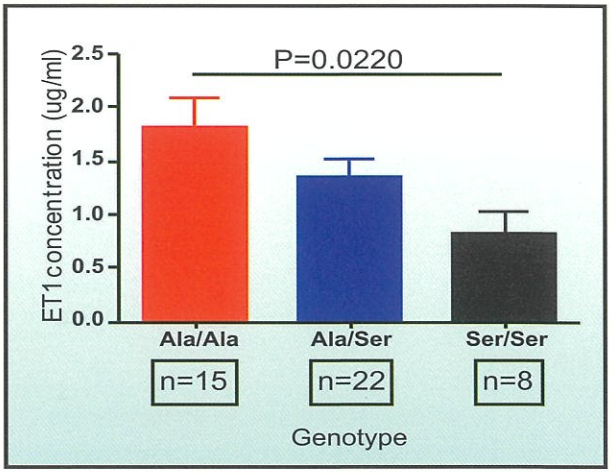


Fig 3



Conclusion

IgG1 antibody to ALT-1 and CPI-2, IgG2 antibodies to SPN-2 and IgG4 antibodies to CPI-2 were significantly high in hydrocele in comparison to lymphedema indicating significant differences in humoral immune responses of the two diverse forms of chronic diseases. We assessed the role of Endothelin-1 (Ala288Ser) and TNF receptor–II (M196R) genetic polymorphisms in the outcome of two diverse chronic manifestations. Polymorphism of TNFRII (M 196 R) genes was at a higher frequency in hydrocele cases in comparison to elephantiasis cases while Endothelin-1 (Ala288Ser) polymorphism was more prevalent in elephantiasis patients in comparison to hydrocele cases. Furthermore, plasma levels of

endothelin-1 were significantly higher in the subjects with the (Ala/Ala) genotype than in those with other genotypes. The results of this study indicated that the endothelin-1 and TNF receptor II polymorphism are genetic risk factors for the development of hydrocele and lymphedema respectively in human lymphatic filariaisis.

Happy moment: RMRC staff picnic at Barunei

2. IMMUNOCHEMICAL CHARACTERIZATION OF FILARIAL GLUTATHIONE S-TRANSFERASE AND ITS PROTECTIVE POTENTIAL IN EXPERIMENTAL FILARIASIS.

Principal Investigator	:	Dr. M. K. Beuria
Co-Investigators	:	Dr. M.K. Das, Dr. M.S. Bal, Dr.N.N.Mandal
Duration	:	Three Years
Starting Date	:	March 2005
Closing Date	:	August 2008
Status	:	Extramural (Funding : DST)

Objectives:

1. To determine recognition pattern of anti-Glutathione-S- transferase (GST) antibodies (SDS-PAGE and immunoblotting) in filarial sera.
2. To determine the cytokine responses specific to GST in filariasis.
3. To evaluate the protective potential of GST to clear microfilariae in experimental infected animal.

Background

Glutathione-s-transferases (GST), a group of detoxifying enzymes, help in parasite survival against host-induced damage. These enzymes have been used as component of anti-parasitic vaccine in Schistosomiasis, Fascioliasis and in Chaga's disease. The present study was carried out to find out the role of GST in Lymphatic filariasis.

Observation

Glutathione binding protein with GST activity was purified through Glutathione Agarose column passing soluble extracts of cattle parasite *Setaria digitata*. On SDS-PAGE analysis it revealed a broad band of 26 to 28 Kda (Figure-1). Protein sequencing of GST was done using Nano LC-MS/MS. The purified GST was found different from human GST having only 43% homology, indicating the filarial specificity of GST. Antibody recognition pattern to GST was checked by ELISA and Immunoblotting assay. Antibody response to GST were determined in asymptomatic microfilaraemics (AS), Chronic filariasis patients (CP), endemic normal subjects (EN) living in areas endemic for bancroftian filariasis. More than 90% subjects were positive for IgG antibody compared to 45 % in endemic normals (Table-1). IgM positivity of about 50% was observed in endemic normals compared to 90% in infected subjects (Table-2). IgE positivity of 39%, 49% and 79% was observed in endemic normal subjects, asymptomatic microfilaraemics and chronic filariasis cases respectively (Table-3). Sera (NEN) collected from individuals from non-endemic region were negative for any isotype indicating the filarial specificity of GST. Further IgG antibody isotype was determined in circulating filarial antigen (CFA) positive and negative individuals (Table-4). There was no significant difference observed between the two groups. Western blotting was done to evaluate the binding of GST with filarial sera. Sera collected from endemic subjects identified two bands of GST by immunoblotting (Figure-2). Sera from non-endemic normal individuals could not recognize GST. Sera collected from CFA positive and negative individuals recognized both the bands of GST by immunoblotting assay (Figure-3). The effect of individual serum on the enzymatic activity of GST was studied. Inhibition was noticed with all categories of filarial sera. Inhibition of enzymatic activity was nearly equal among the filarial groups (Table-5).

We have studied T cell proliferative response, Th1 and Th2 type of cytokine production by PBMCs, upon stimulation with GST, collected from different clinical groups of filariasis patients. T cell proliferative response of peripheral blood mononuclear cells of normal and infected subjects was determined (Table-6). More than 75% of endemic normals and chronic patients were found positive having S.I. index more than two. A few (22.2%) asymptomatic microfilaraemic individuals showed T cell proliferative response to GST which is significantly lower compared to the values obtained with endemic normals or chronic patients. Various cytokine levels were quantified in the supernatant of PBMC cell culture stimulating with GST collected from different clinical groups. IL-2, IFN-ã, IL-4, IL-5, IL-6 and IL-10 were quantified by immunoassays in the culture supernatant of PBMC of various categories. Our results showed that endemic normal subjects produced significantly more IFN-ã compared to AS, AC, CP and HYD groups (Figure-4). However, PBMCs of different individuals from different clinical categories produced almost similar level of IL-2 (Figure-5). There is no significant difference between different clinical categories of filarial patients in IL-2 production. Symptomatic cases either acute or chronic cases (AC,CP, HYD) produced significantly less IL 4 compared to asymptomatic subjects (EN and AS) (Figure-6). AS, AC and CP categories produce significantly more IL-5 as compared to EN but there is no significant difference between HYD and EN(Figure-7). IL-6 production was observed to be more in EN, AS and CP cases compared to AC and HYD Cases (Figure-8).IL-10 is one of the anti inflammatory cytokines. PBMCs of HYD, AC, CP and AS cases produced significantly less IL-10 as compared to EN (Figure-9). Mf individuals produced elevated Th2 cytokines like IL-4, IL-5 IL-6 and decreased levels IL-2 and IFN-ã in response to parasite GST. Elephantiasis patients have elevated levels of both Th1 (IL-2) and Th2 (IL-4, IL-5, IL-6) type cytokines in response to parasite GST. Similar observations were also observed in hydrocele patients except IL-5 production which was low compared to elephantiasis cases. Acute filariasis cases have elevated levels of IL-2, IL-5 production and decreased levels of IFN-ã, IL-4, IL-6 and IL-10 response The EN individuals had a Th1 type pattern with absence of IL-5 production.

The *Setaria digitata – Mastomys* model was standardized in order to study the clearance of microfilaria following GST immunization. The course of appearance of microfilaria in *S. digitata* implanted mastomys was observed taking 20 µl of blood from tail vein. Microfilaria was detected in the peripheral blood on day 4 of post implantation. It was observed that microfilaria could persist in the circulation up to day 160 of post implantation with a peak on day 25 in the non-immunized control group of mastomys. The effect of immunization with GST on appearance of microfilaria was determined. Active immunization with GST antigen either before or after implantation caused rapid clearance of microfilaria in implanted mastomys. Immunization of animals with GST antigen before implantation (Figure-10) resulted in significant reduction of Mf density and a total clearance by about 90 days post implantation. Induction of anti-GST antibodies(Mean ± S.D.) was observed to be 0.87± 0.22 at the time of implantation .Reduction of Mf density (about 7 %) was observed in immunized group vs. 180% increase in non –immunized control animals on day 25 as compared to day 7. The microfilaria (mean ± S.D.) count on day 25 was observed to be 13.3±2.6 and 36.2±6.3 in immunized and control group of mastomys respectively. The circulating Mf in immunized group were found to get cleared very rapidly in comparison to control group animals, indicating that microfilaria clearance in vivo was significantly potentiated by antibodies to GST. Mf density was observed declined by about 52% on 45th day, 57% on 55th day and 78% on 75th day of post implantation in immunized animals. The microfilaria density was more than 100% till 85th day in non-immunized control animals. The effect of immunization with GST antigen was studied in animals with ongoing microfilaraemia (Figure-11). Intraperitoneal immunization with GST antigen resulted in suppression of Mf density and a total clearance by 115 days. Anti-GST antibody level (mean O.D.± S.D.) was observed to be 0.65± 0.18 and 0.09 ± 0.02 on day 35 in immunized and control group of mastomys respectively. The antibody level was found to be maintained in immunized animals till day 115 (0.53 ± 0.14). The reduction in Mf density was marked after day 35, resulting in a sharp decline. Significant reduction in Mf density was observed about 32%, 60% and 71% of the original microfilaraemia by 55,75and 85 days respectively, indicating that active immunization with GST antigen is effective against a pre-existing filarial infection. Immunization of Tetanus toxoid antigen (non filarial antigen) before implantation of worms could not induce microfilaria clearance and suppress the microfilaria density, suggesting microfilaria clearance was not due to the non specific stimulation of the immune system (Figure-12, 13).

Conclusion

The present report demonstrates the antigenecity of heterologus glutathione-s-transferase in human filarial infection. On LC/MS analysis, the purified GST was found different from human GST having only 43% homology, indicating the filarial specificity of GST. It also evaluates the immunoprophylactic of GST antigen in *S. digitata* infected mastomys. Immunization with GST antigen not only resulted in significant reduction in Mf density but also cleared microfilaria completely from the circulation. Complete clearance of circulating microfilaria in the infected mastomys indicating the protective efficacy of GST antigen.

Field study: Collection of blood samples for Hapatitis test.

3. ASSESSMENT OF THERAPEUTIC EFFICACY OF CHLOROQUINE IN TREATMENT OF UNCOMPLICATED P.FALCIPARUM MALARIA IN NAYAGARH DISTRICT OF ORISSA

Principal Investigator	:	Dr. A S Kerketta
Duration	:	Six months
Starting date	:	March 2008
Funding	:	Extramural (NVBDCP, Govt of Orissa, Bhubaneswatr)

Background

The malaria monitoring record of state health department under NVBDCP operating in Orissa has indicated recent increase malarial incidence and death in Madhyakhanda PHC area of Dasapalla block, Nayagarh District. On the basis of available expertise, the state health department requested RMRC to conduct the efficacy study. The epidemiological situation of the block during last three years show the ABER of 6.6, SPR 4.1, Pf % 86.0 and API 2.76%. It is reported that the mortality due to malaria is increasing over last few months that caused concern.

Objective

1. To study the chloroquine sensitivity in the treatment of uncomplicated P.falciparum malaria

Methodology

Study design

The study follows guidelines for 28 days extended test for assessment of therapeutic efficacy of antimalarials as per WHO, 2001.

Study area

The study was under taken in four sub-centres of Madhyakhanda PHC. The health facilities under the PHC area are one area hospital, two PHC new and 18 sub-centres (SCs). As per the previous three years surveillance data of state health department, though the area is having SPR less than 5% but sudden high incidence was reported from the area indicating there is high malaria transmission in the communities as the Pf prevalence in the area is around 90%. The table-1 depicts the malaria situation in the PHC area. The uncomplicated P.falciparum cases from four SCs namely Banigocha, Takra, Pokhorigocha, Kunjabanagada were included in the study.

The study was conducted in collaboration with the state health personnel of the PHC. The team comprised of two physicians, two technical assistant, and three technicians (one from state health department and two project staff). The health workers of the particular sub-centres accompanied the team to the study villages. Initially to select the eligible case a rapid fever survey was done by door-to-door visit in six villages namely Jamusahi, Jagannathprasad, Takra, Tangiapalli, Sankurdengi and Pankua. In a centre place of the village the camp was organized and all the fever cases were asked to report there. A total of 97 fever cases were screened after taking a careful and precise registration of address. Prior to the enrolment the patient and his/her attendant

were briefed in details about the aim, procedure and the benefits of the study. There after informed and written consent was obtained from each subject. Each patient underwent physical and clinical examination with a careful history of the duration of fever and on treatment sought The axillary temperature was recorded with the help of an electronic thermometer and the body weight was measured using a calibrated scale-weighing machine. A finger prick blood was collected from each patient for a thick and a thin smear in duplicate and also for rapid diagnostic kit test (RDK). Simultaneously the thick and thin smears were prepared and were air dried rapidly. The thin smear was fixed with anhydrous methanol. The thick smears were de-haemoglobinised and were stained with Giemsa stain 3% and at pH 7.2 and examined on same day. The parasite count was done against 200 WBC in thick smear. Thin smears were used to confirm the parasite species. Taking consideration of inclusion and exclusion criteria, 57 eligible cases were selected for the study. (The detail is given in Table 1).

Table 1 Enrollment characteristics of the study population

	Mean	Range
Age (in years)	14.4	4-65
Gender *M=32	52.8	6-65
*F=25	47.2	6-40
Axillary temperature	37.7	37.5-39.3
Asexual parasite	6190	1000-48000

*M=Male, * F=Female

All 57 cases were administered i.e Chloroquine 150 mg base under supervision of the medical team as per the WHO recommendation, The study subjects were monitored daily by the medical doctor for initial 3 consecutive days. They were advised not to take any other drug during the study period with out informing investigator.

Follow-up

The study subjects were followed up on day 1, 2, 3, 7, 14, 21 and 28, with detail clinical examination and blood smear for parasite count and on each day the danger signs noted for each subject. Treatment failure cases were treated with second line of antimalarial drug or referred to the nearer government health facility.

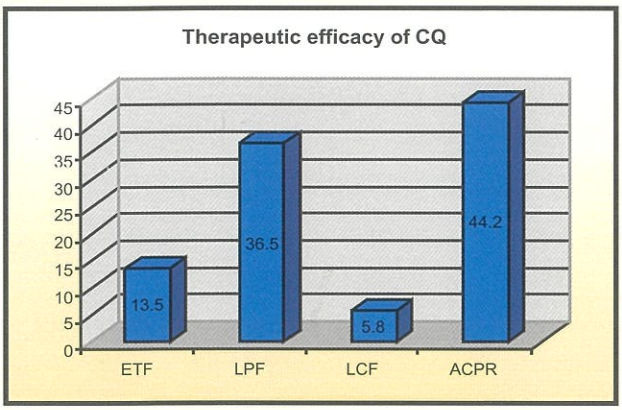
Dropouts

Out of total study population 1(1.7%) dropped out from the study, as he could not be traced since he moved to his relative house, which is out pf our reach of active follow up. One girl (1.7%) was given treatment from out side. Three (5.3%) were detected having Pv trophozoites on D7 and14 and excluded from the study. Thus a total of 52 (91.2%) subjects could be followed up till 28 days study.

Observation

Out of the total cases studied, 52 cases followed up till the completion of study period of 28 days. The study revealed a total treatment failure of 29(55.8%) with CQ in treatment of P falciparum malaria. The

Early treatment failure (ETF) was found in 7 (13.5%) Cases and the late treatment failure (LTF) was marked in 22(42.3 %) cases. Adequate clinical and parasitological response (ACPR) was marked in 23 (44.2%) cases. *Observation*



Conclusion

The present study reported a prevalence of Chloroquine resistance more than the cut off limit of 10% in Madhyakhanda PHC area of Dasapalla block, Nayagarh district of Orissa. The study indicates urgent need of switching over to second line of antimalarial drug in the area. The report has been submitted to the state health department to take necessary action.

4. EVALUATION REPORT OF THE MALARIA MITIGATION MEASURES IN THE COMMAND AREA OF THE RENGALI LEFT BANK CANAL SYSTEM.

Principal Investigator	:	Dr. A. Mahapatra
Co- Investigators	:	Dr. A.S.Kerketta , Dr. R.K.Hazara
Duration	:	Three Years
Starting date	:	March 2007
Closing Date	:	March 2009
Funding	:	Extramural (Govt. of Orissa)

Background

Several water reservoirs have been constructed in different districts of Orissa on major rivers for enhancements of agricultural activities. River Brahmani, the 2nd largest in the State, drains from 39,033 sq.km catchment before falling into Bay of Bengal. Rengali Dam was constructed across River Brahimani, in Angul district. The construction of Rengali dam was taken up during the year 1972 and was completed during the year 1985.

The water releases made after the power generation through Rengali Dam powerhouse is picked up at Samal Barrage for feeding two canals systems-consisting of 121,200ha. from RBC and 114,300ha. from LBC. The LBC mainly covers different districts of Orissa i.e. Angul, Dhenkanal, Jajpur and Keonjhar. LBC-I mainly covers Kaniha block of Angul district and some area of Parajang block of Dhenkanal district. Phase-I (LBC-II), work is under progress, mainly Irrigates different blocks of Dhenkanal district such as Parajang, Kamakhyanagar, Kankadahad and Bhuban. Around 60 to 70% work has been completed in Phase-I, water was released for irrigation (Source: Department of Water Resources, Government of Orissa, October 2008).

References suggest that, Dam Structures contribute to the mosquitogenic problems, which causes the gravest health concern in relation to water resource development projects. Canal networks are one of the important places for mosquito breeding, where the water flow is sluggish or canal banks are eroded or choked with vegetation,

or where seepage pools along canals have been generated. Keeping these factors in mind the Dam funding agency JBCI-Bank loan assistance guide lines made it mandatory to take Malaria Mitigation measures from 2006. The Base Line Survey and the concurrent survey were conducted by the VHAI- Voluntary Health Association of India, New Delhi.The Mid-term evaluation and the End –Line survey were entrusted to Regional Medical Research Centre,(ICMR) Bhubaneswar in 2007. The Mid term evaluation was conducted in 2008 and the End Line report is reported here in 2009.

Impact of malaria mitigation measures on Malariasituation

The Epidemiological data obtained from these PHC-CHCs reveal that Pf% was constant over these years from 1996 to 2008. However, there exits a declining trend in the Annual Parasite Index(API) & Slide Positivity Rate (SPR), which again reveals an upsurge from the year 2005 on wards i.e. after the canal water release in Parjanag PHC. It was also observed that, from 1996 onwards due to concentrated malaria mitigation mesures the malaria trend was in a decreasing order. However, after the LBC –II water release in Parajang PHC in 2005 againg thre is an upsurge in the SPR, & little diffrence in the API trend over these years. The un-changed Pf% in these three PHCs report that (1996 -2008), Epidemiologically that, these are Pf-Malaria vulnerable areas and needs more concentration. In case of fullfledged water release, stagnation & seepage will giverise to serious situations adhead if not handled properly.

Tab-1: Malaria Epidemiological data of the 3 PHCs.

	Parjang				Analabereni				Mathakargola			
Year	SPR	SFR	Pf%	API	SPR	SFR	Pf%	API	SPR	SFR	Pf%	API
1996	16.4	14	87.3	14	11	10.9	99.6	11.3	16.25	9.05	55.69	39.08
1997	15.5	13.3	85.9	16.1	10.3	10.2	99.6	11	17.06	8.59	50.36	35.65
1998	12.7	9.8	77.3	15.3	10.4	10.2	97.9	12.2	23.16	13.79	59.53	49.59
1999	13.2	10.2	77.2	11.4	17.3	16.7	96.6	20.3	20.18	13.41	66.45	37.5
2000	14.6	11.4	78.2	12.7	21	19.7	94.2	19.7	20.98	16.19	77.16	35.19
2001	13.9	12.9	92.83	13.11	20.9	19.18	91.79	25.08	14.8	8.82	59.6	20.39
2002	8.67	8.52	98.36	7.47	18.85	17.46	93.67	24.05	16.04	10.06	62.7	20.86
2003	9.3	8.2	98.2	6	16.06	15.9	96	19.3	13.5	8.9	65.7	17
2004	5.13	5.12	99.8	4.05	16.34	15.48	94.78	22.24	13.53	9.5	70.23	14.29
2005	1.82	1.82	100	1.51	9.8	9.09	92.7	15.54	12.84	8.57	66.73	15.23
2006	4.39	4.26	97.14	2.69	10.31	9.71	94.19	13.26	11.01	7.66	69.55	13.83
2007	9.27	8.95	96.55	9.42	9.30	8.75	94.10	8.54	7.52	5.47	72.75	7.25
2008	7.59	7.35	96.80	7.67	11.37	10.58	93.07	11.77	5.27	3.53	67.03	8.20
Mean	10.19	8.91	91.20	9.34	14.07	13.37	95.25	16.48	14.78	9.50	64.88	24.16
Total	**132.47**	**115.82**	**1185.58**	**121.42**	**182.92**	**173.85**	**1238.20**	**214.28**	**192.14**	**123.54**	**843.48**	**314.05**

Conclusion

The Malaria Mitigation Measures were taken up for 3 years, by the District Health Authorities Dhenkanal was appriciable, as this kind malaria mitigation measures were not taken up by any dam project earlier; this was

in accordance ti the funding agency-JBCI-Bank assistance guide lines. This mandatory clause to take-up Malaria Mitigation measures from 2006 onwards, were initiated by conducting the Base Line Survey by the VHAI-Voluntary Health Association of India, New Delhi, subsequently they were also assigned to conduct the concurrent surveys which are yet to start by .

The Mid Term Evaluation Report & the End Line Evaluations was assigned to RMRC as an independent body for evaluation. The Mid Term Evaluation Report was submitted to the Dam Officials, CDMO & The Japanese Bank representative in Hard & Soft copy form in 2008. This is the End Line Report with following salient features.

From the year 1996 onwards due to concentrated malaria mitigation mesures the malaria trend was in a decreasing order. However, after the LBC –II water release in Parajang PHC in 2005 there is an upsurge in the SPR & little diffrence in the API trend over these years. The un-changed Pf% over these three PHCs indicate Epidemiologically that, these are Pf-Malaria vulnerable areas and needs more concentrated efforts in longrun. It may be kept in mind that, the malaria situation may spurt-up after the full fledged water release in future, precaunary measures may be taken. In comparision with the base line , there is 23% increase in health seeking behaviour and 64% increase in the medicated bednet use pattern in community.

Inaugural function of the training programme on preventive vigilance

5. PREVENTIVE STRATEGY FOR SEVERE DIARRHOEAL DISORDERS IN TRIBAL DOMINATED KASHIPUR, DASMANTPUR AND THUAMUL RAMPUR BLOCKS OF ORISSA.

Principle investigator	:	Dr. B. B. Pal
Co- investigators	:	Dr. H. K. Khuntia, Mr. S. K. Samal
Collaborator	:	Dr. Bikash Pattanaik, Surveillance Officer, IDSP, Govt. of Orissa
Duration	:	Three month
Starting Date	:	01.01.09
Completion Date	:	31.03.09
Funding	:	Extramural(NRHM, Govt. of Orissa)

Background:

In collaboration and funding by Govt. of Orissa, the study was initiated in three tribal blocks of three diarrhoea prone districts of Orissa to look for different bacterial enteropathogens including the *V. cholerae*. This situational study was undertaken in the context of recent emergence of new El Tor variants of *V.cholerae* O1 Ogawa with *ctx*B gene of classical strains in above three blocks in 2007 affecting large population of tribals with severe diarrhoeal disorder.

Objectives:

1. To isolate and characterize different bacterial enteropathogens from diarrhoea patients reported to local health facility and different water samples used by the community.
2. To assess the socio-behavioral causes and practices prevalent among population at risk.

Observation

The study was conducted in the tribal dominated blocks of Rayagada, Kalahandi and Koraput district to isolate and identify the presence of enteropathogens including *V.cholerae* among diarrhoeal patients and its source like different environmental water bodies.The study was undertaken from March to May 2008 and in subsequent year in Feb, 2009. The water and the stool samples were collected and bacteriologically analyzed. Two hundred twenty seven environmental water samples were collected from river, nala, chua and stream from Kashipur, Dasmantpur, Jaipur and Thuamul Rampur. Only six water samples were positive for *V.cholerae* non-O1 & non-O139 serogroups and out of this only one *V.cholerae* non-O1 & non-O139 strain was positive for *ctx*A gene which was collected from a big stream from Kashipur area. The detailed results of water analysis have been described in the following Table. Mass chlorination was done in the identified water body and no cholera outbreak was noticed during this period.

Month and Year	Place	Total samples	No. positive for *V.cholerae* non-O1 and non-O139
March,08	Kashipur	28	3
April,08	Kashipur	41	1*
May,08	Dasmantpur	43	0
May,08	Th.Rampur	35	0
February,09	Kashipur	29	0
February,09	Dasmantpur	35	0
February,09	Jaipur	16	2
Total		227	6

**V. cholerae* non-O1 & non-O139 is positive for *ctx* A gene.

As per the available hospital records on diarrhoeal disorders, the incidence of severe diarrhoea cases was very low and there was no diarrhoeal outbreaks in these areas during this period. Bacteriological analysis of 28 rectal swabs collected during April, 08 to Feb, 09 from diarrhoea patients of Kashipur and Dasmantpur areas revealed that 10 rectal swabs were culture positive. Out of 10 culture positive samples, 9 were E. coli, 1 Aeromonas spp. and 18 were culture negative.

Conclusion and Recommendation:

Since *V. Cholerae* was isolated frequently from the study area, the appropriate recommendations were made to (i) monitor the water samples periodically of the sources consumed by the population for drinking purpose along with the stool samples from diarrhoea patients(ii) disinfection of water as per guideline (iii) IEC activities to local residents for safe hygeine practice.

OTHER STUDIES

1. STUDY OF HAEMOGLBINOPATHY OF REFERRAL CASES FROM GOVT. HOSPITALS

Investigators: Dr A.Maharana , Mr B.Murmu & Miss Sujata Dixit.

During 2008-2009 about 112 families were referred to Human Genetic Division of RMRC from various Medical Colleges and peripheral hospitals of the state for diagnosis of Haemoglbinopathy and Thalassemia. Most of the referral cases had complained of fever, anemia, weakness, joined pain, abdominal pain. A detailed family history has been recorded and clinical examination was done. After clinical examination 3ml of whole blood was collected in a vial containing EDTA as an anticoagulant from the subjects. Laboratory investigation such as Sickling test by Slide method, hematological profile by automated cell counter (MS4), quantitative analysis of HbA2, HbF, HbS were carried out by Cellulose Acetate Membrane (CAM) electrophoresis or by Biorad Variant analyzer. A total of 275 cases were studied during the period from April 2008 to May 2009. Out of which 92(33%) were diagnosed as b-thal minor, 25(9%) b-thal major, 55(20%) Sickle cell trait (AS), 27 (9.8%) Sickle cell homozygous (SS), 8(2.9%) HbS-b-thal, 9(3.2%) Hb-E trait (AE), 4(1.4%) HbE-bthal, 3(1.0) Hb-Dtrait (AD) and 52(19%) are Normal. Genetic counseling was offered to all cases.

Table-1

	β-thal minor	β-thal major	AS	SS	HbS-β-	thal E	Hb-E βthal	trait Dtrait	Normal
General	66	17	33	14	7	7	2	1	32
SC	12	2	10	5	-	2	2	2	18
ST	12	3	9	8	1	-	-	-	8
Muslim	2	2	3	-	-	1	-	-	1
Total= 52	275	92	25	55	27	8	9	4	3

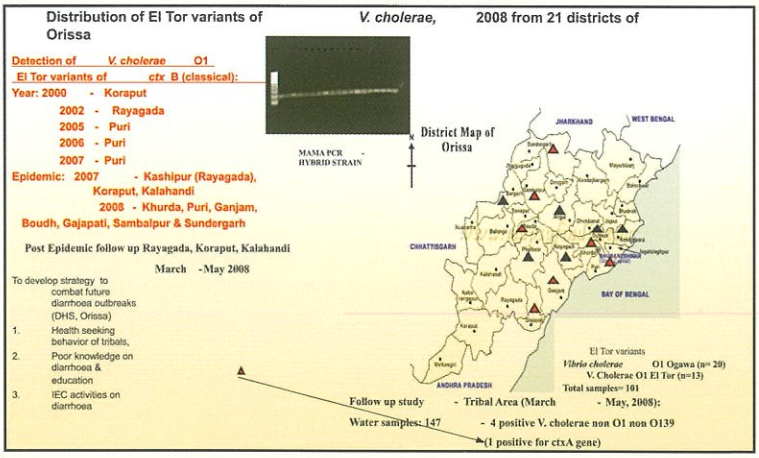
Caste wise distribution of Haemoglobinopathies and Thalassemia

2. INVESTIGATIONS ON DIARRHOEAL DISORDERS

Investigators: Dr. B. B. Pal, Dr H K Khuntia, Mr S. K. Samal

(a) Analysis of rectal swabs from diarrhoea patients reffered through IDSP, DHS, Govt. of Orissa (March, 08–April, 09)

During this period 101 stool/rectal swabs were collected (March, 08 to April 09) from different districts. Out of which 33 were *V. cholerae* O1 biotype El Tor. Among 33 *V. cholerae* isolates, 20 were El Tor variants of ctxB gene of classical strain and 13 were normal El Tor strains. The El Tor variants of *V. cholerae* were isolated from Puri, Ganjam, Khurda, Boudh, Gajapati, Sambalpur and Sundargarh districts and it caused the cholera outbreaks in Puri, Ganjam, Boudh and Gajapati districts for hybrid strain.



(b) Surveillance activity on diarrhoeal disorders

During this period 517 rectal swabs are collected from Bhubaneswar and Puri areas for bacteriological analysis. Out of 236 culture positive samples, 131 (55.5%) were *E. coli,* 97 (41.1%), *V. cholerae,* 93 (39.4%) were O1 Ogawa and 4 (1.7%) were *V. cholerae* Inaba, *Shigella* spp. were 1 (0.4%) and *Aeromonas* spp. were 7 (3%).

(c). Outbreaks of cholera in Puri town, 2008

During this period 2 diarrhoeal outbreaks were reported from Mangalpur area and Puri town. The outbreak in Baghakhada Sahi of Puri town (27.10.08- 9.11.08) was due to leakage of a sewerage line which was mixed with pipeline water. During this period, the household affected 76, total population 845, reported cases 44 and death nil were reported. All the patients were treated and cured.

The outbreak of diarrhoea in Pomasara village under Mangalpur area (14.11.08- 21.11.08) was due to contamination of water. During this period, total population affected 552, household affected 12, reported cases were 46 and death nil were reported. All the patients were treated and cured.

The clinical signs and symptoms were reported as profuse, rice water stool, vomiting, belching of abdomen, muscular cramping and associated with dehydration after single or double discharge of watery stool. Both the outbreaks were due to El Tor variants of ctxB gene of classical strain of *V. cholerae* O1 Ogawa. Timely reporting and implementation of adequate control measures checked the outbreak in time.

3. AN EPIDEMIC INVESTIGATION OF CHOLERA OUTBREAK IN RAJANAGAR BLOCK OF KENDRAPADA DISTRICT OF ORISSA (APRIL 2009).

Investigators: Dr.A S Kerketta, Ms. G Mallick, Mr. B N Murmu, Ms. S Dixit & K Dhala

During mid April 2009 an outbreak of cholera reported from Rajanagar block of Kendrapada district of Orissa. The Rajanagar block is a costal block having revenue village of 226 number of which 107 villages were affected covering 96878 population in the villages. After the outbreak report the RMRC team visited the area. The team collected the surveillance report from the CHC, Rajanagar, and conducted a community-based survey on the triggering factors for such occurrence.

The outbreak was reported after a common gathering in a mela held on the occasion of " Pana sankranti" on 14th April 2009, where thousand of people gathered and had common local made drinks pana. Besides the local people, many vendors from West Bengal had come for that mela. The first index case was a fifteen years girl from village Baghua, who had severe watery diarrhoea after coming back from mela on 15th April 2009. She was admitted in the CHC on 16th April and treated accordingly. On the same day 19 cases from village Balarampur, Rajanagar, Guhalakani, Daruora, Ghadiamal, Champadiha, Keredagada, Silapokhari, CB mula and Daghua reported to the CHC. The season was marriage season and due to the extensive population movement and attending gathering and feast caused rapid spread of the diarrhoea outbreak to several villages.

The RMRC team investigated the behaviour and practice of the local population in 8 villages. The total population in the village studies were 132. Age sex matched case control survey was undertaken.

Of which 44.7% were male and 54.3% were female. The age distribution shows that among the affect persons mostly belonged to the age group of 15-64years. (50.1%). More than 75% belongs to low-income group. For drinking purpose 81.1% use tube well water. For brushing and bathing 55.3% use tube well water. For washing cloths and rinsing utensils more than 50% use pond water. Around 60% people took left over rice with pond water (pokhala). When surveyed for hygienic practice around 80% found not to use soap before or after food or going for defecation. The defecation practice among the people is open field use among 93.2%. About 50% source of drinking water was not chlorinated. Inference:

Though the people use tube well for drinking water purpose the specific food habit and hygiene practice was responsible for the spread of the out break. Therefore an intervention through preventive strategy is of urgent need in the area.

4. TRAINING TO MALARIA TECHNICAL SUPERVISORS (MTS) FOR STENGTHING HUMAN RESOURCE AS A SUPPORT TO NATIONAL MALARIA CONTROL PROGRAM

Investigators: Dr. N. Mahapatra, Dr. A.S. Kerketta, Dr. R.K.Hazra,

To strengthen the on going malaria control programme in the country, the malaria technical supervisors has been appointed by NVBDCP in all the malaria endemic states of the country. On request of NVBDCP,

New Delhi the traing programme for the MTS of Orissa and Jharkhand was conducted by the experts of RMRC on different aspects of malaria like epidemiolocal, clinical diagnosis & case management, vector & its control and monitoring and evaluation. A ten days training including theoretical session with sand witch field exposure and practicals were included in the training. So far a total of 125 MTS from both the state have been trained in five batches during last week of November 08-last week of February 09.

5. CHLOROQUINE-RESISTANT STRAINS OF *PF* DETECTED IN MALARIA TRANSMITTING VECTORS

Investigators: Dr. R.K.Hazra

To detect the spread of drug resistant *P. falciparum* in a population, before any pathological symptoms are detected in humans by analyzing the anophelines vectors, transmitting malaria, this can help in early warning feature of CQ resistance. In the present work we have implemented a new strategy to detect the spreading of chloroquine-resistant (CQR) strains of *Plasmodium falciparum* by the major malaria vectors prevalent in selected endemic regions of Orissa, India. We have screened *P. falciparum* positive vectors using Polymerase Chain Reaction based assay.

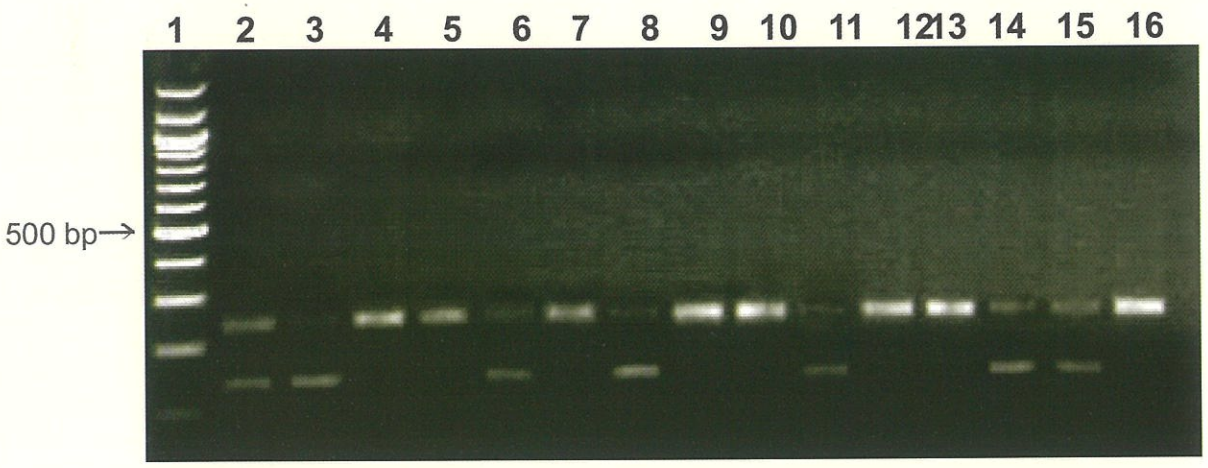
In the present study, we selected four anophelines viz. *An. culicifacies, An. fluviatilis, An. annularis* and *An. Minimus,* prevalent vector species in Orissa. From the results it was evident that, of the total collection, 7.6% of *An. culicifacies* from Angul district and 8.3% from Phulbani district were Pf positive, among which 33.3% had K76T mutation, indicating high malaria sporozoite rates in comparison to previous reports (Parida et al., 1991). However, among 4.9% of Keonjhar district, and 10.1% of Kalahandi district Pf positive individuals, 25% and 14.3% had K76T mutation, respectively. From the results it is clear that, sporozoite, possessing K76T mutation, carrying rate among *An. culicifacies* is very high in all studied regions of Orissa. Similarily of the 7.1% *An. fluviatilis* from Angul district, and 6.2% from Kalahandi Pf positive, 33.3 % had K76T; indicating *An. fluviatilis,* like *An. culicifacies,* also had high sporozoite carrying capacity in these regions of Orissa. In contrast, *An. annularis* and *An. minimus* collected from different regions, although were Pf positive but none had K76T mutation. Moreover, the results showed that, the sporozoite infectivity rates of *An. annularis* and *An. minimus* are not high as that of *An. culicifacies* and *An. fluviatilis* in studied regions of Orissa.

6. CONTRIBUTION TOWARDS ESTABLISHMENT OF KONARK BIOTECHNOLOGY KNOWLEDGE PARK IN ORISSA.

Dr. M.K.Beuria, Dr. N. Mahapatra, Dr. R.K.Hazra, Dr. B. Dwibedi and Dr. M.R Ranjit of this centre attended all the meetings convened by Dept. of Biotechnology, Govt. of Orissa organized at different point of time and submitted required technical papers as and when requied during the proposal stage of the establishement of Biotechnology Park at Bhuabneswar. This has been recently inaugurated and named as Konark Knowledge Park at Andharua, Bhuabneswar.

8. TRAINING ON LQAS METHOD FOR EVALUATION OF NATIONAL MALARIA CONTROL PROGRAMME.

A workshop on use of Lot Quality Assurance Sampling (LQAS) was organized at RMRC, Bhubaneswar in collaboration with NVBDCP, Orissa during November 2008. The experts from local health Dept. Medical Colleges and RMRC participated and interacted in different sessions. Prof. Joe Valadez of Liverpool School of Tropical Medicine (LSTM) explained the concepts and use of LQAS with many practical applications. During the 10 days training programe organized at RMRC for different group of MTS trainees Orissa, Jharkhand and Chhatishgarh during 2008-9, a special interactive session was arranged for the trainees about the use of LQAS in malaria control. During the training, Dr. A.S. Acharya explained about the basic concepts, methodology and Interview techniques to the MTS trainees. Realizing the use of LQAS for malaria eradication in Orissa, NVBDCP along with State Health department with support from DFID and TMST, organized an workshop on LQAS for State MTS workers and other health professionals form 19th-24th October 2009 at Hotel Marion, Bhubaneswar where Dr. A.S.Acharya and Mr. R.C. Parida from RMRC acted as facilitators and provided statistical and technical support.



9. ACTIVITIES OF NNMB UNIT, ORISSA.

The Indian Council of Medical Research (ICMR) established National Nutrition Monitoring Bureau (NNMB) in 1972 in 10 states of Kerala, Tamilnadu, Karnataka, A.P., Maharastra, Gujurat, M.P., W.B., U.P., and Orissa under National Institute of Nutrition (NIN) Hyderabad. The NNMB Orissa Unit working at RMRC, Bhubaneswar.

The steering committee of NNMB is its annual meeting held during 2007-08 had recommended that NNMB should take third repeat survey on rural population to study the change in the nutritional situation with respect to 1975-79, 1980-90, 1996-97, survey. In view of these recommendations the Central Reference Laboratory (CRL) of NNMB proposed to carryout the third rural repeat survey during 2009-10.

Objectives of 3rd Rural Repeat Survey

1. To assess the food and nutrient in take among different age, sex and physiological groups of rural population in MMNB States.
2. To assess nutritional status in terms of anthropometry, clinical examination and to study the time trends.
3. To assess the history of morbidity among all the individuals covered for anthropometry.
4. To assess the prevalence of obesity, diabetes and hypertension among the adult men and women (> 18 years).
5. To access knowledge and practices about hypertension and diabetes among adult men and women (> 18 years).
6. To assess infant and young child feeding practices of mother index.

The NNMB Orissa unit has started the 3rd repeat survey from August 2009. Till November 2009 the unit has covered 24 villages in 7 districts where 480 households are covered and data is being sent to NIN for analysis.

In the NNMB survey will carried out the household demographic and socio-economic particulars anthropometric measurement, clinical examination for nutritional deficiency sign and history of morbidity.

NEWS

1. Dr. S. K. Das (Research Officer) of NNMB, Orissa Unit superannuated from dt. 30.08.2008.
2. Dr. A. R. Mohanta joined as Asst. Research Scientist (ARS) on dt. 30.03.2009.

Meeting / Training attended.

1. Mrs. S. Paikaray ARO (Non-medical) attended the orientation training for 5 days from dt. 29.03.2009 to dt. 02.04.2009 at NIN.
2. Mrs. Heraprava Sahu (Social worker) participated the orientation training on "Assessment of Diet and Nutritional Status of Rural Population" from dt. 29.03.2009 to dt. 02.04.2009 at NIN, Hyderabad.
3. Dr. Amiya Ranjan Mohanta (Assistant Research Scientist) has undergone the orientation training on "Assessment of diet and Nutritional status of Rural Population, 3rd repeat survey" at NIN, Hyderabad from dt. 11.05.2009 to dt. 29.05.2009.

NEW INITIATIVES

1. INFLUENZA (H1N1) DIAGNOSTIC FACILITY

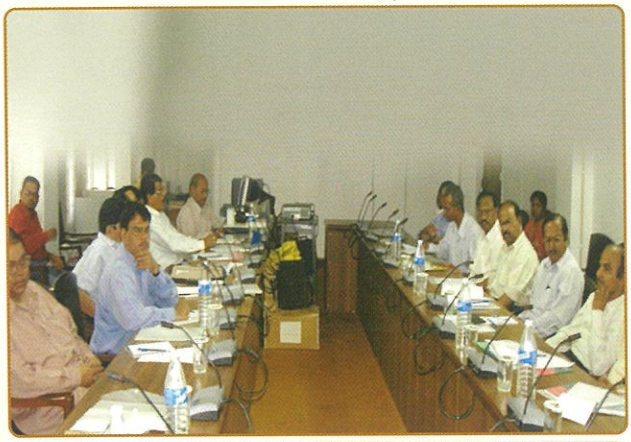
Recently the country faced the challenge of pandemic Swine flu (influenza H1N1) infection affecting various States including Orissa. The country faced the burden of laboratory diagnosis for the same, because of few established centres having the facility for the same.

State of Orissa reported many cases of suspected influenza H1N1 requiring immediate diagnosis. Because of lack of facility of diagnosis in the region samples are supposed to be sent to NICED, Kolkota, NICD, Delhi and NIV, Pune which are already burdened with samples from other parts. It also causes difficulty in timely testing which is crucial for treatment outcome.

Keeping in view the State emergency to test Swine flu (H1N1) infection a viral laboratory with BSL 2 facility has been set up at RMRC with support from ICMR. The Bio safety guidelines have been followed up during the set up. For sample processing laboratory is being maintained with negative pressure and space has been separated for different laboratory steps in the diagnosis.

For the laboratory set up and and diagnosis of H1N1 short training was imparted to Dr. M.R.Ranjit, Dr. B. Dwibedi, Dr. H.K.khuntia and Dr. P.K.Sahoo at NICED, Kolkata. Two Research Assistants i.e Dr. H.K.Khuntia and Ms. Sujata Dixit were trained at NIV, Pune on lab. testing and the procedure has been standardized at RMRC.Till date 52 no of referred samples from different parts of Orissa has been tested out of which 17 came positive. The results are communicated to state health department (IDPS) and concerned hospital with immediate effect.

For timely testing and reporting of samples different activities are assigned to different person like sample receipt and transport to Lab by Mr. T.Moharana, sample processing ni BSL-2 Lab by Dr. H.K.Khuntia, RNA extraction by Dr. P.K.Sahoo, realtime PCR by Miss. Sujata Dixit, report communication by Dr. A. Moharana, material intent by Dr. B. Dwibedi, autoclave by Dr. B.N.Sethy. Other staffs (Dr. Jystna Sabat, Mr. K.C. Dalai, Mr. B.K.Kanhar and Mr. K.C.Naik) also involved in this work for smooth running of Lab.



Training to medical professionals on management of severe malaria

Inauguration of H1N1 facility at RMRC by Hon'ble Minister of Health, Govt. of Orissa Shri Prasanna Acharya

2. Translational Research

To improve human health, scientific discoveries must be translated into practical applications. Such discoveries typically begin at "the bench" on molecular or cellular level of the disease then to the clinical level, or the patient's "bedside." To help address this need the centre has initiated research activities to translate some of our laboratory findings to solve the clinical problems related to filariasis, malaria and diarrhoeal disorders. Important and timely drug trial for the treatment of filariasis was conducted by the centre to incorporate their use in filariasis control programme. The use of Ivermectin for treatment of scabies was reported for the first time in literature. The efficacy of microfilaria killing of anti - $Dssd_1$ antibodies raised in rabbit against an antigen (Dssd1) isolated from the adult cattle parasite *Setaria digitata* is being evaluated. Preliminary results indicate that the antigen can serve as a potential immunoprohylactic agent against bacroftian filariasis. An urban-specific strategy of mass drug distribution under filariasis elimination programme is developed and implemented that can be used for the improvement of compliance in MDA programme. The centre has already developed a technique for simultaneous detection of sporozoite in blood meal and identification of sibling species from single mosquitoes and method for processing of mosquitoes. By this technique the vector mapping and evaluation of vector competence can be studied at PHC level with limited resources. A comprehensive project proposal has been developed for field evaluation of this new method. Further, the centre has developed a quadruplex PCR to identify different sero-groups of *V cholerae*, where biotype, serotype, toxigenic potential and top regulatory protein of *V cholerae* can be detected and another technique to identify the newly detected hybrid strain of *V cholerae* in Orissa. The technique has been standardized at laboratory condition and is to be field tested soon. This will help to monitor the causative organisms associated with diarrhoeal outbreaks. Translational research has proven to be a powerful process that drives the clinical research engine. Therefore we are about to plan for a stronger research infrastructure that can strengthen and accelerate this critical part of the clinical research enterprise.

3. HPLC Laboratory

High-performance liquid chromatography (HPLC) laboratory facility was established for estimation of vitamin A (retinol). After getting training for analysis of vitamin A in blood samples at National Institute of Nutrition, Hyderabad, the technique was standardized in this laboratory. Some of additional requirements like nitrogen cylinder, cold centrifuge were also procured for vitamin A analysis in serum or plasma samples. Currently vitamin A analysis in serum samples is standardized and analysis is going on for ongoing projects. Further, dry blood spot (DBS) method for estimating vitamin A from a drop of finger prick blood sample is in process of standardization. This instrument can also be used for other biochemical estimations of various biomolecules such as vitamins, proteins etc using specific HPLC columns, guard columns, solvents and standards.

4. Virology Laboratory

As per letter from the council, effort was made to establish Virology Laboratory facility at the centre. Laboratory space was identified in 2nd floor of building for the above setup and procurement of equipments was initiated. Major equipments procured in consultation with Dr. D.A. Gadkari and Professor U.C. Chaturvedi; were – Biosafety cabinet – Lebel – ll, Refrigerated centrifuge, thermocycler, ELISA washer, Co_2 incubator and shaking incubator.

Such an initiative was made to support investigation of the epidemics in the region in collaboration with NIV, Pune which are suspected to be of viral origin but mostly remain undiagnosed because of lack of a diagnostic facility, with a future prospective to initiate research on such diseases of importance. In view of the above the centre investigated some of the viral diseases outbreaks by a team led by Dr. B. Dwibedi, which are outlined below.

A. The state health department reported sudden onset of cases presenting with motor weakness, convulsion followed by unconsciousness with/ without fever in a tribal village of Kandhamal district Orissa. Most of the affected subjects where young and presented with the above symptoms (majority below <10 yrs of age) succumbed to death within 10 – 12 hrs of onset of symptoms. Clinico – epidemiological survey was carried out and seven samples collected for investigation .Brain material from one deceased who undergone autopsy was also collected.

In addition to the above, cases of encephalitis with deaths (mostly in the pediatric age) were also reported from Malkangiri and Koraput districts of Orissa.

Samples were transported to NIV, Pune in dry ice and serological tests carried out, which revealed presence of antibody to Chandipura Virus in the tested sera.

B. Cases with fever and vesicular rash of distal part of extremities and pharyngeal lesion were reported from Bhubaneswar, an urban setup. Cases were examined and clinically suspected to be hand, foot & mouth disease. Blood samples were collected and tested by PCR at NIV, Pune which has shown positivity for Entero virus.

C. The state reported epidemics of fever with arthritis/arthralgia during 2006-2008, which were investigated by the centre and confirmed to be due to Chikungunya virus infection following which sporadic cases are being reporting to hospitals of Bhubaneswar city with complains of fever and painful joint swelling .It is presumed that the CHIK infection is approaching towards endemicity in the urban Bhubaneswar. To confirm this IgM ELISA kit was recently procured from NIV, Pune and six samples were tested at RMRC laboratory which has shown that three were positive for CHIK IgM antibody.

Visit to RMRC by Honorable Minister of Health, Govt. of Orissa Shri Prasanna Acharya during inauguration of H1N1 labaratory

FACILITIES

1. OPD FACILITIES AT CAPITAL HOSPITAL, BHUBANESWAR

RMRC,Bhubaneswar has been providing OPD Service at Capital Hospital,Bhubaneswar, for undertaking clinical activities on diagnosis and treatment of patients reporting to Filaria OPD.

During this year 1054 Number of patients attended to the Filarial Out patient Department at Capital Hospital. Out of which 495(46.96%) cases reported for follow-up. Among the followed-up cases 275(55.55%) cases were male & 220(44.44%) were female. The rest 559(53.03%) new cases reported with different clinical presentations. Out of total new cases attended 314(56.17%) were male and 245(43.82%) were female. The commonest clinical presentation encountered was filarial lymphoedema of different grades, which was marked in 266(47.58%) cases. The lympoedema grade-1 was found in 143(53.75%) patients and was marked more among the patients of age group 31-45 and 16-30 for male and female respectively. The lymphoedema grade-2 was found in 35(13.15%), grade-3 in 28(10.52%) and elephantiasis in 60(22.55%) cases and was marked more among the male and female patients of age group 31-45 years.

The lymphangites(LNG) was reported by 12(2.14%) and was marked more among female patients. The Lymphadenitis (LND) was reported by 15(2.68%) and was more among male patients. Cases with acute attack were found in around 60(10.73%) patients. Patients of which acute adenolymphengitis(ADL) that is patient having acute attack with fever was found in 19(3.40%) and Adenodermatolymphongioadenitis(ADLA) was in 41(7.33%) of cases and was more prevalent among the patients aged above 30 years. A total of 24 patients reported with Hydrocele or Orchitis.

Apart from Lymphoedema, Lymphangites, Adenolymphangites (ADL), Adeno Dermatolym phengiodenitis (ADLA) and Hydrocele cases, the other symptoms likeinguinal lymph-adenitis, filarial nodule other than inaugural lymph node and tropical pulmonary eosinophilia was found in other reported patients in very small percentage.

All the lymphoedema patients were given advice on proper foot care management , limbelevation and bandaging. Only 28 cases were given Compression Therapy for lymphatic fluid drainage and reduction of edema size.

*LMD: Lymphoedema grade-1,LMD-II:lymphoedema grade-2,LMD III:lymphoedema grade-3,ELE:Elemphantiasis, LNG: Lymphangitis, ADL: Adenolymphangitis, ADLA: Adenodermato lymphangio adenitis, Hydro: Hydrocele, LND: Lymphadenitis and others.

2. Animal House Facility

This Centre conducts experimental studies on animals and is registered for this purpose with the regulatory authority CPCSEA. The registration of Animal house is renewed. Animal facility in the center continues to be used since last 25 years. Currently Rabbits, M. Coucha, Balb/c mice, and Guinea pigs are available for experimentation. All the projects concerning animal use/ experimentation are discussed in Animal ethical committee of the center. The meeting of IAEC was held on 27.8.09 and accords it approval for following a) Study of genes responsible for vectorial capacity in the anophelines species found in Orissa state b) maintenance of P.berghei and P.yoelli murine malaria parasites in strain of mice and c) Routine rearing and maintenance of colonies of three mosquitoes. The facility is well maintained by animal house attendants. Duties have been allotted to AHA for working hours in both working days and off days. Pelleted feed procured from NIN, Hyderabada has been provided to the animals. Staff has maintained periodic records such as Form-C, Form-D etc of animal house as per the provision of CPCSEA. This facility is maintained regularly with periodic inspection and health monitoring by veterinarian.

Rearing of Mosquito larvae in insectorium

3. Insectorium facility

At Present the centre has one insectorium which was developed 19 years. Before here cyclic colony of three genus of mosquitoes i.e. *Aedes aegypti* (LV strain), *Anopheles stephensi* and *Culex quinquefasciatus* maintained. The reared mosquito species were used in insecticide susceptibility status test, larvicidal bioassay plant extract bioassay test.The different plant extract having larviciding properties tested in our inectorium by our scientist and scientist from other Institute also send their material for testing. Cyclic development of Brugia malayi L3 developed and different aspects of and immunological studies were carried out by our scientist of the Institute. The insectorium was used for giving training to different persons time to time.

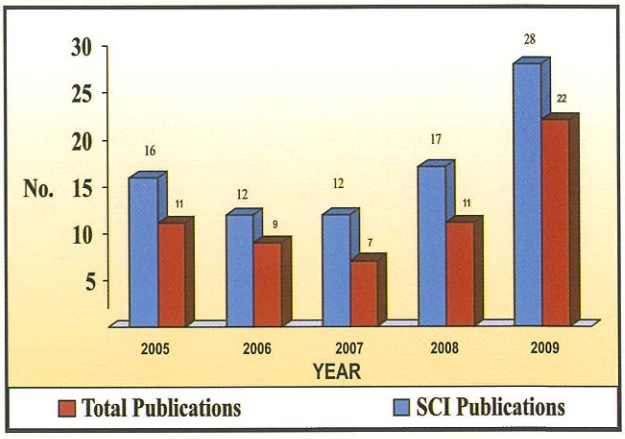
Now we are proposing for conducting virology work ie on Chikungunya, Dengue, West Nile and JE so proper maintenance of *Aedes aegypti*, *Ae.albopictus* and *Culex vishnui* group of mosquito will be maintained so a special infected room will be maintained with utmost care so that a single mosquito can not be escaped.

To investigate the interaction between parasites and mosquito under natural conditions, *An. stephensi* will be fed on infected human blood, using the artificial membrane feeding technique. Gene expression will be monitored at 14, 24, 48 h and 10 days post infected blood meal, corresponding to the transformation of zygote into ookinetes, to the interaction of ookinetes with the peritrophic matrix and mid gut cells, and to the migration and early differentiation of ookinetes into oocysts, and sporozoites stages respectively.

We are now planning to modernization of the insectorium which is required for the centre for conducting future work. In our plan we divided the entire facility into three section i.e. larval rearing space, adult rearing room and infected mosquito room. Necessary required equipment s for each space is mentioned in the planning.

4. Library, Information & Publications

The main aim of the Library & information centre is to provide relevant and latest biomedical information in the shortest possible time, to the researchers and biomedical scientists of the institute. Few years back information needs of the users were catered from *MEDLINE* CDROM (Off-line database). Now that trend has completely changed by providing online literature search through Internet and Online journals either through open access source or Journal consortia through ICMR/ NML. It provides both library and Information services not only to the scientists and researchers of this Centre but also to the researchers, doctors and academicians of this state. The foreign journal collection of this library is unique in orissa in the field of bio-medical sciences. For the calendar year 2008 the library subscribes 41 foreign journals and 35 Indian journals in various fields of medical sciences and public health. The library possesses LAN printer- cum -digital Copier,in order to provide library, Information and reprographic support to its users. The library is computerized with Libsys-IV Library Management software . The library and information centre provides Local Area Networking (LAN) facilities to all scientists and researchers through dedicated LAN server from 9 A.M to 10 P.M from Mon Day to Friday. In publication activities, the library publishes Bi- Annually Library News Letter and RMRC News Bulletin. Besides that, the library works as publication cell of the Centre which publishes periodically IEC materials on various diseases, Posters and pamplets on research findings. The Library and Information division publishes Annual Report of the Centre and monitor Publications of the scientists for scientometric Analysis by Council.



Publication Analysis of RMRC, Bhubaeswar

ONLINE JOURNALS:

ICMR e-Consortia : Through ICMR e -Journal consortia, all 26 ICMR Institutions of the country are able to access following five high impact weekly journals of the world where all latest research findings come out.

Journal	Web site
Science	http://www.sciencemag.org
NEJM	http://content.nejm.org
BMJ	http://www.bmj.com
Lancet	http://www.sciencedirect.com
Nature	http://www.nature.com

LAN system and Wi-Fi in RMRC library

ICMR-NML- ERMED Consortia

In this consortium total 1515 Medical journals are accessible at www.nmlermed.in. The participating libraries are National Medical Library (NML), all 26 ICMR libraries, AIIMS library, JIPMER library and other DGHS libraries. All journals are RMRC IP activated.

Subscription of Science Direct:

For the calendar year 2009 Library & Information division subscribes Elsevier's online package Science Direct (Immunology & Microbiology) bundle which carries 87 journals as per list enclosed. These journals are RMRC IP activated. The scientists can down load the full text of current issues and back files up to 1995 .

List of online Journals subscribed through *Science Direct* in 2009

1. Acta Tropica
2. American Journal of Infection Control
3. Anaerobe
4. Antiviral Research
5. Autoimmunity Reviews
6. Biologicals
7. Bioorganic Chemistry
8. Bioresource Technology
9. Bioscience Hypotheses
10. Biotechnology Advances
11. Blood Cells Molecules and Diseases
12. Brain Behavior and Immunity
13. Cellular Immunology
14. Clinical Immunology
15. Clinical Microbiology Newsletter
16. Comparative Immunology, Microbiology & Infectious Diseases
17. Current Opinion in Biotechnology
18. Current Opinion in Immunology
19. Current Opinion in Microbiology
20. Cytokine
21. Cytokine & Growth Factor Reviews
22. Developmental and Comparative Immunology
23. Diagnostic Microbiology and Infectious Disease
24. Drug Resistance Updates

25. Enzyme and Microbial Technology
26. Epidemics
27. European Journal of Protistology
28. Experimental Eye Research
29. Experimental Parasitology
30. Fish and Shellfish Immunology
31. Food Microbiology
32. Fungal Biology Reviews
33. Fungal Genetics and Biology
34. Human Immunology
35. Ibs, Immuno-Analyse & Biologie Spécialisée
36. Immunobiology
37. Immunology Letters
38. Infection, Genetics and Evolution
39. International Biodeterioration and Biodegradation
40. International Immunopharmacology
41. International Journal for Parasitology
42. International Journal of Antimicrobial Agents
43. International Journal of Food Microbiology
44. International Journal of Infectious Diseases
45. International Journal of Medical Microbiology
46. Journal de Mycologie Medicale
47. Journal of Allergy and Clinical Immunology
48. Journal of Autoimmunity
49. Journal of Bioscience and Bioengineering
50. Journal of Biotechnology
51. Journal of Clinical Virology
52. Journal of Hospital Infection
53. Journal of Immunological Methods
54. Journal of Infection
55. Journal of Microbiological Methods
56. Journal of Molecular Biology
57. Journal of Neuroimmunology
58. Journal of Reproductive Immunology
59. Journal of Virological Methods
60. Metabolic Engineering
61. Microbes and Infection
62. Microbial Pathogenesis
63. Microbiological Research
64. Molecular and Biochemical Parasitology
65. Molecular Immunology
66. Mycological Research
67. Nanomedicine: Nanotechnology, Biology and Medicine
68. New Biotechnology
69. Parasitology International
70. Process Biochemistry
71. Protist
72. Research in Microbiology
73. Seminars in Immunology
74. Systematic and Applied Microbiology
75. Transactions of the Royal Society of Tropical Medicine and Hygiene
76. Transplant Immunology
77. Travel Medicine and Infectious Disease
78. Trends in Immunology
79. Trends in Microbiology
80. Trends in Parasitology
81. Tuberculosis
82. Vaccine
83. Veterinary Immunology and Immunopathology
84. Veterinary Microbiology
85. Veterinary Parasitology
86. Virology
87. Virus Research

Library Modernization Program

In the RMRC Library modernization program, a team of library expert committee has visited RMRC, Bhubaneswar on 28th Jan 2009. The experts were Dr. A. L. Moorthy, Director, Defence Scientific Information & Documentation Centre (DESIDOC), New Delhi and Dr. S. Deshmukh , Chief Librarian, Indraprastha University Library, New Delhi. They have visited the Centre's library and discussed with librarian (ALIO) and interacted with Institute's scientists regarding library services .

A seminar was organized seminar hall where all scientists, A.O and A.C.O were present and Dr. B. Sahoo, ALIO has presented the slide presentation on RMRC library services and modernization program.

In the second phase of library modernization program initiatives have started for appointment of two library apprentices for computerized library services.

Library expert committee meeting held on 28th Jan, 2009

Publication Cell:

The library & Information Centre is doing publication activities of the Institute. RMRC News Bulletin and Library News Letter are being published from this division. IEC materials on various diseases are also made on local languages for distribution to the public. Besides, the division looks after the publication of Centre's Annual Report. Head of the library acts as editor of Library News Letter and Asst. Editor of RMRC News Bulletin.

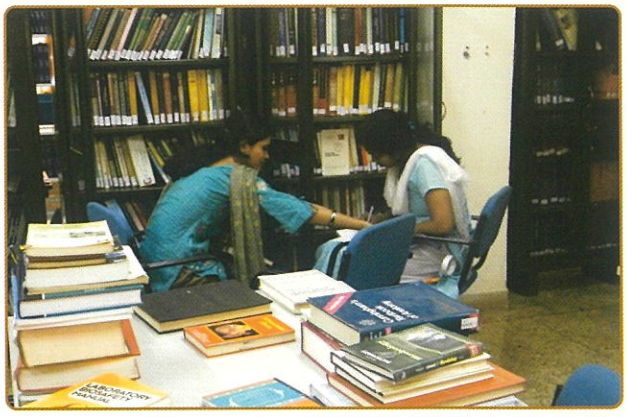
The following are the publications from RMRC being published from library division.

1. RMRC News Bulletin
2. Library News Letter
3. IEC Materials on various diseases on Malaria, Filariasis, Sickle cell diseases, IDD, in regional language.
4. Posters on recent advances in Fiariasis, Malaria, Sickle cell diseases, and diarrhoea for children.

Special Publications:

The centre released the following three publications on the eve of RMRC Foundation day on 30th March 2009 prepared by publication cell of the Centre. The three books are :

1. Over two decades of Research
2. Achievement and contribution in Research
3. Research Skill development



Technical prossing works by the trainees in the library

PUBLICATIONS & OTHER INFORMATION

PUBLICATIONS (2008)

1. Babu BV, Mishra S. Mass drug administration under the programme to eliminate lymphatic filariasis in Orissa, India: a mixed-methods study to identify factors associated with compliance and non-compliance. *Trans R Soc Trop Med Hyg.* 2008;102 (12) 1207-1213.

2. Babu BV, Swain BK and Kar SK. Primary Health Care Services among a migrant indigenous population living in eastern Indian City. *Journal of Immigr Minor Health.* 2008; 12(1):5359

3. Bulliyya G, Dwibedi B, Mallick G, Sethy GS, Kar SK. Determination of iodine nutrition and community knowledge regarding iodine deficiency disorders in selected tribal bloks of Orissa, India. *Journal of Pediatric Endocrinology & Metabolism.* 2008; 21(1): 79-88.

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7. Khuntia HK , Pal BB and Chhotray GP . Vibrio cholerae O139 may be the progenitor of cholera outbreak in coastal district of Orissa, India, 2000: A molecular evidence. American *Journal of Tropical Medicine & Hygiene.* 2008; 78 (5): 819-822.

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RMRC Foundation Day:

The centre observed its foundation day on 30th March 2009 in the RMRC auditorium. On this occasion a symposium on "Health Challenges of Orissa" was organized. Mr. Ajit Kumar Tripathy IAS Chief Secretary Govt. of Orissa attended the meeting as Chief Guest, Prof. B. Rath, Vice Chancellor, Utkal University as Guest of Honour and Dr. V.M. katoch, Secretary, DHR & D.G. ICMR delivered the foundation day Lecture. Other distinguished speakers and participents were Mrs. Anu Garg, IAS, Principal Secretary Department of Health Govt. of Orissa, Dr. S.P. Tripathy, Former DG, ICMR, Prof. L.N. Mohapatra former Director RMRC, Sri M. Rajamani, IAS, Sr. DDG, ICMR, Dr. Lalit Kant Sr. DDG, ICMR and Prof. P.K.Dash, DMET, Orissa. On this occasion the following three books had inaugurated by DHR, Govt. of India, and Chief Secreatary, Govt. of Orissa.

Liting the lamp ceremony of the state level symposium on 'Major Health Challeages of Orissa'

1. Over two decades of Research
2. Achievement and contribution in Research
3. Research Skill development

Training Program Organized:

1. The Centre organized training of Medical Officers on Epidemic prepararedness at RMRC, Bhubaneswar for 16 GFATM district from 21st Feb to 23rd Feb. 2008 and from 18th March 2008 to 20th March 2008.

2. **Training to Malaria Technical Supervisors** (MTS)

   To strengthen the on going malaria control programme in the country, the malaria technical supervisors has been appointed by NVBDCP in all the malaria endemic states of the country. On request of NVBDCP, New Delhi the traing programme for the MTS of Orissa and Jharkhand was conducted by the experts of RMRC on different aspects of malaria like epidemiolocal, clinical diagnosis & case management, vector & its control and monitoring and evaluation. A ten days training including theoretical session with sand witch field exposure and practicals were included in the training. So far a total of 125 MTS from both the state have been trained in five batches during last week of November 08-last week of February 09.

3. **Training to BMC staffs**

   Mosquito population in the city has increased a lot in spite of different control measures taken by Bhubaneswar Municipal Corporation (BMC) . For this, Commisoner of BMC requested RMRC to train the staffs of BMC for updating their knowledge on new technology and guidelines recently adopted for mosquito control .Therefore, 118 field workers, 25 supervisors and 3 insect collectors of BMC were given training by entomology division from 22.10.09 to 23.11.09, on mosquito identification, collection of larvae and adult, mapping of breeding sites, different types of mosquito control measures. The Centre organized training program for Malaria Technical Supervisors (MTS) from the period 24th Nov'2008 to 4th Dec 2008, 22nd Dec. 2008 to 2nd Jan 2009, 12th Jan 2009 to 21st Jan 2009 and 2nd Feb. 2009 to 11th Feb. 2009.

Inauguration of training programme on Mosquito control technique to BMC works by Mrs. Aparajita Sarangi, IAS.

4. The 22nd Scientific Advisory Committee (SAC) Meeting of Regional Medical Research Centre for the year 2007-08 was held during 17th -18TH Sept. 2009. Dr. Sandip K. Basu was the Chairman of 22nd SAC and Dr. S.K. Kar, Director of the Centre was Member Secretary. The 22nd SAC sub-committee meeting was held 30th Sept. 2008 where Dr. K. Ramchandran, Chennai, Dr. S.K. Acharya, AIIMS, New Delhi and Dr. K. Kumarswami, TRC, Chennai were present for evaluation of scientific projects.

Meeting /Seminar/Symposium Attended:

1. Dr. N.Mohapatra, Scientist-E attended a meeting on Interactive meet on implementation of regulator provisions in development projects on 25th March 2008 at Bhubaneswar.

2. Dr. S.K.Kar, Director participated in the protocol development meeting held at RMRC, Bhubaneswar for development of Protocol on HIV/AIDS among tribals and prevented the project proposal on " Community awareness among tribal population in Orissa & its prevalence" in Orissa on 17th April 2008.

3. Dr. N. Mahapatra, Scientist-E attended Technical Committee meeting, held on 7th April 2009 at Bikash Bhawan, Cuttack Municipal Corporation, on mosquito menace.

4. Dr. B. B. Pal, Scientist-D attended the 13th international conference on enteric infectious diseases, 4-9 April, 2009, Kolkata, India and presented the paper entitled "El Tor variants of Vibrio cholerae O1 with ctxB gene of the classical strain causing epidemics of severe cholera during 2007 in Orissa, India- A potential threat".

5. Dr. H. K. Khuntia, R.A and Mr. B. N. Sethi, Lab. Tech. attended the training programme on "CD4 counts on HIV positive samples at NARI, Pune during May, 2008.

6. Dr. G. Bulliyya, Scientist-D delivered an invited lecture on "Public Health Problem of Iodine Deficiency Disorders in Orissa: Community studies" at the 'Thyroid Study Group Meeting' by organized Department of Endocrinology, SCB Medical College held at Akbari Continental, Cuttack on 29.06.2008.

7. Dr.G.Bulliyya, Scientist-D, acted as a resource person, invited lecture given on the topic "Best Practices in Achieving for Food Security and Nutritional Improvement – Case Studies' at the 'Training on Achieving Institutional Linkages for Sustainable Nutritional Security and Role of Women' organized by National Institute of Public Cooperation and Child Development, New Delhi held at Centre for Youth and Social Development (CYSD), Bhubaneswar on 25-27, June 2008.

8. Dr. G. Bulliyya, Scientist-D attended 'Thyroid Study Group Meeting' organized by Department of Endocrinology, SCB Medical College at Akbari Continental, Cuttack on June 29, 2008. Presented a paper entitled 'Public Health Problem of Iodine Deficiency Disorders in Orissa: Community studies'

9. Dr. H. K. Khuntia attended the training programme on "Culture and drug sensitivity of Mycobacterium tuberculosis" at TRC, Chennai during 14th July to 14th August, 2008.

9. Dr. S.K.Kar, Director Inaugurated the "Science Exhibition"" as Chief Guest, organized by Stewar School, Bhubaneswar on 9th August, 2008 and delivered a talk on "Science education".

10. Dr. G. Bulliyya, Scientist-D attended 'Genetic Engineering Foods in Agriculture Research and Consequences on Human Health' held on at IMAGE, Orissa University of Agriculture Technology, Bhubaneswar on August 23, 2008.

11. Dr. S.K.Kar, Director chaired a session on "National Seminar on Critical Issues in Tribal Development" organized by SC &ST Research & Training Institute, Bhubaneswar during 26th to 28th September, 2008 and delivered talk on "Micronutrient status of Tribal Population in Orissa"

12. Dr. S.K.Kar, Director participated in a meeting on "Formulation of Research proposal and identification of collaborative institutes for reseach on vector borne diseases" organized by Central Research Institute (Ayurveda) on 29th September 2008.

13. Dr. S.K.Kar, Director Participated in 2nd Consultation meeting of the Expert Group on health by Orissa Bikash: A joint initiative of HDF & UNICEF on Orissa's social sector development held at conference Hall of Human development Foundation (HDF), Bhubaaneswar on 12th September 2008 and delivered talk on "Malnutrition in Orissa"

14. Dr. G. Bulliyya, Scientist-D attended 'National Level Seminar on Critical Issues in Tribal Development' held at SCSTRTI, Bhubaneswar on September 27-29, 2008 and presented a paper entitled 'Diet and nutritional issues of scheduled tribes and primitive tribal communities in India'.

15. Dr. S.K.Kar, Director participated in National Task Force Meeting on Lymphatic Filariasis as Steering Committee Expert at Resource Centre, Niman Bhawan, New Delhi on 4th November 2008 and presented on "MDA in Filariasis"

16. Dr. S.K.Kar, Director participated as an expert in GRAMSAT Interactive Programme on "Filaria (MDA Campaign) on 14th November 2008.

17. Dr. S.K.Kar, Director organized a training programme at RMRC, Bhubaneswar on "Lot Quality Assurance Sampling (LQAS) for state health professionals on 21st to 23rd November 2008

18. Dr. S.K.Kar, Director attended and delivered a talk on " Role of Physiology in development of Science" at Pre Conference CME on Stem Cell and 23rd annual conference of Association of Physiologists of Orissa on 22nd November 2008 at Kalinga Institute of Medical Sciences, Bhubaneswar

19. Dr. S.K.Kar, Director participated as an Expert in "Review meeting on malaria programme in Orissa" on 17th October 2008 at Conference Hall of Secretary, Health & FW, Govt. of Orissa and delivered talk on "Evaluation of CQ prophylaxis in pregnant mothers in prevention of malaria

20. Dr. S.K.Kar, Director delivered a talk on "MDA in Orissa: etio-pathogenesis, symptoms, signs of LF & use of Dec in MDA" at Press Sensitisation workshop on MDA-2008 held at Hotel Pushpak, Bhubaneswar

21. Dr. S.K.Kar, Director delivered keynote address at 11th Orissa Vigyan Congress held at KIIT University, Bhubaneswar on 23rd December 2008 and addressed on "Science Education & attraction of talent for Excellence in Research "

22. Dr. S.K.Kar, Director participated and delivered a talk on "Sleep disorders" at National Sleep Medicine Workshop held at Hotel Grand Residency Course, Cuttack during 20th-21st December 2008

23. Dr. G. Bulliyya, Scientist-D attended Dissemination Workshop on NFH-3 Orissa Survey. Organized by International Institute of Population Sciences & Department of Women and Child Development, Government of Orissa held at Swosti Plaza, Bhubaneswar on November 20, 2008.\

24. Dr. G. Bulliyya, Scientist-D attended 'The Global Iodine Deficiency Disorders Prevention Day & Week from 21-27th November, 2008 organized by Director of Health Services, Government of Orissa at Red Cross Bhavan, Bhubaneswar on 29 November, 2008.

25. Dr. S.K.Kar, Director participated at workshop on "Role of health Care Providers in preventing female foeticide" organized by National Institute of Applied Human Resource Development (NIAHRD), Cuttack at Hotel Suryansh on 21st January 2009"and delivered talk on "Women's Health and Social Stigma in Orissa".

26. Dr. S.K.Kar, Director participated in "International Symposium on Tribal Health" at Regional Medical Research centre for Tribals, Jabalpur during 27th February to 1st March 2009 and presented a paper on " Alternative regimen for MDA in lymphatic filariasis"

27. Dr. M.R. Ranjit, Scientist-D delivered a guest lecture on "Epidemiology of Drug Resistant Malaria in India" at Department of Zoology, Asutosh College, Kolkata on 13th February 2009.

28. Mr. P.K. Jangid, T.O attended and Presented a paper entitled "Yoga and Health Care" during International Symposium on Tribal Health held at Regional Medical Research Centre, Jabalpur, M.P. on 27 Feb – 1 Mar' 2009.

29. Dr. A.K.Satapathy, Scientist-D presented a paper entitled "Polymorphism of Endothelin-1 (Ala288Ser) gene associated with development of hydrocele in lymphatic filariaisis" in the Annual Indian Immunology Society meeting held at Bhubaneswar on 12-14th Dec 2008.

30. Dr. G. Bulliyya, Scientist-D attended 'National Seminar on Dynamics of Tribal Development with reference to Tribal Women' presented a paper on "Health and nutritional status of women among the scheduled tribe communities in India: an overview" at Andhra University, Visakhapatnam on January 29-30, 2009.

31. Dr. M.R. Ranjit, Scientist-D attended the state level seminar organized by RMRC,Bhubaneswar on Major Health Challenges of Orissa on 30th March 2009.

32. Dr. G. Bulliyya, Scientist-D attended 'Interactive Meet on Implementation of Regulatory Provisions in Development projects' by Ministry of Environment & Forests, Government of India, at Hotel Suryansh, Bhubaneswar, on March 25, 2009.

33. Dr. N.Mohapatra, Scientist-D acted at a resource person for training to Med. officers of eastern state of India at RMRC, Bhubaneswar on 19th August 2008.

News:

1. Dr. S.K.Kar, Director elected as Vice president of Indian Medical Association (IMA), Orissa chapter in November 2008.

2. Mr. M R Ranjit, Scientist-D and Dr. R.K.Hazra, Scientist-C have been elected as the Secretary General and treasurer respectively of National Academy of Vector Borne Diseases, Bhubaneswar in November 2008 for a period of 3 years.

Ph.D Award:

1. Dr. Sunanda Garabadu has awarded Ph.D in Zoology under Utkal University, Bhubaneswar on the topic "**Role of migratory population and environmental factors pertaining to malaria transmission in and around Bhubaneswar**" under the guidance of Dr. N. Mohapatra, Scientist-E in 2009.

Ph.D Program at RMRC:

Regional Medical Reseach Centre , Bhubaneswar continued its Ph.D program in both Life sciences and Medical Sciences since inception. Till today more than 40 Ph.Ds have been produced in various scientific disciplines. Presently the following Ph.D scalars are undertaking their Ph.D work in this Institute.

1.	Name:	Prajyoti Sahu
	Subject:	Zoology
	Guide:	Dr. S.K.Kar
	University:	Utkal University
	Topic:	Prevalence of HBV & HCV infection and their genotypes among acute/ chronic symptomatic hepatitis patients in hospital set up
2.	Name:	Sudhansu Sekhar Nishank
	Subject:	Biotechnology
	Guide:	Dr. G.P.Chhotray
	University:	Utkal University
	Topic:	Molecular characterization of thalassemia and it's clinical significance in Orissa
3.	Name:	Swati Kumari
	Subject:	Entomology
	Guide:	Dr. N. Mohapatra
	University:	Utkal University
	Topic :	Molecular identification of sibling species of *Anopheles subpictus* and their role in malaria transmission in different ecozones of Orissa
4.	Name:	Buli Panigrahi
	Subject:	Zoology
	Guide:	Dr. N. Mohapatra
	University:	Utkal University
	Topic:	Risk factors associated with the spread of malaria in the Rengali Left Bank Canal system of Orissa
5.	Name:	Upasana Sahu
	Subject:	Biotechnology
	Guide:	Dr. M.R.Ranjit
	University:	Utkal University
	Topic:	Role of microparticles and ABCA1 transporter in the pathogenesis of cerebral malaria
6.	Name:	Sasmita Kumari Das Sutar
	Subject:	Microbiology
	Guide:	Dr. M.R.Ranjit
	University:	Utkal University
	Topic:	Development and spread of drug resistance in *Plasmodium falciparum* in Orissa

7.	Name:	Gunanidhi Dhangadamajhi
	Subject:	Life Science
	Guide:	Dr. M.R.Ranjit
	University:	Utkal University
	Topic :	Role of iNOS in the pathogenesis of severe *Plasmodium falciparum* malaria
8.	Name:	Ronnaly Rout
	Subject:	Life Science
	Guide:	Dr. M.R.Ranjit
	University:	Utkal University
	Topic:	Molecular characteristics of resetting in severe *falciparum* malaria
9.	Name:	Biswaranjan Purohit
	Subject:	Anthropology
	Guide:	Dr. A. Mahapatra
	University:	Utkal University
	Topic:	Malaria preventive intermittent treatment of choloroquine among the pregnant women: an anthropological perspective
10.	Name:	P.G.S. Sethy
	Subject:	Zoology
	Guide:	Dr. G.Bulliyya
	University:	Utkal University
	Topic:	Protein energy malnutrition in association with micronutrients deficiency of public health significance
11.	Name:	S.K.Samal
	Subject:	Zoology
	Guide:	Dr. B.B.Pal
	University:	Utkal University
	Topic:	Isolation, characterization and diagnosis of *A. hydrophilia* isolated from freshwater fishes
12.	Name:	Sunita Swain
	Subject:	Entomology
	Guide:	Dr. R.K.Hazra
	University:	Utkal University
	Topic:	Molecular analysis of different anophelines and their vectorial attributes in different geographical region of Orissa

C. **List of PhD Scholars Awaiting Registration**

1. Student: Rashmi Mishra, SRF
   Guide: Dr. A.K.Satapathy
2. Student: K . Gopinath Acharya, SRF
   Guide: Dr. A.K.Satapathy
3. Student: Suchismita Behera, SRF
   Guide: Dr. G.Bulliyya

M.Sc. Dissertation Program:

Library acts as Coordinator for six monthly M.Sc. / M.Phil dissertation program of the Centre from Various Universities of the Country twice in a year i.e Jan- June and July- December. Besides that an one monthly summer training program is also conducted in the month of May-June every year.

List of M.Sc. Dissertation works undertaken in 2008-2009

1	Jyotsana Kumari Panda	Utkal University, Bhubaneswar	To study the role of regulatory T-cell in human complicated and uncomplicated malaria	Dr. A.K.Satapathy	2008
2	Pragalva Mishra	Sambalpur University	A study on the genetic polymorphism of endothelin-1(288) in chronic filarial manifestation	Dr. A.K.Satapathy	2008
3	Sasmita Mishra	Utkal University, Bhubaneswar	Curcurmin induces programmed cell death in metazoan helminthic parasites	Dr. A.K.Satapathy	2008
4	Sonali Panda	Gandhi Inst. Biol. Sc, Gunupur	Comparative efficacy of microscopy and RDK (Rapid Diagnostic Kit) test in diagnosis of malaria	Dr.A.S.Kerketta	2008
5	Biswabharati Baral	North Orissa University, Baripada	Sero molecular diagnosis of HBV infection among icteric individuals with suspicion of viral hepatitis	Dr. B. Dwibedi	2008
6	Pragati Panda	Ravenshaw University, Cuttack .	Serological and molecular diagnosis of HBV infection among icteric individuals with suspicion of viral hepatitis.	Dr. B. Dwibedi	2008
7	Diptimayee Sahoo	Utkal University, Bhubaneswar	Association *ofAeromonas* species related to individual patients from Bhubaneswar and Puri areas of Orissa	Dr. B.B.Pal	2008
8	Priyabrata Mohanty	Utkal University, Bhubaneswar	Isolation and identification of *Vibrio cholerae* from environmental and hospitalized diarrhoeal patients from Bhubaneswar and Puri areas of Orissa	Dr. B.B.Pal	2008

9. Rita Das	Utkal University, Bhubaneswar	Incidence of different bacterial enteropathogens among hospitalized diarrhoeal patients from Bhubaneswar and Puri areas of Orissa	Dr. B.B.Pal	2008
10. Dilip Kumar Bej	Sambalpur University	Biochemical and molecular analysis of insecticide resistance in *Anopheles stephensi*	Dr. R.K.Hazra	2008
11. Manaswini Behera	North Orissa University, Baripada	Molecular identification of An. aconitus complex	Dr. R.K.Hazra	2008
12. Minarva Mahunta	Utkal University, Bhubaneswar	Molecular identification of An. aconitus complex	Dr. R.K.Hazra	2008
13. Nihar Ranjan Jena	Neelachal Institute of Medical Sciences, Bhubaneswar	Molecular identiication of An. culicifacies	Dr. R.K. Hazra	2008
14. Leena Parida	Trident Academy of Creative Technology, Bhubaneswar	Comparison of positivity of P. falciparum in the peripheral ICT KIT and PCR in cord and Placental Bloods samples	Dr. A. Mohapatra	2008
15. Sunita Sahoo	Trident Academy of Creative Technology, Bhubaneswar	Incidence of malaria at community level using microscopy, ICT-KIT & molecular techniques	Dr. A. Mohapatra	2008
16. Somesh K. Padhi	Trident Academy of Creative Technology, Bhubaneswar	Prevalence of iron deficiency anemia among school children by heamoglobin and ferritin levels	Dr. G. Bulliyya	2008
17. Sudhansu S. Behera	AMIT, Bhubaneswar	Iron deficiency and anemia in slum children of Bhubaneswar	Dr. G. Bulliyya	2008
18. Sailendra Panda	Ravenshaw University, Cuttack	Protective efficacy of Glutathione-S-Transferase in experimental filarial infection	Dr. M.K. Beuria	2008
19. Sasmita Pangari	Utkal University, Bhubaneswar	Protective efficacy of Glutathione-S-Transferase in experimental Filarial infection	Dr. M.K. Beuria	2008

20. Stithapragyan Beurial	Trident Academy of Creative Technology, Bhubaneswar	Evolution of PIEMPI gene in P. falciparam	Dr. M.R. Ranjit	2008
21. Swati Mishra	Gandhi Inst. Biol. Sc., Gunupur	Prevalence of G6PD deficiency among neonatal Jaundice case; A hospital based study	Dr. M.R. Ranjit	2008
22. Monalisha Pattnaik	Ravenshaw University, Cuttack	Molecular detection of D3 and ITS2 region ofAedes aegypti, vector of chikungunya disease	Dr.N.Mohapatra	2008
23. Sarmistha Suvadarsini Dash	Utkal University, Bhubaneswar	Strain typing of Culex quinquefasciatus population of Khurda District, endemic for filariasis	Dr.N.Mohapatra	2008
24. Binita Battabyal	Trident Academy of Creative Technology,	Effect of malaria in the placental cord of the pregnant women and estimation of DNA	Dr. A.Mohapatra	2009
25. Mousumi Panda	Trident Academy of Creative Technology, Bhubaneswar	Effect of malaria in the placental cord of the pregnant women and estimation of haemoglobin	Dr. A.Mohapatra	2009
26. Nandita Mohanty	Trident Academy of	Antigenic status of W.bancrofti in relation to clinical manifestations of lymphatic filariasis	Dr. B. Dwibedi	2009
27. Sasmita Sethi	Utkal University, Bhubaneswar	Incidence of HBV & HCV in blood transfused thalassaemia patients	Dr. B. Dwibedi	2009
28. Anima Mohanty	Trident Academy of Creative Technology, Bhubaneswar	Incidence of different bacterial pathogens associated withhospitalized septicemia patients from Bhubaneswar	Dr. B.B.Pal	2009
29. Debendra Kumar Hansda	Utkal University, Bhubaneswar	Spectrum of different bacterial pathogens isolated from filarial patients	Dr. B.B.Pal	2009
30. Rajesh Kumar Sahoo	Siksha O Anusandhan University	Incidence of antibiogram of different bacterial pathogens associated with lymphatic filarial patients	Dr. B.B.Pal	2009

Summer Training Program:

RMRC conducted one month summer training program for B-Tech students in the month of May-June. During the summer training program students were exposed to various techniques, equipments used for research purposes and following areas of exposure.

1. DNA isolation.
2. PCR assay.
3. Gel Electrophoresis.
4. Cell culture.
5. Affinity chromatography.
6. ELISA .
7. Antigen Preparation, Protein estimation etc.
8. SDS Page & immunoblotting.
9. CBT Media Preparation for microbial agent.
10. Streaking, Biochemical and antibiotic test for microbial agent.
11. Microscopical identification of Malaria & Filaria parasite ,Use of ICT Kit for filariasis and malaria diagnosis.
12. De compression therapy for filariasis.
13. Automatic DNA Sequencing.
14. HPLC
15. Flow Cytometry

Budget and Resource Generation

The total sanction budget in respect of the Centre (Non-Plan & Plan) for the year 2008-2009 is 6.69 Crore. The Headwise expenditure of the budget is shown below table. The resource generation during the period is 1.85 crore from the extramural granta and Ph.D program through UGC, CSIR and others.

BUDGET OF RMRC (08-09) , SOURCE : ICMR

Pay & Allowance	Other Charges	Library Books/ Journals	Travel Allowance	Equipment	Capital
338.04 Lakh	103.42 Lakh	25.88 Lakh	10.70 Lakh	128.12 Lakh	63.09 Lakh

23rd Scientific Advisory Committee		
1	Dr.D.S. Agarwal B-24, Swasthya Vihar Delhi 110 092	Chairman
2	Prof.J.P. Muliyil Deptt. of Community Health Christian Medical College Vellore 632 002	Member

3	Prof.R.K. Mutat Kar 64-Anand Park Aundh, Pune 411 007	Member
4	Dr.Subrat K. Acharya Prof,. & HoD Dept of Gastroenterology AIIMS, New Delhi 110 029	Member
5	Dr. Satish Gupta Staff Scientist-VII and Chief Gamete Antigen Laboratory National Institute of Immunology Aruna Asaf Ali Marg, New Delhi 110 067	Member
6	Dr.D.A. Gadkari Ex-Director National Institute of Virology 20-A, Dr.Ambedkar Road Pune 411 001	Member
7	Dr.B. Sesikeran DirectorNational Institute of Nutrition P.O:Jamai Osmania Hyderabad 500 007	Member
8	Dr.P. Jambulingam Director, Vector Control Research CentreIndira Nagar Pondicherry 605 006	Member
9	Director of Health Services Directorate of Health Services Govt. of Orissa Heads of the Deptt. Building Bhubaneswar	Member
10	ICMR Representative	Member
11	Dr.S.K. Kar Director, RMRC, Bhubaneswar	Member Secretary

Human Ethical Committee:

1.	Prof. J.M. Senapati Former Prof. & HOD , Physiology SCB Medical College, Cuttack	Chairperson
2.	Dr.P.K. Dash Director, Medical Education & Training Heads of the Dept Building Govt. of Orissa, Bhubaneswar 751 001	Member
3.	Mrs Kasturika Pattanayak Ex-Chair Person Social Welfare Board Govt. of Orissa, 1, Lewis Road Bhubaneswar.	Member

4.	Dr (Mrs) Manorama Das Retd. Prof. of Pharmacology & Addl. Secretary H&FW Santiniketana, Mathasahi Station Bazar Cuttack 753 003	Member
5.	Dr P.K.Acharya N-1 A/10 IRC Village Near CRP Square Bhubaneswar 751 015	Member
6.	Dr.Sisir Kumar Mahapatra Sr. Consultant Physician Surya Nivas, Plot No:B-1/91 Lingaraj Vihar, Pokhariput Bhubaneswar	Member
7.	Dr.Kabi Prasad Misra Sr. Consultant Cardiologist & Director, Medical Education Kalinga Hospital, Bhubaneswar 751 023	Member
8.	Sri.Himadri Mohapatra Toshali Plaza, Iind floor Satyanagar, Bhubaneswar	Member
9.	Prof.Rita Ray HoD Sociology Utkal University Vani Vihar, Bhubaneswar 751 004	Member

Animal Ethical Committee

1.	Dr S.K. Ray, Ex-Principal College of An. Husb & Vet. Sc. Bhubaneswar	Chairman
2.	Dr R.C.Patra, Prof. & Head Dept. of Veterinary Medicine OUAT, Bhubaneswar	Member
3.	Dr. M.K.Beuria Scientist, RMRC, Bhubaneswar	Member
4.	Dr. R.K. Hazra Scientist, RMRC, Bhubaneswar	Member
5.	Dr. A.K.Satapathy Scientist, RMRC, Bhubaneswar	Member
6.	Dr. S. Dash Prof., Zoology, Utkal University, BBSR	Member

7.	Mrs Kasturika Pattanayak Ex- Chair person, Social Welfare Board, Bhubaneswar	Member
8.	Mr N.R.Mansingh, Inspector, SPCA O/o CDVO, Puri	Nominee of CPSEA
9.	Dr S.K.Kar, Director, RMRC	Member

Technical Equipment Purchase Committee

1.	Dr. A.K. Sahoo Chairman Principal Scientist CIFA, Kausalya gang Bhubaneswar- 751 002	
2.	Dr. P. Das CIFA, Kausalya gang Bhubaneswar- 751 002	Member (External Sr. Scientist)
3.	Dr. N.K. Debata External member Prof. Microbiology SUM-Hospital, Bhuabnesware	
4.	Dr. M. K. Beuria Member Scientist-D RMRC, BBSR	(Sub. Specialist)
5.	Dr. B. Dwibedi Member Scientist-B RMRC, Bhuabneswar	
6.	Mr. A.K.Mohapatra Adm. Officer RMRC, BBSR	Member
7.	Mr. G.Behera Accounts officer RMRC, BBSR	Member
8.	Dr. (Mrs.) N. Mohapatra Scientist_E RMRC, BBSR	Member

Technical Building Maintenance Committee:		
1.	Mr. D.N. Tripathy Retd. Chief Engineer, CPWD	Chairman
2.	Mr. P.K. Pattanik Retd. Sup. Eng. (Elect.), CPWD	Member
3.	Mr. P. Kapoor Retd. Jt. Director (Agriculture)	Member
4.	Dr. M.R. Ranjit Assistant Director, RMRC	Member
5.	Mr. A.K.Mohapatra Admn. Officer, RMRC	Member

STAFF POSITION

(As on 31st March 2009)

SCIENTISTS

DR. S.K. Kar, MD, Dip. Clin. Epid.	Scientist-G & DIRECTOR
Dr. (Mrs.) N. Mohapatra, M.Sc., Ph.D.	Scientist-E
Dr. M.K.Beuria, M.Sc., Ph.D	Scientist-D
Dr. M.R. Ranjit, M.Sc., Ph.D.	Scientist-D
Dr. A. Mohapatra, M.Sc., M.Phil., Ph.D.	Scientist-D
Dr. A.K. Satapathy, M.Sc., Ph.D.	Scientist-D
Dr. G. Bulliyya, M.Sc., Ph.D.	Scientist-D
Dr. B.B. Pal, M.Sc., Ph.D.	Scientist-D
Dr. Dasarathi Das, M.Sc. Ph.D	Scientist-D
Dr. (Mrs.) A.S. Kerketta, M.B.B.S.	Scientist-D
Dr. R.K. Hazra, M.Sc., Ph.D.	Scientist-C
Dr. Bhagirathi Dwibedi, M.B.B.S, M.D	Scientist-B
Dr. A. Moharana, MBBS, M.D	Scientist-B

RESEARCH & TECHNICAL STAFF

Dr. S.K. Parida, M.Sc., Ph.D.	Technical Officer
Mr. P.K. Jangid, M.Sc.	Technical Officer
Mr. R.K. Das, M.Sc.	Research Assistant
Dr. A.S. Acharya, M.Sc., M.Phil, LL.B.,Ph.D	Research Assistant
Mrs. G. Mallick, M.Sc.	Research Assistant
Mr. R.C. Parida, M.Sc.PGDCA	Research Assistant
Mr. N.S. Marai, M.Sc., LL.B.	Research Assistant
Mr. D.P. Hansdah, M.Sc.	Research Assistant
Dr. N. Mandal, M.Sc., M.Phil., B.Ed.	Research Assistant
Dr. P. K. Sahoo, M.Sc., Ph.D.	Research Assistant

Mr. B. Murmu, M.Sc., M.Phil.	Research Assistant
Dr. (Mrs.) M.S. Bal, M.Sc.,M.Phil., Ph.D.	Research Assistant
Dr. H.K. Khuntia, M.Sc. Ph.D	Research Assistant
Miss. Sujata Dixit, M.Sc, M. Phil.	Research Assistant
Mr. H.K. Tripathy, B.Sc, PGDME	Technical Assistant
Mr. K. Dhal, M.A.	Census Taker
Mr. R.N. Nayak, B.A.	Census Taker
Mr. H.S. Naik, Dip. MLT	Lab. Technician
Mr. B.N. Sethi, Dip. MLT	Lab. Technician
Mr. S.C. Rout	Lab. Technician
Mr. T. Mohanta	Lab. Assistant
Mr. C.R. Samantray	Lab. Assistant
Mr. K.C. Dalai, B.A., ITI	Lab. Assistant
Mr. B.K. Kanhar	Lab. Assistant
Mr. G.D. Mansingh	Insect Collector
Mr. B. Pradhan	Insect Collector
Mr. C.S. Tripathy, B.Com. LL. B.	Insect Collector
Mr. S.S. Beuria	Insect Collector
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