Annual Report 2012

Regional Medical Research Centre

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(Indian Council of Medical Research)

Bhubaneswar, India

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(Indian Council of Medical Research)
Chandrasekharpur, Bhubaneswar-751 023, Odisha, India
Tel. : 0674-2301322, 2301332, Fax : 0674-2301351

Contents

From the Director's desk...

The Centre continued its research endeavor in areas of vector borne diseases, diarrhoeal disorder, nutrition, viral diseases and MDR TB during the period along with translational research programs. Two new research field units in tribal areas of Odisha have been added to address to improve the health parameters of the tribal population in close collaboration with Dept. of Health & Family Welfare, Govt. of Odisha.

During this period 24 scientific projects were undertaken by this Centre , of them 22 were funded extramurally; sponsored by either Gates Foundation, DST, DBT, ICMR ,CSIR Task Force or NVBDCP. Of these 18 are ongoing and 6 got completed this year with logical conclusions. During the year 2011, the Centre has published 11 research papers and 10 during 2012 till date. All the publications were published in indexed journals. The average impact factor for 2011 publications is 2.39 and 2.48 in year 2012 till date. The Center's library subscribed 31 foreign print journals and 30 Indian print journals for the year 2012 along with online subscription of 87 titles from Science Direct. Besides, the Centrer's library is a member of ICMR E- journal Consortia, NML's ERMED Consortia and JCCC@ICMR through which more than 3000 journals are accessible. The Institute is now connected with 100 MBPS NKN Leased line which is operational round the clock.

The Centre has generated Rs 4.5 crore through sponsored research in year 2011 & 2012. Human resource development activity of this Centre focused on imparting training to M.Sc students, sponsored from various universities, to complete their six month dissertation work, and Ph.D scholars sponsored from UGC-CSIR and ICMR through their research fellowship as JRF/SRF. During the period two scholars have submitted their thesis under Utkal University, Bhubaneswar and four have been awarded Ph.D degree.

The Centre has established linkages with other ICMR and non-ICMR institutions of the Country in upgrading the expertise in the Centre, sharing scientific informations and in collaborative research programmes. The collaboration was also established with International Research Organizations like International Vaccine Institute (IVI), South Korea and Oral Cholera Vaccine was introduced in Public health setting for the first time in the country.

Collaboration with State Health Dept was strengthened in form of consultancy, undertaking evaluation of health programmes, diagnosis of referral cases in areas of Centre's expertise and investigation of epidemics and disaster management.

With total staff strength of 103 at present 93 are in position at the Centre. Out of sanctioned strength of 19 scientists, only 14 scientists are in position and the vacant positions are under active process to be filled up. One scientist, Scientist-D was transferred from NJIL, Agra. One new Scientist, Scientist-D joined the post.

The Centre had organised State level seminar on "Galvanization of Research in Medical Colleges of Odisha : Role of ICMR" on 4th January 2012. During the year, the Centre has organized a Symposium on "Biomedical Research in Medical Institutions" on April 2012.

During the year several developmental activities of the Centre were undertaken. Laboratory up gradation activities are ongoing including infrastructure modification by CPWD and procurement of modular LAB furniture from Godrej have been completed. Virology(Gr-I) Laboratory and TB culture Laboratory were completed and Inaugurated. Efforts have been taken to establish additional research facilities through construction of a new BSL-3 facility and an OPD for augmenting clinical research and lab studies.

The scientists, research scholars and staff of this Centre have made continuous effort and contributed to significant output 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, collaborating Institutes and experts of SAC, ethical and other technical committees for their assistance, support and co-operation. I extend my deep gratitude to DG, ICMR and Council for their continuous support, guidance and encouragement. With all round support, the Centre can continue its endeavour to achieve its goal.

DR. S. K. KAR
DIRECTOR

Highlights of Research Activities

This year the centre besides continuing its ongoing research programme projected on various translational research activities related to public health issues through operational research made. Ongoing research was conducted on filariasis, malaria, diarrhoeal disorders, bacterial meningitis, viral diseases and nutritional disorders and tribal health. Studies were funded by ICMR, DST, DBT, GATES Foundation, NVBDCP, IVI, S.Korea and Ministry of Health & Family Welfare, Govt. of India. Network has been established with the State Health Department, Medical Colleges and Hospitals of the region for collaborative research as well as referral investigation of viral and other bacterial infections. The centre is also conducting various HRD programmes to strengthen the manpower of this region through PhD programme and six month M.Sc dissertation / training programme. In collaboration with Govt. of Odisha, the centre has established two research field units at Rayagada District Head Quarter Hospital, Rayagada and at District Head Quarter Hospital Bhawnipatna of Kalahandi district to address health research that can be develop strategies for translation. This will help to improve the health indicators of the region dominated by tribal population. In collaboration with the state Government. MOU has been signed in this regard between ICMR and the state Government. The major research activities of the centre in 2011-12 are highlighted below.

Current lymphatic filariasis elimination (LFE) programme envisages transmission control through reduction of microfilaria load using annual Mass Drug Administration (MDA) comprising of DEC 6 mg/kg in divided doses plus 400 mg of Albendazole given for 5-6 years or more while National health policy envisages LFE by 2015. Several endemic states have not been able to achieve the target as yet. The reasons for the same are felt are (i) Poor MDA compliance as compared to target of 80-85 % due to fear of side reactions. (ii) Residual microfilaraemia. (iii) The poor MDA compliance among infected children due to social and other factors.

To address above issues and to achieve more effective and timely MDA success, three studies were addressed by the centre. The five year open ended community trial in 3 different villages with lower but uniform dose of Diethlycarbamazine was completed this year. The results indicated annual dose of 100 mg given uniformly in all age groups for 5 consecutive years achieved lowest frequency and intensity of side reactions while maintaining the comparable mf suppression effectiveness to 200 mg or 300 mg annual doses given in similar fashion in 3 communities with comparable endemicity. The results will be useful in programme that can attain higher compliance while lowering the cost and to facilitate ease in operation.

Randomized hospital based clinical trial with 102 filaria infected subjects between 18-55 years of age divided in to 4 groups received annual or biannual MDA regimens comprising either single dose DEC 6mg/kg plus Albendazole 400 mg given annually (Group I), biannually (Group II) or DEC 6mg/kg plus Albendazole 800 mg given annually (Group III) or biannually (Group IV). Group IV regimen group receiving the regimen with higher dose of Albendazole biannually was found superior to others in achieving continued suppression of microfilaremia in 2 years follow up study with complete adult worm clearance observed through ultrasonography (USG) done periodically. The results on continued suppression of micorfilaraemia with quicker achievement of total adult worm clearance can cut short the period of annual MDA initially envisaged for 5-6 years or more.

To understand the significance of the observed phenomena in course of filarial disease, i.e, the clinically prolonged silent phase seen between the onset of acquisition of filarial infection in early childhood to the time of appearance of discernable clinical manifestation in late adolescence or adult stage of endemic population, the study was undertaken to elucidate any evidence of subclinical lymphatic pathology, the site of lodgment of adult

parasite in children infected between 5 to 18 years of age with or without symptoms. The effect of annual or biannual MDA was also observed. All children enrolled at baseline (n=102) had undergone lymphoscintigraphy and ultrasound examination. Of them 74(74%) had shown abnormality in the lymphatic scan at baseline. Ultrasonography has shown presence of adult parasite. All the enrolled children were given first dose of DEC plus Albendazole supervised by a physician. The children were followed up every 6 month. Out of the 102 children enrolled at baseline 79 children completed 6 month follow up, 38 for 12 months, 27 for 18 months follow up and 16 subjects have completed 24 months follow up. Result of repeat lymphoscintigram at these time points compared with the baseline status has shown significant improvement in lymphatic pathology in terms of lymphatic flow many children demonstrated complete reversibility of lymphatic pathology. The finding suggest that it will serve as a tool for advocacy to improve the compliance rate of MDA amongst children and asymptomatic cases in the community and established the biological link between infection and disease expression.

Although host genetic polymorphism and other environmental factor(s) may influence susceptibility to infection and disease, filarial infection in mothers has been considered a risk factor for increased susceptibility to infection in the off springs. Measurement of filaria specific IgG antibodies to carbohydrates as well as lipids in cord blood of infected mother were shown to be significantly high compared to uninfected mothers, which indicates that filarial specific antibodies to carbohydrate as well as lipid are produced during in utero sensitization. Further, significantly high proliferative response to purified carbohydrate antigen in cord blood mononuclear cells (CBMC) of uninfected mothers indicated that transfer of filarial antigens influences the cellular proliferative response of the newborns.

The role of B-1 cells in human lymphatic filariasis is being evaluated. Significantly low levels of IgM antibodies to Actin and LPS in microfilaria carriers compared to patients with chronic filarial disease and endemic normals raises the possibility of poly reactive property of these antibodies. Demonstration of polyreactive property of ss-DNA antibodies further indicates an important role for these antibodies to provide host protection against filarial infection**.** Further a positive correlation between levels of B-1 cells and IgM antibodies to ss-DNA indicates that CD5+ B cells appear to be involved in the synthesis of polyreactive naturally occurring antibodies. The role of B-1 cells in cytokine responses by filarial carbohydrates/ protein antigen in human filariasis is being evaluated.

Though the PCR method of detection of malaria parasites is highly specific and sensitive, yet it is not easy to perform at peripheral level. In order to find out an easy to operate nucleic acid amplification technique for the diagnosis of malaria attempt was taken to optimize the LAMP assay. With continuous effort we have been able to optimize the reaction conditions using Loop Amp DNA Kit. The study is in progress to find out the sensitivity and specificity of this assay system.

To determine the feasibility, acceptability and costs associated with the introduction of the modified killed whole cell oral cholera vaccine in India when given in a public health setting, a pilot study was undertaken in Satyabadi block of Puri district. The 1st dose of mass vaccination was received by 31551 and 2nd dose by 23751 individuals. The first dose coverage, based on population census was around 61% with a drop-out rate of 25%. A total of 2839 rectal swab samples and 77 environmental water samples have been collected and analyzed for presence of *V. cholerae* and other entero-pathogens after the vaccination. Out of total samples tested 114 (4.0%) found to have *V.cholerae* positive. Out of the positive cases only two were from the study area and others from peripheral adjacent area not covered by vaccine. Out of these two cases detected positive for *V.cholerae* one belongs to is vaccinated and another to non-vaccinated. Out of 77 environmental water sample collected and tested from the study 14 (18%) found positive for non O1/O139 positive. The post vaccination surveillance indicates definite protection of OCV amongst the community vaccinated during the mass vaccination campaign. It was shown that mass vaccination with 2 doses of Shanchol was feasible and well accepted by the community.

Further during 2011-12 the centre carried out outbreak investigations of severe diarrhoea in different blocks (Kashipur, K.singpur, B.Cuttack, Kolnara, Jagannathpur, Gudari etc.) of Rayagada district. A total 88 rectal swabs ware analyses out of which 46.6 % *V. cholerae* O1 Ogawa, 35.2 % *E.cholerae*, 1.1% *Shigella* SPP and 4.6 % *Aeromonas. Similarly 7* out of 437 water samples were positive for *V.cholerae* O1 Ogawa isolated from stream, nala and chua MAMA PCR results on *V. cholerae* revealed that all the strains isolated from stool and water were El Tor variant of *V. cholerae*. The early reporting of chedea cases and identification of water sources had helped the health authorities of the district to take adequate control measures which could check the spread of cholera epidemic in this region.

A hospital based surveillance study on Bacterial meningitis in under five children is ongoing since February 2012. Paediatric unit of SVPPGIP, Cuttack has been taken as the surveillance site. During six months of study period 167 cases of clinically suspected meningitis were enrolled in to the study as per inclusion criteria. Out of 167, 8 were confirmed to be of bacterial origin either by culture or latex agglutination test. Of the total 6 culture positive samples 3 cases were positive for *Staphylococcus aureus* and 1 was *Salmonella typhi* and one was positive for *K. pneumoniae* and one new borne was positive for *S.pneumoniae*. Among the two latex positive cases one was positive for Haemophillus influenzae type B and other was group B Streptococcus.

Investigation on viral diseases is ongoing under ICMR virology grade 1 network laboratory project. During 2012 (till September) 6555 number of samples were received by the centre for investigation of different viral diseases. The major viral diseases/syndromes investigated were Dengue (n= 620), viral encephalitis (n=407), Viral Diarrhoea (n= 1209), Rubella (n= 474), Hepatitis (n=3412) and respiratory infection (n= 193).

Investigations has shown presence of Dengue Serotype II (dominant), I,III and IV. CHIKV of genotype ECSA, Rota Virus of different genotypes; P Type: P4, P8, P9, P10, P11 and G Type: G1, G2, G4 , G8, G9,G10 . The other enteric viruses detected were Noro G1, Noro G2, Astro, Adeno, HAV and HEV.

The respiratory viruses detected were Flu A(29.4%), H1N1(18.6%), Rhino(25%), Para influenza(14.3%) and Adeno(21.5%). Emerging viruses like Boca, HMPV and Parecho viruses were detected with low prevalence. Among air borne diseases Measles IgM was detected in 17.5% of the cases and Varicella IgM was detected in 84.9% of cases during outbreak. IgG antibody for Rubella virus infwection was noted in 81% of cases. Herpes Simplex Virus I was detected in 7.8%, Herpes Simplex Virus II in 5.2% and Japanese encephalitis was detected in 1.5% subjects. Among the cases of jaundice screened for hepatitis virus infection, HBV and HCV were detected serologically in 4.7% and 0.1% respectively and genotyping was done in 16.5% and 3% of cases respectively where HBV genotype D and HCV genotype 1b were identified as the genotypes circulating in this region. Human Papiloma Virus was detected in 5% of cases through PCR.

Outbreaks due to mealsels, varicella, HAV & HEV, Dengue and Chikungunya were investigated with request from State health department & recommendations were made for control. Viral cell culture has been established in the lab and HSV infective cell line has been maintained. Hepatitis B surface gene has been cloned in E. coli that will be helpful for full genome analysis and library preparation.

Under surveillance of drug resistance TB in Raygada district, out of 193 AFB positive sputum samples collected all were subjected to solid culture and drug susceptibility testing with the four first line drugs. Out of the 163 culture positive samples DST was available for 48 samples. It was observed that 3 and 2 samples showed mono resistance to streptomycin and isoniazid respectively. The rest of the samples were sensitive to 1st line drugs and rifampicin resistance was not observed in the samples tested so far.

During this year, out of six districts affected with epidemic of Chikungunya, all six districts were surveyed for Chik virus in human & vectors based upon the record of Chik infection. Detailed entomological survey was

done and detected that *Aedes albopictus* was the most abundant vector with very high container (> 60) and Breteau (> 100) indices, thus proving to be the main vector in this region. To assess the viral infection parameters, serum samples were collected from patients in areas where outbreaks were continuing. Chikungunya virus infection was identified in 70 (42.1 %) cases by both IgM and RT-PCR out of 166 patients collected. Phylogenetic analyses of partial E1 gene revealed the circulation of ECSA genotype in the affected areas. Molecular phylogenetic analysis revealed that all CHIKV isolates from serum and mosquitoes collected from the six districts of Odisha belonged to the Indian Ocean Lineage (IOL) group within the ECSA genotype. From the present results, it can be inferred that the recent outbreaks of chikungunya in Odisha have been caused by viral strains of IOL group of the ECSA genotype with E1-A226V, E2-I211T and E2-L210Q mutations.

A study on genetic aspects of essential hypertension in different population groups of Odisha has shown that there is an association between ACE I/D gene polymorphism and expression of essential hypertension. It has been observed that DD polymorphism and the D genotype was associated with increased blood pressure.

Under translational research the centre has taken effort to develop two PCR based tools for public health use. One is to monitor the information of vector prevalence, incrimination of vector for malaria transmission, identification of the sibling species of vector and chloroquine (CQ) sensitivity of the parasite ingested by the vector. By another tool all different serogroups of *V. cholerae* causing cholera can be detected in a single PCR test. Effort is being made for translation of these techniques for field use. These tools are now being field tested to know the applicability.

The centre is providing outpatient facility to patients of lymphatic filariasis and haemoglobinopathy. The facility is being utilized for referral investigation & diagnosis of suspected cases of filariasis and haemoglobinopathy from different parts of the state. Besides, the facility is providing treatment to acute and chronic filarial disease including decompression therapy for filarial lymphedema reduction. During the year 306 cases of lymphatic filarial diseases (acute disease- 106 and chronic disease-200) were diagnosed and treatment provided. Referred from different hospitals, 192 cases suspected for haemoglobinopathy disorder have been investigated. It has shown 33 cases of â Thalassemia, 24 cases of Sickle cell disease and 5 cases of E-thal disorder. This helped in management of such cases by the treating physicians.

As per the recommendation of the Tribal health forum of ICMR, the centre investigated febrile illness in a defined tribal population in a syndromic approach. A cross sectional study was carried out during July 2012 in tribal population from 16 villages coming under 3 adjacent sub centres of Jemadeipentha CHC, Rayagada. 3730 population from 859 households were covered during the survey, during which 345(9.53%) number of fever cases were detected. The prevalence of fever was found to be higher (28%) in >60 yrs age group. Among the fever cases Respiratory Tract Infection (RTI) constituted 62% and Malaria constituted 22% of the total cases. In the 0-5 yrs age group RTI was the most important cause of fever (50%) followed by Malaria (32%). Around 50% cases presented with fever for more than 7 days duration. Of the total malaria cases reported Pf constituted the major parasite (74%) species. Among throat swabs tested for respiratory tract infections, bacterial pathogens were isolated in 75% of cases that included *S pneumoniae*, Hib, and *Staphylococcus aureus*. Viral infection was accompanied with the above bacterial pathogens in 20% of cases. Viruses identified by real time PCR were Corona and Para. Samples tested from cases presenting with diarrhea (n=30) revealed 30% due to bacterial pathogens. E Coli was the organism in all the cases. None of the samples was positive for Rota, Adeno, Astro tested by ELISA. As recommended by the Council attempt is being made to develop strategy targeting morbidity reduction through effective implementation of disease control measures at Primary health care level.

On Going Studies

Ongoing Studies

Translational Research

1. Role of CD5+ B-lymphocytes in human lymphatic filariasis.

Principal Investigator : Dr. A.K. Satapathy
Co-Investigators : Dr. B. Dwibedi
Dr. P.K.Sahoo,
Dr. S.K. Kar
Starting date : April 2010
Duration : Three years
Funding : 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 role of B cells in host protection against filariasis remains unclear. There are two major subsets of B-lymphocytes, B-1 and B-2 cells. Several studies have shown that B1 subset of B cells play an important role in the outcome of infection in schistosomiasis, S. pneumoniae and experimental filariasis. However, the biological role played by B1 lymphocytes to provide host protection against filarial infection is largely unknown. In our previous year study we monitored the levels of B-1 cells (CD5+ and CD19+) in the clinical spectrum of lymphatic filariasis. B-1 cells were found to be low in microfilariamic patients. In normal humans and mice, B-1 cells produce antibodies that are mostly polyreactive nature and have low affinity. Most of t he B-1 cells produce IgM, which bind to a variety of self-antigens. Therefore an attempt has been made to study the poly reactive antibodies in filarial infected population.

Progress of work

The data presented earlier suggest that the anti-ss-DNA antibodies occurring during filarial infection have multiple reactivity since: (1) a positive correlation was found between antibodies to actin and antiss- DNA in normal serum (2) the antibody reactivity to ss-DNA could be effectively absorbed out from sera by pre incubation with soluble myosin; and (3) the antibodies eluted from ss-DNA sepharoe column reacted with various antigens. It is evident from the above experiments that the anti-ss-DNA antibodies detected in plasma of human filariasis have multiple reactivity. Since this may be related to low affinity, we examined relative binding of affinity purified antibodies to ss-DNA against ss-DNA, actin, myosin and LPS (Table I). These affinity purified antibodies to ss-DNA from human plasma at a

Table1. ELISA: affinity determination of affinity purified anti-ss-DNA antibodies to ss-DNA, actin, myosin and LPS.

Absorbance at 492nm								
		Autoantigens[a]			Autoantigens[b]			
Treatment	ss-DNA	actin	myosin	LPS	ss-DNA	actin	myosin	LPS
None	0.866	0.434	0.504	0.314	0.515	0.257	0.330	0.124
2M KSCN[c]	0.232	0.146	0.350	0.104	0.134	0.067	0.264	0.033
4M KSCN	0.121	0.061	0.252	0.060	0.115	0.028	0.234	0.007
6M KSCN	0.126	0.098	0.234	0.030	0.104	0.034	0.220	0.057

[a] 10-fold diluated sample against autoantigens, [b] 20-fold diluated sample against autoantigens
[c] Potassium thiocyanate

dilution of 1:10 have a lower affinity for ss-DNA, actin, myosin and LPS. Significant dissociation of the antibody reactivity against ss-DNA, actin, myosin and LPS occurred only at a much lower concentration 2M of potassium thiocyanate. These results were further confirmed when the affinity purified antibodies to ss-DNA were diluted 20 times and tested against various auto antigens. Similarly significant dissociation of the antibody reactivity was observed at a lower concentration of potassium thiocyanate indicating a lower affinity of affinity purified antibodies to ss-DNA. The demonstration of polyreactive property of ss-DNA antibodies with low affinity to various autoantigens in this study indicates an important role for these antibodies to provide host protection against filarial infection.

During human filariasis, microfilariaemic individuals have been shown to exhibit a significant decrease in peritoneal CD5+ B cell populations and developed low levels of Ig M antibodies to various auto antigens. These interesting findings led us to study the relationship between % of B-1 cells and IgM antibodies to ss-DNA. Interestingly a positive correlation was found between levels of B-1 cells and IgM antibodies to ss-DNA (Fig-1) indicating that CD5+ B cells appear to be involved in the synthesis of polyreactive naturally occurring antibodies.

It has been demonstrated in murine schistosomiasis that parasite carbohydrates polyclonally stimulates CD5+ B-lymphocytes to produce IL-10 which down regulate protective Th1 type of immune responses. This investigation tends to indicate a role for carbohydrates in mediating immune deviation and prolonged survival of parasites in infected hosts. Therefore we measured the antibodies responses to fil carbohydrates antigens in the clinical spectrum of filariasis. A filarial carbohydrates antigen devoid of protein was prepared. We analyzed the antibodies response in clinical spectrum of human lymphatic filariasis using the purified carbohydrates from filarial worms. IgM antibodies to filarial carbohydrates in human lymphatic filariasis are shown in Fig-2. IgM antibodies to filarial carbohydrates were significantly low in microfilariaemic individuals compared to other groups. When the samples are classified according to presence or absence of filarial active infection, individuals with active filarial infection had significantly low levels of IgM antibodies to fil carbohydrates compared to individuals without active infection (Fig-3). We also measured IgG antibodies to fil carbohydrates in human filariasis and shown in Fig-4. IgG antibodies to fil carbohydrate antigen was found to be significantly low in case of

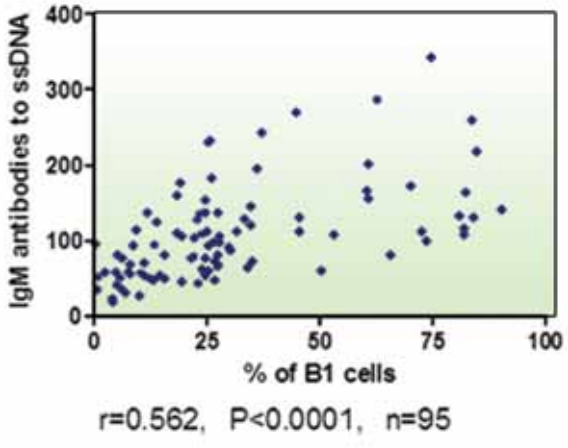


Fig.-1. Correlatioin between% of B1 cell and antibodies to ssDNA.

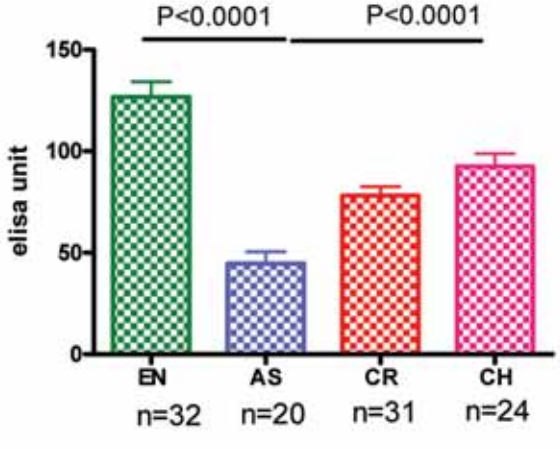


Fig.-2 . IgM antibodies to carbohydrate antigens in human lymphatic filariasis.

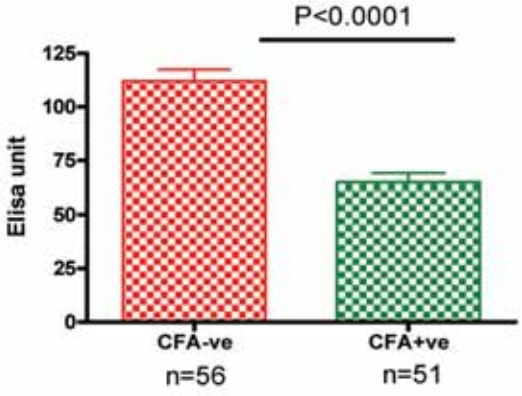


Fig.-3. IgM antibodies to carbohydrate antigens in circulating filarial antigen in human lymphatic filariasis.

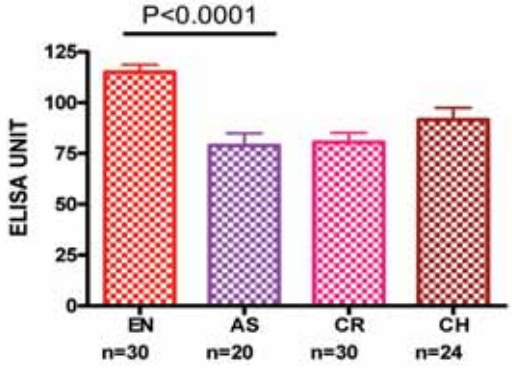


Fig.-4. IgG antibodies to carbohydrate antigens in human lymphatic filariasis.

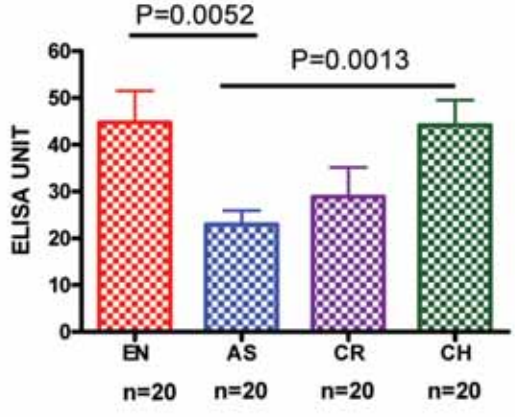


Fig.-5. IgG2 antibodies to carbohydrate antigens in human lymphatic filariasis.

microfilaremic carriers in comparison to endemic normals (fig. 4). IgG2 antibodies are mostly directed toward carbohydrates. We have found that microfilaremic individuals had significantly low IgG2 antibodies to carbohydrate antigens compared to endemic normal and chronic cases (Fig-5). An increased level of IgM to filarial carbohydrates is associated with absence of active filarial infection indicating that could be responsible for down regulation of Th1 type of responses.

The role of B-1 cells in cytokine responses by filarial carbohydrates/ protein antigen in human filariasis is being evaluated.

2. Effect of maternal infection on neonatal immune responses in bancroftian filariasis.

Principal Investigator	:	Dr A.K. Satapathy
Co-Investigators	:	Dr M. S. Bal
		Dr N.N. Mandal,
		Dr S. K. Kar
Starting date	:	Dec 2009
Duration	:	Three years
Funding	:	Extramural (Immunology Task Force, ICMR)

Objectives

1. To study the B cell response (antibody isotypes) to filarial antigens in cord blood samples of offspring and in their 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 infected and uninfected mothers

Background

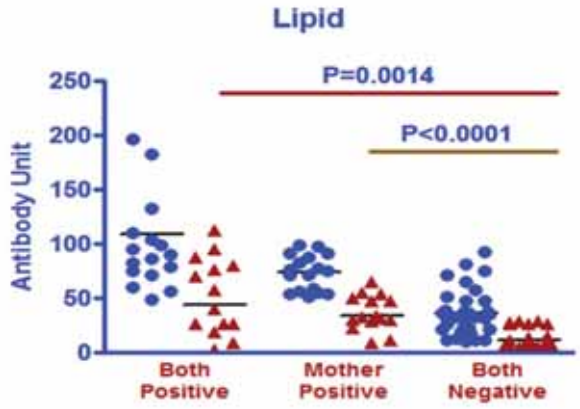
Filarial infection acquired through maternal origin has been considered a risk factor for increased susceptibility. A number of studies have shown that children of microfilaraemics mothers were more likely

to be microfilaraemics than those of amicrofilaraemics mothers. Although host genetic polymorphism and bacterial superinfection may influence susceptibility to infection and disease, prenatal filarial-specific immune tolerance or sensitization associated with maternal infection during gestation and adaptive T cell cytokine responses appear to have a dominant effect. In general, helminthes induced Th2–type of response that confers host protection and expulsion of intestinal nematodes in experimental models. Similarly filarial parasites selectively induce Th2 type response. Women commonly harbor filarial infections during their childbearing years, raising the possibility that the developing fetus may be exposed to filarial antigens in utero and thereby have altered immunity and susceptibility to infection during early childhood. The relationship between maternal filariasis and filarial-specific T cell immunity in newborns has, however, not been examined in any study. More importantly, it is not known whether or how maternally conferred immunity affects the evolution of parasite specific T cell immunity and susceptibility to infection during childhood.

Progress of work

The data presented in our earlier annual report indicate the evidence for pre-natal sensitization to filarial antigens developed in utero since a) 24.5% of samples born from CFA-positive mothers were found positive for CFA b) IgM and IgE antibody prevalence was significantly higher in cord from infected mothers than non-infected mothers and c) Filarial specific IgG4, which is a marker of active infection, response was higher in cord blood of infected mothers than non-infected mothers. We further characterized the neonatal immune responses. Filarial Carbohydrate antigens devoid of proteins and lipids antigens were prepared from filarial worms. IgG antibody responses to filarial carbohydrate antigen and lipid antigens was determined in paired maternal and cord blood samples. Filarial specific IgG antibodies to carbohydrates as well as lipids were significantly high in cord blood of infected mother compared to uninfected mothers (Fig-1 A&B) indicates that filarial specific antibodies to carbohydrate as well as lipid are produce during in utero sensitization.

A



B

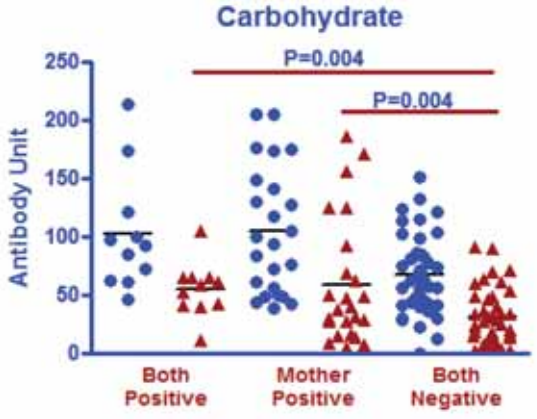


Fig-1 Filarial specific IgG Response against purified Carbohydrate and Lipid antigen.

Last year we reported that CD4+CD25+ natural T regulatory cells were found high in cord samples of filarial infected mothers compared to cord blood of uninfected mothers. T regulatory cells are known to exert their function through a number of mediators such as Fork Head transcription factor (FOXP-3), Cytotoxic T lymphocytes antigens (CTLA-4) and glucocorticoid-induced tumor necrosis factor receptor (GITR). These cells are anergic to proliferative

responses in vitro in response to stimulation with titanl antisen. FOXP3+ cells are normally identified by virtue of high levels of expression of CD 25 on CD 4 T-cells. The CD4+ T cells expressing highest levels of CD25+ (FOXP3cells) was evaluated in cord blood of filarial infected and uninfected mother as shown in Fig-2. T regulatory cells (fox p3 + cells) were significantly high in cord blood of infected mothers.

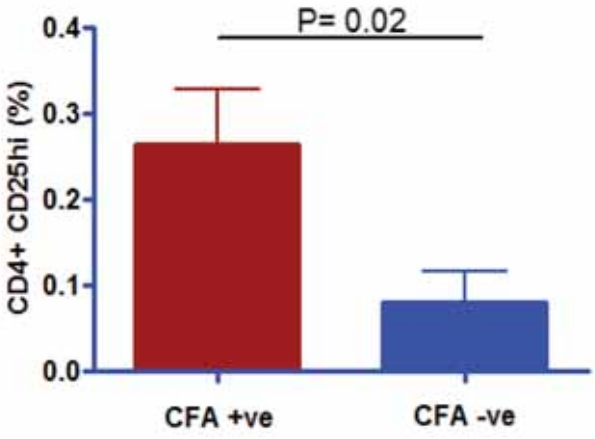


Fig.-2: CD4+ cells expressing CD25hi in cord blood of CFA+ve and CFA-ve mothers.

CD8+ T cells expressing CD25 are known as induced regulatory T cells. The CD8+ T cells expressing CD25+ was evaluated in cord blood of filarial infected and uninfected mothers. Figure-3 shows the levels of CD8+ cells expressing CD25 in cord blood of filarial infected and uninfected mothers. Levels of CD8+CD25+ induced regulatory T cells were found to be significantly high in infected mothers compared to uninfected mothers. Children born from infected mothers had significantly high levels of CD8+CD25+ cells compared to children of uninfected mothers indicates in utero sensitization of neonates by maternal filarial infection (Fig. 3). Further, increased levels of natural T- regulatory cell (CD4+ CD25+) and induced T-regulatory cells (CD8+CD25+) population detected in cord blood of filarial infected mother indicating down regulation of Th1 response in cord blood of infected mothers.

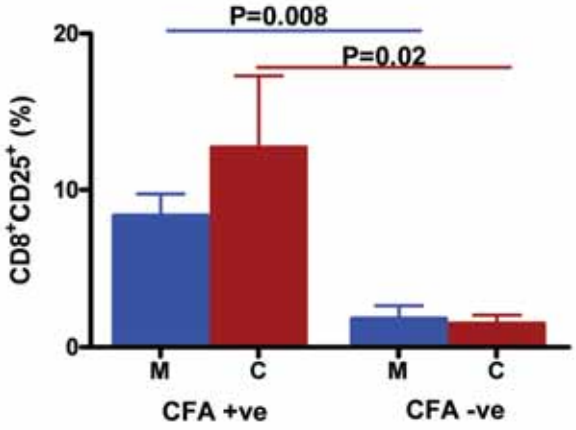


Fig.-3: Levels of CD8+ cells expressing CD25 in mother and cord blood according to infection status.

The influence of maternal filarial infection on mitogen and filarial antigen induced cellular responsiveness and cytokine production in cord blood of neonates has been evaluated. Peripheral blood mononuclear cells (PBMC) of mothers and cord blood mononuclear cells (CBMC) of newborn were purified, statined with CFSE before culture.and stimulated with mitogen and different filarial antigens (Crude, Excretory secretory, Purified carbohydrate and purified protein). The cells were cultured for 72 hours under stimulation with mitogen and different filarial antigens. Then the cultured cells were stained with Propidium Iodide to exclude the dead cells and proliferation was measured by flowcytometer as shown in Fig-4.

Proliferative responses of CBMCs by using Carboxyfluorescein Diacetate Succinimidyl Ester (CFSE) A: Getting of cultured CBMCs, B: Getting of Live CBMCs by excluding dead cells stained with Propidium iodide, C: Histogram showing unstained CBMCs, D: Histogram showing non-proliferated CBMCs stained with CFSE, E: Histogram showing Proliferated CBMCs stained with CFSE, F: Histogram showing overlay of unstained CBMCs (BLACK), stained un-proliferated CBMCs (BLUE) and proliferated CBMCs (RED).

Purified CBMC of infected mothers displayed weak T-cell proliferative response to filarial parasite

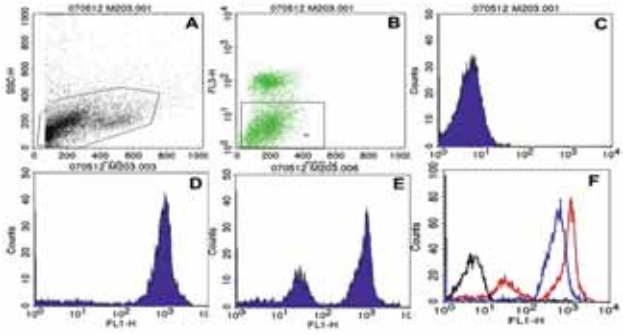


Fig.-4. Proliferative responses of CBMCs by using Carboxyfluorescein Diacetate Succinimidyl Ester (CFSE) A: Getting of cultured CBMCs, B: Getting of Live CBMCs by excluding dead cells stained with Propidium iodide, C: Histogram showing unstained CBMCs, D: Histogram showing non-proliferated CBMCs stained with CFSE, E: Histogram showing Proliferated CBMCs stained with CFSE, F: Histogram showing overlay of unstained CBMCs (BLACK), stained un-proliferated CBMCs (BLUE) and proliferated CBMCs (RED).

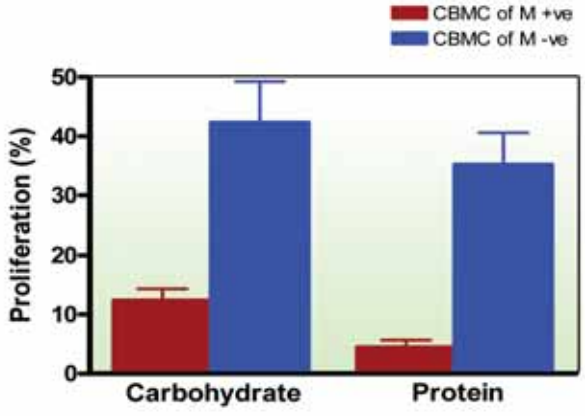


Fig.-6: Proliferative responses of CBMC induced with Purified antigens of filarial parasite.

antigens in comparison to CBMC of uninfected mothers. CBMCs from uninfected mothers have shown significantly high proliferative response to filarial antigens compared to CBMCs from infected mothers (Fig-5). However the extent of proliferation, stimulated with mitogen (PHA) was found to be similar in CBMCs of both uninfected and infected mothers. The proliferative response to purified carbohydrate antigen was significantly high in CBMCs of uninfected mother as shown in Fig-6. This indicates that transfer of filarial antigens influences the cellular proliferative response of the newborns.

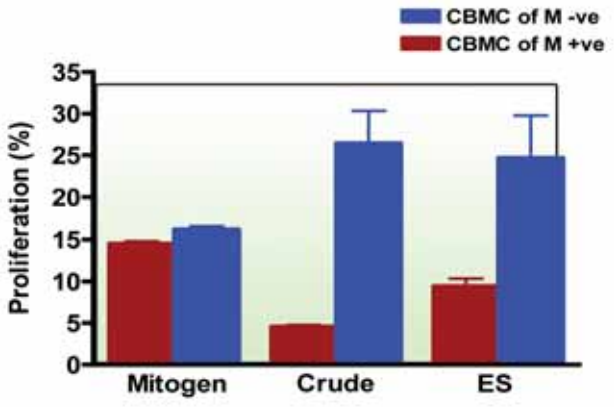


Fig.-5: Proliferative responses of CBMC induced with mitogen and different filarial antigens.

3. A study of Sub-clinical Lymphatic Manifestation in W. bancrofti Infection.

Principal Investigator	:	Dr. S.K. Kar
Co- Investigators	:	Dr. B. Dwibedi, Dr A.S. Kerketta
Starting date	:	Oct. 2009
Duration	:	Three years 6 month
Funding	:	Extramural (GATES Foundation, USA)

Background

Several reports from filarial endemic regions globally including Odisha indicated that while most of the endemic children (25-30%) below 5 years of age get infected, overt clinical disease appears later in life, ie. late adolescence or adult hood. It is not clear about any pathology that develops following infection till the clinical signs appear. Lymphoscintigraphy evidences suggest sub-clinical lymphatic abnormality in mf carriers who does not show any clinical signs. Study on B. malayi infected children (3-15yrs) has shown evidence of sub clinical lymphatic pathology in form of lymphatic obstruction.

It was proposed to undertake an observational study to find out any sub-clinical lymphatic pathology in filariasis infected children and adolescents in W. bancrofti endemic area of the state; and to observe the effect of MDA with DEC and Albendazole (alb) on the lymphatic abnormality.

Objective

1. Prevalence of sub clinical lymphatic pathology in population between 5-18 years with W. bancrofti infection in defined endemic community.
2. Effect of single annual and biannual dose of DEC plus Albendazole on lymphatic pathology in the identified group.

Progress of work

Screening and Enrollment

102 subjects have been enrolled to the study after confirming the eligibility criteria, of which 52 subjects were assigned randomly to annual and 50 to biannual dose (DEC + Albendazole) group. Out of 102 subjects, 50 were symptomatic and rest of the children were asymptomatic, but with detectable mf and/or antigenimia.

Out of 52 asymptomatic children 33 were mf -ve and antigen positive where 19 were positive for antigen and mf. In 50 symptomatic children clinical signs or symptoms of filariasis were observed in form of presence or history of lymphadenitis, lymphedema, testicular enlargement or hematuria. Out of these children 10 were positive for mf.

Baseline investigation and follow up

All the subjects enrolled at baseline (n=102) had undergone Lymphoscintigraphy and ultrasound examination. They were given dose of DEC + Albendazole in the dosages prescribed for their age and study arm (annual or biannual). Till date 79 children completed 6 month follow up, 38 completed follow up for 12 month, 27 completed 18 month follow up and 6 subjects have completed 24 months follow up. All the investigations were repeated 6 monthly. The lymphatic abnormality noted at baseline was compared with the subsequent follow up results which is outlined below.

In the enrolled subjects, the initial microfilaria (mf) count ranged from 2 to 1540 mf/ ml (GM=208.75) The Og4C3 titre in the Baseline was 182 to 15107 units (Mean=5108).

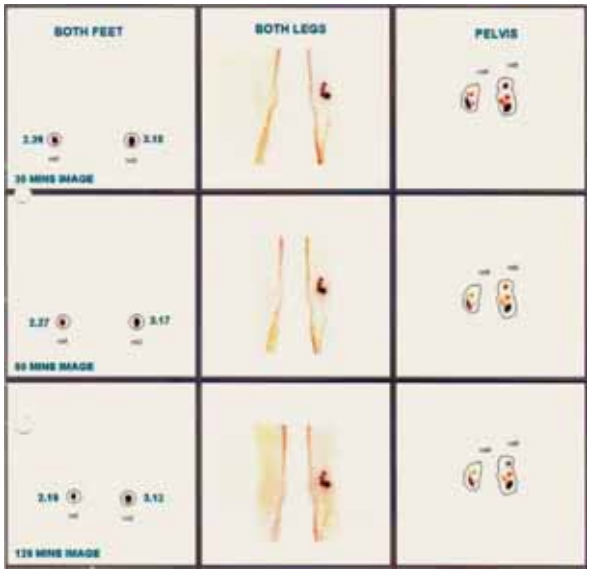
Lymphoscintigraphy of and lower limbs was carried out by expert in nuclear medicine using radio labeled sulphur colloid. The procedure was standardized before initiating the study. Effect on lymphatic pathology was evaluated by comparing the scintigraphic observation made at the follow up visit with the pretreatment (baseline) findings. The scintigraphic image showing visualization of lymph nodes and lymphatic channels on both the limbs and the tracer uptake ratio from the distal end of the limb was compared with the baseline observations in the same limb, to interpret on the lymphatic flow/ pathology and improvement if any.

Out of 102 subjects 74(74%) had shown some abnormality in the lymphatic scan at baseline. The earliest age showing lymphatic pathology was 6 years among the studied children. Ultrasonography has shown filarial dance sign (FDS) of adult worm in 8 subjects.

All the enrolled children were given first dose of DEC plus Albendazole supervised by a physician and they were followed for any side reactions. Among them 10 (10%) children reported to have side reactions like fever, headache, and leg pain, nausea, head reeling and cough. All were mild in nature and managed at home. No severe adverse event was noted. During 6th month 9.6% children had side reaction, while at 12th month none reported of any adverse event.

Out of the 102 children (50 Symptomatic & 52 Asymptomatic) enrolled at baseline 79 children completed 6 month follow up, 38 completed follow up for 12 month,27 completed 18 month follow up and 6 subjects have completed 24 months follow up. Result of repeat lymphoscintigram at these time point compared with the baseline status has shown improvement in lymphatic pathology hence

Pre Rx



Post Rx (12 month)

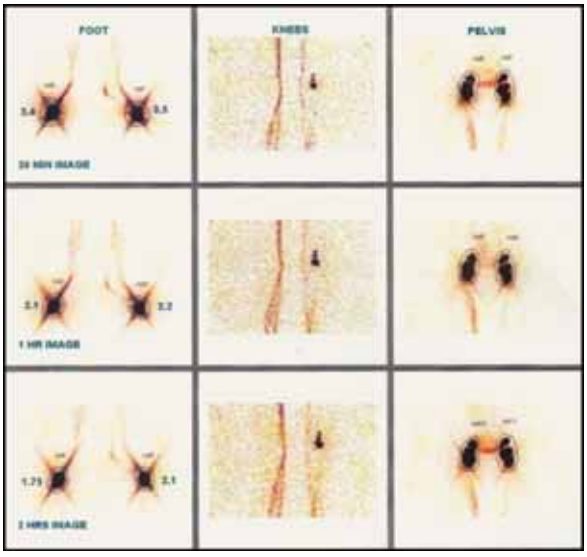


Fig.1: Image of lymphoscintigraphy of a 15 yr Male. (Asymptomatic and Mf negative) at 30, 60, & 120 minute.

lymphatic flow in 71%, 94% and 85% of children who had baseline abnormality and followed at 6th, 12th and 18th month period respectively.

Subsequent Plan

As enrollment of all subjects is over. Follow up activity is going on which is expected to be completed by April 2014.

4. National net-work for genotyping of human lymphatic filarial parasite, Wuchereria bancrofti from different endemic areas.

Principal Investigator	:	Dr A. K. Satapathy
Co-Investigators	:	Dr S.K.Kar Dr.M.R. Ranjit
Coordinator	:	Dr S.L.Hoti, VCRC, Pondicherry
Starting date	:	Feb 2012
Duration	:	Eighteen months
Funding	:	Extramural (ICMR Task Force)

Objectives

1. To establish a national network of researchers and programme managers interested in the genotyping of Wuchereria bancrofti and Brugia malayi prevailing in different endemic areas.
2. To determine the frequency of alleles of different loci on different genes (?-tubulin, Alt-2 and ITS-2 region of rDNA) among W. bancrofti parasite populations in different parts of the country.

Background

In an effort to eliminate lymphatic filariasis, combined drug administration strategy viz., annual mass-administration with microfilaricidal drugs (DEC/Ivermectin) with Albendazole has been undertaken globally in more than 30 countries. In India, infection due to Wuchereria bancrofti is widely distributed in vast geographical areas and account for 98% of the cases. It is essential to understand parasite divergence in these areas as geographic isolation coupled with reproductive isolation forms a platform for the divergence of species. Till date nothing is known about the existence of strains of this parasite and hence it's molecular epidemiology

Progress of work

This project has been approved by RMRC SAC. Institutional human ethical committee has approved this project. ICMR has approved this project. The

project has been initiated in Jan 12.A meeting of collaborators and standard operating procedure for the project was held at VCRC, Pondicherry on 9th April 2012. The mf survey in filarial endemic area is being conducted to collect mf blood. Genotyping assay is being standardized.

5. Developmentment of integrated vector management for demonstrating control of co-existing mosquito borne diseases such as malaria, filariasis and chikungunya in Nayagarh district of Odisha.

Principal Investigator	:	Dr. N. Mahapatra
Co-Investigators	:	Dr R K Hazra Dr.S. K. Parida Mr. N. S. Marai Collaborators State health department and NVBDCP, Odisha.
Starting Date	:	April 2012
Closing date	:	March 2015

Funding : Started intramurally and Applied for Extramural funds of ICMR Vector Task Force. (The title and the objectives were changed as per SAC recommendation)

Objectives

1. To study the bionomics of the vectors of co-existing mosquito borne diseases such as malaria, filariasis and Chikungunya.
2. To develop evidence based, location specific and technically sound vector control strategies to reduce prevalence of co-existing mosquito borne diseases.

Back ground

Amongst all vector control strategies, integrated vector management (IVM), is the most recent and appropriate strategy to control mosquito vectors of public health importance. But in the current situation the NVBDCP is applying this strategy in an isolation to control filariasis, malaria and chikungunya vectors even though a lot of similarities are being observed in bionomics and habitats of those incriminating vectors. Based on the available information, we have hypothesized that a single comprehensive strategy can be applied in controlling these vectors population to reduce transmission of the above three diseases. This will be cost effective and easy to operate. To test this hypothesis the present study has been initiated in Odagaon PHC of Nayagarh district.

Work Progress

Selection of Study site

Kural village of the Odagaon PHC of Nayagarh district has been selected as study site and Mashabari village of the above PHC as control village, where there is co-prevalence of malaria, filariasis and chikungunya (Govt. of Odisha Health Statistics) exist. (Fig.1)

Fig.-1: Odisha map showing the study area.

Entomological survey

A base line survey of mosquito vector has been carried out during 2011-2012 (July to March) to study the bionomics and transmission indicators. The indoor collection of the adult vectors showed presence of 15 species of mosquitoes belonging to genera Culex, Aedes, Anopheles . In Kural village the majority of mosquitoes are filariasis vector (Cx quinquefasciatus). The other are malaria vectors (*An.culicifacies* and *An.annularis*) chikungunya vectors (*Aedes* aegypti and Ae. albopictus) and JE vectors (Cx.vishnui, *Cx.tritaeniorhynchus, Cx.gelidus, Cx.bitaen- iorhynchus*). The other mosquitoes species are *An.subpictus, An.vagus, An.hyrcanus, An.barbirostris, Ae.vittatus, Ae.edwardsi*.

Table-1: Prevalence of diseases vectors in Kural village.

Disease	Vector Species	Total collection	%
Filariasis	Cx. quinquefasciatus	740	21.86
Malaria	An.culicifacies	431	12.73
	An.annularis	323	9.54
Chikungunya	Ae.aegypti	91	2.68
	Ae.albopictus	118	3.48
	Other species	1681	49.67
	Total	3384	

In Mashabari village the entomological survey was done only in summer and rainy season (from March 2012 to July 2012) though the distribution pattern of vector mosquito species are as Kural village, but the prevalence of malaria and chikungunya vector are very low.

Table-2: Mosquito species found in Mashabari village.

Disease	Vector Species	Total collection	%
Filariasis	Cx. quinquefasciatus	542	66.6
Malaria	An.culicifacies	46	5.67
	An.annularis	31	3.8
Chikungunya	Ae.aegypti	25	3.08
	Ae.albopictus	43	5.3
	Other species	124	15.28
	Total	811	

Transmission Indicators

(i) Density of vectors species.

The data collected on density of the vectors during the three seasons has been depicted in Fig-2 The Per Man Hour Density (PMHD) of *Cx.quinquefasciatus* showed an increasing trend from summer to winter while highest in winter (13 to 36.3). The *An.culicifacies* density was highest in rainy while *An.annularis* and *Ae.aegypti* showed highest density in winter. But *Ae.albopictus* showed highest density in rainy season .

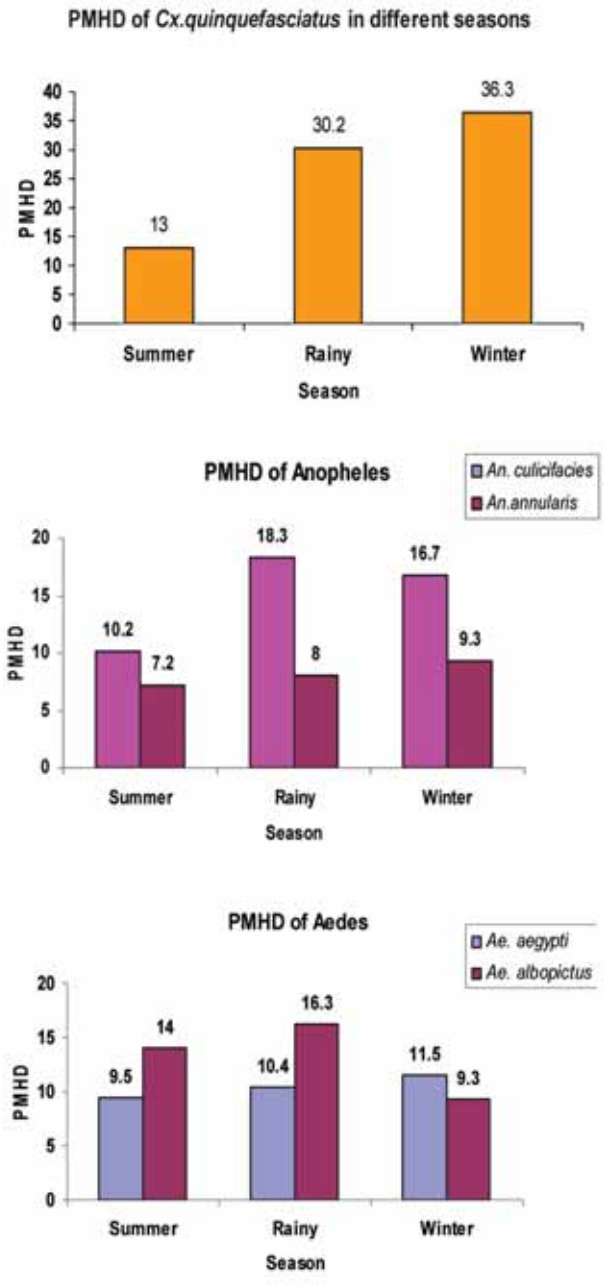


Fig.2: Per Man Hour Density of *Cx.quinquefasciatus*, *Anopheles* and *Aedes* mosquito during 2011-12.

(ii) Infection and Infectivity rate

Detection of *Wuchereria bancrofti* in *Cx. quinquefasciatus* was done by dissection as well as by molecular methods. In case of filariasis, the infection and infectivity rate in *Cx.quinquefasciatus*

was 6.8(38/559) and 4.1(23/559) respectively. Infection and infectivity rate shows high transmission of filariasis.

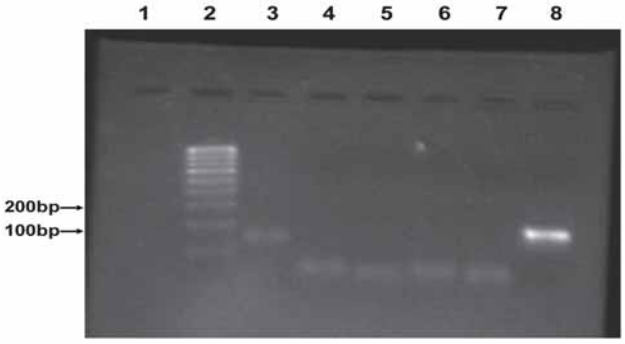


Fig.3: Gel photo showing the presence of Wuchereria bancrofti (188bp). in Cx. quinquefasciatus (Lane 3 and 8) Lane 2: 100bp DNA ladder.

Sporozoite rate

Sporozoite rate of P.falciparum in *An.culicifacies* and *An.annualris* was 3.8 and 2.31 %.

Hence both the species were transmitting the malaria.

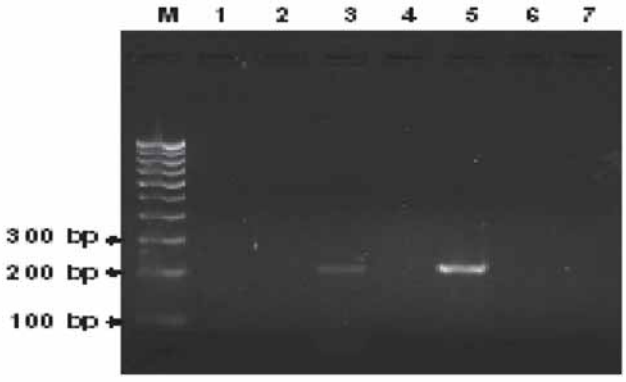


Fig.4: Presence of sporozoite in both the species indicates indigenous transmission.

Lane, 1-5 test samples of An. culicifacies, Lane 3 & 5 sample showing positive for P. falciparum, amplification at 205 bp, lane M -100bp DNA ladder.

Detection of CHIK virus

Total of 45 Ae.aegypti and 100 Ae.albopictus were processed for the detection chik virus by RT–PCR method. None found positive for the virus.

Anthropophilic Index.

Table 5: Detection of Human blood meal (Anthropophilic Index) in vectors.

Species	No. of Mosquito processed	No. positive for Human blood meal	Anthropophilic Index (%)
An. culicifacies	75	7	9.3%
An. annularis	60	9	15%
Cx.quinquefasciatus	105	72	68.6%
Ae. aegypti	35	22	62.8%
Ae. albopictus	50	33	66%

During the period under investigation the *Cx.quinquefasciatus* , *Ae. aegypti* and *Ae. albopictus* showed highest anthrophilic Index (more then 60%) while *An. culicifacies* and *An. annularis* showed low anthrophilic Index of of (9.3 and 15 % respectively). (Tab-5)

Insecticide Susceptibility status of Vectors

Insecticide susceptibility tests were carried out on field collected *An.culicifacies* and *An.annularis* and *Cx. quinquefasciatus* mosquitoes by using WHO kits following standard procedure (Table 6a-6c).

Table 6a: Susceptibility status of An.culicifacies.

Insecticide (%)	No. exposed	No.Dead (post 24 hours)	Mortality (%)
DDT (4%)	40	9	22.5
Malathion (5%)	40	12	30
Deltamethrin (0.05%)	40	30	100

Table 6b: Susceptibility status of An.annularis.

Insecticide (%)	No. exposed	No.Dead (post 24 hours)	Mortality (%)
DDT (4%)	25	5	20
Malathion (5%)	25	7	28
Deltamethrin (0.05%)	25	20	100

Table 6c: Susceptibility status of Cx.quinquefasciatus.

Insecticide (%)	No. exposed	No.Dead (post 24 hours)	Mortality (%)
DDT (4%)	40	7	17.5
Malathion (5%)	40	12	30
Deltamethrin (0.05%)	40	20	100

From the test it was evident that all the vector mosquitoes showed >75% resistance to 4% DDT and .68 % resistance to 5% malathion .But all(100%) susceptibility to deltamethrin.

Preference of Breeding Site

Larvae of the above vector collected from the various breeding spots using larvaral dipper had shown that the major breeding places of *Cx. quinquefasciatus*, *An.culicifacies*, *An.annularis* and Aedes were Cesspit, Rice field and earthern pot.Larval density were calculated and species were identified after adult emergence. Species association mosquitoes in each breeding spot were recorded. (Tab-7) Major breeding places of each vector were identified and the analysis showed Cesspit, Rice field and earthern pot were the major breeding place of *Cx. quinquefasciatus*, *An.culicifacies*, *An.annularis* and Aedes respectively.

Future plan

A. Entomological and parasitological survey will be continued for generating baseline data for one year and also in the intervention period..

B. Breeding spots will be stratified for implementing different larval control.

Table 7: Major Breeding Spots identified study area.

SL. NO	Type of Breeding Spot	% (+ve/no .of breeding spot surveyed)	Larval density/Dip	Species composition of mosquitoes larvae
1	Tube well (water accumulation)	92.5 (25/27)	25	+ve Cq. Cv, Armi, Ano
2	Earthen pot	47.1 (106/225)	25	+ve Cq. Cv .Armi, Aedes ,Ano
3	Big pond	100 (5/5)	25	+ve Cq , Cv ,Ano
4	Empty manure pool	100 (150/150)	56	+ve Cq. Cv ,Armi, Ano
5	Drain	100 (7/7)	55	+ve Cq. Cv ,Armi, Ano
6	Well	58.3 (7/12)	3	+ve Ano Cv,
7	Cemented pot/tank	36 (95/247)	38.46	+ve Cq. Cv ,Armi, Aedes, Ano
8	Unused Utensil/cooler/ bucket/containers /gr. stone	23.2 (10/43)	6	+ve Cq. Cv ,Aedes, Ano
9	Wooden dongas	33.3 (1/3)	25	+ve Cq. Cv ,Armi, Aedes, Ano
10	Rice field	60 (15/25)	16	+ve Cq. , Cv, Ano
11	Canal	100 (1/1)	12	+ve Cq, Cv., Ano
12	Pit of Septic Tank	68(102/150)	65	+ve Cq. Cv ,Armi,
	Total	58.5 (525 /892)		

C. Basing on the baseline data of vector bionomics comprehensive control strategy will be developed using the following three intervention tool.

i. Source reduction.

ii. Use of Biolarvicides (B.thuringiensis, use of larvivorous fish)

iii. Long Lasting Insecticide Treated Nets (LLIN)

iv.a: Mobilization of the Community to participate in the control programme

b: Capacity building- Training will be given to identify Gram Kalyan Samiti (GKS) members on spraying larvicides, IEC activities will be done for community awareness and their active participation in the household as well as community level. Primary school teachers will be trained specifically for source reduction activities for Aedes mosquito control. However active members of all the different Govt. programme running in the village will be involved in carrying out activities at different steps of the control activities. So that improved resources at a local level could be done in cost effective manner.

The indicators which will be identified for the above activities will be developed as a tool for comprehensive vector control and this can be translated to the programme to be implemented on blocks as well as district level.

6. Multicentric evaluation of L3 stage specific RT-PCR Assay for the detection of infective stage (L3) W.bancrofti in vector.

Principal Investigator : Dr. N. Mahapatra
Co-Investigator : Mr. N. S. Marai
Starting Date : Jan 2012
Closing date : Dec.2012
Funding : ICMR Task Force

Objective

To assess the sensitivity and specificity of the infective stage specific RT-PCR assay in detecting infectivity in vector and evaluate its usefulness in control programmes at various National Research Centres.

Progress of the work

The above project is a multicentric project of VCRC, Puducherry which has developed a L3 stage specific RT PCR assay to detect infective larvae of *W.boncroftie* in vector. This study is being conducted to evaluate the assay. For this VCRC conducted a workshop. The technique has been standardized and the work is in progress.

7. The epidemiology of malaria with special reference to P malariae in two tribal blocks of Odisha.

Principal Investigator : Dr. M.R. Ranjit, Scientist-E

Co-Investigator(s) : Dr. S K Kar, Scientist-G & Director
: Dr A S Kerketta, Scientist-D
: Dr. A.S.Acharya, RA
: Dr M M Pradhan, Dy Director (Malaria), DHS, Govt of Odisha, MO I/C of Ghatgaon & Badampahar

Starting Date : 1 / 3/2012
Duration : Two years
Funding : EM: ICMR (Concept/8/2010 ECD-II Dated 5/2/2012)

Objectives

(i) To find out the incidence of P malariae along with P falciparum and P vivax

(ii) To analyze the intra-species diversity of P malariae among the clinical isolates

(ii) To investigate the association of P malariae with severe clinical malaria particularly renal failure

Background

Every year at least 0.4million people in Odisha are reported to be slide positive for malaria parasites and more than 200 deaths are being reported due to it. Even though the tribal dominated forested districts are known to contribute substantially more malaria

than the non-tribal districts, the exact cause of persistence of malaria in those areas is not known. According to the NVBDCP malaria report the P falciparum accounts >80% of the malaria cases in the state followed by 10-15% of P vivax. However, we have observed as high as 44.6% of P malariae by PCR in some selected tribal and forested areas of Orissa compared to 8.3% by microscopy. Although, the reason for such unexpected hike in P malariae occurrence is not known, the apparent shortage of P malariae prevalence by light microscopy could include morphologic variations that may contribute to misdiagnosis, but the seasonal incidence of the high prevalence cannot be ruled out. Moreover P malariae can remain long in blood circulation and cause chronic nephritis. The increased hospitalization of severe malaria cases with multi-organ failure in recent years and growing incidence of malaria attributed renal failures in the tribal districts of the state may be due to misdiagnosis of P malariae infection (both mono and mixed) as mono infection of P falciparum that needs to be evaluated. Therefore in the proposed study we will do a systematic investigation on the incidence of P malariae along with P falciparum and P vivax and its association with clinical outcome of severe malaria particularly nephrotic syndrome in Odisha.

Progress of Work

During this period the study sites has been selected. Out of 23 sub-centres in Badampahar block / CHC, 5 sub-centres (Bhondon, Kasiabeda, Saraspada, Jorda and Purunapani) along with the CHC Hospital have been selected for the continuous survey based on the API and SPR. Similarly out of 25 sub-centres in Ghatgaon block / CHC, 5 sub-centres (Uperdiha, Kundapitha, Manoharpur, Tara and Muktapur) along with the CHC Hospital have been included in the study. The Medical Officers, Malaria Laboratory Technician and the Malaria Technical Supervisor (MTS) of the concerned CHCs have been sensitized about the project works. The MPHW (M / F) and ASHAs of the selected study sites have been motivated and a network has been established to collect the blood samples from the clinically suspected malaria patients for the study round the year. Initially at least 31 samples have been collected for molecular diagnosis of the malaria parasites. The study is in progress.

8. Assessment of adolescent reproductive and sexual health programme in Orissa: advocacy for intervention strategies.

Principal Investigator	:	Dr.G.Bulliyya
Co-Investigator	:	Dr.A.S.Kerketta
Starting date	:	June 2011
Closing date	:	May 2014
Status	:	Extramural (ICMR Adhoc project)

Introduction

Adolescents (10-19 years of age) comprise 22.8% (225 million) of Indian population and their numbers are steadily rising. It is a heterogeneous group, marked by physical, physiological, sexual and behavioural changes and their situation vary by age, sex, marital status, class, region and cultural context. A large proportion of adolescents are out of school, malnourished, get married early, work in vulnerable situations, sexually active, and exposed to peer pressures. They posses a distinct array of health challenges including teenage pregnancy, unsafe abortions, excess risk of maternal and infant mortality, high-risk behavior and rapidly rising incidence of HIV / AIDS. The health and nutrition status of adolescents is likely to have intergenerational effects on their offspring. Early marriage and early child bearing is more common in India, 47.4% of girls married before age 18 years and 42% give birth before 20 years of age. Adolescence is perceived to be healthy period of life because mortality is relatively low in this age group. Yet they face many challenges in their life, which are related to health and inadequate access to health care. Thus it is important to influence the

health-seeking behaviour of adolescents as their situation will be centre in determining health, mortality, morbidity and the population growth scenario. Keeping this in view, Adolescent Reproductive and Sexual Health (ARSH) program articulated as a key strategy in the RCH-II and programme implementation plan (PIP) of NRHM to achieve the goals of delaying age at marriage, reducing incidence of teenage pregnancy, prevention and management of obstetric complications including access to early and safe abortion services and reduction of unsafe sexual behaviour. To meet the specific health needs, Adolescent Friendly Health Clinics (AFHC) established at institutional level that provide a range of preventive, promotive and curative services to ensure improved availability, accessibility and utilization of health services.

Objectives

The general objective is to evaluate the adolescent reproductive and sexual health (ARSH) program and quality of care at adolescent friendly health clinic (AFHC) through developing advocacy-based intervention in Orissa.

Specific

- To assess the knowledge, attitude and behavior on reproductive health problems of adolescents;
- To assess the quality of care at Adolescent Friendly Health Clinics;
- To assess the accessibility and utilization of health care services by adolescents; and
- To devise plausible ways and intervene with package of services to explore opportunities for improving utilization of adolescent health services.

Methodology

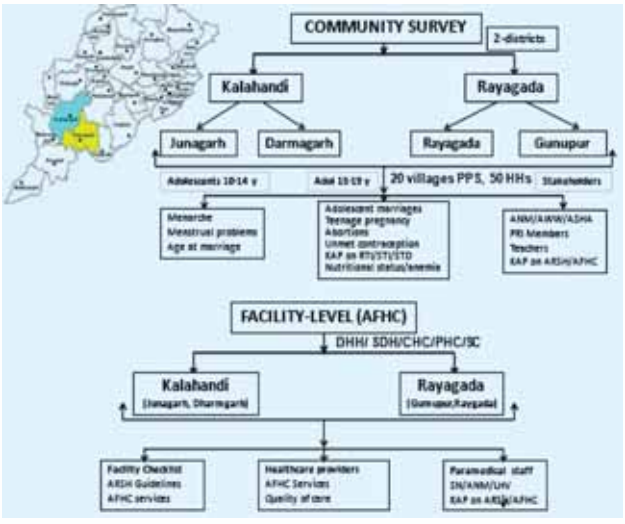
The study is conducted in two phases:

Phase-I Comprising formative research on evaluation of process indicators of ARSH program and accessibility of quality of care at AFHS facility. Situation analysis is the first step for systematic scaling up services that involves collection of data and identifying gaps.

Phase II: The findings of phase-I will identify gaps in accessing quality of care, strategy development and implementation of intervention programs based on baseline evaluation to improve ARSH services towards achieving the envisaged goals.

Study area

The study is being conducted in two districts, namely Kalahandi and Rayagada, where 29% and 35% of women married before 18 years and adolescent health indicators are poor (DLHS-3, 2010). Multistage stratified random sampling procedure adopted for selection of blocks (4), Sectors (4), sub-centres (8).



Data was collected using pre-tested questionnaires separately for household socio-demographic and economic status, and study population adolescents (unmarried and married) in the community. Anthropometric measurements such as height (cm), weight (kg), and mid-upper arm circumference measured using standard equipment and procedures. Finger prick blood samples collected

on filter paper and carried to laboratory for haemoglobin estimation. Further, stakeholder's questionnaires used for community health workers like Anganwadi Workers (AWW), Accredited Social Health Activist (ASHA), members of Panchayat Raj Institutes (PRI) and school teachers. Independent pre-structured questionnaires used for facility-based survey (AFHC) and healthcare providers such as Medical Officers, ICTC Counselors, Lady Health Visitors (MPHS-Female), MPHS-Male, ANM (MPHW-Female), MPHW-Male.

Progress

The study included 720 household (HHs) in Kalahandi and 657 HHs in Rayagada from two selected blocks in each district. A majority of HHs are Hindus (92%) by religion, belonged to SC / ST (24 / 45%) by community, dependant on agriculture and labour. Most of the HHs had poor housing, safe drinking water and sanitation facilities. Half of HHs had BPL cards, wealth index measured by HH assets revealed low to medium economic status. Majority

Table 1. Study characteristics of adolescent population (10-19y) by age and sex.

Study character	Kalahandi (858)			Rayagada (755)		
	Junagarh	Dharmagarh	Total	Rayagada	Gunupur	Total
Number	567	291	858	420	335	755
Sex						
BOYS	**40.2**(228)	**47.4**(138)	**42.6**(366)	**38.9**(163)	**47.8**(160)	**42.8**(323)
GIRLS	**59.8**(339)	**52.6**(153)	**57.4**(492)	**61.1**(257)	**52.2**(175)	**57.2**(432)
Age group						
10-14 yr	62.7	58.6	60.6	57.1	53.1	55.1
15-19 yr	37.3	41.4	39.4	42.9	46.9	44.9
Schooling/Occupation						
BOYS	61.6	59.8	60.7	61.4	65.2	63.3
GIRLS	38.4	40.2	39.3	38.6	34.8	36.7
Literacy						
Primary (<5th std)	48.8	44.7	46.8	53.8	42.3	48.1
Secondary (5-10th std)	37.5	34.7	36.1	33.2	37.6	35.4
Higher Sec. (>10th std)	5.2	8.2	6.7	4.8	15.8	10.3
No education	8.5	12.4	10.5	8.2	4.3	6.3
Drug abuse						
Chewing	8.7	10.3	9.5	17.3	8.9	10.7
Smoking	1.6	1.2	1.4	2.5	0.6	1.5
Alcohol	1.0	0.2	0.6	6.8	0.8	3.8
Steroids/drugs	0.0	0.0	0.0	0.0	0.0	0.0
Marital status (15-19y)						
Unmarried	90.9	82.5	86.7	91.8	87.3	89.6
Married adolescent	9.1	17.5	13.3	8.1	12.6	10.4
Male	1.0	2.2	1.6	0.6	2.1	1.4
Female	**8.1**	**15.3**	**11.7**	**7.5**	**10.5**	**9.0**
Pregnant adolescents	3.5	3.6	3.5	2.5	4.2	3.4
Lactating adolescents	3.5	9.5	6.5	1.9	4.7	3.3
Non-pregnant/Non-lactating	1.1	2.2	1.7	3.1	1.6	2.3

of head of HHs accessed to public health services, however unaware of adolescent health problems.

The study covered 858 (Junagarh 567, Dharmagarh 291) and 755 (Rayagada 420, Gunupur 335) adolescents respectively in Kalahandi and Rayagada districts (Table-1). Coverage of female adolescents are more than their male counter parts in Junagarh (male 40.2%, female 59.8%), Dharmagargh (male 47.7%, female 59.8%), Rayagada (male 38.9%, female 61.1%) and Gunupur (male 47.8%, female 52.2%) blocks. Categorizing by age groups i.e. 10-14yr (62.7%, 58.6%, 57.1%, 53.1%) found to be higher than 15-19yr (37.3%, 41.4%, 42.9%, 46.9%) in Junagargh, Dharmagargh, Rayagada and Gunupur blocks respectively. Majority of adolescents are educated in both the districts, illiteracy ranged 6.3-10.5%. By

Table 2. Knowledge on adolescent reproductive issues and health programs.

Knowledge variable	Kalahandi (858)			Rayagada (755)		
	Junagarh	Dharmagarh	Total	Rayagada	Gunupur	Total
Number	567	291	858	420	335	755
Puberty						
Aware of Pubertal changes in boys	6.0	8.6	7.3	27.4	18.5	22.9
Aware of Pubertal changes in girls	8.5	14.1	10.4	45.0	14.9	31.7
Knowledge on fertile age period	20.6	17.9	19.7	38.1	16.4	28.5
Aware on legal age of marriage	26.3	33.0	28.6	42.4	23.9	34.2
Consequence of teenage marriage	19.9	22.3	21.1	25.7	21.8	24.0
Menstruation						
Age at menarche	12.2	12.3	12.2	12.1	12.5	12.3
Practicing menstrual hygiene	82.7	87.6	85.1	92.4	87.3	89.8
Using sanitary pads	16.4	18.5	17.4	15.2	37.9	26.5
RTI/STI & HIV/AIDS						
Knowledge on RTI/STD	23.2	17.6	20.4	15.7	28.3	22.0
Aware of HIV/AIDS	68.7	62.0	65.4	64.6	50.7	57.7
Know at least three routes of transmission of HIV/AIDS	42.5	32.3	37.4	31.4	43.6	37.5
Aware that HIV infection can be prevented by using condoms	49.6	37.6	43.6	39.5	46.2	42.9
Contraception & Family Planning						
Aware on family planning methods	42.3	47.6	45.0	38.9	57.2	48.1
Aware about contraception	38.9	41.5	40.2	23.0	51.6	37.3
Know 2 contraceptive method	5.6	7.8	6.7	5.4	12.0	8.7
Adolescent Health Programs						
Know at least two health programs	1.6	8.2	3.8	9.3	3.0	6.5
Accessed to health services						
Tetanus injection (10& 16yr)	0.7	1.0	0.8	3.6	3.9	3.7
IFA tablets	6.9	13.7	9.2	8.8	3.9	6.6
De-worming tablets	2.1	3.8	2.7	3.8	0.9	2.5
Sanitary pads	6.7	5.2	6.1	4.4	6.0	5.4
Health check-up	2.8	8.2	4.7	6.7	3.6	5.3
Contraceptives	0.0	0.0	0.0	0.0	0.0	0.0
Aware of ARSH / AFHC	0.2	0.0	0.1	0.0	0.3	0.1

education, female adolescents are at par with their male counterparts. Male adolescents are addicted more to tobacco chewing followed by smoking and alcohol than females. Adolescent girls married at earlier age than male adolescents. Teen-age pregnancy is 3.5%, 3.6%, 2.5% and 4.2%, while lactating 3.5%, 9.5%, 1.9% and 4.7% and non-pregnant/non-lactating adolescents are 1.1%, 2.2%, 3.1% and 1.6% in Junagarh, Dhamagarh, Rayagada and Gunupur blocks respectively.

A higher proportion of female adolescents are aware about pubertal changes than their male counterparts. Only one-fifth of adolescent population has knowledge about fertile age period, legal age of marriage and also its complication. Mean age at menarche is 12.2, 12.3, 12.1 and 12.5 years in Junagarh, Dharmagarh, Rayagada and Gunupur respectively. About 80% aware of menstrual hygiene practices, only one-fifth of them are using sanitary pads during menstrual periods. Knowledge on RTI/STD ranges 20.4-22.0%, a majority of adolescents aware about HIV/AIDS, and half of them aware on routes of transmission and preventive methods. About 35-45% of study population has knowledge on family planning and contraception, but 6.7-8.7% knows at least two contraceptive methods. Adolescents those who received health services is below 10%, including iron-folic acid tablets, tetanus injections, deworming and health check-ups. Awareness about the ARSH programme is less than one percent in accessing Adolescent Friendly Health Services.

Married adolescents

Mean age at marriage of adolescents are 18.5, 18.0, 18.2, 19.1 years in four study blocks. Similarly, mean age at first conception is 19.3, 19.8, 18.7 and 19.6 years. Out of which only one-third married adolescents aware about ideal birth spacing, only 7.8-11.2% of them currently using any methods of birth spacing. Ever married adolescent women who had an abortion is 5.9% in Junagarh, 8.3% in Dharmagarh, 14.3% in Rayagada and 11.1% in Gunupur. Married adolescents aware of consequences of teenage marriage ranged 64.7% in Junagarh and 58.3% in Dharmagarh, where as it is 85.7% in Rayagada and 55.5% in Gunupur. Similarly adolescent women ever had a pregnancy is 82.3% in Junagarh and 87.5% in

Table 3. Knowledge on adolescent reproductive issues among married adolescents.

Reproductive health indicator	Kalahandi			Rayagada		
	Junagarh	Dharmagarh	Total	Rayagada	Gunupur	Total
Number	18	24	42	13	19	31
Mean age at marriage	18.5	18.0	18.3	18.2	19.1	18.6
Mean age at first Conception	19.3	19.8	19.6	18.7	19.6	19.2
Aware about ideal birth spacing	38.3	43.8	41.0	21.4	16.7	19.1
Using any birth spacing method	3.0	12.5	7.8	8.6	13.8	11.2
Adolescents ever had an abortion	5.9	8.3	7.1	14.3	11.1	12.7
Adolescents ever had a pregnancy	82.3	87.5	84.9	57.1	66.7	61.9
Aware of consequences of teenage marriage	64.7	58.3	61.5	85.7	55.5	70.6
ANC received during pregnancy	76.5	87.5	82.0	57.1	55.5	56.3
TT received during pregnancy	70.6	87.5	79.0	57.1	55.5	56.3
Supplementary food from AWW	70.6	79.2	74.9	57.1	55.5	56.3

Dharmagarh, where as it is lower in Rayagada and Gunupur respectively i.e. 57.1% & 66.7%. Over 90% of married adolescent females registered their pregnancy for ANC with ANM/ASHA/AWW followed by Govt. hospital, 70% of them received IFA tablets as well as covered under tetanus (TT) injection and ICDS supplementary food in both the districts.

Nutritional status reveal that underweight (BMI kg/m2 <-2SD of WHO reference) is 16.6% and 19.5% respectively in Kalahandi and Rayagada districts while stunting (z-scores height-for-age <-2SD) is 33.3% and 38.2% (Table 4). Prevalence of anaemia is 51.4% in Kalahandi and 49.1% in Rayagada districts. Severity of anaemia in terms of mild 25.2%, moderate 21.7% and severe 3.6% forms in Kalahandi and it is 28.7%, 15.1% and 4.3% respectively in Rayagada districts. Anaemia prevalence is more among adolescents as compared to their male counterparts.

Table 4. Nutritional status of adolescent study population.

Nutrition indicator	KALAHANDI			RAYAGADA		
District (number)	Junagarh (327)	Dharmagarh (286)	Total (613)	Rayagada (360)	Gunupur (102)	Total (462)
Thinness(BMIAZ)	11.3	22.7	16.6	13.6	25.4	19.5
Stunting (HAZ)	30.6	36.4	33.3	37.2	39.5	38.2
Haemoglobin g/dl	11.7 (71)	11.4 (141)	11.5 (212)	10.5 (70)	10.3 (82)	10.4 (152)
Non-Anaemic	56.2	43.0	49.6	51.6	52.2	51.9
Mild	23.2	27.1	25.2	29.8	27.6	28.7
Moderate	17.6	25.7	21.7	12.8	17.4	15.1
Severe	3.0	4.2	3.6	5.8	2.8	4.3

Table 5. Stakeholder's perception towards ARSH.

Awareness on ARSH	Kalahandi				Rayagada			
	AWW	ASHA	Teacher	PRI	AWW	ASHA	Teacher	PRI
	N=36	N=52	N=12	N=16	N=62	N=26	N=12	N=08
Aware of adolescent age group	100.0	58.0	80.0	0.0	100.0	41.7	75.0	0.0
Aware of health concerns of adolescents	65.4	25.3	42.0	12.0	72.9	25.0	25.0	10.0
Know any adolescent health program	98.4	37.9	28.2	14.2	82.1	33.3	25.0	10.0
Aware of ARSH/AFHC	30.0	42.0	8.4	0.0	42.5	20.3	10.0	5.0
Attend any meeting (adolescent health issue)	69.2	86.8	60.0	0.0	51.7	66.7	25.0	3.0
Ever referred adolescent to health facility	38.4	73.7	0.0	0.0	29.2	41.7	0.0	0.0
Ever advised parents to discuss RH issues with their adolescents	61.5	55.2	40.0	0.0	89.6	33.3	0.0	0.0
ARSH issue must be part of school education	53.8	65.8	40.0	0.0	93.8	33.3	50.0	0.0
Community supports in access ARSH service	23.0	18.4	20.0	0.0	50.0	25.0	0.0	0.0
Need of community awareness meeting	61.5	50.0	0.0	0.0	93.8	75.0	75.0	50.0

Stakeholders

Stakeholders such as AWW, ASHA, PRI members and school teachers in the community were interviewed on knowledge and perceptions about ARSH programme. A total 116 & 108 are stakeholders interviewed in Kalahandi and Rayagada districts. AWW and ASHA have more knowledge about health concerns and programmes meant for adolescents followed by teacher and PRI members (Table-5).

Facility-level survey (service providers)

A total 73 healthcare providers including Medical Officers (4), ICTC Counsellors (3), Lady Health Visitors (MPHS-Female 7), MPHS-Male (10), ANM (MPHW-Female 39), MPHW-Male (10) from Kalahandi (30) and Rayagada (43) districts were interviewed. Awareness about physical, mental and emotional changes that are taken place during adolescence is 79% and 86% respectively in Kalahandi and Rayagada districts. Further, knowledge on health concerns of adolescents (malnutrition, drug abuse/ smoking, RTI/STI, HIV/AIDS) are 63-72% and specific to female adolescents (menstrual problem, nutritional anemia, teenage pregnancy, unsafe abortions) is 63-70% and reproductive health needs (family life education, provision for contraception, ANC services) 48.8-60.2%. Knowledge about the 5-Components of ARSH services is ranged between 23-27%, whereas respondents awareness is more on independent, promotive (35.3-43.3%), preventive (39-44%), curative (44.2-58.1%), referral (64.2-77.7%), and outreach (34.2-36%) services. About 24-31% of

healthcare providers aware that confidentiality of adolescent's health services.

Facility services (AFHC)

Quality of care evaluated at facility levels (AFHC) in Kalahandi (2) and Rayagada (1) districts on availability and accessibility of services from ICTC Counselor using a pre-tested checklist. A designated name plate "Shraddha (10-19 Barsa ra Kisora/ kisorinka Pain)" displayed at each centre specifying time on every Saturday 3-5 PM. A Medical Officer and an ANM/ staff nurse deputed for delivery of quality care. Most of services as specified in ARSH are available by infrastructure (separate room, examination table, display boards, records/registers, weighing scale) and health services (condoms, oral contraceptive pills (OCP), emergency contraceptive pills (ECP), vaccination (TT), pregnancy test kits, rapid plasma reagent (RPR) kits for syphilis). However, IEC materials, and outreach services such as community health check-ups and camps, and co-curricular education activities are yet to initiate.

Plan for next year

The study needs to cover remaining 400 sample data, compilation and statistical analysis for identifying gaps in accessibility and utilization of program and quality of care at facility. These gaps will be used for strategy development and implementation using appropriate tools for improvement of quality AFHS, monitoring and evaluation of ARSH program in achieving the targeted goals.

9. Study on drug resistance among sputum positive tuberculosis patients in Rayagada district, Orissa.

Principal Investigator: Dr Dasarathi Das, Scientist D
Co- Investigaotor : Dr B Dwibedi, Scientist-C
Starting Date : June 2011
Duration : Two years
Funding : ICMR

Objective

To assess the prevalence of drug resistance among sputum positives, cases on treatment and currently treatment failure cases.

Progress of work

The study was undertaken in Rayagada district, one of the tribal districts of Orissa, situated about 400 kms away from the state capital, Bhubaneswar. It has 8.2 Lakh populations out of which 55.76% are Scheduled Tribe population. The district is divided in to three tuberculosis units under which sputum

microscopy is done in 20 centres. Prior to start of sample collection, networking of District Tuberculosis Officer, DOTS providers, Lab Technicians with the research group in the district was carried out. The sputum samples of patients under treatment and treatment failure cases were collected from the microscopy centres and transported to the district headquarter. Sputum samples were collected in 50 ml sterile plastic centrifuge tubes with equal volume of 1% Cetyl Pyridinium Chloride in 2% Sodium Chloride. The external surface of the tubes carrying sputum samples were decontaminated by dipping in 5% Phenol for 30 minutes. The samples were stored in room temperature for a maximum period of one week and transported to RMRC, Bhubaneswar for culture processing and DST studies. The sputum samples were processed at RMRC, TB Laboratory and inoculated to LJ medium, LJ medium with PNB. The drug susceptibility testing of the first line drugs was carried out by Proportion Sensitivity Test (PST) method. The drug concentration used was Isoniazid 0.2 ìg / ml, Ethambutol 2 ìg / ml, Streptomycin (dihydrostreptomycin sulfate) 4 ìg / ml, Rifampicin 40 ìg / ml

During this period 244 sputum samples were collected from sputum positive tuberculosis patients in Rayagada district, Orissa. The sputum samples were transported to District Headquarter Hospital, Rayagada and finally to RMRC, Bhubaneswar laboratory. The study population comprises of 97 males and 26 females with different age groups. The majority of sputum positive patients were males in the productive age group of 21-50 years. From the history of the patients it was observed that most of the patients reported with symptoms like cough of different duration, chest pain and only two patients reported haemoptysis.. Out of the 244 sputum samples collected in 1% Cetylpyridinium chloride, 182 samples had already showed confluent growth in solid LJ media, contamination was observed in 2.3% samples and growth could not be observed in 8.8% cases. Out of 53 sputum samples subjected for drug susceptibility testing with the four first line drugs the results were available for 41 samples. It was observed that only three samples showed mono resistance to isoniazid or streptomycin and all other 38 samples were sensitive to 1st line drugs. The study is in progress.

10. Detection and phylogenetic analysis of chikungunya virus from human cases and vector mosquito species in different endemic regions of Odisha.

Principal Investigator : Dr. R. K. Hazra

Co-Investigator : Dr. B. Dwibedi

Starting date : November 2010

Duration : Three years

Funding : Extramural (ICMR)

Objectives

1. Screening of human cases and selected mosquito species from defined areas of Odisha State for the detection of chikungunya virus infections by serologic and molecular tests.
2. Nucleotide sequencing of the entire E1 genomic region for phylogenetic analysis.

Background

Orissa has been considered as an endemic region for chikungunya since 2005. According to the reports of Govt. of Orissa, chikungunya has affected many parts of coastal areas and presently many suspected CHIK cases are continuously being reported from different regions of the state. In order to forecast and control chikungunya strategies are to be developed. The present study has been undertaken for the above purpose which needs a continuous monitoring.

Progress of work

During the period under report the “chikunguniya” survey has been carried out in

Fig 1: Map of Odisha showing the Chikungunya affected areas.

Kendrapara, Jagatsinghpur, Anugul, Ganjam and Gajapati district, which were affected by chikungunya outbreak.

Entomological Survey

Both adult and larval mosquitoes were collected in rural areas of Kendrapara, Jagatsinghpur, Anugul, Ganjam and Gajapati district. Examinations of larvae and adult have confirmed presence of five species of mosquitoes. These are Aedes aegypti, Aedes albopictus, Aedes vitatus, Aedes edwardsi, and Culex sps. Out of the four Aedes species, Ae. albopictus was found to be dominant species in all the above districts. Aedes edwardsi was found in Gajapati and Ganjam districts. The cement tanks and earthen pots were found to be the most preference breeding spots of Aedes mosquitoes in areas surveyed. From the number of positive breeding spot surveyed, the Breteau Index of Aedes albopictus in all the blocks under each district was greater than 100 indicating high vector densities and hence being the main vector responsible for transmission of arbovirus in the affected areas (Table 1-2 & Fig 7-8).

Viral Survey

Total 166 serum samples collected from suspected cases of chikungunya have been tested for presence of CHIKV by antigen capture IgM ELISA. Out of 166 samples, 45 were found to be positive for CHIK IgM, indicating acute epidemic outbreak in the affected areas (Table 1). Further it has been confirmed by analyzing the chikungunya viral E 1 and E2 specific genes by RT-PCR (Fig. 2-4).

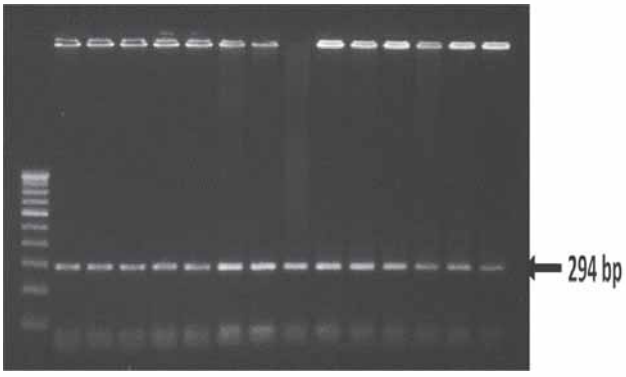


Fig 2: 1.5 % agarose gel photo showing the amplified E1 region of CHIKV.

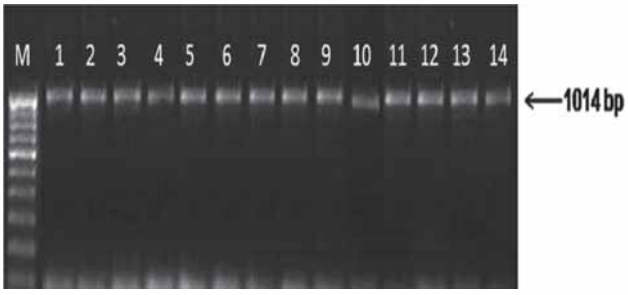


Fig 3: 1.5 % agarose gel photo showing the amplified complete E1 region of CHIKV.

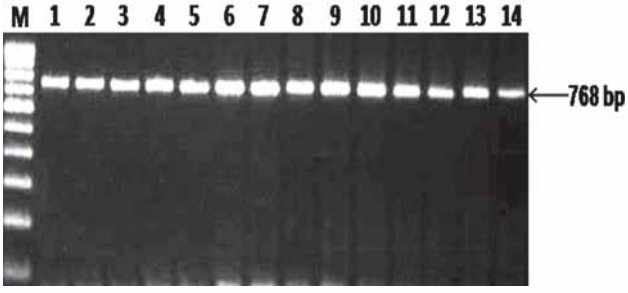


Fig 4: 1.5 % agarose gel photo showing the amplified complete E2 region of CHIKV.

Genotyping of CHIKV

The phylogenetic analysis (Fig 5 & 6) indicates that the sequences of the complete E1 gene of CHIKV from Odishawere grouped along with sequences of CHIKV belonging to IOL strain within ECSA genotype, originating probably from the Kenya 2004 strain (predecessor). Hence IOL group, ECSA genotype of chikungunya virus can be attributed to recent outbreaks of chikungunya in Odisha. Further evidence of the ECSA genotype circulation in Odisha was due to the abundance of Aedes albopictus vector that efficiently transmits this genotype. This was supported by high larval indices of Aedes albopictus in different breeding spots surveyed (Table 1). The phylogenetic analysis shows more of a temporal pattern rather than a topographical pattern. Many South-East Asian isolates were found to cluster with the isolates under study depicting that a similar genotype has circulated during the recent outbreak in different districts of Odisha.

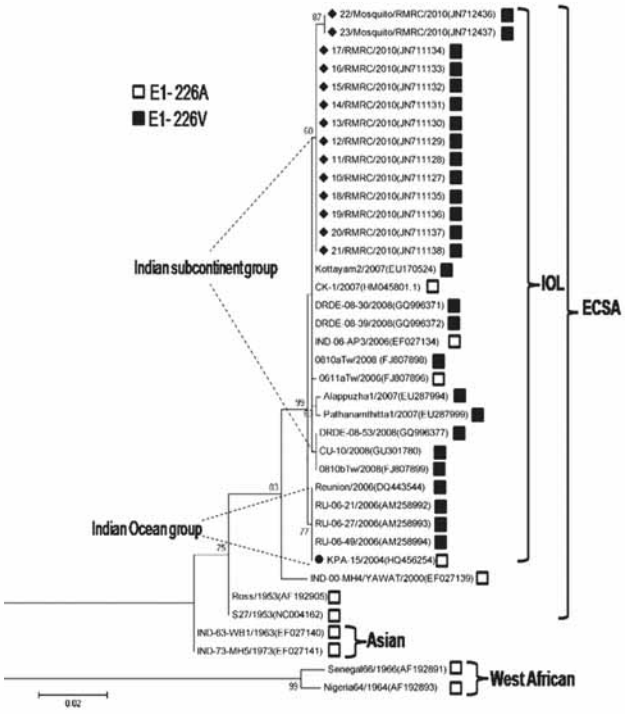


Fig 5: Phylogenetic tree of 1014 bp sequence of E 1 gene of different genotypes of chikungunya virus showing all CHIKV sequences from Odisha belong to East Central South African genotype.

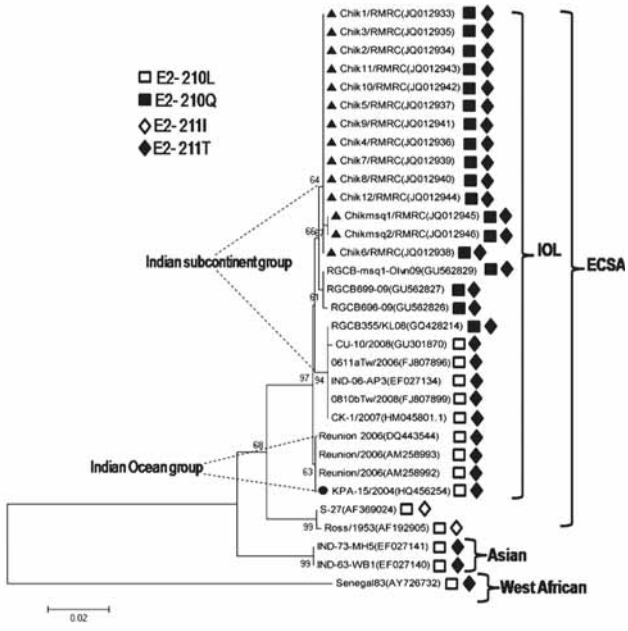


Fig 6: Phylogenetic tree of 768 bp sequence of E 2 gene of different genotypes of chikungunya virus showing all CHIKV sequences from Odisha belong to East Central South African genotype.

Further E1A226V primary adaptive mutation along with E2 I211E and E2 L210K which acted as second step adaptive mutations were detected in all Odisha isolates (vectors and sera). All the above mutation collectively supported the hypothesis: increase in viral dissemination and multiplication in Ae. albopictus species that finally renders it to be the chief arboviral vector in this region. The E1-A226V mutation in CHIKV results in increased fitness in Ae. albopictus mosquitoes with respect to midgut infectivity, dissemination to the salivary glands and transmission to vertebrate species. This mutation significantly increases CHIKV transmissibility to and by Ae. albopictus mosquitoes, which provides a selective advantage over infection in Ae. aegypti.

The above findings indicates that the current outbreaks of chikungunya in Odisha was due to viral strains belonging to IOL group of the ECSA genotype with E1-A226V, E2-I211T and E2-L210Q mutations, which might have favored Ae. albopictus to act as the efficient vector in this region. Since the CHIKV isolates were from a single geographical region and cluster around the IOL group, this suggests endemicity of this group in Odisha. The resurgence and persistence of CHIKV warrants the need for continuous monitoring and identification of arboviral vectors and genetic divergence of newly evolving variants with a view to plan for appropriate strategies for vector control and vaccine development.

Table 1: Number of samples collected and tested positive for CHIKV IgM ELISA..

Sl. No.	Name of the village	Name of the District	Number of samples collected	Samples positive for CHIK V (By ELISA)
1.	GADADAMDARPALLI	GANJAM	26	9
2.	GUDIALI	GANJAM	10	7
3.	KAUDIA	GANJAM	23	2
4.	AUL	KENDRAPARA	6	0
5.	SAHADA	GAJAPATI	2	0
6.	POKHARIPADA	JAGATSINGHPUR	5	0
7.	BAUDPUR	BHADRAK	6	0
8.	GURANDI	GAJAPATI	10	7
9.	KUMBHARA SAHI	GAJAPATI	17	8
10.	ADARSHA NAGAR	RAYAGADA	2	1
11.	ODIA SAHI	RAYAGADA	17	5
12.	GOUDA SAHI	GAJAPATI	1	1
13.	BISOI SAHI	GAJAPATI	4	0
14.	CHRISTIAN SAHI	GAJAPATI	3	1
15.	JHOLASAHI	GAJAPATI	4	2
16.	KANKRODA	GANJAM	7	0
17.	KAUDIA	GANJAM	23	2
		TOTAL	**166**	**45**

Table 2: Collection site, relative distribution, breeding spots, type of species identified and larval indices in the different districts of Odisha

NAME OF COLLECTION SITE	RELATIVE DISTRIBUTION	BREEDING HABITATS	TYPE OF SPECIES CONFIRMED BY MOLECULAR METHODS	CI	HI	BI
KENDRAPARA	Indoors	Earthen Pots	Aedes albopictus, Aedes aegypti, Culex*	60	50	95
	Outdoors	Discarded tires, Small waste plastic glass, Large waste drums, jars				
JAGATSINGHPUR	Indoors	Earthen Pots	Aedes albopictus, Aedes aegypti, Culex*	45	32	70
	Outdoors	Discarded tires, Small waste plastic glass				
RAYAGADA	Indoors	Earthen Pots	Aedes albopictus, Aedes aegypti, Culex*	34	45	85
	Outdoors	Discarded tires, Small waste plastic glass				
GAJAPATI	Indoors	Earthen Pots	Aedes albopictus, Aedes aegypti, Aedes vitatus, Aedes edwardsi,Culex*	56	60	110
	Outdoors	Discarded tires, Tree holes, Small waste plastic glass				
GANJAM	Indoors	Cement tank	Aedes albopictus, Aedes aegypti, Aedes vitatus, Aedes edwardsi,Culex*	65	58	105
	Outdoors	Discarded tires, Small waste plastic glass				
BHADRAK	Outdoors	Flower pot, cement tank	Aedes albopictus	22	24	45

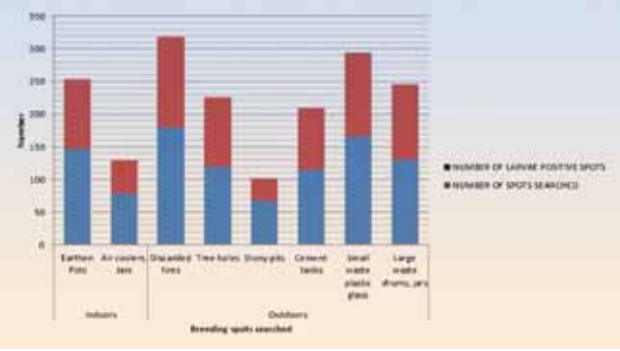


Fig 7: The graph showing the Breteau Index (BI), House Index (HI), Container Index (CI) of the six Chikungunya endemic districts.

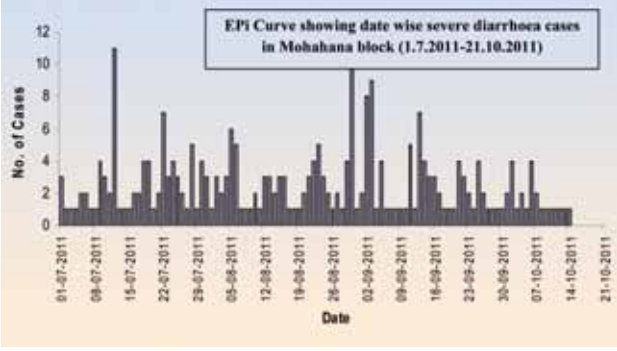


Fig 8: The graph showing the number of Aedes larval positive spots in the six Chikungunya endemic districts.

Future Plan

1. Further screening of more areas during epidemics and intermittent periods needs to be done for entomological survey and vector identification.
2. More number of patients samples and mosquito species needs to be collected for more confirmatory results regarding identification of the chikungunya virus.
3. Sequencing of the complete E 1 and Nsp 1 gene in more number of samples in order to establish phylogenetic analyses and confirm the genotype of CHIKV circulating in Odisha.
4. To study the role of any secondary host that may act as reservoir of the CHIKV during non-epidemic period.
5. The cell culture laboratory will be expected to be established in this year and the virus culture in mosquito cell line will be established in this year.

11. Hospital Based Sentinel Surveillance for Bacterial Meningitis in India - Multi centric Study.

Principal Investigator : Dr. S. K. Kar

Co-Investigators : Dr. B. Dwibedi, Prof. Niranjan Mohanty, Head, Department of Pediatrics, SVP Post Graduate Institute of Pediatrics, Cuttack.

Starting date : February 2012

Duration : 5 years

Funding : Extramural (Ministry of H & FW, Govt. of India)

Objectives

Primary Objectives

1. To establish a hospital based sentinel surveillance for bacterial meningitis in children between 1 month and 59 months in six States in India
2. To determine trends of bacterial meningitis in children 1 month to 59 months of age in these states in India

Secondary Objectives

Determine the etiological profile of bacterial meningitis in children for Haemophilus influenzae type b, Streptococcus pneumoniae and Neisseria meningitides.

Application of the research for National Health Policy:

The aim of the project is to establish a network for sentinel surveillance for bacterial meningitis caused by H. influenzae, S. pneumoniae and N. meningitidis in India. Preparations are ongoing by the Government of India for the phased introduction of a Pentavalent vaccine (DPT-Hep.B-Hib) in selected states of the country as part of Universal Immunization Programme. An ongoing surveillance network is critical to facilitate data flow and monitor the changing trends in disease pattern following introduction of potentially lifesaving public health intervention (Pentavalent Vaccine). The study of trends in the pattern of organisms and drug resistance across the country is also being planned as a part of the project.

The surveillance will provide hospital based data on bacterial meningitis specifically those caused by S. pneumoniae, H. influenzae and N. meningitides. Data on drug resistance using MIC will be generated from all the surveillance sites. Generation of this data will help the government not only to observe trends in drug resistance patterns but will ultimately help in formulation of a policy guideline for management of the same.

Progress of Work

Investigators & Staff training / Reorientation: To maintain uniformity in the study methodology and quality of data all the site investigators attended reorientation training on GCP and GLP at CMC, Vellore. Project staffs were trained subsequently on the protocol and procedures involved in the study. The data entry operator engaged in the project was trained on Data entry through Epi info software at NIE Chennai .Technical staff (2 SRFs, 2 research assistants and two technicians) got laboratory training pertaining to identification of isolates using gram stain, blood and chocolate agar culture, biochemical tests during a workshop held at CMC, Vellore.

Standardisation of laboratory procedures at the centre's lab:

Laboratory investigation has been undertaken on trial samples (Blood & CSF samples) on the required laboratory procedures including CSF cytology (DC, TLC), CSF biochemistry (glucose, protein) by auto analyzer, culture (blood and CSF) and antibiotic sensitivity. Cultures were run on blood agar, chocolate agar and Mac conkey plates for identification and antibiotic sensitivity.

Quality control

Internal quality check was made on coded samples to see inter observer variations which was negligible. External quality control was inbuilt into the study, where CMC Vellore acted as the reference laboratory. In the process coded isolates were received from CMC, Vellore and relevant laboratory tests were performed to identify the isolates and results communicated to CMC.

Laboratory up gradation at SVPPGIP, Cuttack

The hospital facility selected for the study i.e. SVP Post Graduate Institute of Pediatrics, Cuttack is situated 35 kms away from this Center's laboratory and as per the laboratory protocol the samples need to be put into culture immediately (within 15 – 30 minutes) considering the sensitivity of H Influenza & S pneumoniae to external temperature and CO_2 concentration. Hence it was planned to set up a laboratory facility inside the hospital. In this process laboratory space was identified and necessary civil modification (partitioning and ceiling etc.) undertaken with the help of state R&B Division, necessary equipment have been shifted to the laboratory from RMRC and installed. It has been made functional with help of the project staff who are already trained. Laboratory activity is ongoing to cover 24 hrs. X 7days surveillance activity as desired.

Subject enrolment & Lab Investigation

No of patients attending the hospital i.e. SVPPGIP, Cuttack, patients suspected of meningitis and no. of hospital admission were recorded during the period of surveillance i.e. March 2012 onwards through 24hr surveillance. After obtaining written consent from parent or guardian accompanying the patient, the subjects were enrolled.

Case report form was filled with the help of resident paediatrician. History of illness and history of immunisation was also recorded. 123 no of suspected meningitis cases were enrolled in the study those who satisfied the inclusion criteria laid down in the protocol. The children enrolled were between the age group of 1 to 59 months as per the protocol. The major presenting illness was fever with convulsion (76%), the other associated features were bulging fontanel (16%), neck rigidity (29%), and altered sensorium (13%).

Around 35% of patient reported to the above hospital within 24hrs of onset of fever. History of use of antibiotics before admission was observed in 61% of cases.

There was no recorded history of immunisation against Hib and streptococcus pneumoniae in all cases that were enrolled. CSF and blood samples were collected following standard practise and procedure in the hospital for investigation.120 CSF samples and 11 blood samples was collected for investigation. In all cases samples were processed immediately and put into culture (within 15-30 mins). Latex agglutination test was done in 38 samples. Previously latex test was done only in probable cases but now latex test is being carried out in all suspected cases of meningitis. Out of 38 samples subjected to latex test, 2 samples were latex positive (one for Hib and one for group B streptococcus). The CSF count varied from 0 to 16500. About 30% of CSF samples presented with cell count more than 10.

Of the total samples subjected to culture, 3 were culture positive for Staph .aureus and 1 was positive for Salmonella typhi. The culture positive cases were subjected to antibiotic sensitivity testing and were found to be sensitive to Chloramphenicol, Cotimoxazole, Linezolid and resistant to Cefotaxime and Erythromycin.

Future Plan

Enrolment of the subjects into the project will be carried out as per protocol. Latex test will be carried out in all cases from now onwards.

12. Etiology of diarrhoea in three tribal districts of Orissa.

Principal investigator	: Dr. B.B Pal
Co- investigator	: Dr. H K. Khuntia
Collaborator	: Dr. Bikash Pattnaik
Starting Date	: October, 2010
Duration	: October 2013
Funding	: Funding- Extramural, Tribal task force, ICMR

Objectives

1. Phenotypic characterization of common enteric bacteria including the Vibrio cholerae O1 E1 Tor variants from diarrhoea patients from the tribal populations of Orissa.
2. To find out the antibiotic susceptibility test of the diarrhoeagenic E.coli (EPEC, ETEC, EHEC, EAggEC), Salmonella, different Shigella spps, Aeromonas spp and V.cholerae.
3. To find out the correlation between clinical isolates of V.cholerae by different molecular techniques for the detection of biotype (tcpA-classical / E1 Tor), serotype (O1 / O139), virulence (ctxA) and regulatory genes (toxR) by Quadruplex PCR assay, mismatching amplification for mutation assay (MAMA) PCR for the detection of E1 Tor variants of V.cholerae O1with ctxB gene of classical strains.
4. The clonality of all sero-groups of V.cholerae isolates will be done by RAPD PCR, PFGE, etc. to track their migration from one outbreak area into other. Further a detailed analysis of the strains causing different outbreaks will provide the origin of new clones of V.cholerae strains.

Progress of work

The project has been carried out in 4 blocks of 3 tribal districts like Raygada, Koraput, and Gajapati district for detection of bacterial pathogens causing diarrhea in this population. The rectal swabs from the diarrhoea patients (IPD and outbreak villages) and environmental water samples were collected for bacteriological analysis. During this period (July, 2011-June, 2012),41 rectal swabs were collected from Kasipur, 85 Dasamantpur, 276 Laxmipur and 90 Mohana blocks (table-1). Out of total 492rectal swabs, 373 were culture positive; E .coli were 251(67.3%) followed by V.cholerae.O1 Ogawa (42-11.3%). Shigella species(43-11.5%), salmonella species(6-1.6%), and aeromonas species (31-8.3%) .Among the shigella species isolated, S. dysenterae type- 1were 6, S. flexnerae 20, S boydi 4 and S. sonei 11. The V.cholerae O1 strains were sensisitive to ciprofloxacin, noffloxacin, neomycin, azithromycin, gentamicin, chloramphenicol, ofloxacin and resistant to tetracycline, erythromycin, co-trimoxazole, ampicilin, furazolidone and nalidixic acid. The shigella spp were sensitive to tetracycline, azithromycin, neomycin, streptomycin, gentamicin, ciprofloxacin and ofloxacin. But were resistant to ampociliin, erythromycin, furozolidone, co-trimoxazole, chloramphenicol, nalidixic acid and norfloxacin. The large cholera outbreak was reported in the Mohana block from July to October 2011 accounting for high morbidity and mortality. During the diarrhoeal outbreak in Mohana Block, 264 diarrhoea cases, 88 diarrhoea affected villages, and one death was reported. 64 water samples were analyzed from Mohana block from which 7 were positive for V. cholerae O1 Ogawa biotype El Tor and those were collected from open wells. Consumption of contaminated water, unhygienic practices, poor knowledge on diarrhoea, and migration of people were responsible for acquiring and spread of infection.

During this period 110 rectal swabs were collected from different blocks of Rayagada district for bacteriological analysis. Only 4 V .cholerae O1 (Ogawa-2, Inaba-2) El Tor variant followed by E.coli-

80, shigella spp-1 and aeromonas-1were isolated from B. Cuttack and Kolnara Blocks. The MAMA PCR results on V. cholerae revealed that all the strains isolated from stool and water were El Tor variant of V. cholerae. The early reporting and implementation of adequate control measures could check the spread of the eminent cholera epidemic in this region. Early isolation and reporting enabled the state government to implement control measures, so vital cholera epidemic was checked.

Two hundred ninety environmental water samples were collected from different water sources like river, stream, chua, nala, open well and tube-well etc. from different villages from different blocks of the above districts and those were analyzed for the presence of V. cholerae .Seven out of 64 water samples collected from Mohana area from open well ,tube-well during rainy season were positive for V.cholerae O1 Ogawa biotype El Tor. (Table- 2) Besides the four study Blocks water samples were also collected from different Blocks of Rayagada district. Three out of

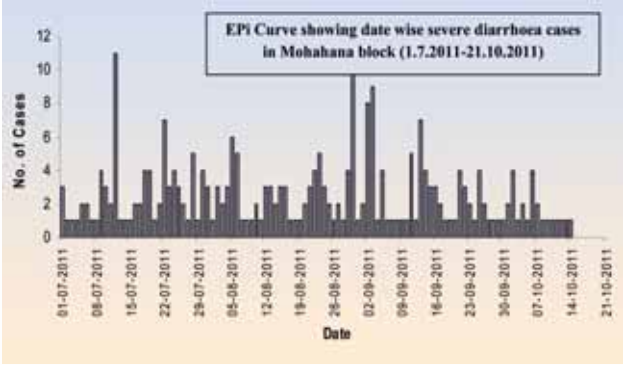


Fig-1: Date wise severe Diarrhoea cases in Mohana block of Gajapati district.

183 water samples collected from Raygada district particularly from Kolnara and B. Cuttack Blocks were positive for Vibrio cholerae. Where as none of the stool and water samples collected from Laxmipur and Dasamantpur blocks were positive for V. cholera. The early reporting and implementation of adequate control measure could check the eminent cholera outbreak in both Gajapati and Raygada districts.

Table -1: Analysis of rectal swabs collected from four tribal blocks-Kashipur, Laxmipur, Dasamantapur and Mohana **(July 2011 to June 2012).**

	Mohana, Gajapati	Laxmipur, Koraput	Dasmantpur, Koraput	Kashipur, Rayagada	Grand Total
Total samples collected	90	276	85	41	**492**
Culture positive	72	207	62	32	**373(75.8%)**
Culture negative	18	69	23	09	**119 (24.2%)**
E. Coli	***27***	***148***	***51***	***25***	*251 (67.3%)*
V. Cholerae O1 (O)	41	1	0	0	**42 (11.3%)**
V. Cholerae O1 (I)	0	0	0	0	**0**
V. Cholerae O139	0	0	0	0	**0**
Shigella spp.	2	33	4	4	**43(11.5%)**
Salmonella spp.	1	4	1	0	**6(1.6%)**
Aeromonas spp.	1	21	6	3	**31 (8.3%)**

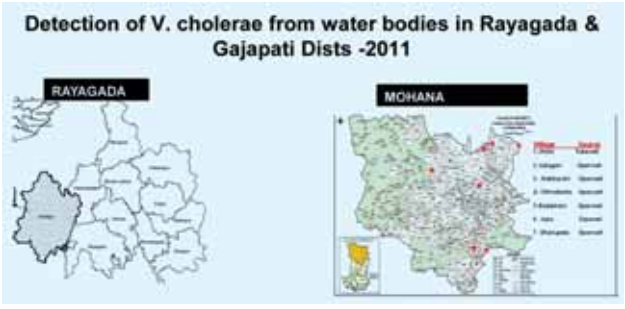
Table: 2 Bacteriological analysis of water samples collected from Kashipur, Laxmipur, Dasamantapur and Mohana Blocks **(July 2011 to June 2012).**

	Mohana, Gajapati	Laxmipur, Koraput	Dasmantpur, Koraput	Kashipur & Rayagada	Grand Total
Total samples collected	**64**	**43**	**0**	**183**	**290**
Culture positive	**7**	**0**	**0**	**3**	**10(3.4%)**
Culture negative	**57**	**43**	**0**	**180**	**280(96.6%)**
V. Cholerae O1 (O)	**7**	**0**	**0**	**3**	**10(100%)**

Hundred seventy four stool samples were analyzed for the presence of rotavirus infection and only 16(5.1%) samples were positive for rotavirus antigen.

Interpretation

The isolation of shigella spp. was more in comparison to the previous year isolation and those were in summer months. The results were communicated to the concerned health authorities for implementation of adequate control measures to check the spread of the diarrhoeal outbreak.



13. Migration, poverty and access to healthcare: a multi centric study on people's access and health system's responsiveness in fast-growing Bhubaneswar city Odisha.

Principal Investigator : Dr. Anna S. Kerketta,

Co-Investigator(s) : Dr. G Bulliyya, Dr. D Das, Mrs. G Mallick

Starting Date : April 2011

Closing Date : October 2013

Funding : Extramural, ICMR National Task force

General Objective

To assess the migrants' healthcare access in the vulnerability context of migration and livelihood insecurity, and to understand the factors (individual-/community-/system-level) affecting the migrants' access to healthcare services and to identify key points to develop an intervention to improve healthcare access to the socio-economically disadvantaged migrants.

Specific Objectives

1. To understand the demographic and socio-economic characteristics of the migrant communities.
   a. Migration history/duration of migration.
   b. Age/gender/educational/occupational/religious/ethnic composition.
2. To explore the community/organizational capacity of the migrants and migrant communities.
   a. the social networks/CBOs/NGOs of the migrants/migrant communities and their role in health/help seeking.

b. Formal and informal processes of decision making related to healthcare issues (at household level and community level)

c. Organizational capacity of the migrant groups to negotiate for better services

d. Existing communication channels available to these communities and their utilization pattern

3. To assess the availability, accessibility, adequacy, affordability and acceptability of the existing system of healthcare delivery to the migrants, in view of distinct features of migrants.

a. To assess the felt healthcare needs, utilization and perceived relevance of available healthcare services by migrants

b. To elicit the migrants' assessment of quality of healthcare

c. To identify the perceived roles of the community and health system in improving the provision of healthcare services.

d. To identify the demand-side barriers deterring the migrants' access to and utilization of healthcare services.

e. To identify the difficulties and bottlenecks of government health services in delivering the healthcare service to the migrants

4. To explore the governmental processes of identifying new areas/settlements and processes of placing basic amenities like water supply and sanitation, health infrastructure and manpower (including outreach) to cater to those areas.

5. To understand the 'exclusion' of migrants from provision of healthcare services in the background of their migration status.

6. To review the existing modes of communication and IEC strategies by the health system and to identify the strengths and gaps in reaching the migrant communities.

7. To review the existing policies and regulations with regard to healthcare to migrants and slum population.

8. To develop an intervention model for improving the healthcare access to the migrants based on the results of the above formative research.

Progress of work

The study is being undertaken in 94 slums, in

Table-1: Social Characteristics Families

N= 2524				
Sl No.	Variables		Number	Percentage
3	Ethnicity	ST	325	12.8
		SC	558	22.0
		OBC	1267	50.4
		General	374	14.8
4	Religion	Hindu	2431	96.32
		Islam	42	1.66
		Sikh	11	0.44
		Christian	40	1.58
5	Duration of Migration	1-3 year	321	12.74
		4-6 year	451	17.86
		7-10 year	1752	69.4

and around Bhubaneswar city of Odisha. people who have migrated to urban area and currently been living in the urban slums/slum like temporary settlements/camps, etc. during a period of 30 days to 10 years have been included in the study. Data collection was done using both quantitative and qualitative research methods. For the quantitative survey the head of the family or their spouses were interviewed through a pre-tested structured questionnaire and for qualitative survey the tools like Focus group discussion, in-depth interviews were applied. So far 2524 households survey has been completed for quantitative house hold survey. The households are distributed in notified slum 1993 (79.1%), in non notified slums 527(20.8%) and in migrant camp 4 (0.2%)

Table-2: Socio Economic Status of the study Population

Sl No.	Variables		Number	Percentage
1	House Ownership	**Own**	**1993**	**78.96**
		Rented	519	**20.56**
		Free	12	**0.48**
2	Type of House	Squatter hut	1475	**58.44**
		Katchha	218	**8.64**
		Semi pucca	820	**32.49**
		Pucca	9	**0.36**
		Open space	2	**0.08**
3	Fuel Used	Gas	193	7.65
		Wood/Coal/Cowdung	1910	75.67
		Kerosine	415	16.44
		Others	6	0.24
4	Portable water	Piped water into the house	80	3.17
		Hand pump	760	30.11
		Public tap	1429	56.62
		Tanker truck	28	1.11
		Others	227	8.99
5	Toilet Facility	Yes	93	3.68
		No	2431	96.32
6	Drainage	No Drain	1093	43.30
		Open Drain	1182	46.83
		Closed Drain	249	9.87
6	Electricity Facility	Yes, Metered connection	932	36.93
		Drawn from the street lines	694	27.50
		No Connection	898	35.58
7	Ration card	Yes	95	3.76
		No	2429	96.24
8	Communication Channel	TV	1115	44.18
		Radio	41	1.62
		News paper	96	3.80
		Neighbour/co-workers	2370	93.90
		Through Announcement	2225	88.15
		Others	11	0.44

The data on socio-economic, demographic details is given in Table-1.

The social characteristics indicates majority 50% contributed by caste category OBC, followed by Scheduled caste 22.0%, Scheduled Tribe 12.8% and General caste around 15%; of which around 96% belong to Hindu religion. The duration of migration is 7-10 years in 70% of the residents. Reason for migration is for better earning which wazs observatiion 98% people.

Socio-economic status: The socio economic status of migrant people shows around 80% people are having own house. The types of houses found are Squatter hut 60%, followed by semi pucca house 32% and 8.6% kutccha. The fuel used for cooking is either wood / coal / cow dung 76% of the people.

The information on available basic facilities indicates around 80% people have access to drinking water facilities like public tap or hand pump. The hygiene and sanitation practice of community residents shows, usual open defecation practiced by 96% people as only 4% people are having toilets. Regarding drainage the closed drains available in 10% & open drains in 46% and no drainage facility in 43% households. Electricity facility as authorized meter connection available in 37% house hold, 36% do not have electricity facility. Ration card is available with only 4% house hold. Regarding the channel for communication, 44% get information from T.V, 96.3% from neighbor or Co-workers and 86% through announcement. The use of radio, news paper is very negligible.

A total of 9031 people covered during this house hold survey. The age and sex distribution of the population covered is given in (Table-3) shows earning age group people of aged 19 to 45 years comprise 56.8% of the total population, indicating that mostly working age group people are migrating to the cities.

Education status of the community (members > 5years of age N=8489) shows, a total literacy rate of 72%, of which 37.9% are having primary education, 37.9 % are high school and 6.1% are having education level higher secondary or more. A total of 28.0% are illiterate in the migrant communities, which is more than national rural average literacy level. Out of the total population majority 60.9% are daily wage earner including wage labourer 8.9%.

Table-3: Age / sex Distribution of population and qualification.

Age group	Total N=9031	Male	female
1 To 5	996 (11.1%)	518 (52.0%)	478 (48.0%)
6 To 14	1801(20.1%)	944(52.4%)	857(47.6%)
15 To 18	777(8.6%)	406(52,2%)	371(47.8%)
19 To 45	5136(56.8%)	2573(50.1%)	2563(49.9%)
46 To 65	731(8.0%)	460(62.9%)	271(37.1%)
65 Above	93(1.0%)	23(24.7%)	70(75.3%)
Qualification			
Primary	2363 (27.8%)	1192(50.4%)	1171(49.6%)
Medium/high school	3222(37.9%)	1880(58.3%)	1342(41.7%)
Higher secondary	514(6.0%)	325(62.0%)	189(38.0%)
Illiterate	2380(28.0%)	1507(63.3%)	873(36.7 %)

Table-4: Health Care Utilisation by migrants.

Variables		Number	Percentage
Usual source of medical care	Private doctor	71	2.81
	Local Practitioner	35	1.39
	Govt. Health centre/hospital	1409	55.82
	Private hospital nursing home	610	24.17
	Traditional/spiritual healer	2	0.08
	Other systems of medicine	22	0.87
	Others	15	0.59
	Didn't have any regular source	350	13.87
Available Health Facility in Locality	Govt Hospital	343	13.59
	Medical College	45	1.78
	Dispensary	32	1.27
	Private Hospital	24	0.95
	Private practitioner	27	1.07
	Local practitioner	1	0.04
Reasons for Non utilisation of Govt Health Facility	Lack of money to reach	759	30.07
	Distance is too far	379	15.02
	Wait for longer time	846	33.52
	Non availability of medicines	924	36.61
	No test facility available	289	11.45
	Delay in getting test reports	337	13.35
	Non attendance of doctor	18	0.71
	Rough behaviour of service provider	103	4.08

Communities based organization: A of 216 CBOs like SHG (61.1%), Slum welfare Society (12.0%), Youth Clubs (11.5%), Mahila Mandal97.85%) exist in these slums.

Health Care Utilisation: The usual source of medical care, available health facilities in the locality and reasons for non utilization of Govt health facility is given in table-4.

The health care utilization by the migrants indicates, around 16 % House hold are having healthcare facility like hospital, dispensary, or private medical college in their locality and 1% are close to private practitioners. The usual source of medical care is govt. health facility by 55.8% people & private hospital / nursing home is 24% and rest use local medicine stores for their medical care. The reasons for not using Govt. health facility as informed by the migrants are non-availability of free medicines among 37%, longer waiting time 34%, lack of money to reach the facilities 13%, too far distance in 14%, unavailability of test facilities delay in getting reports 12% of the population.

Available Health Care Providers: The availability of primary health care providers was assessed and the detail is given Table-5.

Table-:5 Available Primary Health Care Providers.

Sl No.			Number	Percentage
1	Visit of Health Worker to the area	Yes	365	14.46
		Never	406	16.09
		Don't Know	1755	69.53
2	Visit of Health Worker to the Houses	Yes	61	16.71
		No	304	83.29
3	Types of service	Antenatal care services	219	8.68
		Immunization services	338	13.39
		Postpartum care	118	4.68
		Family planning services	32	1.27
		IEC/health education	19	0.75
		Pulse Polio	316	12.52
4	Satisfactory of people on services	Not Satisfied	25	6.85
		Somewhat satisfied	286	78.36
		Satisfied	54	14.79
5	Give Information on Govt. Programme	Yes	250	68.49
		No	67	18.36
		Some Time	48	13.15

The table depicts that structured primary health care is not available or functioning in these slums. Since only 14% people are aware about the visit of Health Worker in their area. She visits the houses having pregnant women and small children. She provides ANC, immunization, Post partum care, family planning, health education. The satisfaction of the families availed the services of health providers is somewhat satisfied among 78.4% families.

Community perception on Govt facilities (through Qualitative assessment):

The qualitative survey like focus group discussion with both men and women group shows the people perceive of having deprived from basic facilities like electricity, sanitation, road, drainage & sufficient portable water. Health problem is perceived as a priority problem in some but most of the group opined it is least priority due to the burden of other problems. The school facilities are available in most of the areas. The people feel negligent due to lack of basic amenities even after struggling to get it. The reasons for negligence as opined are because they are outsiders, unable to fight for their rights, lack of time and leadership, lack of political power, lack of knowledge on political structure & feeling of insecurity due to residing in unauthorized slums.

Regarding the primary health care the Health worker visits only to the houses having pregnant women & small babies. AWW centers are working in most of the slums which provides information on program like pulse polio. People use govt. hospital like capital hospital and municipal hospital for any major illness or delivery. The migrant communities are not satisfied with the health services as there is delay in getting treating, no free drugs, careless treatment by the health provider. The efforts they

have taken to get improved health care services are by approaching corporater, given memorandum & organized rallies. They perceive the need of health camps, small dispensary, awareness camp, health card for free drugs, diagnostics facility & visit of doctors which can improve their health need.

Interim Inference

The main reason for migration among these migrant communities as observed is better earning as majority of the migrants are in the working age group. These migrant people feel neglected due to non availability of basic facilities including health care facility. They cannot fight for justice as they are outsiders, do not have time or leadership, lack of political power, lack of knowledge on political structure & feeling of insecurity as residing in unauthorized slums, temporary job, loss of community social strength etc. Regarding health care their expectations from the government is health center / dispensary in their locality, availability of free medicines, health card, diagnostics facility, available medical professional, proper behavior, better treatment.

Future Plan

To complete both quantitative and qualitative survey, develop interventional strategy based on the finding of formative research and undertake intervention with health providers of Municipal Corporation.

14. Virology Network Laboratory (Grade-I).

Principal Investigator	:	Dr.B.Dwibedi
Co- Investigators	:	Dr.R.K.Hazra, Miss S.Dixit
Co-ordinator	:	Dr.S.K. Kar
Starting date	:	March 2010
Duration	:	Five years
Funding	:	Extramural (ICMR)

Background

It was aimed at creating regional facilities for laboratory diagnosis, surveillance and research in viral diseases of importance.

The proposal involves construction of the laboratory, procurement of equipments, training of involved staff, establishment of laboratory techniques like serology, molecular diagnosis, sequence analysis, cell culture and isolation etc. in phased manner. Outbreak investigation, surveillance during epidemic and inter epidemic period and sporadic disease diagnosis of important viral diseases of the region and emerging infections would be carried out which will be strengthened by research subsequently.

Objective

To establish a grade I diagnostic virology laboratory for investigation of viral diseases of regional and national importance including but not limited to

1. **Viruses transmitted by respiratory route**: Measles, Rubella, Mumps, Influenza viruses (A, B and C), Parainfluenza virus, Adenoviruses, Respiratory Syncytial Virus, Rhinoviruses, Coronaviruses.
2. **Viruses transmitted by intestinal route**: Poliovirus, Hepatitis A & E viruses, Rotavirus, Astroviruses, Calciviruses, Norwalk viruses, Enteroviruses.
3. **Vector Borne Disease Viruses**: Dengue, Chikungunya, Japanese encephalitis, West Nile, Kyasanur Forest Disease, Chandipura viruses.
4. **Zoonotic viruses**: Rabies virus, Nipah virus, Hanta virus
5. **Viruses transmitted by body fluids**: HIV, Hepatitis B and C viruses.

Progress of work

Current strength of laboratory diagnosis

Presently the laboratory facility has been standardised for:

a. Diagnosis of Hepatitis A,B,C,D, and E Virus, Chikunguniya, Dengue, Measles, Varicella, HSV 1 and 2, Rubela , Mumps, EBV, CMV, JE Viral Diarrhoea: Rota, Astro, Adeno, Noro , through serology.

b. Molecular diagnosis of HBV, HCV, Chik, Dengue, HSV, Rubella, Varicella, HPV, JE, Entero and Rota by PCR

c. Diagnosis by Real time PCR for Respiratory Tract Infection: Influenza A (FluA), A(H1N1)swl, B (Flu B), Coronaviruses NL6 (Cor63), 229E (Cor229), OC43(Cor43) and HKU1(HKU1), Parainfluenza 1,2,3 and 4 (Para1, Para2, Para3 and Para4), Human metapneumovirus A and B (HMPVA and B), Rhinovirus (rhino), Respiratory syncytial viruses A and B (RSVA and B), Adenovirus (AV), Enterovirus (EV), Parechovirus (PV), Bocavirus (HboV).

d. Diagnosis by Real time PCR for Viral Diarrhoea: Rotavirus, Astrovirus, Adenovirus, Noro G1 and G2 virus.

e. Diagnosis by RealTime PCR for cases with fever and rash: Measles, HSV 6, 7, Parvo virus

f. Genotyping and phylogeny of HBV, HCV, Chik and Dengue through sequencing.

Man power training

Project staff were given training on molecular techniques and epidemiology during the period. One Scientist (non medical) undergone short training on Rota virus molecular typing at CMC, Vellore. Two scientists(Medical) were trained on GCP methodology of outbreak investigation and epidemiology of viral disease at NIE , Chennai.

Networking for obtaining information, Sample receipt, Investigation and reporting.

Network with the State Health Department, Medical Colleges and Hospitals of the region for referral investigation of sporadic cases and outbreak investigations was further strengthened through frequent interaction. Outbreak investigations are being undertaken along with the state health team upon getting information through media or health system. Immediate report is being communicated to the concerned hospital within 3 days of sample receipt.

I. Sample collection

A. sporadic/ referred cases

Sporadic/referral cases were received by the centre from different hospitals from different districts. So far 8139 number of samples were received by lab from different Govt. and Private hospitals from Odisha. 6890 number of samples were received from July 2011 to July 2012. The details of sample receipt from hospitals has been given in below mentioned tables (1 and 2).

B. Outbreak investigations (2012)

Outbreaks of Dengue, Chikungunya, Measles, Varicella and Hepatitis virus infection has been investigated with immediate reporting to State Health Department with recommendations for timely prevention.

A team from virology laboratory investigated five villages in Khurda district for reported Jaundice cases during last week of January 2012. A total

Table 1: Sample Receipt from different hospitals and Medical colleges (Till July 2012).

Source Hospital/Centre	No. of subjects enrolled
Capital Hospital, BBSR	994
SCBMH, Cuttack	656
SVPPGIP, Cuttack	581
SuM Hospital, BBSR	3236
Outbreak investigation	1058
Other hospitals and PHC	1614
Total	8139

Table 2: Suspected viral diseases investigated.

Sl. No.	Suspected Diseases under investigation	No. of samples for the respective disease
1	Chikungunya	546
2	Dengue	340
3	Respiratory infection	373
5	Measles	290
6	Chickenpox	179
7	Mumps	10
8	Hepatitis	3727
9	Encephalitis	688
10	Viral diarrhea	1685
11	Rubella	235
12	Human papilloma Virus	39
13	CMV	2
14	EBV	1

population of 2686 was clinically examined out of which 29 cases were recorded. Mostly the school going children were affected (Below 15 Yrs of Age).

In the district of Khurda, cases suspected of hepatitis and chicken pox was reported from 3 villages in the same period in last week of February. Investigation was undertaken in the following villages of Banamalipur, Anda and Basanta. 18 samples for chickenpox and 9 samples for hepatitis A and E were collected and tested. Out of 18 samples, 10 samples were positive for Varicella IgM and 3 samples were positive for HAV IgM and 2 samples positive for HEV IgM. Investigation report was submitted to the concerned public health officials.

- During 1st week of April Outbreak was reported from Raygada district suspected of Measles Virus infection. 7 samples were received and tested for Measles IgM antibody and 5 were found to be Positive.
- During 1st week of May- 2012, cases of chicken pox were reported from Gadamaha village (total population 872) of Kandhamal district where 25 cases were recorded. 5 samples were collected from the affected individuals by the District health department and referred to RMRC Lab. 2 out of 5 samples were positive for Varicella IgM.
- During 2nd week of May- 2012, cases of Jaundice were reported from Puran village of Jagatsingpur district for suspected Hepatitis A and E infection. 16 samples were collected from the affected individuals out of which 6 were positive for HAV and 5 were positive for HEV infection.
- During 3rd week of May- 2012, cases of Measles viral infection were reported from Jautukapasi village of Dhenkanal district where 20 cases were recorded. 9 samples were collected from affected individuals and tested. All were positive for IgM antibody. Report was submitted to the state health department and measures (Ring immunization and vitamin A supplementation) were undertaken to prevent spread and complications.
- During 1st week of June - 2012, cases of Measles were reported from Analberini block of Dhenkanal district where 9 cases were recorded. 4 out of 5 samples were positive for Measles IgM.
- During 2nd week of June - 2012, cases of Jaundice were reported from Tamian village of Bolangir district for suspected Hepatitis A and E infection. 7 samples were collected from the affected individuals by the District health department and referred to RMRC Lab. 5 were positive for HAV and 1 was positive for HEV infection.

All the reports were submitted to concerned health authority for undertaking control measures.

C. Laboratory Investigation Results

Laboratory investigation was done for the samples collected from outbreak areas as well as on the samples collected on sporadic hospital based cases collected by or referred to the centre.

Among vector borne diseases Dengue antigen (NS1) was detected in 45% of the cases where as in 10% cases dengue IgM was detected. On 50% of the positive samples PCR was performed and **dengue serotype II** was identified as the serotype. Chik IgM was detected in 20% of cases. 25% of the positive samples were subjected for genotype analysis and **Genotype-ECSA** was found in 25% of the cases.

Among enteric viruses both tribal and non tribal population were investigated during the period. 347 number of samples were collected from tribal population of Raygada district of Orissa.In 9 number of samples Rota antigen was detected and circulating genotypes were **P6, P8, P11 (P Type) and G1, G9,G10 (G Type). In** population from coastal area, Rota antigen was detected in 31.6% of cases. **Genotype G1,G2, G4 , G8, G9,G10 and P4, P8, P9, and P10, P11** were detected in 20% of cases. Other enteric viruses detected were Noro G1 (3.7%), Noro G2 (1.5%), Astro (1.2%), Adeno (22.3%), HAV(21%), HEV(22%).

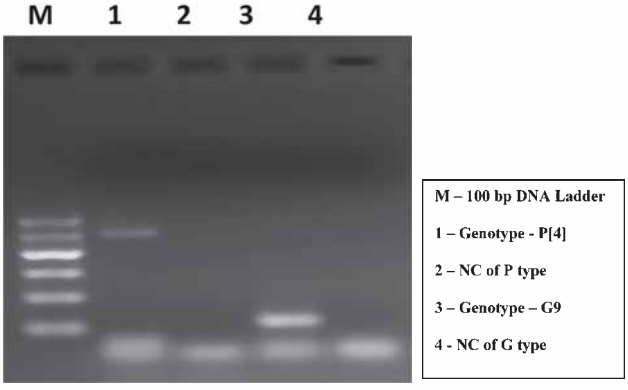


Fig. Rotavirus P and G genotype P[4] G9.

Among the cases of jaundice screened for hepatitis virus infection, HBV and HCV were detected serologically in 4.7% and 0.1% respectively and genotyping was done in 16.5% and 3% of cases respectively where **HBV genotype D and HCV genotype 1b** were identified as the genotypes circulating in this region. Human Papiloma Virus was detected in 5% of cases through PCR.

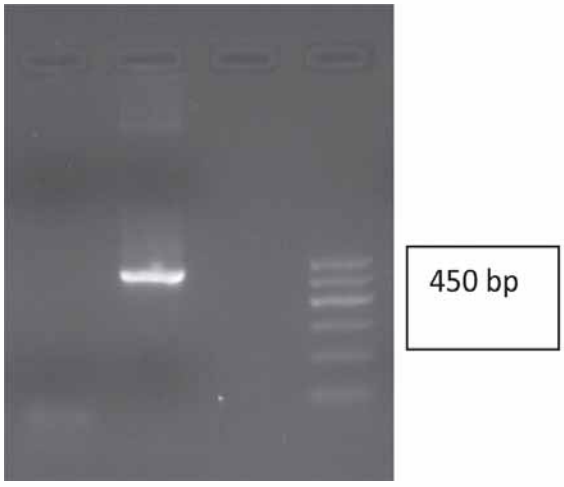


Fig: Diagnostic PCR for Para influenza 1.

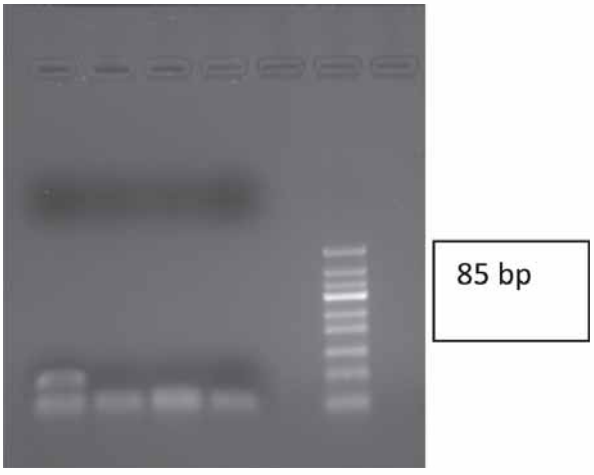


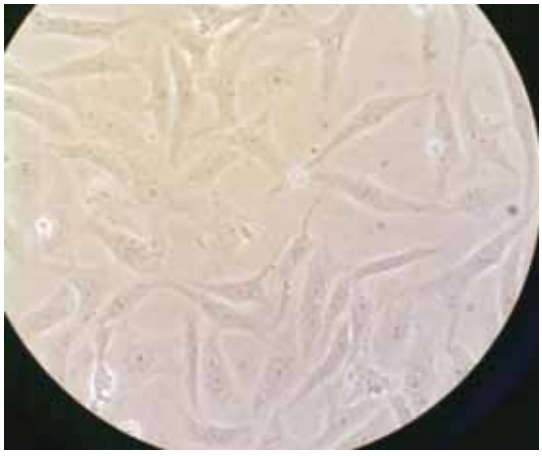
Fig: Diagnostic PCR for Rubella Virus.

Viral respiratory infection was another important disease which was covered for laboratory diagnosis. Through Real Time PCR assay, many respiratory viruses were identified including some emerging viruses. The viruses those detected were Flu A 29.4%, H1N1 18.6%, Rhino 25%, Para influenza 14.3% and Adeno in 21.5% of cases. Emerging viruses like Boca, HMPV and Parecho viruses were detected with low prevalence.

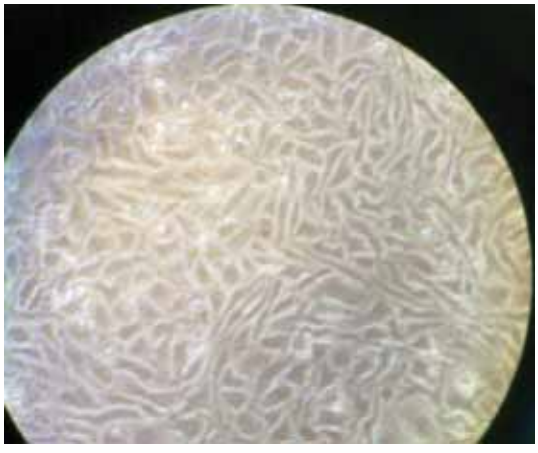
Among air borne diseases Measles IgM was detected in 17.5% of the cases and Varicella IgM was detected in 84.9% of cases. IgG antibody for Rubella

virus infwection was noted in 81% of cases. In one patient both IgM and IgG antibody was reported which was also positive for PCR.

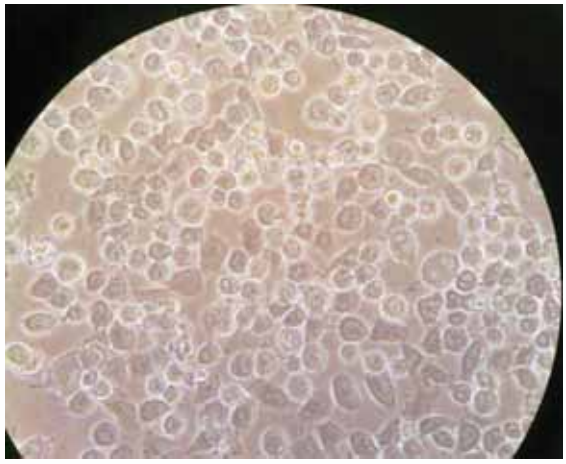
Viruses that cause encephalitis were also investigated. Herpes Simplex Virus I was detected in 7.8%, Herpes Simplex Virus II in 5.2% and Japanese encephalitis was detected in 1.5% subjects. Among 8 cases identified, one was detected from blood and rest was from CSF samples. Out of total positive cases, 4 were male children where as 4 were adult females. A PCR amplification was done for HSV 1 and HSV 2 and in 12.7% of cases PCR positivity was noted.



Normal Vero Cell Line



HSV Infected Cell Line after 1 day



Cytopathic efect after 2 days
Detachment and rounding of cells

Cell culture and Cloning

- Cell lines like MDCK, Vero, A549, HEP2, and C6/36 were obtained from NCCS, Pune and maintained in the laboratory.

Vero cell line was infected with HSV suspected sample and characteristic cytopathic effect was observed which was further confirmed by Immunoflourescent assay by using florescent labeled antibody.

- Cloning was done for Surface gene of Hepatitis B Virus.

Subsequent Plan

The above activities will continue for the next year. Cell culture will be established for Chik, Dengue, Measles and Rubella Viruses, sequencing and typing will be established for Measles, HPV and Influenza H1N1 viruses. Cloning will be done for Rubella, HSV, and HPV. Outbreak investigation will continue along with sporadic case investigation with collaborations of state hospitals. Network will be further strengthened to cover southern and western parts of Odisha.

15. Socio-cultural features and stigma of leprosy for treatment & control in general health services in India: Cultural epidemiological study.

Principal Investigator	:	A. Mahapatra
Co-Investigator	:	D.P.Hansdah
Collaborator	:	P.K.B.Patnaik (Government Odisha)
Duration	:	Two Years
Starting Date	:	Jan 2012
Status	:	EM (Multi-centric study of the ICMR task force on leprosy)

Background

Leprosy is no longer considered a public health problem at the national level, since the overall prevalence in India is less than 1 in 10,000 population, even though it remains more problematic in some areas. Notwithstanding accomplishments of the programme, questions remain about the effectiveness of current strategies of leprosy control. Leprosy-related stigma also remains a serious issue, contributing to a frequently overlooked "hidden burden" of this neglected disease beyond the standard epidemiological indicators. Such questions are especially timely with the current integration of leprosy services in primary healthcare, and the importance of maintaining the capacity for diagnosis, access to effective treatment and disability care despite the impact of stigma, both in the general population and among general health services personnel. Research is needed to determine whether and how social and cultural features of leprosy affect access and the quality of clinical services and leprosy control that are required for effective control with integrated services.

The substantial reduction in the prevalence and detection of new cases of leprosy has been documented. Current programme aims are now concerned with motivating people to recognise symptoms and seek appropriate treatment in general health facilities, but for that to happen, the adverse impact of leprosy-related stigma must be minimised. Despite effective leprosy treatment and massive efforts for public health education to facilitate leprosy control through the general health services, leprosy-related stigma remains a barrier to access to clinical services for diagnosis and treatment. Even though essential features of stigma are changing from enacted to perceived stigma—that is, from overt discrimination to fear among affected persons of what might happen if they were known to have leprosy global and Indian leprosy programmes acknowledge the continuing impact of stigma and the need to reduce it. It had been expected that a reduced burden of leprosy would lead to a lower level of community awareness, more social stigma, atypical skin lesions and late presentation of neurological symptoms. In fact, recent studies in India and Bangladesh do in fact provide evidence for undetected leprosy in communities despite well-established programmes. In addition to problems in identifying cases in integrated programmes, the burden imposed by stigma is not adequately assessed in standard burden of disease estimates, which are typically based on epidemiological measures, disability and functional impairment. Stigma imposes an additional "hidden burden," that is typically omitted from accounts of the burden of illness reported in disability-adjusted life-years (DALYs), which fail to consider the impact of social exclusion and the consequences and concerns about disclosure. Furthermore, an appreciation of how the nature of stigma is affected by social and cultural factors should be considered in formative research to guide policy that recognises the importance of acceptance and social support.

Disease-specific factors may require rethinking of the usual assumption of a direct relationship between the proximity of, and access to, health services. Research has shown that concerns about

disclosure of the condition may make nearby health services for leprosy too close for comfort. Nicholls and colleagues state that integrated services may prove effective in reducing delays, but will depend on levels of awareness of leprosy, effective arrangements for referral and sensitivity to the impact of leprosy on those affected. Complementing the issue of whether adequate services are available, both knowledge of the disease and the social impact of the illness substantially affect access and appropriate use of services. Apart from questions of help seeking that affect case finding and treatment, stigma may also affect the quality and effectiveness of primary health services which provide first-line treatment for leprosy. The integration of leprosy into primary health services may result in a low priority for training to recognize and treat a complicated condition, inadequate skills of health workers, weak supervision and monitoring and low motivation of the health workers. In studies conducted in Nepal and Bangladesh, the patients identified priority areas concerning health system issues that included waiting time, privacy during examination, correct diagnosis and prompt treatment, attitude and skills of the health workers and availability of care for preventing disabilities. Even in urban settings, lack of adequate knowledge about leprosy care and persistence of some misconceptions and prejudices about leprosy has been documented among physicians.

Patients emphasize the importance of the quality of health services, and the nature of interactions between patients and providers is also an important factor affecting perceived quality and the motivation initially to seek treatment and continue with it over time. Leprosy patients have identified their own priorities concerning the quality of care and their decisions for seeking care. In the context of integration of services, early detection and adherence to treatment are likely to be even more sensitive to ideas about the disease and perceptions of patients that influence their behaviour. Moreover, very little information is available, but very much needed, on the quality of care for leprosy patients attending general health facilities, as they seek help not only for leprosy but also for general medical problems other than leprosy. Social and cultural features of leprosy affect not only the quality of services for that condition but also for other conditions for which people with leprosy, like everyone else, seek treatment. Social and family support systems are important for sustained care of all chronic diseases, and stigma affects the quality and effectiveness of that support. Efforts to encourage support and minimize disqualification are important considerations for effective community health services. More information from research examining the attitude and response to leprosy of family members, local leaders, and institutions outside the health sector is needed for effective community health action. In addition to the factors specific to patients, social and family support systems, there is a need to identify the health system specific issues with reference to differential level of integration process in various States and the varied responses of the general health services and vertical staff; A multi-State study documented that all the urban and rural health facilities in Maharashtra were providing MDT and medical officers in all health facilities were diagnosing and treating leprosy cases. The involvement of health sub-centers in treatment delivery was also 100% in Maharashtra. However, in contrast, much lower involvement of the health professionals in recording (10%) and reporting (30%) was noted in Andhra Pradesh. This study emphasized the need to undertake further follow-up studies to address local State specific problems. Since then various other studies have commented on the State and district specific responses and the challenges in integrating leprosy services. A recent study from Bargarh district in western Odisha has also highlighted the need for effective monitoring and evaluation of the integration process. However, all of these studies addressing the integration issues were restricted in scope and

descriptive in nature and only to some extent detail out operational and technical constraints.

In this context, we propose to address important health social science issues concerning patients, health systems and community within a framework of cultural epidemiology.

Aims

- Clarify relevance of socio-cultural features of experience and meaning of leprosy and the current impact of stigma
- Suggest strategies for improving patient-centred leprosy services

Specific objectives

- **Patients:**

1. Describe socio-cultural features and stigma among leprosy affected persons
2. Determine effects of socio-cultural features and stigma on preference and utilization of health services by leprosy affected persons

- **Family/ Community:**

3. Assess the role of family & community members to motivate leprosy affected persons to seek health services
4. Assess the perception of family & community members on leprosy-related stigma

- **Health system:**

5. Assess the level of leprosy-related stigma prevalent among health professionals in general health services
6. Assess the impact of leprosy-related stigma on delivery of services for leprosy affected persons

Expected deliverables

This study will (1) clarify the nature of stigma and the social burden of leprosy; socio-cultural

Table 1: Proposed time-line for project activities.

Project activities	Month of activity																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Protocol, Approvals, Ethics	X	X	X																					
Staff recruitment, training of investigators	X	X	X																					
Draft EMIC interviews other instruments	X	X	X	X																				
Pilot and finalize interviews/instruments				X	X	X[1]																		
Data collection							X	X	X	X	X	X	X											
Data entry								X	X	X	X	X	X	X	X									
Data cleaning & analysis															X	X	X	X						
Report writing																			X	X	X[2]			
Publications/Dissemination																					X	X	X	X

1 Workshop for lessons learnt from the pilot study and training of the project staff

2 Workshop for review of preliminary analysis and report writing

features of leprosy illness explanatory models; how both of these are understood among patients with leprosy, their family and community; and how these relate to the utilization of primary health services for people with leprosy; and (2) identify strategies to enable health professionals to interact with patients in a manner that clearly responds to patients' concerns.

Progress of work

Since ICMR fund is released, in june2012, before that, by means of intramural funding preliminary data collection was made from the secondary sources. The data thus is used for calculation of Prevalence Rate (PR) / per 10,000 populations & the Annual Case Detection Rate (ANCDR) / 10,000 populations for all 30 Districts of Odisha from 2001 to 2011. In addition to these the Collaborators of the State Government were apprised of the projects aim and objectives. So far the Annual case detection rate(ANCDR) / 10,000 population is calculated for 30 districts of Oriss and the data reveals that Sonepur District has the highest case detection rate of 5.47 in 2011 and 3.30 in 2011 (Tab-2; fig-1).

The finalization of Emic Tool, Pre-testing of the tools, Staff recruitment & training was carried out by July2012. The Line listing of the Leprosy patients, TB, Malaria were obtained and entered in to the Computer and sent to NIE for sampling, as per the protocol. As soon as the lists arrive the field work started in Aug 2012. As on date of leprosy, 23 patients of TB 12 patients were interviewed.

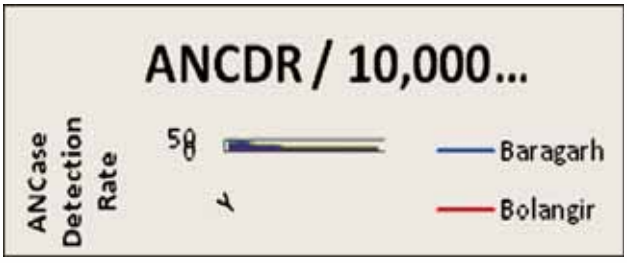


Fig-1. ANCDR / 10,000 Population.

Table 2 : Annual Case Detection Rate (ANCDR) / 10,000 population.

Sl no	district	Annual case detection rate(ANCDR) /10,000 population										
		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
1	Angul	23.50	14.50	7.18	9.42	3.74	3.70	3.14	3.83	3.71	3.32	2.74
2	Balasore	8.20	7.26	2.73	2.56	1.33	0.91	0.85	0.79	1.08	1.08	1.01
3	Baragarh	32.78	26.39	13.92	14.99	7.20	4.74	3.62	3.38	3.95	3.22	3.21
4	Bhadrak	10.24	11.26	4.06	2.72	1.36	1.05	1.01	0.89	0.98	0.80	1.06
5	Bolangir	21.77	14.77	9.44	10.83	4.36	2.14	1.86	2.19	3.18	3.11	3.12
6	Boudh	24.16	17.30	10.78	12.08	4.39	1.78	2.01	1.89	3.18	3.12	2.81
7	Cuttack	7.31	6.85	3.84	3.07	1.43	1.08	1.01	0.96	1.10	0.76	0.88
8	Deogarh	9.87	8.86	5.59	5.01	2.82	2.10	1.95	2.35	2.76	2.46	1.98
9	Dhenkanal	19.41	14.75	8.08	10.08	3.32	2.10	1.79	1.39	1.70	2.54	2.49
10	Gajapati	4.37	4.20	1.78	1.98	0.92	0.61	0.78	0.88	0.80	0.68	0.46

11	Ganjam	12.34	12.14	6.88	5.32	1.60	1.31	1.21	1.12	0.91	0.78	1.19
12	Jagatsinghpur	4.93	3.09	2.23	1.42	0.89	0.87	0.77	0.52	0.75	0.63	0.62
13	Jajpur	7.45	6.58	3.95	3.58	1.14	0.63	1.05	0.99	1.15	1.52	1.66
14	Jharsuguda	31.83	18.78	9.11	10.21	4.27	2.94	2.55	2.75	2.91	2.71	2.51
15	Kalahandi	10.12	8.76	4.61	4.22	1.87	1.39	1.30	1.72	1.55	1.80	2.16
16	Kendrapara	5.37	3.85	2.02	1.74	0.79	0.66	0.70	0.67	0.63	0.49	0.58
17	Keonjhar	7.70	4.72	2.53	1.68	1.10	1.23	1.17	0.99	1.10	1.35	1.14
18	Khurda	13.54	10.36	7.22	5.59	1.83	1.36	1.00	1.10	0.77	0.86	1.03
19	Koraput	6.66	4.62	2.75	2.64	1.46	1.05	1.11	0.94	1.21	1.64	1.78
20	Malkanagiri	4.72	2.98	1.00	1.36	0.60	0.47	0.69	1.10	0.69	0.87	0.66
21	Mayurbhanj	16.98	12.58	5.89	6.50	2.52	1.49	1.41	1.52	1.68	1.85	2.02
22	Nawarangpur	7.92	8.98	3.01	3.96	1.69	0.81	0.72	1.16	1.39	1.62	1.44
23	Nayagarh	9.04	5.74	4.27	4.42	1.95	1.77	1.57	1.67	1.82	1.52	1.74
24	Nuapada	11.48	7.57	2.14	4.76	1.84	1.27	1.41	2.37	3.30	2.02	2.34
25	Phulbani	5.06	2.99	1.81	1.23	0.45	0.37	0.33	0.38	0.54	0.55	0.68
26	Puri	6.70	6.84	5.91	3.62	1.80	1.39	1.21	1.00	1.08	1.01	1.26
27	Rayagada	8.53	6.07	2.97	2.47	1.38	0.51	0.67	0.64	0.47	0.50	0.63
28	Sambalpur	24.91	16.45	12.44	10.90	3.44	2.58	2.33	1.35	1.70	1.67	2.77
29	**Sonepur**	**22.45**	**15.15**	**10.74**	**9.78**	**4.56**	**3.79**	**3.62**	**4.19**	**4.18**	**5.47**	**3.30**
30	Sundargarh	20.02	15.74	6.67	5.32	2.34	1.83	1.42	1.41	1.84	1.98	1.84
	Total	12.91	10.12	5.51	5.19	2.14	1.52	1.38	1.39	1.54	1.54	**1.61**

16. Assesment of treatment seeking behaviour, LLIN use and IRS acceptance by the tribal community of Orissa.

Principal Investigator : Dr. N. Mahapatra

Co-Investigator : Dr R K Hazra

Starting Date : October 2012

Closing date : Februry 2013

Funding : NVBDCP.Orissa

Objectives

1. Tobuild up capacity for scaling –up implementation of malaria control through COMBI approach.

Specific

- To asses the malaria treatment seeking behaviourof the people.

- To asses community acceptability and usage pattern of bednets
- To asses community acceptance of IRS for malaria control..

Background

Govt of Odisha had distributed LLIN received from Govt of India in High malaria endemic district of the state during 2010 and 2011.Further, the state had distributed LLINs to protect pregnant women under 'Mo Masari' scheme.This is first time in the country that such a huge number of LLINs have been distributed to protect population under high risk malaria.If the use and impact shows positive result,IRS, the labour intensive and costly vector control measure can be withdrawn from the LLIN areas.Hence the evidence is of prior importance. Hence on pilot basis, the study has been initiated in Kandhamal Districtwhere one lakh LLIN has been distributedby NVBDCP, Orissa.

Progress of work

Two endemic blocks I,e Tikapali and Tumudibandh were selected for the study. From each block 5 villages have been identified.A well structured questionarie were pre tested.Recruitment of staff is on process. Field survey will be conducted soon.

Visit of Virology Lab. of RMRC by DPS, Kalinga Students

ICMR Tribal Health Research Forum at RMRC in 2012

Working in the RMRC TB Laboratory

Translational Research

1. Transfer of Molecular Technique from Lab based study to Field for Mapping of Malaria Vectors and their Vectorial Attributes.

Principal Investigator : Dr R.K. Hazra
Co-Investigator : Dr N. Mahapatra (Collaborator from VCRC, Pondicherry)

Objectives

(i) To standardize methodologies for different parameters for vector mapping

(ii) To test the standardized methodologies from Phase-1

(iii) To map the vectors at PHC level and identify operational issues

(iv) To prepare a vector map at district level

(v) Transfer the laboratory based technology to the field.

Preliminary work started on standardisation procedure of Phase I

Progress of work

Entomological work

1. Study area

The samples used in the study originated from Orissa. Two times field visit and mosquito sample collection was done from Keonjhar district. The two process of collection were compared in the field condition. The sampling methods of mosquitoes were determined. Now we are standardising 0.5% of the houses of the villages for collection of mosquitoes.

Molecular work

1. Molecular approach for identification of four malaria vectors of Odisha.

Mosquito samples collected in the previous study are mainly composed *An. fluviatilis, An. culicifacies, An. varuna,An. aconitus.An. subpictus, An. vagus, An. pallidus, An. annularis, An. hyrcanus, Cx. Quinquefaciatus, Cx. Vishnui, Ma. Indiana and Ma. Uniformis.*The multiplex PCR for*An. fluviatilis, An. culicifacies, An. varuna* and *An. aconitus,* has already started.

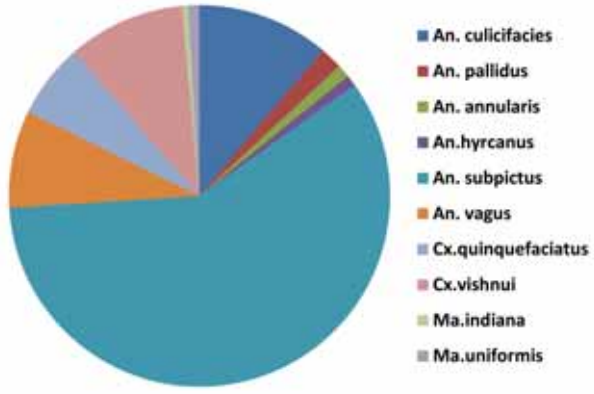


Fig.: Showing the mosquito sample collected during field visit.

Standardisation has started for multiplex PCR of 7anophelinemosquitoes in a single PCR.

2. Validation of the standard methods of the single step multiplex PCR for simultaneous detection of *Anopheles annularis* group, human host preference and *Plasmodium falciparum* sporozoite presence standardisation are in progress.

Future Work

- Conducting Work shop on the technique developed on the identification of the species and mosquito processing system with different category of staffs and scientists from state Govt., VCRC and NIMR before validation inter institutionally.
- Standardisationof the mosquito sample collection and preservation and transportation will be done.

- Validation of our technique will be done by other Institute like VCRC, NIMR. The blind coded samples collected by VCRC and NIMR will be identified by the developed PCR methods to confirm the species identification and this will be the validation of our developed technique.

2. Title: Quadruplex PCR for diagnosis of V. cholerae O1 and/or O139 Serogroup causing Cholera: A novel Technique.

Principal Investigator : Dr. H. K. Khuntia

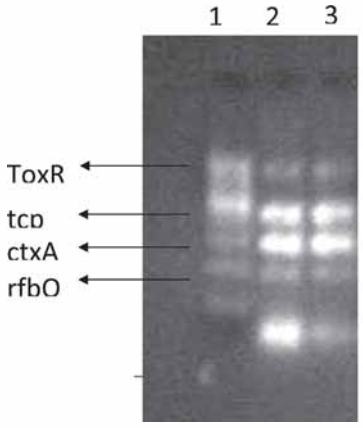
Objectives

1. To optimize, inter and intra observer variations of the Qudruplex PCR will be checked for detection of *V. cholerae.*
2. To map out the *V. cholerae* strains found in Orissa by Quadruplex PCR by examining both hospital and outbreak samples.
3. Transfer of the Quadruplex PCR technology from laboratory to the field.

Progress of Work

A Quadruplex PCR Kit has been prepared which can be preserved up to one year at 0^0C. This kit gives satisfactory results for rapid diagnosis of cholera. Proposal has been submitted to the Council for commercialization of this kit. Inter and intra validation of the technique has been completed. Two hundred and fifty rectal swabs from hospitals of different districts were analysed to map out *V. cholerae* strains in Odisha. Of the 292 samples 17 were positive for *V. cholera* O1 El Tor biotype carrying *ctxA*, tcpA (El Tor), *rfb*O1 and *Tox*R genes.

Preparation of Test Kit



Quadruplex PCR assay of *V. cholerae* O1 using master mix of One year old preserved at 0^0C

Bridding spot of Aedes in Tree holes

Completed Studies

Completed Studies

1. Pilot introduction of the modified bivalent killed whole cell oral cholera vaccine in Orissa, India.

Principal Investigator	:	Dr S. K. Kar
Co-Investigators	:	Dr. A. S.Kerketta Dr Hemant K. Khuntia
Collaborators	:	Department of Health and Family Welfare (HFWDO), State Government of NICED, Kolkata International Vaccine Institute (IVI), South Korea
Starting Date	:	January 2011
Completion Date	:	February 2012
Funding	:	Bill & Melinda Gates Foundation through IVI

Objectives

Primary objective: To determine the feasibility, acceptability and costs associated with the pilot introduction of the modified killed whole cell oral cholera vaccine in India when given in a public health setting

Secondary objective: To identify challenges to mass oral cholera vaccine implementation, the overall goal of the project: to identify operational and logistic issues regarding the use of the modified killed whole cell oral cholera vaccine (OCV) in a public health setting in Orissa before implementing in a larger scale.

Study Area & Method : Satyabadi block of Puri district India has reported cholera cases from1997 – 2006 in 18 of the 35 states and union territories. Orissa, adjacent to the Bay of Bengal, had reported severe diarrhoeal cases due to *V. cholerae* in seven of the 10 years reviewed. Every year, from May to November, coastal areas in Orissa experience cyclones and flooding ensues. During these times, outbreaks of diarrheal illness occur often due to cholera. The diarrheal disease surveillance performed by RMRC wherein stool specimens or rectal swabs were obtained from admitted cases once a week for three years from 2004 to 2006 in three hospitals (Capital Hospital in Bhubaneswar, Infectious Diseases Hospital in Puri and Sishu Bhaban in Cuttack), it was found 17.3% diarrhea were due to V. cholerae O1 or O139. Moreover, unpublished data from the RMRC reveal V. cholerae is most often isolated from diarrhea patients who hail from Puri district. This indicates that the organism is endemic in the area. The State Government of Orissa, in consultation with RMRC, suggested that mass vaccination be performed in the Satyabadi block of Puri district. Satyabadi block was chosen because since 2005, Satyabadi had one of the highest proportions of severe diarrhea cases in Puri district (Fig 1 and 2).

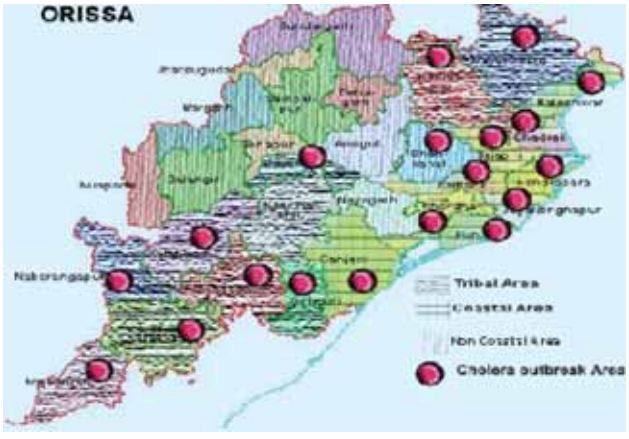
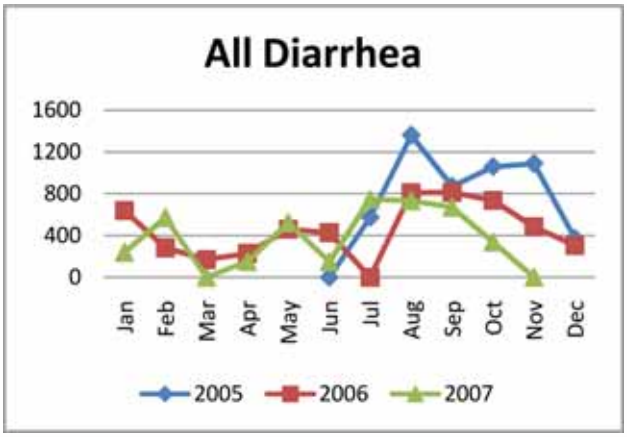


Fig.-1: Map of Orissa with reported severe diarrhea outbreaks due to V. cholerae from 1993-2008.



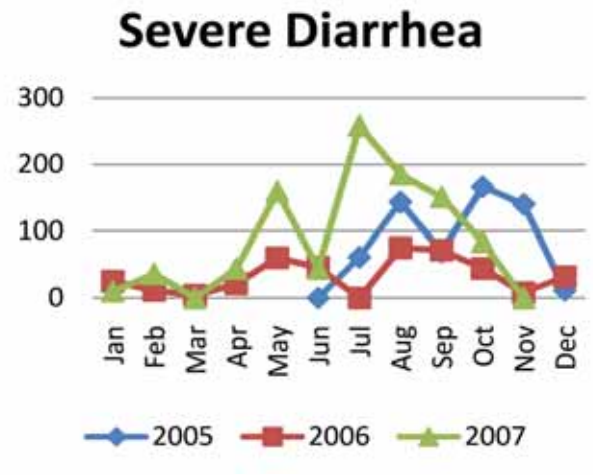


Fig. 2: Shows the number of diarrhea cases and severe diarrhea cases seen in the government hospital in Satyabadi. Severe diarrhea cases appear to increase during the month of May and during the monsoon season from July to October.

Oral Cholera Vaccine (Bivalent killed whole cell Oral Cholera Vaccine)

This Bivalent killed whole cell Oral Cholera Vaccine produced by IVI and its production technology modified to comply with WHO and current Good Manufacturing Practices (cGMP) standards before its manufacturing technology was transferred to an Indian manufacturer by IVI. This modified vaccine, licensed by the Drugs Controller General of India (DCGI) to Shantha Biotechnics, Hyderabad and marketed as Shanchol ®. Dosing is 2 doses orally, spaced 7-14 days apart. It provided ~67% efficacy in a placebo-controlled, randomized trial currently being performed in Kolkata by the National Institute of Cholera and Enteric Diseases NICED) and IVI.

The said protocol proposed by RMRC was discussed at length through several meetings with Technical Committee constituted by State Health Department. Since, Govt. of Orissa has infrastructure and expertise in vaccination programme in the community, considering the need for such vaccination for conferring protection to at risk population, it was decided to impart vaccination covering all population (except infants less than one year and pregnant women) through booth approach and formal approval from Govt. of Orissa was obtained for mass vaccination. Vaccine was provided free of charge to the residents of the community who were included in the census. In addition it was given to any eligible

Table 1: Formulations of available killed whole cell vaccines.

Strain	Dukoral ®	ORC-Vax®*	Shanchol®†
Formalin-Killed *V. cholerae* O1 El Tor Inaba (Phil 6973)	2.5×10^{10}	5×10^{10}	600 EU LPS
Heat-Killed *V. cholerae* O1Classical Inaba (Cairo 48)	2.5×10^{10}	-	300 EU LPS
Formalin-Killed *V. cholerae* O1Classical Inaba (569B)	-	2.5×10^{10}	-
Heat-Killed *V. cholerae* O1 Classical Ogawa (Cairo 50)	2.5×10^{10}	2.5×10^{10}	300 EU LPS
Formalin-Killed *V. cholerae* O1 Classical Ogawa (Cairo 50)	2.5×10^{10}	-	300 EU LPS
V. cholerae O139 (4260B)		5×10^{10}	600 EU LPS
B subunit	1 mg		

consenting people who visited vaccination booth considering public health values. Existing State Govt. set up and personnel were participated in this endeavor

Strategy adopted for Mass vaccination

The following 3 strategies for the mass vaccination in the study area were proposed to the State Government of Orissa:

- School – based vaccination of 5 – 14 year old children
- School and community – based vaccination of 1 – 14 year old children
- Mass vaccination of all persons 1 year and older

The State Government indicated its preference for the strategy that provides vaccines to all individuals 1 year and older who are not pregnant, based on their experience with cholera endemicity in the study area where all population is at equal risk of getting the disease.

Baseline information collection

Baseline information from the community was collected through Focused Group Discussions (FGDs) in January - February 2011. Ten focused group discussions were held by the RMRC staff and social scientists from the IVI involving the community residents (stratified by high and low socio-economic status, religion, and gender), local administrative officials and the health care providers (community workers and PHC staff**).**

The major findings from the FGDs were

1. Acute watery diarrhea (including severe diarrhea) is perceived as a major public health problem in the community.
2. Communities have insufficient clean drinking water and inadequate sanitation.
3. There is positive perception of ASHA/AWW in the community.
4. There is positive demand for preventive efforts against diarrhea including cholera, particularly for vaccination.

Census and GIS mapping of the catchment area

To assess the target population and to prepare micro-plan for the mass vaccination, an initial census in the catchment area was carried out by house-to-house visit with personal digital assistance (PDA) from February to April 2011:

- Census covered a total population of 51,872 in 9166 households in the catchment area. Female constitute 50% of population. The socio-economic status shows major (64%) community residents are Farmers/laborers. Educational level of primary school and less is 63%.
- The water and sanitation facility indicates community hand-pump/tap as the main source of drinking water. Water never boiled before drinking in 74% people. Open field defecation is practiced by 80- 84% community members. Hand washing practice after defecation with water or soil or ashes is 80%. Place of waste disposal in indiscriminate or not well maintained in 84%.
- Health care utilization shows 89% seek care for diarrhea from Hospital/Health center.

The census activities as the first level of social mobilization activities as the RMRC project staff visited each and every household in the community and thereby making them aware about the upcoming oral cholera mass vaccination.

GIS mapping

The GIS mapping of the catchment area has been carried out with the aim to identify the coverage area for vaccination on map and use it in analysis of protective effectiveness.

Social mobilization

Social mobilization activities was undertaken to make the community residents and providers familiar

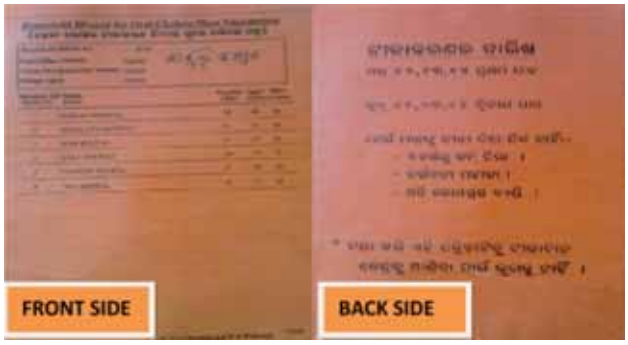
with the new Oral cholera and mass vaccination where the catchment population was almost the entire community. Initial sensitization meetings with the grass root level providers like ASHA, AWW and MPHW of the catchment population were conducted with the aim of making them aware about the disease, vaccine profile and the upcoming mass vaccination activities in the area. The content of the sensitization meetings were derived from the Focused Group Discussions. Altogether 134 providers were provided an orientation on the mass vaccination campaign in 3 batches prior to mass vaccination.

Participant's suggestions were invited for the vaccination campaign, which were consistent with the findings from the FGDs and these are:

- Distribution of leaflets and posters highlighting the importance and necessity of the campaign in the community.
- Putting of banners at the vaccination booths and in the community.
- Holding of various Self-Help Group (SHG) meetings in the community.
- Miking in the community 2 days before and during the campaign.
- Inter-personal communication by the ASHA and AWW with the community residents.

The house-to-house distribution of laminated **household ID cards** also served as **the invitation letter** for the community to participate in the mass vaccination campaign.

Household ID card



Micro-planning for the mass vaccination

A detailed micro-plan was developed for conduction of mass vaccination in consultation with the Medical Officer In-charge of local Primary Health Centre. Given the logistic challenges, mainly in terms of human resources and cold chain capacity, mass accination was decided to be carried out in 2 phases. Particular emphasis was made on vaccination booths placements where they were kept within a walking distance of 10-15 minutes from the community.

One-day training on vaccine delivery, recording and reporting was provided to the vaccinators and supervisors. A total of 260 health workers were trained for this purpose.

Mass vaccination: As per the suggestions came from the community as well as the providers the micro plan, the booth based mass vaccination was conducted in two phases by RMRC and State Health Department. Existing state government set-up and personnel will participate in this endeavor. Two rounds of vaccination at least 14 days apart were scheduled for two dose of vaccine. The first round of 1st phase was conducted during 5th -7th May and second phase during 12th to 14th May. Similarly the second round of 1st phase was conducted during 26th -28th May and second phase during 2nd to 4th June 2011.

Monitoring for Adverse Events (AEs)

Adverse events were monitored at the time of vaccination by asking the participants to stay at the booth for ~30 minutes after taking the dose. In addition, the ASHA/AWW with support from the RMRC project staff visited the community for 3 subsequent days to monitor for any adverse events that may have occurred once the participants returned to their home.

Results

The result of this mass vaccination campaign shows, a total of 31551 had received 1st dose and 23751 received 2nd dose of vaccine. The first dose coverage, based on population in-census is around 61% with a drop-out rate of 25%. A total of 46% of population received two-complete doses of oral cholera vaccine during the mass vaccination campaign. The detail of the vaccine coverage is given in Table-2.

The adverse effect monitoring indicates that overall, there were no major concerns regarding the safety of the vaccine. There was no serious adverse event among the vaccine recipients. Only 0.2% vaccine recipient experience adverse reactions like nausea or vomiting, which were transient and resolved spontaneously within a day. Details of adverse effect are given in Table-3.

Table 2: Age and sex distribution of the Vaccine recipient of dose 1 & 2.

Age[1]	No. of one dose recipients[2]			Coverage for one dose (%)			No. of 2 doses recipients[3]			Coverage for 2 doses (%)		
	Total	Female	Male	Total	Female	Male	Total	Female	Male	Total	Female	Male
1 - ≤5	2698	1327	1371	70.9	71.0	70.8	2116	1048	1068	55.6	56.0	55.1
>5 - ≤17	8816	4457	4359	77.6	79.7	75.6	6975	3550	3425	61.4	63.5	59.4
>17 - ≤60	17167	9692	7475	55.1	61.7	48.4	12467	7423	5044	40.0	47.2	32.7
>60	2870	1358	1512	55.7	53.5	57.9	2193	1024	1169	42.6	40.3	44.8
Total	31551	16834	14717	61.3	65.5	57.2	23751	13045	10706	46.2	50.7	41.6

'2' *individuals who received at least dose 1*
'3' *individuals who received both dose 1 and 2*

Table 3: Adverse Effects Reported.

Adverse events	After dose 1								After dose 2								Total
	1≤ age ≤5		5<age ≤17		17< age ≤60		age >60		1≤ age ≤5		5< age ≤17		17< age ≤60		age >60		
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
ABDOMINAL PAIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
DIARRHEA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
FEVER	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
HEAD REELING	0	0	0	2	0	2	0	0	0	0	0	1	0	0	0	0	5
NAUSEA	0	0	0	0	1	3	0	0	0	0	0	0	0	1	0	0	5
VOMITING	1	2	7	12	2	20	0	1	0	0	0	0	0	4	1	1	51
SPIT OUT	4	2	1	5	2	8	0	0	0	4	3	5	3	6	0	0	43
Total	5	4	8	19	5	33	0	1	1	4	3	6	3	11	2	2	107

Post Vaccination Survey

To determine acceptability and private cost bared by individual for cholera mass vaccination campaign the post vaccination survey was conducted. The data was collected both qualitatively and quantitatively over a period of one month. The government officials and staff involved in planning and executing mass vaccination, grass root level health workers who implemented vaccination were included in this survey. The quantitative survey was conducted for the beneficiaries in 600 preselected households including the households. The qualitative data analysis indicates perceived satisfaction in overall activities by participants. An innovative approach of house to house visit by public staff and distribution of informative leaflets played a crucial role in the vaccine acceptability.

In the qualitative component, three in-depth interview of key government officials and three focus group discussions of grass root level workers was conducted. In the quantitative component the survey accomplished 519 complete households which included 162-zero dose, 160-one dose and 197-two dose recipients' households.

Reasons for full participation in mass cholera vaccination campaign: a). Perception of vaccine protection against disease in 62% b) Perception of Cholera as a dangerous disease in 30.9% and c) free vaccine in 7.0%.

Reasons for full participation in the oral cholera campaign: was bad taste and odour of vaccine in 51.2%, resident absenteeism 45.7% and others 3.1%.

Conclusion

The oral cholera mass vaccination in the Satyabadi block, Puri district in Orissa was successfully completed with active involvement of all the stakeholders. It was shown that the mass vaccination of almost entire community with 2 doses of Shanchol was feasible and well accepted by the community. Based on the successful completion of this pilot demonstration project, State Government of Orissa, with technical assistance from RMRC, is planning to conduct oral cholera mass vaccination in hard-to-reach tribal area where cholera has been a major public health issue.

Given that this was the first study for feasibility of using Shanchol in public health settings, an effectiveness study becomes very important to collect the evidence-base which will be crucial for the policymakers' in order to use the vaccine for population at high risk for cholera. This study is the first one to analyze the effectiveness of reformulated, bivalent, killed whole-cell oral cholera vaccine (Shanchol) when delivered in a 'real-world' setting.

Post vaccination surveillance: The mass vaccination campaign was completed in the first week of June 2011. It was expected that the protective efficacy would start after 15 days of vaccination. Therefore to see the immediate effectiveness of the vaccine, facility based post vaccination surveillance was undertaken from 15th July 2011. The catchments areas were Algum and Sukala PHCs and Area Hospital Satyabadi which are catering health services to the study population. Infectious Disease Hospital and Pediatric ward of District Headquarter Hospital Puri also were involved for post vaccination surveillance as most of the severe diarrhea cases from our study villages and periphery area report there.

The doctors in the health facilities were equested to inform our project staff on attendee of diarrhea cases. The project staffs were assigned to attend each facility on daily basis. After getting information about the cases the staff was visiting each case and collecting socio-demographic and clinical and vaccination history. Following that, after taking due informed verbal consent rectal swab was collected with the assistance health staff. The samples were transported in CVT medium and tested at RMRC laboratory. The environmental water samples were also collected

from the various water sources like ponds, well, tube well etc. So far a total of 2839 rectal swab samples and 77 environmental water samples have been collected and analyzed for presence of V. cholerae and other entero-pathogens.

Out of total sample tested 114 (4.0%) found to have V.cholerae positive. Out of the positive cases only two are from our study area and others are from peripheral adjacent area. Out of this two cases detected positive for V.cholerae one is vaccinated and another is non-vaccinated. Out of 77 environmental water sample collected and tested from the study 14 (18%) found positive for non O1/O139 positive. The post vaccination surveillance indicates the definite protection of OCV amongst the community resident vaccinated during the mass vaccination campaign.

2. Impact assessment of the Janani Suraksha Yojana (JSY) on maternal health in Orissa.

Principal Investigator : Dr. A S Kerketta
Co-Investigator : Dr. G Gulliyya, G Mallick
Starting Date : July 2010
Duratio : October 2012
Funding : Extramural (ICMR, HSR)

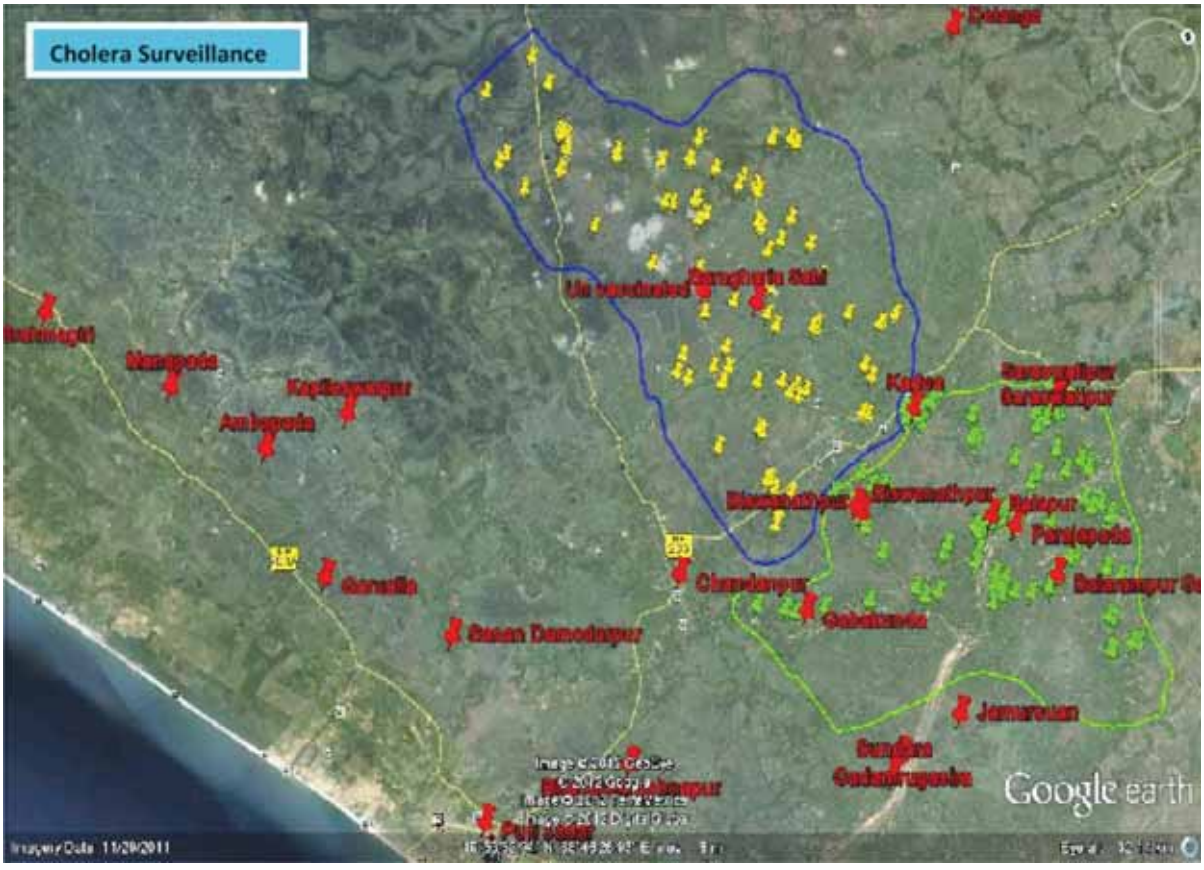
Objectives

General objective

To assess the impact of Janani Suraksha Yojana on maternal health in Orissa.

Specific objectives

- To assess process of the JSY scheme functions



Red - *Cholera Cases*
***Yellow** - Acute Diarrheal cases from study area (10 sub-centers of Satyabadi block)*
****Green** - Acute Diarrheal cases from study area (Remaining 9 sub-centers of Satyabadi block).*

- To assess the quality of care (QoC) provided to women delivering at health institutions
- To assess the actual costs to households during pregnancy, delivery and post-partum
- To assess population based coverage and accessibility of institutional deliveries
- To assess the impact on maternal morbidity and mortality

Material and Methods

Study design- Cross sectional study applying both qualitative and quantitative methods.

Sampling: Multistage random sampling

Study subject: Programme manager, programme implementer and beneficiaries

Selection of study area: Puri, Bargarh, Sundargarh, Mayurbhanj, Boudh and Nabarangpur

(a) Selection of study district: The study district were selected based on the geophysical location like Northern plateau, Coastal plains & Central table land and South Eastern Ghats. Two districts each from South eastern and northern plateau and one each from oastal plains & Central table land were selected with the aim to cover all category of population.

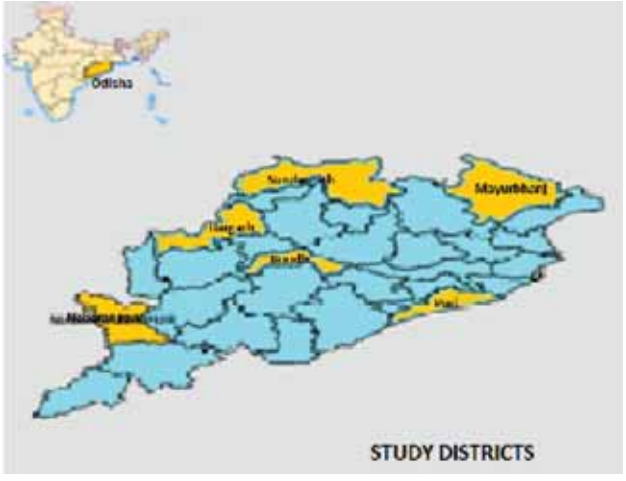
(a) Selection of study block: The study blocks were selected based on the performance level data. One block close to the head quarter and another remotely located was selected. In each block the one health facility either block PHC/CHC/Area Hospitals In each block two health facilities either block PHC/CHC/Area Hospitals acting as First referral unit (FRU) were selected. Thus a total of 12 health facilities were selected in different blocks for the study.

(c) Selection of sub-centres and villages: From each selected block PHC/CHC/Area Hospitals two sub centres were selected based on the performance level. In each sub centre 5-7 villages were randomly selected some easily accessible and some located in remote area. Thus a total 24 sub-centres and around 150 villages were included in the study.

Data Collection Methods

Data was collected through Quantitative as well as Qualitative methods using semi –structured, structured schedules, in-depth interviews (IDI) and focus group discussion (FGD) and incase of death the maternal and perinatal death enquiry response was applied. Primary and secondary data sources were used for data collection. Primary data was collected from the providers as well as from the beneficiaries. Secondary data was collected from the available reports and the records at the district, block, and sub-centre levels regarding the operational mechanism and utilization of the services under the JSY.

Map of study district:



The study was conducted in six districts of Odisha from July 2011 to April 2012. The districts studied are Boudh, Nabarangpur, Puri, Bargarh, Sundargarh, Mayurbhanj,. To cover representative sample the study populations were drawn from both rural interior and urban areas from health facility as well as from the community. For facility based in each district, the districts headquarter hospital and two PHCs / CHCs were studied. The health facilities were selected based on their performance level. Bangriposi and Sriramchandrapur CHCs of Mayurbhanj,

Sargipalli CHC and Liang PHC of Sundargarh, Nimapada and Baghamari of Puri, Padampur SDH and Bhukta CHC of Bargarh, Harbhanga and Manmunda CHC of Boudh and Tentulikhunti and Pujariguda of Nabarangpur were included in the study.

The programme manager, implementer and beneficiaries like women who had delivered within past six months from the day of survey were included in the study. The beneficiaries were captured both from health facility and community. For facility based mothers attending the health facility for delivery, post natal check up or immunization were captured for the interview. For community or population based, the lists of mothers delivered in past six months were obtained from the grass root level providers like ANM, AWW and ASHA. The lists were matched for any differences. All the listed women were traced and underwent questionnaire survey after obtaining informed verbal consent.

Socio-demography of study population: A total of 4132 post natal and 996 antenatal mothers covered for the survey. The personal detail of the study populations is given in table-1. That shows all caste categories are included in the study. The majority of the women 93.5% belong to Hindu religion but few belong to minority groups like Christian or Muslims re also from 1-9%. The age profile shows around 68% are in the age group of 17-25 years and 0.7 above 35 years. The education status shows illiteracy in 30% and up to secondary education in 40% of the women.

The functioning of the JSY was assessed through the various components of the scheme.

Registration under JSY: Out of total interviewed around 88 % had registered under JSY. That was marked high of 98% in Bargarh district. JSY registration was done by ANM/LHV in 78% cases in all the districts. Validation of JSY registration indicated physical availability of the JSY/MCH card and found in 87% women.

Information given on JSY: The information given about components JSY was on free institutional delivery (30%), cash benefit (46.6%).

Antenatal care (ANC)

The data on ANC shows 98% of the mothers' availed antenatal cares check up from various public health providers.

Out of which around 59% had more than three ANC check up, 6% had two and 32.3% had one check up.

Motivation for ANC was mostly by the husband of the women (53%) and ASHA 19.0%, ANM 9.3% and and rest from either relatives or friends.

Tetanus Injections and Iron tablets

Injection tetanus was received by 98% of mothers during pregnancy. Similarly the iron and folic acid was received by 90% of women.

Micro birth planning: During micro birth planning, date of next visit was discussed with 21.4%, place of next visit 42.5%. But EDD, place of delivery, place of referral and transport arrangement for delivery was discussed with a mere 2.% of mothers.

Means of Transport: The means of transport used by the mothers to reach the institution was mostly auto ricksow-57.5% or hired car by 1.8-17% and Janani express was used by 210 to 30 %. Transport was arranged by family members in 68.8%, by ASHA 57.5% and GKS 0.8%.

Accompanying person: In around 60% cases ASHA accompanied the mothers to the institution and 21% were accompanied by the family members.

Institutional Delivery

Out of the mothers surveyed, institutional delivery was found in more than 80% in all the districts and maximum 99% in Bargarh. Lowest home delivery was found in Nabarangpur where it is 55%.

Thus home delivery was marked about 45% in Nabarangpur followed by 20% in Boudh.

Normal Institutional delivery & person conducted: Out of total institutional delivery normal delivery was found in 78%, followed by cesarean section (CS) in 24%. Out of total normal delivery at intuitions 50% was conducted by the doctors, 24% staff nurse, 24% ANM and 2% by JASODA.

Expenses Incurred for ANC: Out of those who attended ANC centre 88% had to incur expenses for various purposes like pathological investigations 16%, medicine 26%, ultrasound 35%, fees of the doctor 2.3%, 9.8% paid to health providers, the transport cost 8.9%.

Expenses Incurred for Delivery: For delivery 8.4% of women had spent Rs.500 to 1000/- for various purposes. Mostly around 80% women had spent more than Rs.1000/- for delivery. Majority of the women 70% spent for procurement of medicine followed by CS which was found in around 20% of cases.

Outcome of pregnancy: Out of total institutional delivery yield live birth of 96.0% and 4% still birth. The baby found surviving in 99% cases and in % women lost their baby.

Out of total home delivery live birth 98.9% and still birth was 1.1%, of which 94% baby are surviving and 6% baby is died.

Duration of stay at the institution: As per the JSY scheme the mother has to stay at institutions for at least 48 hours. 17% did not stay for 48 hours and the proportion of women stayed for more than 48 hours was 63% of the mothers.

Post natal visit

Post natal visit by the health providers was reported by 20.3% mothers of which 80% was by ASHA.

Cash benefit: Out of the total institutional delivery 13.5% were not eligible for the cash benefit. 66% received and 20% had not received the cash benefits for delivering at institutions.

The qualitative study data is under analysis.

Inference: The preliminary quantitative data from the beneficiaries shows that almost more than 90% mother registered under JSY and availed ANC. The proportion of institutional delivery is consistent with the proportion registered for JSY.

3. Development of a LAMP assay for diagnosis of human malaria.

Principal Investigator	:	Dr M R Ranjit
Co-Investigator	:	Dr S K Kar
Starting Date	:	July 2010
Closing Date	:	July 2012
Funding	:	EM: DBT (BT/PR12536 MED/29/02/2009)

Objectives

(i) To design species specific loop primers for detection of human malaria parasites

(ii) To optimize the reaction conditions for easy detection of the LAMP derived products

(iii) To find out the efficacy of the test compared to nested PCR and light microscopy

Background

Microscopy is the gold standard for diagnosis of malaria even though various rapid and simple tests have been developed in recent years. But loop-mediated isothermal amplification (LAMP) of nucleic acids seems to be a promising new technique, which enables to detect malaria parasites in a setting with limited resources. However, LAMP assay in its current form lacks sufficient accuracy in detection of the end product. Therefore, optimization of the current method for visualization of LAMP end products is important. The proposed project will help to develop a suitable method for detection of end roduct.

Progress of Work

Using Primer Explorer V4 software 5 sets of LAMP primers were designed for P falciparum, 7 for P vivax, 5 for P malariae and 5 for P ovale based on the 18sRNA gene sequence. Each set of primer consists of (i) outer forward primer (ii) outer backward primer (iii) inner forward primer (iv) inner backward primer (v) forward loop primer and (vi) backward loop primer, which recognizes eight regions of the target DNA.

With continuous effort we have been able to optimize the reaction conditions using Loop Amp DNA Kit of Eiken Company, Japan. To prevent contamination different sets of pipettes and different work areas were designated for DNA template preparation, reaction mixture preparation and DNA amplification. For every 25 µl reaction mixture the optimum primer mix would be in the proportion of 10(FIP & BIP) :5 (FLP &BLP):1(FOP &BOP) and in the concentration of FIP& BIP (50 pico mole), FLP &BLP (25 pico mole) and FOP & BOP(5 pico mole). The optimum temperature for reaction is 63C and duration is 20 minutes.

Reaction Mixture	**: 25 µl**
2X Reaction mix	: 12.5 µl
Primer mix	: 1 µl
Bst DNA polymerase	: 1 µl (1U)
Template	: 2 µl
Nuclease Free Water	: 8.5 µl
Reaction condition	
Temperature	: 63 C
Time	: 20 minutes
Incubation	**: Hot Bath**

The amplification product can be distinguished with the naked eye from the level of turbidity of the reaction mixture. The LAMP positive reaction mixture will be turbid due to the precipitation of Magnesium pyrophosphate, while negative reactions will be clear (Fig 1).

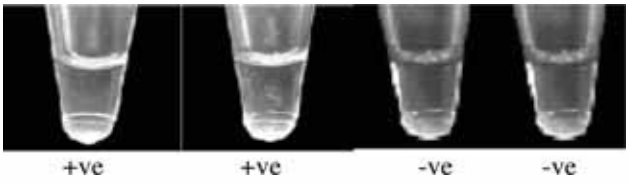


Fig.1: Visualization of lamp product by naked eye.

We have also standardized another method for easy detection of the LAMP product. In this method just by adding 1µl of 1/10 diluted SYBR Safe DNA gel stain (Invitrogen) to the reaction mixture, the LAMP products can be visualized under UV. The reaction mixtures with amplicons will show stronger luminescence under UV compared to reaction mixtures without amplicon (Fig 2).

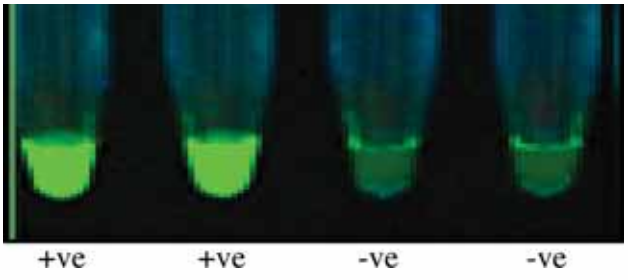
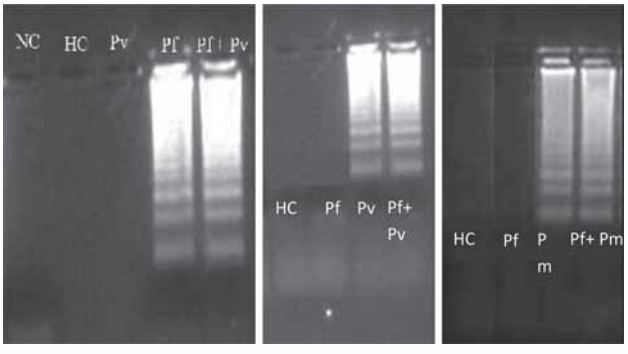


Fig.2.: Visualization of lamp product after adding Syber safe DNA gel stain under UV.

For further confirmation of the amplicons, we have analysed the amplified LAMP products by 2% agarose gel electrophoresis. Positive results were identified by the appearance of the typical ladder bands of various sizes (Fig 3).



Based on the efficiency and specificity of amplification one set LAMP primers have been selected for further analysis. Specificity of LAMP primers were tested using genomic DNA of *P falciparum* , *P vivax* and *P malariae* and human DNA (negative control). Since we do not have P ovale genomic DNA with us, we have not tried with *P ovale*. Template DNA for LAMP assay was prepared using the standard protocol (chloroform-phenol extraction and ethanol precipitation) from EDTA anti coagulated whole blood (200µl).

We have taken 5 samples for *P falciparum*, 5 samples for *P vivax* and 5 samples for *P malariae* and 5 samples for human DNA for optimization of the reaction conditions.

Our selected LAMP primers did not show any cross reactions with each other as would evident from Table 1.

Table 1: Test cross specificity of different species specific primers.

Sample primers	DNA *P. falciparum* (n=5)	DNA *P. vivax* (n=5)	DNA *P. malariae* (n=5)
P. falciparum	+	-	-
P. vivax	-	+	-
P. malariae	-	-	+

When we tested the repeatability (5 samples repeated for 10 times) of the selected set of primers, it was found that the LAMP primers selected for *P falciparum* can give the same amplification in 98% of time, while *P vivax* and *P malariae* in 100% of time (Fig 4)

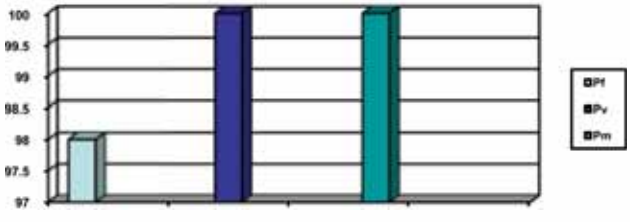


Fig.- 4: Repeatability of the test with same set of primers.

The detection limit of parasites for *P falciparum* was found to be 2 per µl of blood and *P vivax* it was 5 per µl of blood and can be compared to PCR (Table 2)

Table 2: Detection limit of parasites in LAMP and PCR techniques

Plasmodium falciparum			*Plasmodium vivax*		
Parasite/µl	PCR	LAMP	Parasite/µl	PCR	LAMP
200	+	+	100	+	+
100	+	+	50	+	+
20	+	+	20	+	+
10	+	+	10	+	+
5	+	+	5	+	+
2	-	+	2	-	-

However after optimization when we compared the efficacy of the LAMP primers and LAMP assay with new batch of samples (20 each), it was observed that *P falciparum* primers are showing 3 amplifications out of 20 human DNA samples and *P vivax* /*P malariae* 2 each out of 20 human DNA samples. Further the Lamp amplification in case of *P falciparum* and *P vivax* are less in number than PCR test results. But *P malariae* was at par with the PCR (Table 3).

Table 3: Comparison of LAMP assay with microscopy and PCR.

Methods	Control groups		Microscopy positive		
	Water(n=20)	Human DNA(n=20)	Pf(n=20)	Pv(n=20)	Pm(n=20)
PCR	No amplification	No amplification	20	20	5
LAMP	No amplification	Pf=3 PV=2 Pm=2	17	19	5

The study is in progress to standardize the reaction conditions further to increase the sensitivity and specificity of the tests.

4. Efficacy and tolerability of single annual low doses of DEC given uniformly in all ages as mass drug administration.

Principal Investigator : Dr. B. Dwibedi
Co Investigators : Dr.S.K. Kar, Dr.N. Mahapatra
Starting date : March 2006
Duration : 5 years
Funding : Intramural

Objectives

1. To compare the efficacy of single dose DEC of 100mg strength in mf suppression with either 200mg or 300mg given uniformly in all age groups as annual doses of MDA in 3 different endemic communities.
2. To compare the frequency and intensity of side reaction of DEC observed with three different strengths given as annual dose of MDA.
3. To observe the effect on vector transmission in three different communities following annual uniform doses of DEC of varied strength.

This need to observe followings

(a) Mf suppression effect of 100mg, 200mg or 300mg DEC given as single annual dose of MDA.

(b) Effect on community load of microfilarimia

(c) Effect of low dose DEC of 100 mg compared to either 200 or 300mg in higher age groups 6-14 or above 14 yrs.

Application of the research for National Health Policy

Mass drug (DEC) administration is being undertaken in the country targeting elimination of lymphatic Filariasis by 2015 as per national health policy statement of 2002. The programme was based on mass administration of single annual dose of DEC in the recommended dosage of 6mg/kg body weight averaged for three age groups i.e. 2-5, 5-14 & >14 years. But the population compliance of the programme is limited largely due to fear of side reaction of the drug regimen and also by confusion n three strengths of the drug dosage distributed by volunteers to various age groups. The present study aims at generating evidence for use of low dose DEC given in uniform doses for all age groups to observe, whether it is equally efficacious and better tolerated. This result may help the national programme for elimination of filariasis in increasing the population compliance of the drug.

Study Outline

Three filarial endemic areas were selected and population census carried out. Baseline screening for Mf count and antigenimia was undertaken on subjects providing consent. IEC activities organized in the villages about the purpose of the study, MDA and follow up evaluation. Then five rounds of annual MDA instituted in the three sites. Each site was randomly allocated for either of three 100 mg, 200 mg and 300 mg DEC regimen given uniformly to all ages. Population below 2 years, pregnant ladies and critically ill individuals were not covered with DEC as recommended by programme. DEC administration was supervised and population was followed for a week after each MDA round for any reported side reaction for record and their management at house hold level. The population was followed up with annual investigation of Mf count and antigen detection after each successive annual round of MDA. This was done by collection of night blood by finger prick collection. Thick blood smears made from 40µl blood for Mf count. The collected slides were coded, stained and mf count done by trained technicians. Vector survey was carried out at baseline and annually each year in three seasons for vector density, vector infection & vector infectivity after MDA and compared. *Cx. quiquefasciatus* mosquitoes were identified and dissected for the presence of infective

larvae of the parasite. Detection of filarial DNA in the vector was done by PCR for xeno-monitoring.

All the information recorded in pre designed format, entered into computer using Excel and SPSS software and analyzed with help of statisticians of the centre and VCRC, Pondicherry.

Result of study

Bhatimunda and Kandrakana villages of Cuttack district and Retang-Nanput of Khurda district were selected as the study site. The villages were situated more than 5 kms away and possibility of cross contamination of study population was low. Baseline parameters of the study population in 3 sites were comparable. The baseline investigation and the observations made following three annual rounds of MDA were detailed in the Table 1. After baseline assessment the population was covered with annual single dose MDA with 100,200,300mg dose of DEC uniformly to all ages. Five annual rounds were administered from May 2007 to May 2011.MDA coverage and side reaction were recorded. The study opulation was surveyed for microfilaremia by night blood survey at 0, 12, 24, 36, 48 and 60th month follow up and results are outlined below.

Table 1: DEC coverage

Dose	1st Round	2nd Round	3rd Round	4th Round	5th Round
100mg	86	79	76	74	98
200mg	85	73	71	64	86
300mg	80	75	72	70	87

(a) DEC coverage and frequency of side reaction:

Coverage of population for DEC intake was 74 to 98%, 64 to 86% & 70 to 87 % respectively for 100, 200 and 300 mg sites in five rounds (Fig 1). Frequency of side reaction was noted to be 7.2, 10.8 and 12.6% respectively during the first round, which decreased to 0.68, 0.2 and 1.3% after five rounds. The side reaction frequency was found to be significantly low ($p<0.05$) in lower dose (100mg regimen) site in all four rounds of MDA (Fig.2). Severity of the side reactions was also significantly low with 100mg dose, and all side reactions were mild in nature.

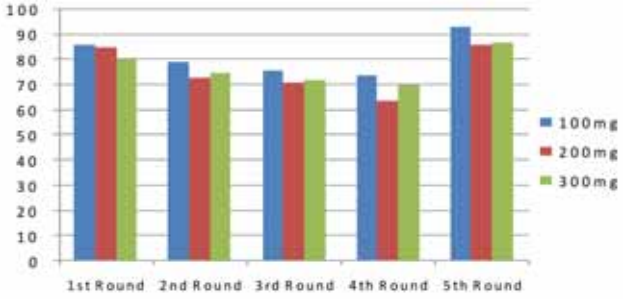


Fig. 1: DEC coverage in three regimen groups in 5 successive annual rounds.

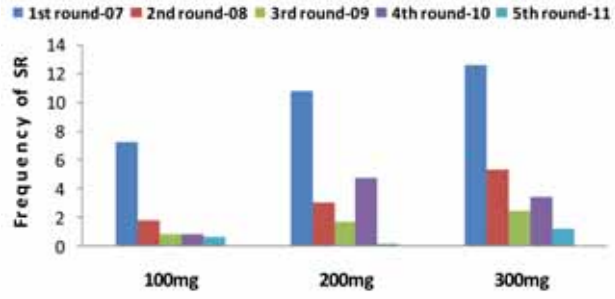


Fig.2: Frequency of side reaction to DEC in three regimen groups in 5 successive annual rounds.

(b) Change in community microfilariamia rate:

With five rounds of MDA the mf rate was noted to be 1.5%, 3.7% and 0.8% in the three sites. There was comparable decline in the mf prevalence rate from the baseline in the low dose i.e. 100mg **(84.69%)** compared to 200 **(61.46%)** and 300 mg **(86.21%)** doses.

(c) Clearance of microfilarimia among subjects found mf positive at baseline:

The individuals who were mf positive at baseline were followed up to 60 months which shown mf clearance of **92.6%, 77.5 % and 89.2 %** ($p<0.0$) in 100, 200, 300mg regimen sites respectively. There was a similar reduction (84.28-86.4%) in the

microfilarimia load expressed as geometric mean of mf density (Fig 4).

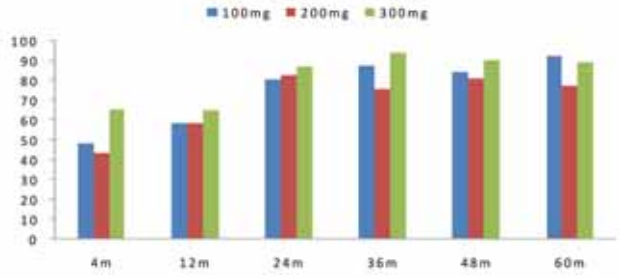


Fig.3: Mf clearance among microfilarimic at different periods of follow up.

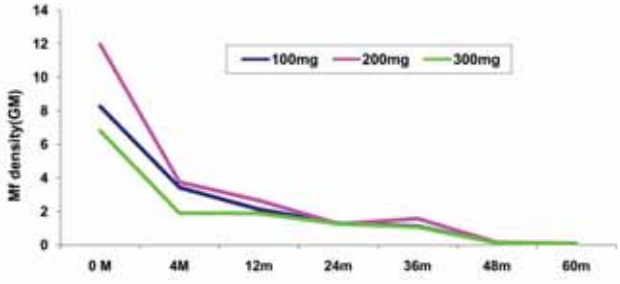


Fig. 4: Mf count (geo mean) in the microfilarimic at 4th, 12th, 24th, 36th, 48th & 60th month follow up.

(d) Change in vector infection parameters

The baseline vector survey showed the average per man hour density of *Culex quinquefasciatus* to be 34.8, 41.6 & 30.1 % in 100, 200 & 300 mg regimen. After 4th round of MDA, as the infective population of mosquito reduced to low level xenomonitoring tool was used to detect DNA of the developmental stages *W. bancrfoti* parasites for calculating infection and infective rate. After 5th round of MDA, it showed 81.4, 78.2 and 83.3% reduction in infectivity rate in 100,

200 and 300 mg regimen sites. Parallel Reduction in L3 load was also seen in all the three area after MDA.

Conclusion

The five year follow up study with five successive annual rounds of MDA indicated comparable reduction of both mf frequency and density in all 3 sites those were randomized to receive either 100, 200 or 300mg of DEC applied uniformly to all age groups indicating comparable efficacy of uniform low dose DEC (100 mg) compared to high oses (200 & 300 mg). Side reaction frequency and severity was significantly low with lowest dose of DEC used in MDA i.e. 100mg. Thus the study has shown that uniform low dose (100mg) of DEC applied as annual MDA is significantly well tolerable and has comparable efficacy in reducing mf load in the community and microfilarimic individuals. This was also supported by similar decline in the Vector infectivity rate, which indicated comparable effect on transmission that is targeted during LF elimination programme. Hence the study has shown that uniform low dose (100mg) DEC has the potential to be used as an alternative to current MDA dose, to enhance population compliance while maintaining efficacy of the current MDA regimen.

5. Effect of Albendazole dose and interval on *Wuchereria bancrofti* micro filarial clearance in India: a randomized, open label study.

Principal Investigator	:	Dr. S.K.Kar
Co Investigator(s)	:	Dr.B. Dwibedi, Dr.A.S.Kerketta Dr.S.S.Panda (Dept. of Medicine, KIMS Hospital, BBSR)
Starting date	:	October 2008
Duration	:	Four years
Funding	:	Extramural (GATES Foundation, USA)

Aims & Objectives

1. To determine whether increase in dose or frequency of albendazole administration in MDA regimen is more effective in clearing microfilarimia in *Wucheraria bancrofti*

Microfilaria - positive cases.

2. To assess the effect on adult worm burden as assessed by Doppler sonography.

Background

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 in combination with albendazole is used. While DEC is a powerful microfilaricidal agent, Albendazole possibly plays role in sterilizing adult parasite, hence suppressing resurgence of mf, when applied at repeated intervals. 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. Hence the study was undertaken as an open level clinical trial with four treatment arms to look for a better efficacious regimen.

Study Outline

The clinical trial was registered. Ethical clearance was obtained by Institutional ethical committee. ICH, GCP and GLP guidelines were followed during conducting the study.

opulations in the age group of 18-53 yrs from filarial endemic villages of Khurda district were screened for Mf status by night time blood collection. Based on the results of the night time microfilarial counts and inclusion criteria in the pre-randomization screening, 104 volunteers with microfilarial counts greater than 50 mf/ml of blood were identified and consent were taken. Consenting volunteers were allotted to one of the four arms of the study as per the random number table created through computer oftware. Baseline investigations (Mf count, CFA, Hb%, blood urea & createnine, urine pregnancy test in case of females and ultrasonography) were carried out. Subjects were recruited in batches to KIIMS hospital for treatment & post treatment follow-up for 2 more days. Then the subjects were followed at home for 7 days. Subjects were followed up with treatment and investigation 6 monthly following the randomization.

The study arms are as below

1. S1-Standard q 12 months: 400 mg of Albendazole and DEC (300mg)
2. S2-Standard q 6 months: 400 mg of Albendazole and DEC (300mg)
3. H1-High dose q 12 months: 800 mg of Albendazole and DEC (300mg)
4. H2-High dose q 6 months: 800 mg of Albendazole and DEC(300mg)

Inclusion and Exclusion criteria

1. Inclusion Criteria (Screening)

- Age 18 years to 55 years inclusive
- Both genders
- Not pregnant or breastfeeding by history
- If selected, subject must be willing to spend 3 days on the Kalinga Institute of Medical Sciences (KIMS), Bhubaneswar, Orissa
- If selected, subject must be willing to undergo night time blood draws every 6 months for 2 years.
- If selected, agree to have blood stored for future investigations
- Ability to understand and sign the informed consent

2. Exclusion Criteria (Screening)

- Non-volunteers
- Age < 18 years or > 55 years

- Pregnant or breastfeeding by history

3. Inclusion (Treatment)

- Age 18 years to 55 years
- Men and non-pregnant or non-breastfeeding women
- Microfilarial levels >50 mf /ml
- Willingness to spend 3 days on the Clinical Trials Unit of the KIMS, Bhubaneswar, India
- Willingness to undergo night time blood draws every 6 months for 2 years
- Ability to understand and sign the informed consent
- Hb levels for inclusion >9 g/dl
- Normal Cr, ALT
- Willingness to have blood stored for future investigations

4. Exclusion (Treatment)

- Non-volunteers
- Age < 18 years or > 55 years
- Pregnancy or breast-feeding
- Hgb d" 9 g/dL
- Cr > 1.2/100 ml
- ALT > 30 U
- Alcohol consumption of more than 2 beers or other alcohol-containing drink/day within a week of each drug administration
- Temperature > 37.5° C

  Serious medical illness
- History of benzimidazole allergy

  History of DEC allergy
- Use of Albendazole or DEC within past 6 months
- Unwillingness to comply with required study visits

Results of Study

Screening

Field screening was conducted covering 1716 endemic population between age group of 18-55 yrs for presence of microfilarimia by finger prick blood which recorded 118 Mf positives. Individuals giving consent for enrolment were investigated for eligibility by Mf count, Hb%, ALT, Creatinine and urine pregnancy test (for females only). 104 individuals satisfied inclusion criteria.

Enrollment

All the 104 eligible subjects (88 male, 16 female) have been enrolled to the study at baseline. The patients were admitted to the hospital (KIMS, Bhubaneswar) in small batches of 3-5 persons for drug treatment after obtaining their consent. Each subject underwent pre drug baseline assessment by clinical examination, ultrasonography, microfilaria count, Og4C3 Ag and haematology parameters like haemoglobin and eosinophil count and stool test for helminth. Each of them was assigned to one of the following four drug regimen groups as per the random number table.

Subject allocation to drug regimens (four)

The 104 microfilariaemic subjects were randomly assigned to one of the each drug regimens as given below.

Table 1: Treatment regimen and no. of subjects.

Regimen	Drug Dose	No of subjects enrolled
S1	DEC(300mg) +Alb(400)Annual	26
S2	DEC(300mg) + Alb(400) Biannual	26
H1	DEC(300mg)+Alb(800) Annual	26
H2	DEC(300mg)+ Alb(800) Biannual	26
	Total	104

Baseline mf and FDS status of the enrolled subjects

The baseline microfilaria count among the subjects ranged from 54 -3000 mf /ml. The Geometric Mean of Mf count in different regimen groups were 455, 336, 383 and in 466 in S1, S2, H1, H2 arm

respectively. The study groups were comparable in terms of distribution of individuals with low and high mf density (Table 2). The ultrasound examination for presence of filarial dance signs (FDS) indicating the presence of live adult worm in the lymphatic vessels was carried out in each of the subjects at axillary, inguinal and scrotal (in males) regions bilaterally. Out of 104 subjects, 55 were detected with worm nests showing Filaria dance sign (FDS) indicating presence of adult parasite in their lymphatics.

Table 2: Distributions of Microfilarimics in four arms.

Treatment arm	No. of individuals in the Mf Count range		
	50-100	101-1000	>1000
S1	5	13	8
S2	5	14	6
H1	6	13	7
H2	3	15	7

Follow Up

As per protocol the individuals were followed six monthly for investigation and treatment. 104 subjects were completed follow up for 6 months, 103 subjects at 12 months, 18 months and 24 months. One individual was lost to follow up because of death, cause of which was not related to the study procedure. Mf count & Og4C3 were repeated at 6th, 12th, 18th & 24th month. USG was repeated within 3 days of baseline drug intake and at 1 year and 2 years, only on the cases showing positive FDS in baseline assessment.

Effect on Mf clearance

Mf clearance was observed to progress over time in all 4 regimen groups. The number of subjects with total mf clearance was noted to be 9, 19, 58 & 72 in all 4 regimens together at 6, 12, 18 & 24 months out of the subjects tested at each point. Significantly higher clearance was observed with H2 group (71.4% at 24 month) compared to other regimens (Fig. 1).

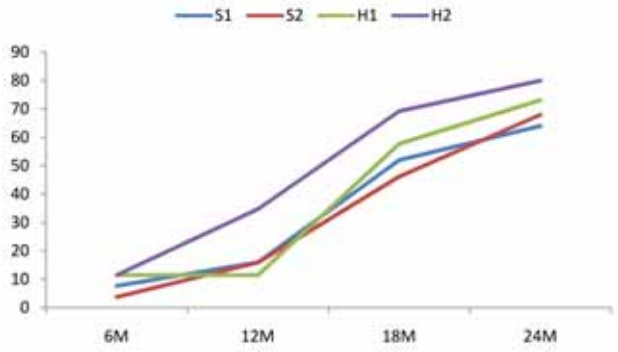


Fig. 1: Complete Mf clearance (%) in different arms.

Effect on Mf density

It indicated progressive microfilaria density reduction over period in all the four arms. The percentage reduction from baseline noted in the regimen groups was 99.94 % in S1, 99.95% in S2, 99.96 % in H1 and 99.97 % in H2 respectively at 24 month follow up.

There was sharp reduction in the microfilaria density (geo mean) at 6 month in all 4 regimen (98.3-99.3%) which was maintained with slow reduction n subsequent follow ups (12, 18 & 24 months) (Fig.2)

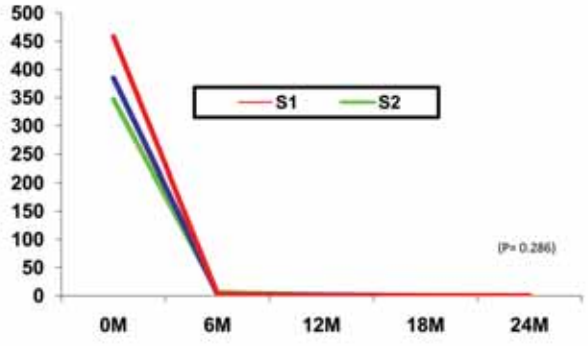


Fig.2: Change in mf density (GM) in 4 regimen.

Effect on Adult worm clearance (Filarial Dance Sign and Antigeneimia)

FDS in Ultrasonography

USG was done on third day following first drug dose with subjects showing FDS at baseline to see any

immediate effect of DEC + Alb on adult parasite. It was repeated at 12 month & 24 months. At initial level 14, 15, 13 & 13 cases had visible FDS in the 4 arms. Percentage reduction of FDS observed on 3rd day was 7, 13.3, 23 and 38 % in S1, S2, H1 & H2 arms respectively. At 1 yr percentage reduction was highest (92%) in H2 arm out of cases followed. Similarly at 2yrs FDS clearance was highest (100%) with H2 arm, clearance in S1, S2 & H1 arm was 84.6%, 92.9% and 92.3% respectively.

Antigenimia

The mean antigen titer over 24 month period post drug has shown reduction of 89.84 %, 85.24%, 98.25% & 85.58 % with S1, S2, H1 & H2 arms respectively.

Adverse reaction in the four arms

fter administration of the different drug regimens, patients were followed up for 2 days in hospital and up to seven days in the village for any side reaction. However each subject was followed up periodically every fortnight at village level to ensure any clinical illness and any other drug used.

Out of total 104 enrolled subjects only 60 (57.6%) had side reactions (after first dose) like fever, headache, malaise, reeling head, drowsiness, nodule and testicular pain of mild to moderate grade. These symptoms started between 2 hrs to 3 days after the drug consumption. There was no significant difference in frequency of side reaction between Albendazole 400 & 800 mg groups.

52 subjects received the second dose at 6 month out of which six developed side reaction. 103 subjects received the annual dose at 12 month, out of which 9 had shown side reaction. At 18 month 52 subjects received the drug and 4 had developed side reaction. At 24 month no side reaction was recoreded. All side reactions were mild, no severe adverse effect was reported.

Frequency of side reaction reduced with repeated dosage as expected, while there was no increase in the frequency and severity of side reaction on increasing the dose of Albendazole (i.e. 800 mg) .

Conclusion

The four arm open clinical trial indicated that the arm that used high dose Albendazole (800 mg) with DEC (300mg) given biannually was superior to the current MDA regimen in terms of microfilaria and adult worm clearance without addition of side reactions due to increased Albendazole dose. This showed higher Mf suppression action and effect on adult that has the potential for use in the MDA programme as a superior regimen with usefulness in reducing the period of MDA programme for LF elimination.

6. Vector mapping with its susceptibility status to insecticides in seven high-risk districts of Odisha.

Principal Investigator	:	Dr.R.K.Hazra
Co-Investigator(s)	:	Dr.N.Mahapatra
		Mr.H.K.Tripathy
Starting date	:	March 2008
Closing Date	:	March 2011
Funding	:	Extramural (NVBDCP)

Objectives

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

Background

The success of any vector control programme relies on knowledge of vector species and their bionomics, which is complicated due to the fact that among the six recognized primary malaria vectors in India, are species complexes. There are growing

evidences that the members of species complexes differ significantly in biological characteristics that are vital for malaria control point of view such as vectorial potential, host-preference, resting behavior and response to insecticides. Mosquito fauna that transmits malaria and its insecticidal susceptibility status in Odisha has not been precisely studied, although few reports exist from patchy regions of state. In view of high morbidity reported in Odisha 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.

Knowledge of baseline malaria transmission intensity in a given environment is important to guide malaria control interventions. In Odisha, recent information on malaria transmission intensity is insufficient. Therefore, an entomological study was conducted in seven ecologically different districts of Odisha to assess the seasonal patterns in malaria transmission intensity.

As identified by EMCP, operating in Odisha by Govt. of Odisha, following blocks of 7 districts are high risk for malaria transmission that are Nuapada (Kharia), Keonjhar (Ghatgan), Khandamal (Khajuipara), Gajapati (Mohana), Boudh (Adenigarh), Rayagada and Nabarangpur.

Odisha where the biodiversity and specific richness of Anopheles species is high compared to the other regions. Even within the state, there are considerable variations in malaria epidemiology due to differences in climatic, ecological and human activities. The consequences of urbanization, deforestation and unplanned urban growth are liable to alter the ecosystem and behavior of vectors affecting malaria transmission. There has not been any systematic study on the entomological aspects in different parts of the state during the past several years (Guha et al 1979) and consequently our knowledge on the anopheline fauna of the state is poor. It is therefore very important to understand the dynamics of the transmission of malaria in a state like Odisha with different ecological zones. There are no longitudinal entomological studies directed toward the understanding of the dynamics of malaria transmission. Hence, the bionomics and vectorial status of the anopheline species present in the Odisha district needs to be ascertained in order to determine if they are competent vectors of malaria or not. Along with this the detection of susceptibility status of malaria vectors in malaria endemic zones study can be very useful in modifying the vector control strategy in Odisha.

Results

Collections of species

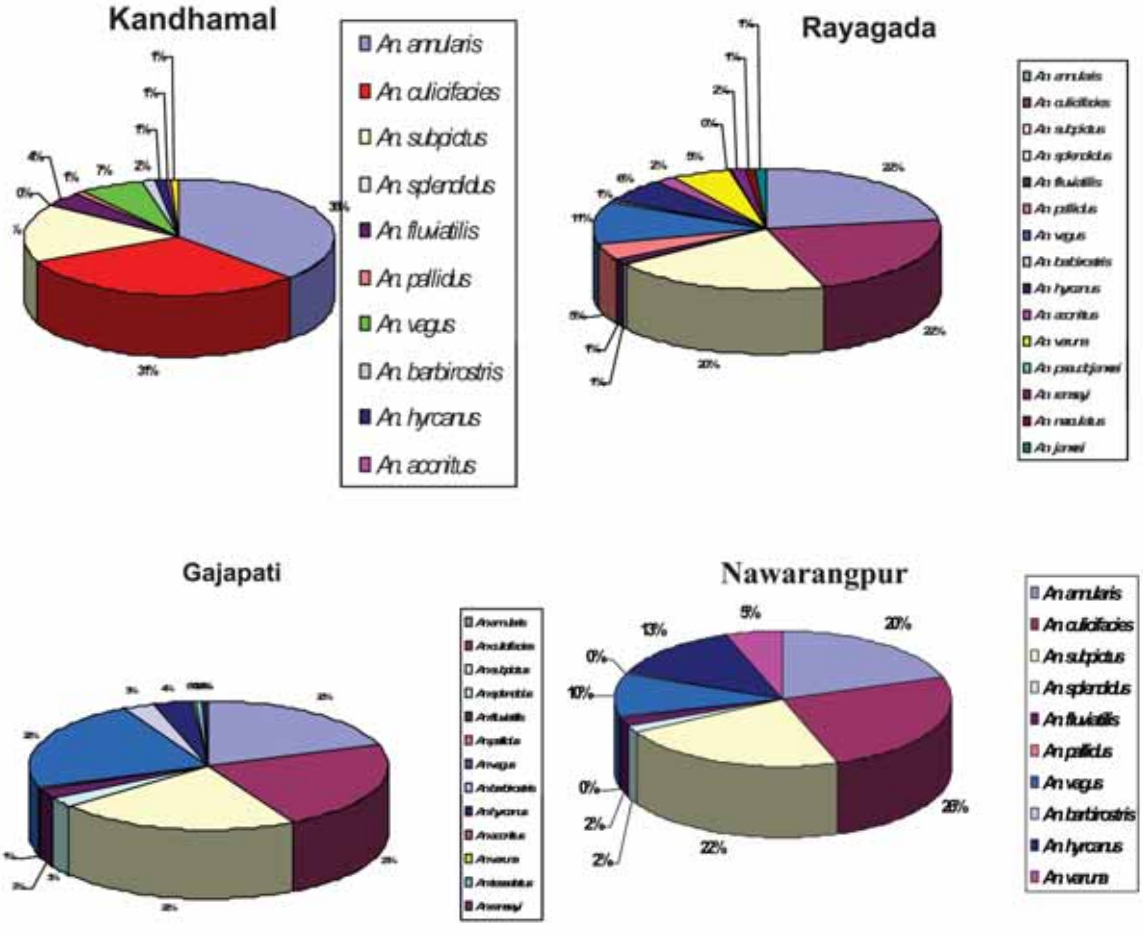
All surveys were conducted during rainy and winter seasons in all the districts. The highest mosquito collection was made in Keonjhar area and lowest was in Nuapara area. There was more Anopheles species (77%) than Culicine (22.9%). The highest number of Anopheles was caught in Gajapati area (88.5%). A total of 6270 Anopheles mosquitoes of 23 species were obtained from adult collections was recorded during the study. The species recorded

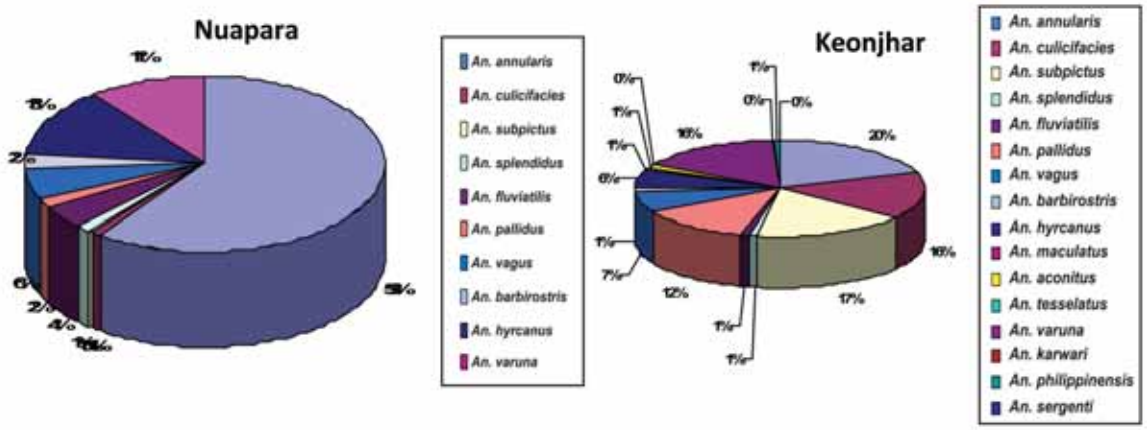
included An. annularis, An. culicifacies, An. fluviatilis, An. minimus, An. philippinensis and An. varuna, which have been recognized as malaria vectors in India. Most of the species (54.0% of the anopheline fauna) were collected during the winter season. An. culicifacies, An. annularis was predominant vector in the seven regions and istributed as follows: Kandhamal (ann 46.7%, cul 31.9%, n=379), Rayagada (ann 18.6%, cul 33.8%, n=384), Gajapati (ann 32.8%, cul 11.8%, n=347), Nawarangpur (ann 19.7%, cul 28.5%, n=536), Nuapara (ann 27.6%, cul 39.1%, n=427), Keonjhar (ann 8.9%, cul 21.7%, n=578), Boudh (ann 21%, cul 24.3%, n=738).

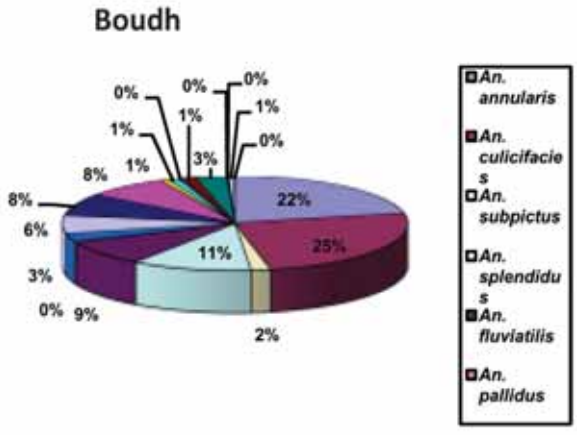
The morphological identification into genera of mosquitoes collected in the seven district of Odisha.

Area	*Culicine* (%)	*Anopheles* (%)	Total
Khandamal	328 (32.7%)	674(67.2%)	1002(12.3%)
Rayagada	285(26%)	808(73.9%)	1093(13.4%)
Gajapati	112(11.4%)	864(88.5%)	976(11.9%)
Nawarangpur	175(17.1%)	843(82.8%)	1018(12.5%)
Nuapara	127(14.2%)	767(85.7%)	894(10.9%)
Keonjhar	451(25.3%)	1329(74.6%)	1780(21.8%)
Boudh	389(28.3%)	985(71.6%)	1374(16.8%)
Total	1867 (22.9%)	6270(77.0%)	8137

Composition of the anophelines fauna in different study site.







District	No. of Anopheles found	Name of anophelines	Rare anophelines
Kandhamal	11	annularis, culicifacies, subpictus, splendidus, fluviatilis, pallidus, vagus, hyrcanus, aconitus, varuna	barbirostris
Rayagada	15	annularis, culicifacies, subpictus, splendidus, fluviatilis, pallidus, vagus, hyrcanus, aconitus, varuna	pseudojamesi, ramsayi,maculatus, jamsayi
Gajapati	16	annularis, culicifacies, subpictus, splendidus, fluviatilis, pallidus, vagus, hyrcanus, aconitus, varuna	barbirostris,ramsayi, jamsayi, karwari, tesselatus,superpictus
Nawarangpur	10	annularis, culicifacies, subpictus, splendidus, fluviatilis, pallidus, vagus, hyrcanus, varuna	barbirostris
Nuapara	10	annularis, culicifacies, subpictus, splendidus, fluviatilis, pallidus, vagus, hyrcanus, varuna	barbirostris
Keonjhar	16	annularis, culicifacies, subpictus, splendidus, fluviatilis, pallidus, vagus, hyrcanus, aconitus varuna	barbirostris, maculatus, tesselatus, karwari, philippinesis, sergenti
Boudh	19	annularis, culicifacies, subpictus, splendidus, fluviatilis, pallidus, vagus, hyrcanus, aconitus, varuna	barbirostris, ramsayi, maculatus, tessalatus, jamsayi, theobaldi, philippinensis, minimus, kochi

Bionomics of Vectors

Resting fauna of main malaria vectors

- *An. fluviatilis* were collected less in numbers from different resting places.
- *An. culicifacies* and *An. annularis* were captured at more relevant density and at different abdominal conditions from animal shelter.

Biting habits

- We have studied the biting habit of mosquitoes in indoor, outdoor and cattle shed in evening hours.
- *An.culicifacies*, *An.annularis* though bites animal and human in indoor habitats mainly, also found as a out door biter.

Biting time

- *An. fluviatilis*, *An. annularis* were found biting human in evening hours i.e. up to 7PM to 9PM in out door.
- *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.

Human blood index (HBI) and sporozoite rate (SR) of anophelines

In all, 4643 female anopheline specimens belonging to 5 species collected in the different study

sites were processed for human blood index and *Plasmodium falciparum* infectivity by PCR. Of these 28 Pf positive *Anopheles*, *An. culicifacies* (Hm 5.8%, Pf1.3%), *An. fluviatilis* (Hm 47.8%, Pf 1.5%), *An. annularis* (Hm 2.7%, Pf 0.3%), *An. varuna* (Hm 1.4%, Pf 0%) and *An. subpictus* (Hm 0.44%, Pf 0%). The highest human blood index was found in the *An. fluviatilis* population at 47.8% of fed females while 5.8% of *An. culicifacies* had fed on human blood. Generally the mosquitoes particularly *An. fluviatilis* in the hilly area (Boudh) showed more propensity for human blood rather than those in the flat area.

Susceptibility test and genotypes as assessed by PCR assay.

Exposure to DDT induced significantly reduced mortality in *An. culicifacies* from all study localities, implicating resistance according to established criteria. The highest resistance of *An. culicifacies* was recorded from Kandhamal followed by Keonjhar and Boudh. By applying WHO criteria (98-100% mortality indicates susceptibility, 80-97% mortality requires confirmation of resistance with other methods and < 80% mortality suggests resistance), it was found that filed samples were resistant to DDT. A total of , 560 *An. culicifacies*were exposed to DDT (4%) to determine their level of susceptibility. Over 75% and above of the malaria vector mosquitoes exposed was knocked down within an hour of exposure to the chemicals. The *kdr* mutation was detected in Keonjhar district at frequency of 1%.

Conclusion

Vector control is an indispensable aspect of the global malaria control strategy. Successful implementation of a vector control program requires accurate knowledge of the bionomics of the species involved in disease transmission. To study the vector

Human blood index (HBI) and sporozoite rate (SR) of anophelines in different study sites.

Areas	*An. culicifacies* % Positive (n)		*An. fluviatilis* % Positive (n)		*An. annularis* % Positive (n)		*An. varuna* % Positive (n)		*An. subpictus* % Positive (n)	
	HBI	SR	HBI	SR	HBI	SR	HBI	SR	HBI	SR
Khandamal	15	4 n=210	20	0 n=26	12	0 n=250	0	0 n=5	0	0 n=107
Rayagada	9	2 n=179	4	0 n=8	10	1 n=182	0	0 n=44	0	0 n=162
Gajapati	11	2 n=194	12	0 n=21	3	0 n=182	0	0 n=4	1	0 n=188
Nawarangpur	18	3 n=210	10	0 n=19	1	0 n=166	1	0 n=46	1	0 n=185
Nuapara	16	4 n=251	1	0 n=13	2	1 n=171	0	0 n=32	2	0 n=229
Keonjhar	14	3 n=207	7	1 n=15	8	2 n=261	5	0 n=210	1	0 n=226
Boudh	5	2 n=246	36	2 n=86	3	1 n=214	0	0 n=76	0	0 n=18
Total	88	20 n=1497	90	3 n=188	39	5 n=1426	6	0 n=417	5	0 n=1115

Phenotype data using WHO susceptibility test and genotypes as assessed by PCR assay.

District	WHO Bioassay test	*An. culicifacies* n=560			
		Total	SS	SR	RR
Khandamal	Dead/ knock down	76%	76%	-	-
	Survivors	24%	21.5%	2.5%	-
Rayagada	Dead/ knock down	90%	90%	-	-
	Survivors	10%	10%	-	-
Gajapati	Dead/ knock down	82.3%	81.3%	-	-
	Survivors	17.7%	16.5%	1.2%	-
Nawarangpur	Dead/ knock down	86.3%	86.3%	-	-
	Survivors	13.7%	12.5%	1.2%	-
Nuapara	Dead/ knock down	95%	95%	-	-
	Survivors	5%	5%	-	-
Keonjhar	Dead/ knock	81.2%	81.2%	-	-
	down				
	Survivors	18.8%	16.5%	1.3%	1%
Boudh	Dead/ knock down	85%	85%	-	-
	Survivors	15%	14%	1%	-
Total		560		-	-

fauna, their habits and density and vector infection rate in the sample sites of seven high district of Odisha The main objective of these studies is to implement a more selective approach for vector control programs in Odisha in relation to the incriminated species, their ecology and their role in malaria transmission.In this study different vectors prevalent in different districts were studied and the presense of sporozoite rates were observed.It was observed that *An.culicifascies* is the major vector followed by *An.annularis* and *An.fluviatilis*. *An.culicifacies* found to be resistant to DDT but it is susceptible pyrethroid. The result was communicated to state health department for the changing pattern of IRS. Improved efficiency and n measure to tackle the problem by the state health department.

Out Come of the Study

- The prevalence of vectors and their susceptibility status to different insecticide which will ultimately help for planning of appropriate intervention measure to tackle the problem by the state health department.

1 Swain S, Mohanty A, Tripathy HK, Mahapatra N, Kar SK, Hazra RK.. (2010). Molecular identification and phylogeny of Myzomyia and Neocellia series of Anopheles subgenus Cellia (Diptera: Culicidae). Infect Genet Evol. 10(7):931-9.

2 Mohanty A, Swain S, Kar SK, Hazra RK(2009). Analysis of the phylogenetic relationship of Anopheles species, subgenus Cellia (Diptera: Culicidae) and using it to define the relationship of morphologically similar species. Infect Genet Evol.

3. Swain S, Mohanty A, Mahapatra N, Parida SK, Marai NS, Tripathy HK, Kar SK, Hazra RK (2009). The development and evaluation of a single step multiplex PCR for simultaneous detection of Anopheles annularis group mosquitoes, human host preference and Plasmodium falciparum sporozoite presence. Trans R Soc Trop Med Hyg. 103(11):1146-52.

Other Scientific Activities

Scientist working in field station of RMRC at Raygada

LAB Visit by AMBICON during workshop session at RMRC, Bhubaneswar

Activities in RMRC Field Stations

Progress Report on the works of Raygada & Kalahandi (Bhawanipatna) field Unit.

An MOU has been signed between ICMR and Government of Odisha to develop strategies for improving the health indicators of the tribal populations of Raygada and Kalahandi district. Therefore the centre has established two field units, one at Raygada of Raygagda district and another at Bhawanipatna of Kalahandi district with an aim to transfer the sate of the art technology of operational and laboratory research to the state health personnel for achieving the goal of the MOU. The field unit of Raygada was inaugurated by the Honourable Health Minister of Odisha on 6th September 2011 and the field unit at Bhawanipatna will be inaugurated shortly. The field unit at Raygada has already started projects on severe diarrhoeal disorder, detection of MDR Tuberculosis (TB) using Line Probe Assay and development of training and diagnostic modules for detection of Reproductive Tract Infections (RTI). The proposed area of research for Bhawanipatna field unit are on malnutrition, malaria, haemoglobinopathies and other emerging/reemerging viral/bacterial infections. One time budget for renovation of the existing building of the DHQ hospital and establishment of the laboratory has been released by the ICMR for both Raygada and Bhawanipatna field unit during the financial year 2011-2012.

Raygada Field Unit

Ongoing

1. Diarrhoeal Disorders

Since July 2011 the centre has started working on investigation of diarroeal epidemics. Early detection and timely reporting has helped the local health authorities as well as district administration to check the epidemic this year by implementing adequate control measures. Networking has been established to collect, preserve and transport the rectal/stool samples from diarrheal patients to the Raygada field unit laboratory. At least 67.03% of stool/rectal swabs collected from the diarrhoea patients during Aug, 2011 to April 2012 have been identified to be positive for *E coli* and around 2.2% of the samples to be positive for *V cholerae* O1 Inaba bio type El Tor by bacteriological analysis. Similarly 1.7% of the water samples collected from different sources like stream, nala, and household water, have been found to be positive for *V cholerae* O1 Ogawa. The MAMA PCR results on the *V cholerae* isolates indicate that all were El Tor variants of *V cholerae*.

2. Tuberculosis

A study has been initiated on detection of MDR TB in Raygada district. Staffs has been trained on TB culture and sensitivity assay. All the 20 DMCs of the Raygaga district have been sensitized and networking has been established for sample collection, preservation and for transportation of sputum samples to Raygada field unit. So far samples from 16 subjects have been collected and processed. All the samples have shown growth in solid LJ medium. Drug resistance study is on progress. The laboratory is in the process of getting accreditation.

Projects for Initiation

1. Improving health of under five children in Raygada District, Odisha.

The present activity is planned in the context of the MOA reached between Government of Odisha and ICMR & DHR in 2011. The main objective of this MOA is to bring about a substantial improvement in the health related parameters of the people of that area and state at large by providing superior preventive, diagnostic and therapeutic services to the populace and facilitating transfer of technology on modern advances to the end users. Based on this MOA and on request from the Department of Health, Government of Odisha, a field unit of RMRC, Bhubaneswar has been established at Raygada district head quarter hospital during 2011 and the unit is

providing diagnostic services for diarrhoeal disorders and early warning for outbreak. Meanwhile a high level expert meeting was held on 4th October 2012 at RMRC under the chairmanship of Lt Gen D Raghunath (Chairman Tribal task force, ICMR) in presence of Director Health Services, Government of Odisha and CDMO of Raygada and Kalahandi to outline the tasks and prioritize the diseases to be undertaken. From the available record it is observed that there is a gross disparity in IMR (Raygada: 65/ Odisha: 62) and Under Five mortality (Raygada: 105/ Odisha 82) of the district with the overall figure of the state. According to the world literatures the high U5CM in developing countries are mostly due to acute diarrhea, ARI and under nutrition. These diseases have been identified to be addressed through strengthening the health system by way of capacity building, improving communication technology and bringing convergence between the grass root level workers of ICDS and health department. RMRC will undertake capacity building, monitoring and evaluation activities by innovative approaches to create health awareness, improve utilization and community mobilization and involvement. Implementation of the programme will be done as per the national programme by the State Health Department so that the model will be replicable.

Kalahandi (Bhawanipatna) Field Unit

Ongoing

1. Nutrition

Assessment of adolescent reproductive and sexual health programme in Orissa: advocacy for intervention strategies: Adolescents (10-19y) represent 21.6% of Odisha's population and majority are out of school, get married early, sexually active and exposed to peer pressure. Adolescent pregnancy contributes to maternal, perinatal and infant mortality, and to a vicious cycle of poverty and ill-health. Adolescent Reproductive and Sexual Health (ARSH) programme implemented by established Adolescent Friendly Health Clinics (AFHC) to provide a core of preventive, promotive, curative and counseling services. However, the use of health services is limited due to poor knowledge and lack of awareness calling for public health interventions to influence the health seeking behaviour and empowering adolescents. The study is aimed to evaluate ARSH program and to develop advocacy-based strategies in backward Kalahandi district of Orissa, where adolescent marriages are high. The study is being conducted on sample of 630 adolescents in Junagarh (n=645) and Dharmagarh (322) blocks that include 179 married. Quality of care assessed from 31 health service providers and 63 stakeholders at community levels. A meager proportion of adolescents were aware about ARSH services and negligible. The data is being analyzed.

In Process of Initiation

1. Improving health of under five children in Kalahandi District, Odisha.

According to the Annual Health Survey Data (2010-11) the under 5 death rate in Kalahandi is 77, IMR is 59/1000 live births and Neonatal death rate is 32. Around 50% of the infant mortality is within 4weeks of birth i.e. during infant stage. As per WHO estimates, the causes of child mortality in the age group 0-5 years in India are neonatal causes (55%), pneumonia (11%), diarrheal disease (11%), measles (4%), injuries (3%) and others (16%). The diarrheal diseases, acute respiratory infections, under nutrition and haemoglobinopathies have been identified to be addressed through strengthening the health system by way of capacity building, improving communication technology and bringing convergence between the grass root level workers of ICDS and health department. The RMRC will undertake capacity building, monitoring and evaluation activities, creation of health awareness by innovative approaches and improve utilization of health services through community mobilization. Implementation of the programme will be done by the state health department as per the national guideline so that the model can be replicated.

A. Referral investigation on rectal swab samples for identification of V. cholerae from from different districts of Odisha.

Principal Investigator : Dr. B.B Pal

Co-Investigator : Dr. H. K. Khuntia

Collaborator : Dr Bikash Pattnaik, IDSP, Govt. of Odisha.

During this period under report, 53 rectal swabs from diarrhoea patients from different districts were referred for bacteriological analysis. Out of 53 samples 12 were positive for *V. cholerae* O1 Ogawa biotype El Tor. About 100% of the strains were El Tor variant of *V.cholerae* which indicates that this hybrid strain is spreading to other districts of Odisha. (Table 3). Similarly, 44 water samples were tested received from 13 districts and none was positive for V.*cholerae***.** The antibiogram profile of *V.cholerae* strains from different districts exhibited variable results.

B. OPD facility at Capital Hospital, Bhubaneswar

Dr B. Dwibedi, Dr A.S. Kerketta, Mr B. N. Murmu, Mr B.N. Sethi & Mr H.S. Nayak

The centre is providing out patient facility to patients of lymphatic filariasis and haemoglobinopathy. The facility is being utilized for referral investigation & diagnosis of suspected cases of filariasis and haemoglobinopahy from different parts of the state. Besides, the facility is providing treatment to acute and chronic filarial disease including decompression therapy for lymphedema reduction. The facility is also being utilized for collection of clinical information and biological samples for diagnosis and research including viral diagnosis, bacterial meningitis and hypertension related to research projects of the centre as well as PhD programmes.

During the year 306 cases of lymphatic filarial diseases attended the set up, Out of them two third of cases have chronic filarial disease as grade II - IV lymphedema. Rests were having acute episodes of adenolymphangitis. The cases were examined and ADLA attacks were identified and treatments provided. Lymphedema management was provided with preventive chemotherapy, foot hygiene and intermitted de compression therapy.

Table3: District wise isolation of *V. cholerae.*

Name of the district	Total samples	No. positive for *V.cholerae*
Nuapada	16	3
Ganjam	13	2
Kalahandi	4	0
Baudh	1	1
Bargarh	2	0
Jharsuguda	1	0
Balangir	6	4
Khurda	4	0
Sundargarh	2	0
Keojhar	4	2
Total	53	12

192 cases were referred with suspected haemoglobinopathy disorder and laboratory investigation undertaken. 33 Cases of thalasemia and 24 cases of sickle cell and 5 cases of E thal were detected. Parent's blood samples were collected and lab test report provided to help them in planning subsequent pregnancies. 387 samples were collected from capital hospital, Bhubaneswar for viral infection diagnosis and 51 no. of samples were collected for bacterial meningitis diagnosis using the facility by the project staff. 200 cases of hypertension were enrolled from the hospital set up, on which genetic markers studied by our research scholar and the bio chemical test report provided to the patients.

The services offered at the above facility have benefited the patient and the state health department in diagnosis and treatment of the cases. This also supported the research activity of the centre which required clinical facility and clinical information that supplemented the laboratory and epidemiological expertise of the centre.

C. Aetiology of Fever among tribalpopulation of Odisha.

Investigators: - Dr B Dwibedi, Dr A S Kerketta, Dr A Mohapatro, Dr G Bulliya)

Objectives

The study was undertaken as per the recommendation of the Tribal health forum of ICMR to look into febrile illness in tribal population with following objectives -

- To estimate the magnitude of febrile illness in tribal population
- To identify the aetiology of febrile illness
- To assess the health seeking behaviour and accessibility to health system

Methodology

A cross sectional study was carried out during July 2012 in tribal population from 16 villages coming under 3 adjacent sub centres of Jemadeipentha CHC, Rayagada. The study villages were contiguous and the area fairly represents a tribal inhabited area of the region. 3730 population from 859 households were covered during the survey.

House to house survey was made to record data on census, history of illness in last fortnight, current fever and health seeking behaviour in previous illness. Fever cases identified during the survey were examined by a physician and samples (blood, urine, stool, throat swab) collected for identification of bacterial, viral, & parasitic aetiology as per clinical suspicion. Routine tests like DC, TLC, MP and ICT for malaria were conducted in the field / in the Rayagada field unit lab. Patients were provided treatment by the physician as per the clinical diagnosis. Samples were then transported to RMRC lab for bacteriological analysis and virological tests.

Results

The sex ratio of the study population was found to be 1130. Less than 15 yrs. population constituted 30% of the total population. The older age group (>50 yrs) constituted around 8% of the population. The illness summary revealed that 20% of the population were affected with some sort of illness in last fortnight, out of which fever constituted around 47 % of the total morbidity. The prevalence of fever was found to be higher in >60 yrs age group. Among the fever cases Respiratory Tract Infection (RTI) constituted 62% and Malaria constituted 22 % of the total cases. In the 0-5 yrs age group RTI was the most important cause of fever followed by Malaria. Around 50 % cases presented with fever for more than 7 days duration. Of the total malaria cases reported Pf constituted the

major component constituting around 74% of the total malaria cases.

Among throat swab tested for respiratory tract infections, bacterial pathogens were isolated in 75% of cases that included S Pneumoniae, Hib, and Staphylococcus aureus. Viral infection was accompanied with the above bacterial pathogens in 20% of cases. Viruses identified by real time PCR were Corona and Para. Samples tested from cases presenting with diarrhoea revealed 30% of bacterial pathogens in 30 cases. E Coli was the organism in all the cases.None of the samples was positive for Rota, Adeno, Astro tested by ELISA.

The health seeking behaviour has shown that 82% preferred to seek treatment from traditional practitioner and rest preferred for Quacks (72%) , ASHA / AWW (62%) and PHC (42%). It was noted that average delay in treatment seeking after onset of illness was 2-3 days in the population.

The above pilot study has given idea on pattern of febrile illness and treatment seeking of the tribal population. It is further planned for a strategy development to effectively diagnose and treat the fever cases in the health system reducing the gap of initiating treatment, thereby reducing the days of morbidityandmortality.

D. Accreditation of TB Lab:

The tuberculosis culture and DST laboratory of RMRC, Bhubaneswar was accredited by Central TB Division, Govt. of India in May 2012.

E. Activities of NNMB Unit, Odisha

(Team : Dr. A. Mohanta, Ms. S. Paikaray, Ms. H. Sahoo, Miss. K. Swain)

The National Nutrition Monitoring Bureau (NNMB) established in 1972 by Indian ICMR in 10 states including Odisha. The NNMB has been

Sl. No.	Name of District	No. of Tahasil	No. of Village	HHs Surveyed	Diet Survey	Fasting blood glucose	DBS
1.	Balangir	9	12	240	120	101	101
2.	Balasore	11	14	280	140	216	216
3.	Baudh	3	10	200	100	117	117
4.	Cuttack	7	10	200	100	150	150
5.	Ganjam	11	18	360	180	223	223
6.	Jagatsingpur	2	6	120	60	147	147
7.	Jajpur	4	7	140	70	119	119
8.	Kalahandi	7	12	240	120	60	60
9.	Keonjhar	8	14	280	140	142	142
10.	Mayurbhanj	5	6	120	60	108	108
11.	Sundergarh	8	11	220	110	170	170
Total		**75**	**120**	**2400**	**1200**	**1553**	**1553**

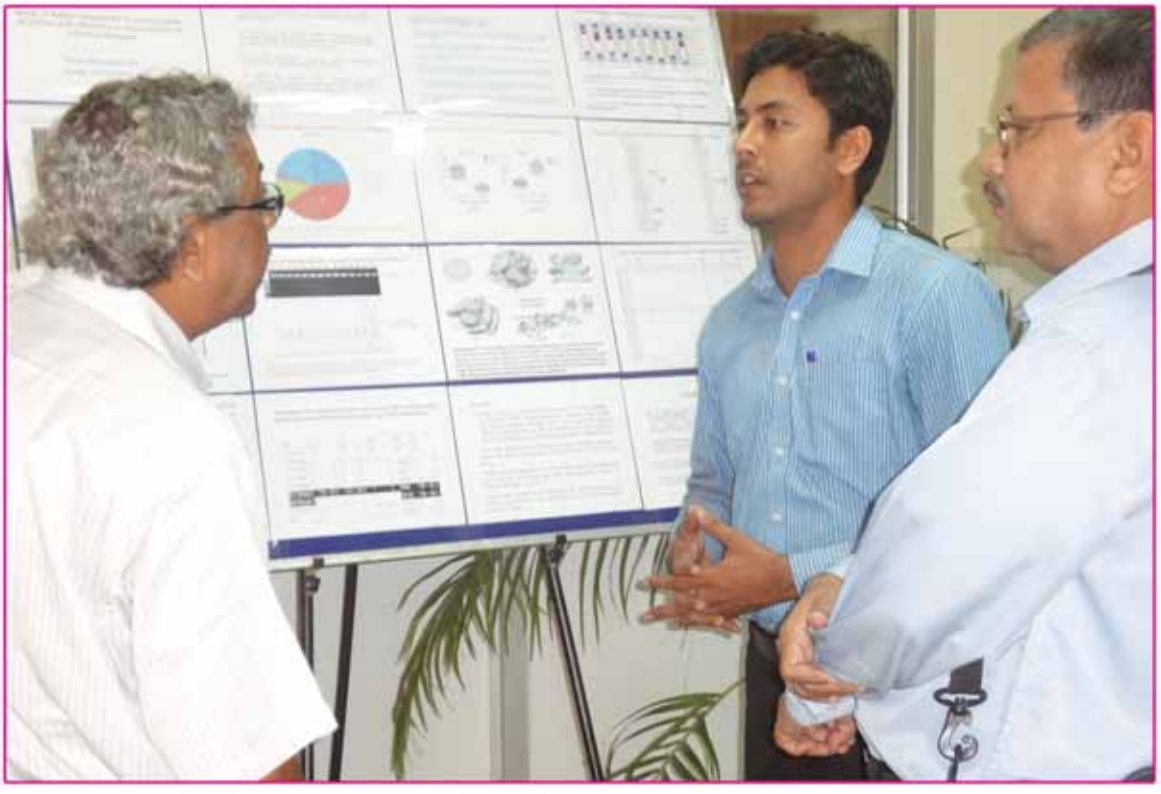
carrying out Diet and Nutrition surveys on a regular basis in Rural, Tribal and Urban areas. This Unit has completed the 3rd Rural Repeat Survey entitled "Assessment of Diet and Nutritional status of Rural population and prevalence of Hypertension and Type 2 Diabetes mellitus among adults (e" 18 years)" from August 2009 to January 2012 as per targets provided by NNMB, Central References Laboratory, NIN, Hyderabad. The survey covered households (HHs) demographic, clinical examination for nutritional deficiency, anthropometry, KAP on Iron Deficiency Anaemia/ Hypertension / diabetes among adults. Infant and young child feeding practices (< 3 years children) and blood sugar also collected, and dry blood samples (DBS) for genetic study. The data collected on sample of 2400 HHs, diet survey on 1200 HHs, 1553 DBS and fasting blood sugar estimations.

The NNMB, CRL proposed to carry out the Urban Survey entitled **"Assessment of prevalence and determinants of over weight and obesity, hypertension, diabetes mellitus among Urban adults"** in 5 selected cities of Odisha (above 1 lakh population) that include Bhubaneswar, Balasore, Sambalpur, Baripada and Rourkela. The NNMB staff undergone orientation training on the proposed methodologies during February 22 to March 2, 2012 and subsequently by laboratory technician during June 4-8, 20012. The study wards, Census Enumeration Blocks (CEB) were identified from each selected cities. The urban survey is yet to be initiated after receiving required equipments from CRL, NIN.

Students in RMRC Library

Works of Ph.D Scholars

Poster presentation by Ph.D Scholars during SAC Meeting



1. Role of B1 lymphocytes and autoantibodies in human lymphatic filariasis.

Research Scholar : Rashmi Mishra

Guide : Dr.A.K.Satapathy

Status : ICMR (SRF)

Objectives

1. To study the profile of B1 cell in filarial infected human population.
2. To study the association of poly-reactive antibodies with B1 cells in different clinical groups of filarial patients.
3. To study the role of B1 cells in cytokine response by filarial carbohydrate and protein antigens in human fileriasis.
4. To study the Fas-FasL expression profile of B1 lymphocytes and its immune regulatory role in mediating CD4+ T-cell apoptosis in human filariasis.

Work progress

B1 lymphocytes play an important role in innate as well as in adaptive immune response. B1 cells have been shown to produce polyspecific autoantibodies mostly of IgM against ssDNA, actin myosin and LPS. As B1 cells play role in outcome of several infections but the status and clinical manifestation is still to be investigated. We have studied different antibody (such as IgM, IgG and IGg2) responses to filarial protein and carbohydrates in different clinical spectrum of human bancroftian filariasis. Several study point towards a host protective role for antibodies to carbohydrate antigens in human lymphatic filariasis. In this present study a significant low IgG, and IgM antibody respone to carbohydrate antigen was found in case of microfilaremic carrier compared to endemic normal and chronic cases (Fig.1 and 3). IgG2 levels to filarial carbohydrate were significantly more in CFA negative cases i.e in case of endemic normal and chronic cases(Fig.2). This

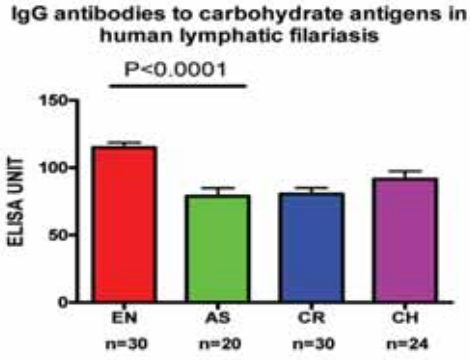


Fig.1

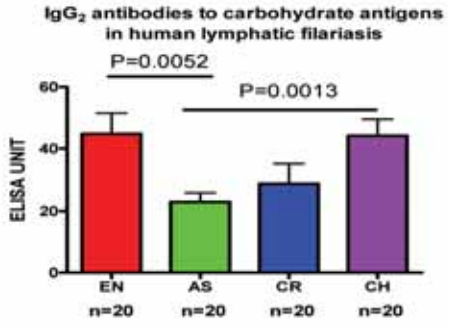


Fig.2

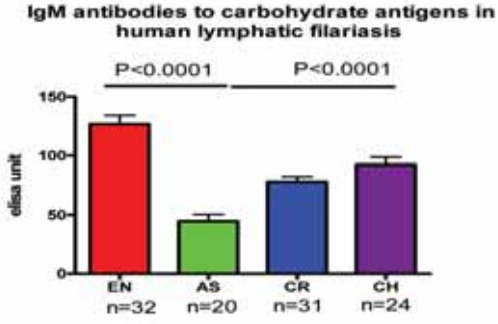


Fig.3

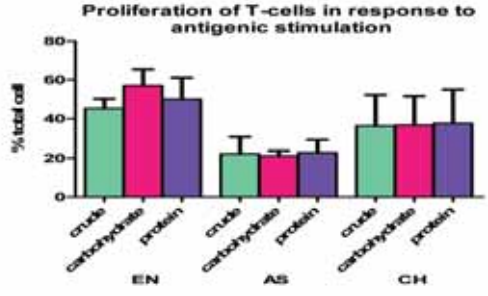


Fig.4

study lead us to investigate whether stimulation with filarial carbohydrate and fil.protein to purified peripheral blood mononuclear cell shows any significant lymphocytic (i.e T-lymphocyte and B-lymphocyte) cell proliferation.

Down-regulated inflammatory responses are observed in chronic infectious diseases. From the literature it is clear that peripheral mononuclear cells show poor antigen-specific T-cell proliferation in lymphatic filariasis as well as in schistosomiasis. With respect to cytokines both Th1 and Th2 type products are down regulated during chronic infection. Subjects carrying recent infection are characterized by strong proliferation to parasite antigen and IFN-ã production than increased length of exposure to infection. In this present experiment PBMCs (Peripheral blood mononuclear cells) were isolated by gradient centrifugation by using lymphocyte separation medium. The purified PBMCs were stained with CFSE (Carboxyfluorescein diacetate succinimidyl ester). About 1×10^6cells/ml were incubated with 1.25µM CFSE for 10 min at 37p C and stimulated with purified protein, carbohydrate and crude antigen of *S.digitata* at a concentration of 10µg/ml. We have found comparatively high T-cell proliferation to carbohydrate antigen than crude and protein antigen in case of endemic normals but no such remarkable difference found in case of chronic pathology(Fig.4), which shows a reduction in warm load results in enhanced proliferative responses. In microfilaremic cases a down regulatory T-cell proliferation was found in all the three antigenic stimulation. The T-cell proliferation was found significantly low compared to endemic normals. A remarkable feature

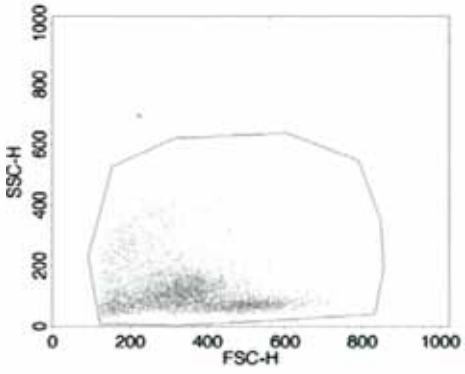


Fig-5a

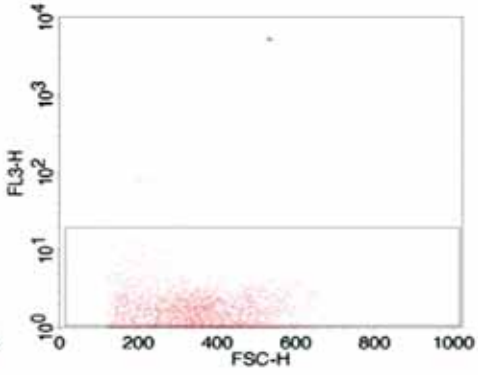


Fig-5b

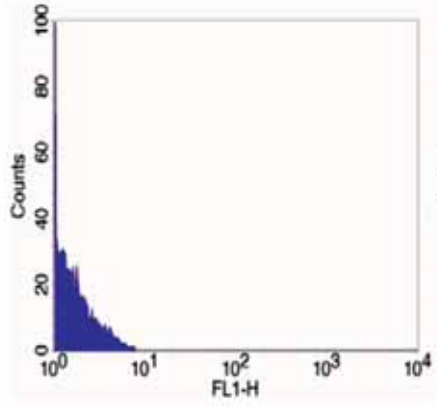


Fig-5c

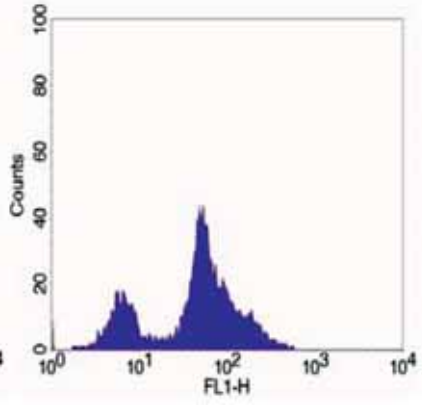


Fig-5d

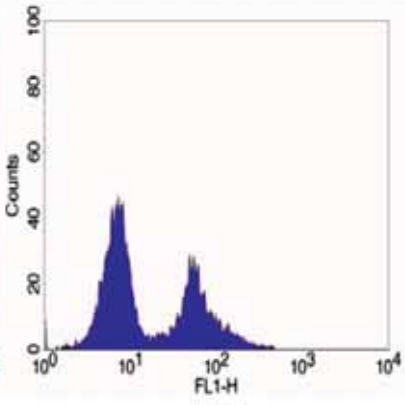


Fig-5e

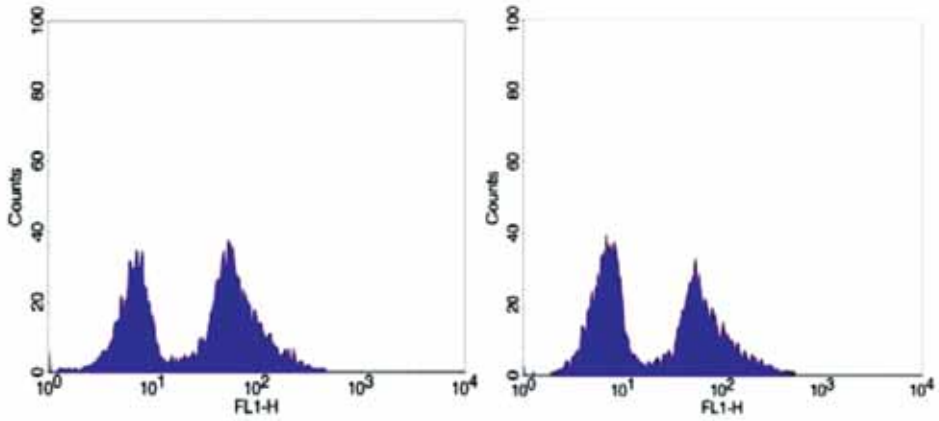


Fig-5f **Fig-5g**

Fig.5. Flow- cytometry analysis of the lymphocyte proliferation in a healthy subject.

of fileriasis is the spesific T-cell hyporesponsiveness to filarial antigen that is found in microfilaremic individuals carrying parasites in their blood. This leads to the concept that filarial parasites induce some degree of antigen specific immunological tolerance that may enhance parasite survival within an immune competent host.

[PBMCs were labeled with CFSE prior to culture and stimulated for upto 3days with 10ug/ml PHA (Fig 5e), purified carbohydrate (Fig 5f) and protein antigen (Fig 5g). Fluorescence histogram showing viable stained (Fig 5d) and unstained (Fig 5c) control cells. At the indicated time point, the cells were collected and analysed on a FACS Calibur flow-cytometer. Viable lymphocytes and monocytes selected on the basis of their size (FSC) and granularity (SSC) characteristics (Fig 5a). Cells were stained with propidium iodide and dead cells were gated in Fl-3 region and CFSE fluorescence on the horizontal axes (Fig 5b). Shifting of cells to left shows the T-cell proliferation by decreasing CFSE intensity in different antigenic stimulation.]

The presence of infection is associated with strong down-regulation of T-cell proliferation and parasite antigen. It has been established that in different clinical groups not only proliferation but also IFN-ã release is highly suppressed in microfilaremic persons. This down modulation involves enhanced production of suppressive cytokines such as IL-10 and TGF-beta. Since B1 cells are known to produce IL-10, the role played by B1 cell in host protection in human filariasis is being investigated.

2. Investigation on effect of maternal infection on humoral and cellular immune response of neonates in lymphatic filariasis.

Research Scholar : K Gopinath Achary
Guide : Dr. Ashok Kumar Satapathy
Status : SRF(ICMR)

Introduction

Women commonly harbor filarial infections during their child bearing years, raising the possibility that the developing fetus may be exposed to filarial antigens in utero and thereby have altered immunity and susceptibility to infection during early childhood (Malhotra et al, 2003). Placental transfer of filarial antigens and prenatal exposure develop a state of tolerant in the offspring diminishing the anti filarial immune reactivity and making them more susceptible to infection than offspring of uninfected mothers

(Haque et al, 1982) and affects development of subsequent immune responses. Th1 cytokines such as IL-2, IFN-ã and enhanced lymphocyte proliferation responses have been proposed to contribute to partial immunity in lymphatic filariasis (Malhotra et al, 2003). Such responses could be down regulated by IL-10 or TGF-B, which are produced by innate immune cells in response to pathogen-derived molecules (Redpath et al, 2001 & Reed et al, 1999) or indirectly through the generation of regulatory T cells, there by rendering such individuals more susceptible to infection.

Objectives

1. To study the humoral immunological responses to filarial antigens (Water soluble, detergent soluble and excretory secretory antigens) in cord blood samples of offspring and in corresponding mothers.
2. To evaluate the influence of maternal infection on filarial antigen induced cellular responsiveness and cytokine production in cord bloods of neonates.
3. To compare the expression profile of antigen-specific and non-specific cell mediated immune cells in cord blood samples of offspring and in corresponding mothers.
4. Characterization of the antigen responsible for in-utero sensitization of fetal immune cells.

Work Progress

All the samples were separated into 3 groups according to the CFA status of the mother and its respective cord blood i.e. Both positive group: Mother and its respective cord blood were CFA positive (Both Positive: M+ C+); Mother positive group: Mother was CFA positive and its respective cord blood was CFA negative (M+ C-); Both Negative group: Mother and its respective cord blood were CFA negative (M- C-).

Filarial specific IgG subclass antibodies response: Previously filarial specific IgG subclasses were quantified in both maternal and cord sera by ELISA. Some studies reported the transpalcental transfer of IgG subclasses so to have a clear picture for transfer of antigens and antibodies from mother to cord, qualitative assessment of IgG3 and IgG4 were done by western blotting shown in figure-1.

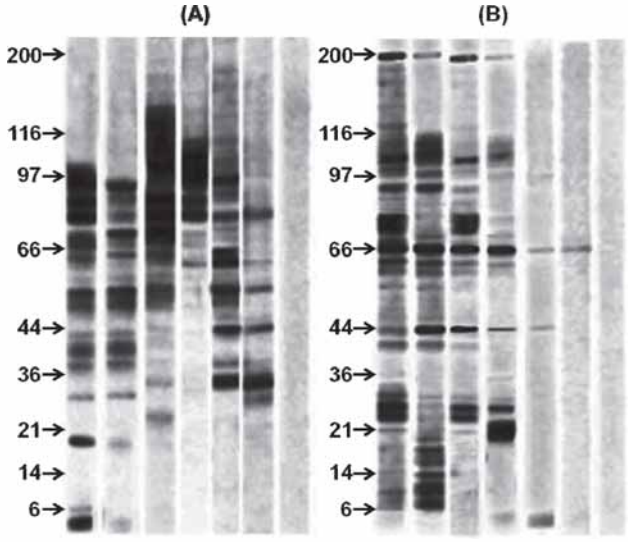


Fig.-1: Recognition profile of the filarial antigens by maternal blood serum and cord blood serum samples from all the three groups. (A): IgG3. (B): IgG4. Lane 1-2, mother and cord of M+C+ group; Lane 3-4, mother and cord of M+C- group; Lane 5-6, mother and cord of M-C- group; Lane 7, Non endemic normal serum.

The percentage of similarity of recognition pattern in cord blood serum pool with maternal blood serum pool was high for IgG3 response than IgG4 in all three groups which indicates that the transfer of filarial specific IgG3 was more vigorous than IgG4 in filarial infection. It was found that cords have shown more IgG4 response than mothers in form of stronger bands against some lower molecular weight antigens and this type of response was found to be high in M+C+ group than M+C- group which indicates that in M+C+ group when there is a transpalcental transfer of antigens and antibodies against those antigens occur then cord responds more to that particular antigen compared to mothers as it may be due to a

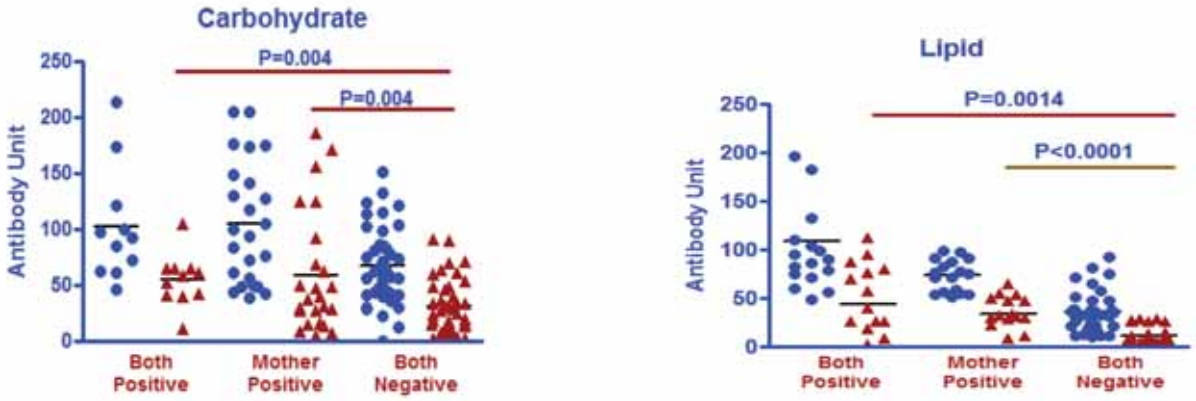


Fig.-2: Filarial specific IgG Response against purified Carbohydrate and Lipid antigen

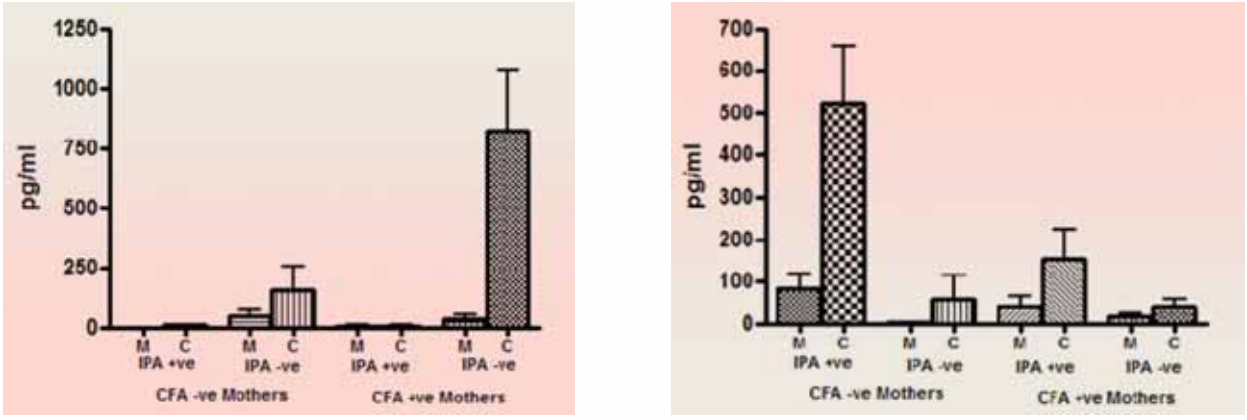


Fig.-3: Plasma level of cytokine IL-10 (a) and IFN-g (b) in mother and their respective cord blood samples obtained from newborns of women with (CFA +ve) or without (CFA –ve) filarial infection. The groups were further stratified according to anti-sheath antibodies positive (IPA +ve) and negative (IPA -ve) status. Bars represent geometric mean ± SE values. M – mother, C- cord blood

combined response of their own along with the acquired antibodies from mother. However, IgG3 response in cord bloods and mothers were found to be approximately similar. This is a major finding indicating that transpalcental transfer of filarial specific IgG4 and filarial antigens occurs more when the adult filarial worm burden was high in mothers while transpalcental transfer of filarial specific IgG3 occurs more in endemic normal population. From all the above results it can be hypothesized that apart from the antibodies acquired from the mothers, cords can produce some antibodies against filarial antigens by their own due to in-utero sensitization.

IgG response against purified carbohydrate and lipid is significantly higher in children born from infected mothers than children born from uninfected mothers in all groups as shown in figure-2.

To evaluate the influence of maternal infection on the anti-sheath antibodies and cytokine production in neonates, mothers and their respective cords were examined which is shown in figure-3.

Anti-sheath antibodies were detected in about 69.5% of uninfected mothers and their cords, and 16.6 % of cords from infected mother. IL-10 levels were significantly high in cord bloods of infected mothers

than that of uninfected mothers and elevated levels of IL-10 was observed in anti-sheath negative cord blood irrespective of the infection status of the mothers. In contrast, levels of IFN-ã were significantly higher in cord bloods of uninfected mothers than that of infected mothers. IFN-ã levels were higher in anti-sheath positive cords irrespective of infection status of mothers. The study provides evidence that presence / absence of anti-sheath antibodies with the association of cytokines in the neonates skewed the filarial specific immunity to either Th1 or Th2 responses which could affects the natural history of filariasis during childhood.

Last year we reported that $CD4^+CD25^+$ known as natural T regulatory cells were found high in cord samples of filarial infected mothers compared to cord blood of uninfected mothers. This year we studied the changes in $CD8^+$ cells (Cyto-toxic T Cells) and have shown a population of $CD8^+$ T cells characterized by expression of CD25 known as induced regulatory T cells. Levels of CD8+CD25+ regulatory T cells were found significantly high in infected mothers and their children compared to uninfected mothers and their children. However the children born from infected mothers are showing high levels of CD8+CD25+ compared to their mothers. High induced T regulatory cells found in cords of infected mothers compared to cords of uninfected mothers indicate in utero sensitization of neonates by maternal filarial infection.

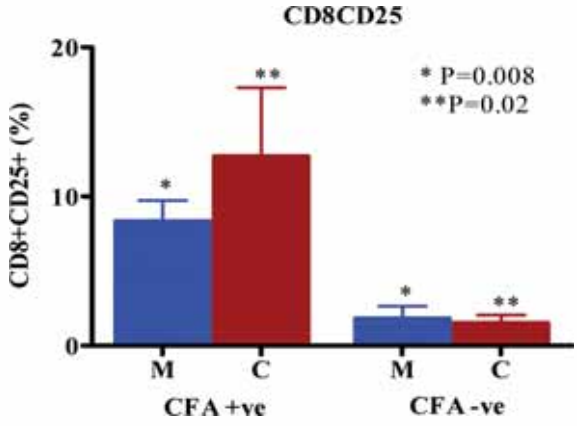


Fig.-4: levels of CD8+ cells expressing CD25.

It was observed that cells expressing only CD8+ found significantly high in uninfected mothers and neonates born from them compared to the uninfected mothers and their children. CD8+ cytotoxic T lymphocytes are known as antigen specific cell mediated immune cells. So to know the role of antigen non specific cell mediated immune cells in filarial infection we have investigated Natural killer cells (NK cells) in both mother and cord blood of newborns which was shown in figure-3. Previously it was reported by Babu et al, 1998 that host NK cells are required for the growth of human filarial parasite further it was reported by the same in 2007 that filarial parasites induce and activate NK cells in early stage of infection and subsequently cause apoptotic cell death of NK cells.

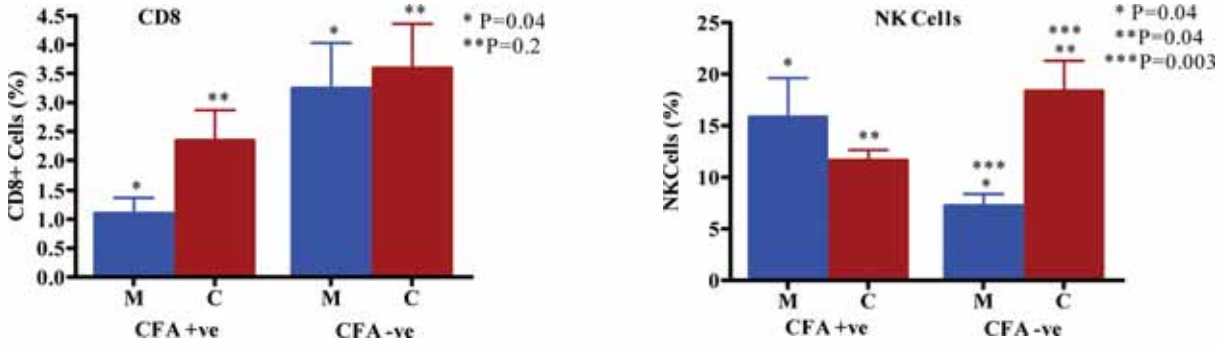


Fig.-5: Levels of $CD8^+$ and NK cells in mother and cord blood according to infection status.

NK cells were significantly high in infected mothers than uninfected mothers whereas in cord blood it was significantly high in cords born from uninfected mothers than the cords born from infected mothers. In uninfected group it was significantly high in cords than mothers. High NK cells in infected mothers indicate that it helps the filarial parasite for its survival as reported by Babu et al.

To evaluate the influence of maternal filarial infection on mitogen and filarial antigen induced cellular responsiveness in cord blood of neonates, we cultured Peripheral blood mononuclear cells (PBMC) and cord blood mononuclear cells (CBMC) by inducing with mitogen and different filarial antigens (Crude, Excretory secretory, Purified carbohydrate and purified protein). CBMC and PBMC were separted from whole blood and statined with CFSE before culture. The stained cells were cultured for 72 hours under stimulation with mitogen and different filarial antigens. Then the cultured cells were stained with Propidium Iodide to exclude the dead cells and proliferation was measured by flowcytometer.

Summary

- Apart from the antibodies acquired from the mothers, cords produce their own antibodies against filarial antigens due to in-utero sensitization.
- Presence / absence of anti-sheath antibodies with the association of cytokines in the neonates skewed the filarial specific immunity to either Th1 or Th2 responses which could affects the natural history of filariasis during childhood.
- Increased levels of T- regulatory cell (CD8+ CD25+high) population detected in cord blood of filarial infected mother compared to uninfected mothers indicating down regulation

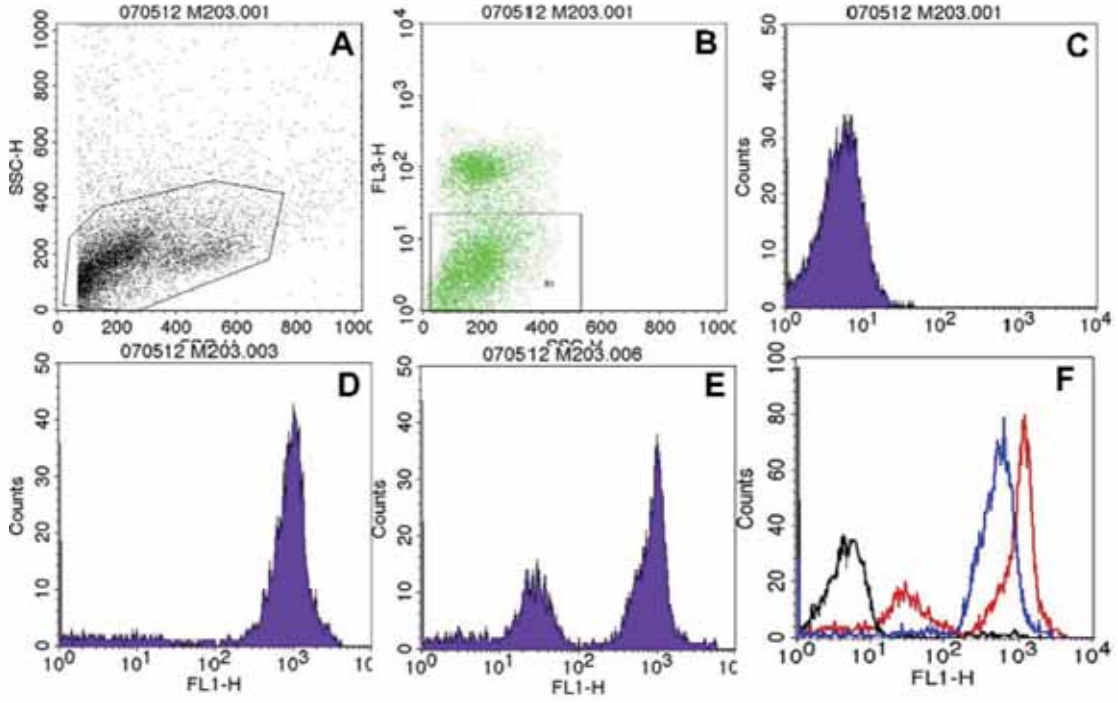


Fig.-6: A: Getting of cultured CBMCs, B: Getting of Live CBMCs by excluding dead cells stained with Propidium iodide, C: Histogram showing unstained CBMCs, D: Histogram showing non-proliferated CBMCs stained with CFSE, E: Histogram showing Proliferated CBMCs stained with CFSE, F: Histogram showing overlay of unstained CBMCs (BLACK), stained un-proliferated CBMCs (BLUE) and proliferated CBMCs (RED).

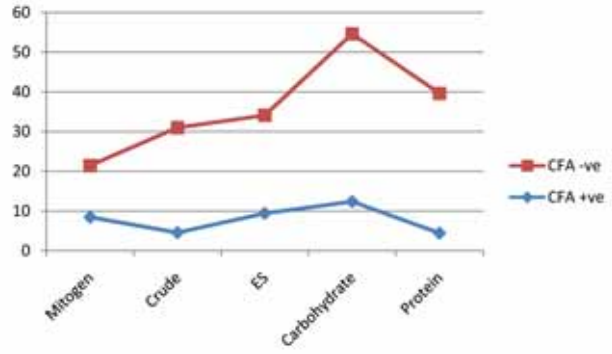


Fig.-7: Cell proliferation of CBMC induced with mitogen and antigens of filarial parasite. CBMCc from uninfected mothers have shown significantly high proliferative response to filarial antigens compared to CBMCs from uninfected mothers. The proliferative response to purified carbohydrate antigen was significantly high in CBMCs of uninfected mother. However the extent of proliferation, stimulated with mitogen (PHA) was found to be similar in CBMCs of both uninfected and infected mothers. CBMCs of infected mothers have shown high proliferative response to purified carbohydrate antigen compared to other antigens. This indicates that CBMC of infected mothers become tolerant to filarial crude and ES antigen which may be due pre-exposure in the womb however some stimulation occurs with carbohydrate antigens.

of Th1 response in cord blood of infected mothers by antigen induced T regulatory cells.

- Antigen specific and non specific cell mediated immune cells were found high in cords of uninfected mothers than cords of infected mothers.
- CBMC of infected mothers become tolerant to filarial crude and ES antigen which may be due pre-exposure in the womb however some stimulation occurs with carbohydrate antigens.

3. Study of Aedes mosquitoes in various parts of Orissa with reference to transmission of arboviral disease.

Research Scholar	:	Biswadeep Das
Guide	:	Dr. R.K.Hazra
Status	:	SRF(ICMR)
Date of joining	:	January 2010.

Objectives

i. To study the distribution and bionomics of Aedes mosquitoes involved in disease transmission in different parts of Orissa.

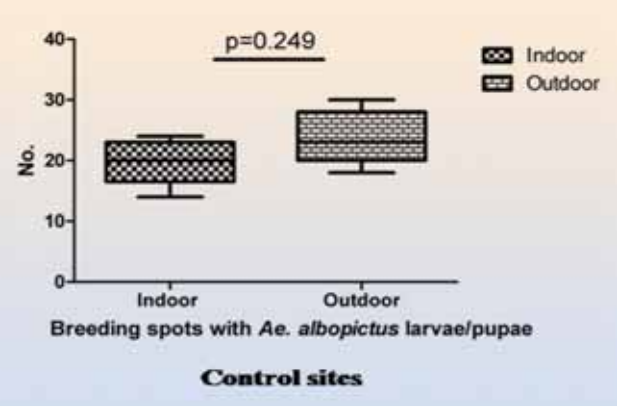
ii. To develop a molecular method for identifying the immature stages of different Aedes mosquitoes that will be collected from various parts of Orisaa.

iii To identify pathogenic viruses in Aedes mosquitoes collected from different regions of Orissa by molecular methods.

iv. To study the polymorphisms in genes primarily responsible for inducing immune response in Aedes mosquitoes against infections and to establish phylogenetic relationship between them.

Work progress

In the previous report, comprehensive entomological survey was undertaken in the coastal areas of Orissa and a multiplex PCR was developed to distinguish the three Aedes species commonly found: *Ae. albopictus*, *Ae. aegypti* and *Ae. vittatus*. Discarded tires were the main Aedes breeding spots and *Ae. albopictus* are the most abundant species. Chikungunya and dengue outbreaks were surveyed in the several areas and studies revealed that both the diseases are transmitted among humans by *Ae. aegypti* and *Ae. albopictus* which are anthropophilic mosquitoes and are peridomestic. In this report, the molecular aspects of chikungunya and dengue virus and arboviral vector are discussed in relevance to transmission of the diseases. Detailed entomological and virological analyses was performed in specific areas of the arboviral affected districts, particularly the coastal and some central tableland districts. In each study site, we classified the site into case sites (arboviral affected sites) and control sites (arboviral unaffected sites). Entomological analyses revealed that *Ae. aegypti* and *Ae. albopictus* were the chief



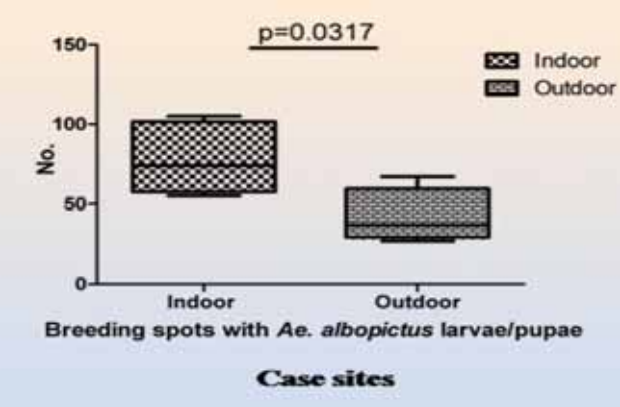


Fig 1

arboviral vectors. Indoor breeding spots, viz. clay items contributed maximum *Aedes* species in the case sites and most Aedes were collected from outdoor breeding spots, i.e., tires, tanks, discarded plastic, glass, etc from control sites. The findings were further supported by non parametric statistical analyses which suggested that indoor containers were the prime breeding sites in arboviral affected areas (Fig 1). Such type of adaptation by *Aedes sp.* to indoor/ domestic environment will trigger increased human-vector contacts that will presumably stimulate feeding behavior and thus will produce more competent vectors. This behavioral change will lead to increased vectorial capacity and enhance its ability to transmit different arboviral strains, thereby leading to more severe epidemics.

Molecular investigations of chikungunya virus during several outbreaks in Odisha revealed the circulation of a unique strain, Indian Ocean Lineage (IOL) which was further subdivided into Indian subcontinent and Indian Ocean clades. IOL strain

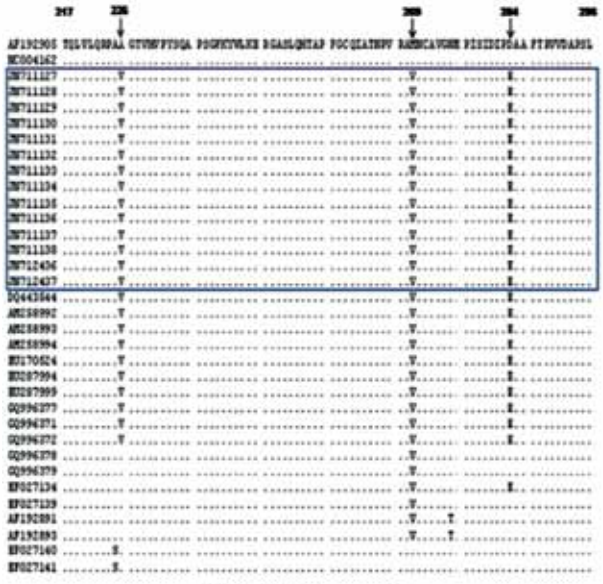


Fig 2(E1 gene)

Fig 2(E1 gene)

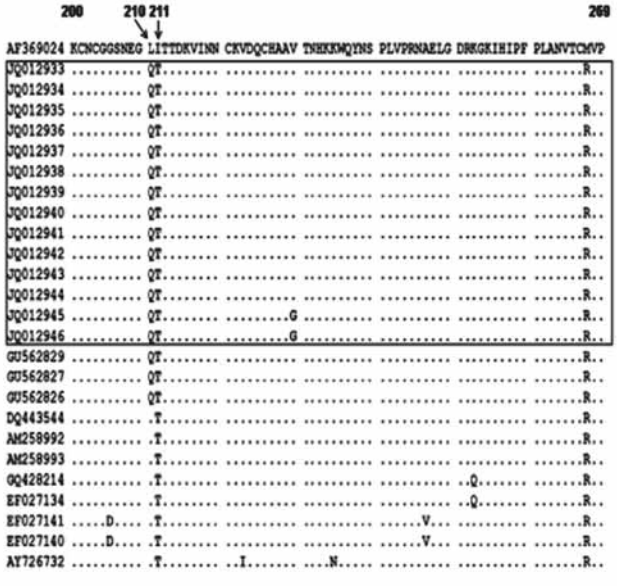


Fig 3(E2 gene)

Fig 3(E2 gene)

Demographic and clinical factors associated with CHIKV positive and CHIKV negative cases.

Demographic and clinical factors	CHIKV +ve cases (n = 135)	CHIKV –ve cases (n = 85)	p-value
Age (years) mean ± SD	38.7 ± 14.6	28.9 ± 15.6	<0.0001*
Male: female ratio	71:64	48:37	0.58$^{\Delta}$ (NS)
Painful polyarthralgia	111	40	<0.0001$^{\Delta}$
Body temperature mean ± SD	39.0 ± 0.9	38.8 ± 0.8	0.095* (NS)

NS: Not significant.

Fig 4

originated from the ECSA genotype of CHIKV which was supposed to be the predominant strain circulating in India since 2006. It was supposed to be originated from Kenya, 2004. The CHIKV strains from Odisha possessed the primary adaptive mutation, E1-A226V along with second step adaptive mutations, E2-L210Q and E2-I211E that epistatically modulated the E1-A226V mutation to incerese the transmissibility of CHIKV by *Ae. albopictus* by enhancing the rapid dissemination of virion particles in the salivary gland of the vector. Other mutations detected in the E1 gene were E1-M269V and E1-D284E, although they have not been reported to play any role in CHIKV transmission (Fig 2 & 3).

Clinical analyses by using random sampling methods and two tailed t tests showed that middle aged adults (38 yrs) and painful polyarthralgia were the most significantly associated with chikungunya disease occurrence (Fig 4).

Recombination frequency by which the RNA viruses tend to evolve and mutate was assessed by preliminary analyses using a whole set of viral isolates from India and around the world. Although a comprehensive analysis is yet to be achieved, preliminary results showed that 1953 Tanzania (Ross) strain can be considered as first parent, Kenya strains as second parent and the recent Indian strains as daughter (recombinants) (Fig 5). Maximum recombination was observed in the structural region which indicates that this region is prone to genetic evolution thereby depicting impeccable targets in the virus for potential drug and vaccine delivery. Further work is essential particularly on immunogenic epitopes for complete characterization of the regions that will pave a path for drug and vaccine discovery.

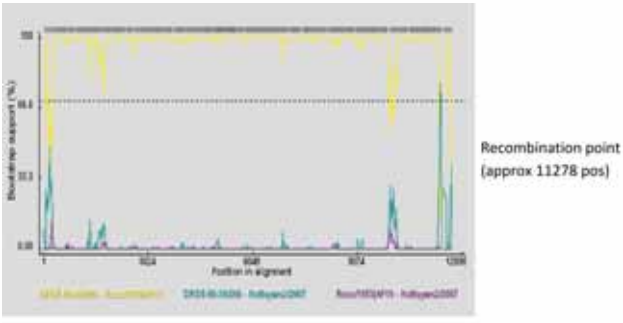


Fig 5

Fig 5

Phylogenetic analyses of isolates of dengue virus obtained from Odisha showed that it was grouped under genotype IV which is supposed to the main cause for dengue haemorrhagic fever in most parts of India (Fig 5).

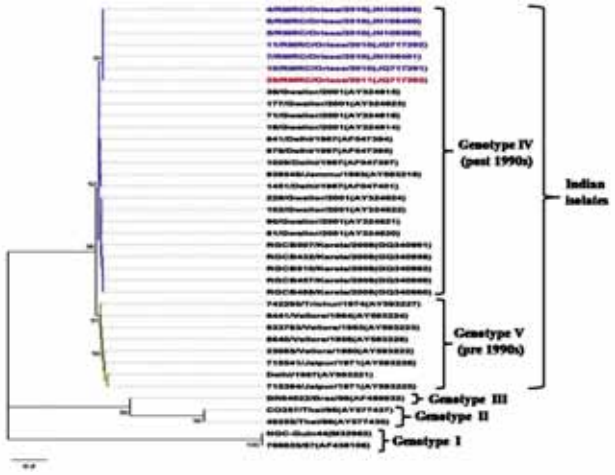


Fig 5

4. Studies on Genetic Aspects of Essential Hypertension in Different Population Groups of Odisha.

Research Scholar	:	Manisha Patnaik
Guide	:	Dr. M. R. Ranjit,
Co-Guide	:	Dr. B. Dwibedi
Status	:	JRF (CSIR)
Date of Joining	:	24th Sept. 2009

Introduction

Hypertension is a pathophysiological condition in which the blood pressure remains abnormally higher than normal. There are two classes of clinical hypertension: 1. Primary or Essential Hypertension: with unknown etiology which accounts for 90-95% cases and 2. Secondary Hypertension which results secondarily from renal disease, endocrine disorders, or other identifiable cause. Worldwide there were 972 million hypertensive adults in the year 2000 and is expected to reach 1.56 billion by 2025 (1). In India there were 65.5 million hypertensives in 2004 (2) and with the current rate of hypertension, it will have the largest number of people with hypertension in the world, with the potential of becoming the 'Hypertension capital of world' (3). In case of essential hypertension, there are both genetic and environmental factors involved. The candidate genes include those of Renin-Angiotensin-Aldosterone system (Renin, Angiotensinogen), Sympathetic Nervous System (Alpha and Beta adrenorecptors), Renal transporters (Na-K-2Cl cotransporter, Epithelial Sodium Channel), Vascular endothelium (endothelial Nitric Oxide Synthase, endothelin, Endothelin receptors A etc. and the environmental factors include obesity, high alcohol intake, high salt intake (in salt-sensitive patients), aging, sedentary lifestyle, stress, low potassium intake, low calcium intake, low dietary fiber etc. Genetic studies on essential hypertension have been carried out in different parts of India but no report is available for Orissa. Therefore, this study has been initiated. Angiotensin Converting Enzyme, Angiotensin Converting Enzyme 2, Endothelial Nitric Oxide Synthase (eNOS or NOS3) and 11 b-hydroxysteroid dehydrogenase 2 are some of the genes that have been studied worldwide and associations have been found with hypertension.

Angiotensin Converting Enzyme (dipeptidyl carboxypeptidase), a zinc metallopeptidase, has an important role in circulatory homeostasis, which catalyses the conversion of angiotensin I to angiotensin II, a potent vasoconstrictor, and through protease activity, inactivates bradykinin, a potent vasodilator (4). Insertion/deletion (I/D) polymorphism of a 287 bp Alu repeat sequence in intron 16 of the ACE gene is associated with altered plasma and serum ACE levels and plasma ACE activity. The DD genotype has been shown to have increased serum ACE production and activity while II and ID genotypes relate respectively to low and intermediate levels of protein production and activity. (5,6,7).

Endothelial Nitric Oxide Synthase (eNOS or NOS3) is responsible for production of nitric oxide (NO) from L-arginine. NO has various physiologic regulatory roles and is involved in smooth muscle relaxation and blood pressure regulation (8,9,10) and therefore NO deficiency induces vascular and cardiac hypertrophy and inhibition of eNOS reduces coronary flow and raises blood pressure(11,12). A 27 base pair VNTR (Variable Number of Tandem Repeats) sequence in intron 4 of eNOS gene has been identified which has two alleles: the longer allele with 5 tandem repeat units of 27 base pairs with first three having "A" and last 2 "G" at 19th position of the repeat unit "GAAGTCTAGACCTGCTGC(A/G) GGG GTGAG" is designated 4b and the smaller allele with 4 repeats having "A" and "G" in the first and last two repeats respectively at the same position is

designated 4a (13,14,15,16). Presence of allele a, rather than the wild-type allele b, has been shown to increase the expression of the enzyme but to reduce its activity (17). Another polymorphism which involves a G to T substitution at position 894 in the exon 7 region leading to a change from Glu at 298 position to an Asp, decreases the expression of the enzyme but has no effect on the activity (17,18). A second study has suggested that such a change causes the enzyme to undergo selective proteolysis (19). A third variant in the eNOS 5′-flanking/ promoter region gene has been identified. The variant is a result of a thymidine being replaced by a cytosine at nucleotide -786 (T-786C). It linked with decreased eNOS expression (20,21). All these three polymorphisms have been found to be associated with hypertension (22,23,24).

Angiotensin Converting Enzyme 2 is a monocarboxypeptidase (30) involved in the regulation of BP homeostasis and cardiac function. ACE2 converts angiotensin I to angiotensin1–9 and angiotensin II (Ang II) to angiotensin1–7 (Ang (1–7)) which has been reported to promote vasodilatation and counterbalance effects of Ang II. (25,26,27,28). A C to T point mutation in intron 1 has been found to be associated with hypertension. (29).

11 b-hydroxysteroid dehydrogenase 2 converts cortisol to the receptor-inactive cortisone, protects the non-selecive mineralocorticoid receptor from occupation by cortisol. Mutations in the HSD11B2 gene generating a compromised 11BHSD2 enzyme activity (31,32), as occurs in the syndrome of Apparent Mineralocorticoid excess (AME) lead to overstimulation of the mineralocorticoid receptor by cortisol and sodium retention, hypokalemia and high BP (33). An exonic base substitution G534A at codon 178 has been linked to raised blood pressure (34, 35)

Besides, associations with various blood groups and hemoglobin levels have also been observed. An apparent slight advantage in the AB group with respect to blood pressure has been regarded in one study (36) and in another case people with blood group B have been found to be more susceptible to pre-hypertension thus showing tendency to develop hypertension. (37). Also, it has been shown that the levels of hemoglobin varies between hypertensives and normotensives.(38, 39). Hence, this study also aims to investigate the association of these parameters with hypertension in Orissa population.

Objectives

1. To investigate the distribution of candidate gene polymorphisms associated with essential hypertension.
2. To find association of the studied polymorphisms with clinical expression of essential hypertension.

Methodology

2 ml blood was collected from the subjects by veinipuncture and stored in EDTA vials. Age, height and weight were recorded and BMI was calculated (weight in kilograms divided by the square height in meters). From fresh whole blood hemoglobin was estimated by cell counter and blood group was identified using a blood grouping kit. Plasma was then separated by centrifuging the blood at 3000 rpm for 3 minutes and stored at -20°C for biochemical analysis. Lipid profiling, blood glucose level analysis and and kidney function tests (urea and creatinine) were done using an autoanalyser. Hemoglobin was estimated by running the fresh blood in a cell counter. DNA was isolated using phenol chloroform method and used to study the polymorphisms.

The data was statistically analysed.

The primer sequences, PCR conditions and restriction enzymes (in cases of PCR-RFLP protocols) have been tabulated below.

Table 1: Primer sequences, PCR conditions and restriction enzymes for the polymorphisms analysed.

Sl. No.	Gene	Polymorphism	Method	Primers	Annealing Temp. (°C)	Enzyme
1.	ACE	I/D (intron 16)	PCR	F:5'CTGGAGACCACTCCCATCCTTTCT3' R:5'GATGTGGCCATCACATTCGTCAC3'	66	-
2.	ACE2	Intron1 C>T	PCR-RFLP	F:5'GAAAGCCAGATGCTTTAACAAG3' R:5'TTTTTCCATATCTCTATCTGATCG3'	55	Taq1
3.	eNOS	Intron 4a/4b	PCR	F:5'AGGCCCTATGGTAGTGCCTTT3' R:5'TCTCTTAGTGCTGTGGTCAC3'	54	-
4.	eNOS	G894T	PCR-RFLP	F:5'CATGAGGCTCAGCCCCAGAAC3' R:5'AGTCAATCCCTTTGGTGCTCAC3'	59	MboI
5.	eNOS	T-786C	PCR-RFLP	F:5'ATGCTCCCACCAGGGCATCA3' R:5'GTCCTTGAGTCTGACATTAGGG3'	61	NgO MIV
6.	11βHSD2	G534A	PCR-RFLP	F:5'AGGACACGGGGACTGGAAG3' R:5'GGGGGCTCCTTTTTGCTCC3'	58	AluI

Results

240 hypertensives (148 males and 92 females) and 189 normotensives (105 males and 84 females) were included. The subjects were age and sex matched. All subjects were genotyped for ACE and ACE2 polymorphisms. The rest polymorphisms have yet been analysed for only 100 samples. Genotype and allele frequencies were compared using chi square test or fisher's exact test. Significance difference was observed in case of ACE I/D polymorphism. It was found that DD polymorphism and the D genotype was associated with increased blood pressure. The ACE2 gene is located in the X chromosome, therefore the polymorphism was analysed separately for males and females. In females the frequency of CT genotype was significantly higher in controls than in subjects and a significant difference was also observed. No significant differences were found in case of the other polymorphisms which may be attributed to the small sample size. Further, it was observed that the homozygous mutant genotype of HSD11B2 G>A polymorphism i.e. AA genotype was not found at all and the A allele was only found in 2 cases (1 each in hypertensives and normotensives) amongst the 100 samples studied. More number of samples need to be analysed to find out if this mutation is extremely rare in Orissa population.

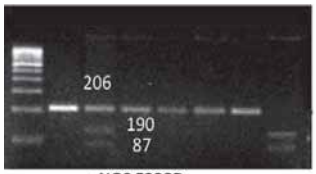
Table 2: Clinical Characteristics:

Characteristics	Hypertensives	Normotensives	p value
Mean Age +/- SEM	51.92+/-1.407	49.35+/-1.314	0.1923 (ns)
Male/Female	148/92	105/84	-
Diabetics	102/240	75/189	-
Mean BMI+/-SEM	23.31+/-0.472	22.92+/-0.432	0.5523 (ns)

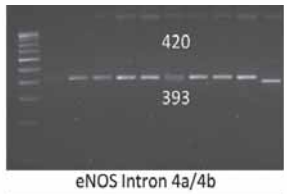
Gel Photographs

ACE I/D

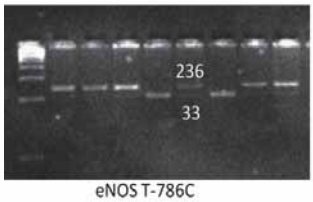
ACE 2 C>T



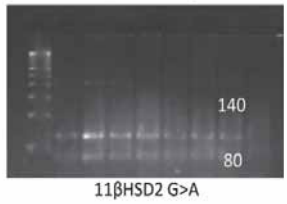
eNOS E298D



eNOS Intron 4a/4b



eNOS T-786C



11βHSD2 G>A

Table 4: Genotype distribution

Genotype	Hypertensives	Normotensives	Odds ratio (CI)	p value
ACE ID				
II	75	74	ref	
ID	88	83	0.9559 (0.62-1.48)	0.8407
DD	54	20	0.3754 (0.20-0.69)	**0.0013**
ID+DD	142	103	0.7352 (0.49-1.11)	0.1401
ACE2C>T				
Females				
CC	63	46	ref	
CT	10	23	3.150 (1.37-7.26)	**0.0056**
TT	14	8	0.7826 (0.30-2.02)	0.6118
CT+TT	24	31	1.769 (0.91-3.41)	0.0862
Males				
C	84	76	ref	
T	30	27	0.9947 (0.54-1.82)	0.9864

Genotype	Hypertensives	Normotensives	Odds ratio (CI)	p value
HSD11B2 G>A				
GG	43 (97.7%)	48 (0.980)	ref	
GA	1 (2.3%)	1 (2.0%)	0.89(0.54-14.77)	1.0
GA+AA	1+0 (2.3%)	1+0 (2.0%)	0.89(0.54-14.77)	1.0
eNOS VNTR 4a/4b				
bb	33 (0.63)	30 (0.67)	ref	
ab	14 (0.27)	11 (0.24)	0.86 (0.34-2.20)	0.76
ab+aa	19 (0.37)	15 (0.33)	0.87(0.38-2.009)	0.74
eNOS G894T				
GG	27 (0.6)	25 (0.54)	ref	
GT	18(0.4)	18 (0.39)	1.08 (0.46-2.53)	0.86
GT+TT	18(0.4)	21 (0.46)	1.26 (0.55-2.90)	0.59
eNOS T-786C				
TT	20 (0.5)	24 (0.69)	ref	
TC	13 (0.33)	8 (0.23)	0.51 (0.18-1.48)	0.21
TT+CC	20(0.5)	11 (0.31)	0.46 (0.18-1.18)	0.10

Table 5: Allele distribution.

Polymorphism	Allele	Hypertensives	Normotensives	Odds ratio (CI)	p Value
ACE I/D	I	238	231	ref	
	D	196	123	0.6466 (0.48-0.86)	**0.003**
ACE C>T (F)	C	136	115	ref	
	T	38	39	1.214 (0.73-2.02)	0.4573
ACE C>T (M)	C	84	76	ref	
	T	30	27	0.9947 (0.54-1.82)	0.9864

Polymorphism	Allele	Hypertensives	Normotensives	Odds ratio (CI)	p Value
eNOS G894T	G	72	68	ref	
	T	18	24	1.41 (0.70-2.83)	0.33
eNOS T-786C	T	53	56	ref	
	C	27	14	0.49 (0.23-1.04)	0.0594
eNOS 4a/4b	b	80	71	ref	
	a	24	19	0.89 (0.45-1.77)	0.74
HSD11B2 GA	G	87	97	ref	
	A	1	1	0.90 (0.06-14.57)	1.0

Summary

Age and sex matched subjects and controls were taken. DD genotype and D allele of ACE I/D polymorphism showed significant association with hypertension. The CT genotype of ACE2 C>T polymorphism was significantly higher in normotensives which has commonly been found to be associated with hypertension. No significant difference in genotype or allele distributions among hypertensives and normotensives on the other four polymorphisms. This may be attributed to the small sample size that was analysed. The homozygous mutant genotype of HSD11B2 G>A polymorphism i.e. AA was totally absent and the A allele was only found in 2 cases (1 each in hypertensives and normotensives) and a larger sample size analysis will be required to find out if this mutation is extremely rare in Orissa population.

Future plan

Sample size in each clinical category will be increased.

Data will be statistically analyzed.

More number of polymorphisms will be included.

5. A study on neurotropic viruses causing encephalitis in adults and children of odisha.

Research Scholar	:	Susil Kumar Rathore
Guide	:	Dr. B. Dwibedi
Status	:	JRF (ICMR)
Date of Joining	:	29th Dec. 2009

Introduction

Encephalitis is one of the life threatening diseases. It is the inflammation in the brain parenchyma resulting from the direct viral invasion or hypersensitivity initiated by virus or another foreign protein. Sudden fever, stiff neck, photophobia, confusion and convulsions are some characteristic symptoms of viral encephalitis.It can occur in the individuals of all age group. Generally children are more affected than adults, so also adults that have compromised immune system and elderly people. The major causative agents are viruses but bacteria, parasites, protozoa and fungi have also been reported. Viruses causing sporadic and endemic encephalitis throughout the world are Herpesvirus, Enterovirus(EV), Myxo/paramyxovirus, Togavirus and many Flaviviruses. In India the observed viruses are Flaviviruses Nipahvirus, Enteroviruses Chandipuravirus, Myxo/paramyxoviruses, Chikungunya and Herpesviruses.

Objectives

1. To identify the causative viral agents of encephalitis.
2. To study the clinical presentation in encephalitis due to different viruses.

Materials and Methods

526 Patients were enrolled for the study after being physically and clinically diagnosed by concerned physician. Clinical and demographic information were recorded on predesigned format together with physical examination. Samples (Serum/CSF) were collected as per standard guidelines of venipuncture and lumberpuncture. Samples were aliquoted and stored at -20^{0}C and -80^{0}C for serology and PCR respectively . Samples were subjected to serology and PCR. IgM ELISA were done for HSV I & II, Measles, Dengue,Varicella,enterovirus and JEV.

Results

Age and Sex

The study included 245 males and 75 females in pediatric group and 129 male and 70 female in adult group. The male to female ratio was 1.8 in pediatrics while 1 in adult. The mean age of male and female were 6.0 and7.1 in pediatrics whereas 41 and 38 in adults respectively .Pediatric groups were categorized

into three groups like 1month-5yr, 6yr-12yr and 13-17yr. Adults were classified in four groups those are 18-30,31-45yr,45-60yr and more than 60. The case distribution of encephalitis basing upon age and sex has been depicted in Figure1.

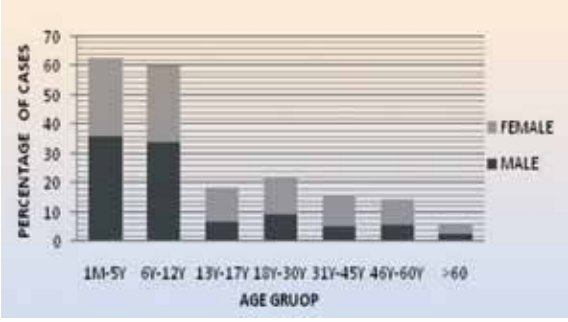


Fig.1 Distribution of cases basing upon Age and Sex

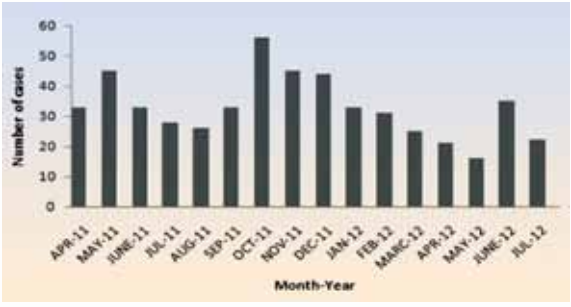


Fig.2 Seasonal distribution of cases due to viral encephalitis.

Seasonal Distribution

There was no such season specific incidence of encephalitis but cases of \jev were reported during post monsoon period of November whereas the cases due to HSV did not show any seasonality. During one year study all the seasons were covered and the number of cases month wise has been reported in Figure.2

Viral Etiologies

Viral etiologies were identified in 90(17.1%) patients out of 526 enrolled patients. The most common etiology was HSV infection (95.5 %) followed by 14(15.5%) in Measles and 8(8.8%) in JEV. Dengue was detected in 3 cases (3.3%) and 2 cases from VZV (2.2%) infection were identified.

Seven encephalitic patients suffering from Measles were also found to be positive for either IgM antibodies or PCR against HSV (2 HSV DNA PCR , 5 HSV I IgM). Single case of definite dual infection with Dengue and JEV was detected.

Conclusion

Viral etiology was identified in only 17% of the enrolled patients . Our study identified HSV, JEV and Measles as the most common etiologies in the

Table 2. Laboratory Diagnosis of the Viruses.

Pathogen	Detected by				Total	Percentage
	SEROLOGY		PCR			
	CSF	BLOOD	CSF	BLOOD		
HSV I		40			40	44.4
HSV II		25			25	27.7
HSV			21		21	23.3
MEASLES	7	7			14	15.5
JEV	7	1			8	8.8
DENGUE*	1	2		1	3	3.3
VARICELLA	1	1			2	2.2
ENTEROVIRUSES		1			1	1.1

*** One of the patient was found both NS1 antigen positive as well as PCR positive.**

Table 3. Clinical features of patient with viral encephalitis.

The clinical features of the viral encephalitis cases belonging to both diagnosed and undiagnosed have been tabulated below.

Clinical Features	Undiagnosed (N=436)	Diagnosed (N=90)
History of Fever	335(76%)	82(91%)
Headache	138(31%)	25(27%)
Vomiting	138(31)	27(30%)
Convulsion	205(47%)	39(43%)
Rash/Skin Eruption	24 (5%)	13(14%)
Mental disorientation	124(28%)	35(38%)
Meningeal signs	110(25%)	28(31%)

population of Eastern Odisha accounting for 95.5 %, 15.5% and 8.8 % in the diagnosed cases respectively.

Measles was second most common etiology in suspected viral encephalitis cases. All of the patients had the history or symptoms of rash. Seven cases due to HSV infection were observed in Measles patients having the manifestation of encephalitis

CNS manifestations are rare clinical complication of Dengue but are reported with an increasing frequency in endemic areas. Dengue was found in 3.3 % with suspected encephalitis. The cases were reported during the major Dengue outbreak during Sept-Nov,2011. The patients had thrombocytopenia along with the CNS involvement. One Dengue patient died without any hemorrhagic manifestation. The precise pathogenesis of Dengue associated CNS manifestation remain unclear. However Dengue remained as one of the neurotropic viruses causing encephalitis in rare cases.

6. Study on micronutrients malnutrition with special reference to vitamin A deficiency and its associations with other micronutrients among children in Odisha.

Research Scholar : Suchismita Behera

Guide : Dr. G. Bulliyya

Status : SRF (ICMR)

Date of Joining : 25th June 2009

Background

Vitamin A deficiency (VAD) is one the major public health nutritional problem, night blindness affects 5.2 million preschool children (0.9%) and 9.8 million pregnant women (7.8%) globally (WHO 2009). VAD is a public health problem in India including Orissa. Although VAD in form of clinical signs declined, sub-clinically remains to be of public health importance. It was found that 0.8% Indian children are suffering from clinical signs (Bitot's spot) of VAD, while sub-clinical VAD (low retinol <20ug/dl) affects 51% in India and 57% of children in Odisha. Vitamin A status is associated and influenced by several factors such as morbidity conditions like diarrhea, pneumonia, malaria etc. VA is correlated with many other nutrients. Iron deficiency deteriorates VA metabolism leading to a reduction in serum retinol. Adequate VA stores improve the mobilization of iron, driving to an increase in the intestinal absorption and utilization (Sommer & West 1996). Vitamin E effects vitamin A metabolism in tissues, and physiological effect of retinol homeostasis. Zinc status influences VA metabolism, absorption, transport and utilization. Oxidative conversion of retinol to retinal requires retinol dehydrogenase enzyme (Smith et al 1973). Other trace elements such as K, Cu etc play important roles in Vitamin A homeostasis. The present study is being conducted in assessing the vitamin A status and its association with other micronutrients in children in rural areas in Bhubaneswar block, Orissa

Objective

The objective is to study the vitamin A status and its association with micronutrients and major trace elements in children under 12 years of age.

Material and Methods

A cross sectional study conducted in a population of children below 12 years of age from

rural Bhubaneswar block. Demographic and anthropometric (height and weight) data collected from 700 children using standard equipments and procedures. A total 323 blood samples collected from children so far and serum samples preserved under -20°C for micronutrient estimations. Blood hemoglobin estimated by cyanomethamoglobin method and hematological parameters (RBC, WBC, Hct, MCV, MCHC etc) also estimated using MS4 cell counter. Vitamin A levels (serum retinol) were estimated by HPLC (Biery *et al* 1979). Serum vitamin E and vitamin C have been measured by HPLC and spectrophotometric methods respectively. Estimations of ferritin, C-reactive protein and transferrin receptor were done by ELISA methods. Trace elements (Br, K, Ca, Fe, Zn, Cu, Mn, S and Ni) were measured in a sample of 95 lyophilized blood using proton induced X-ray emission (PIXE) method at Institute of Physics, Bhubaneswar.

Work progress

A total of 700 children included in the study that include 305 preschool-aged (1-6y) and 395 school-aged (6-12y). Among pre-school children 29.5% have underweight (weight-for-age), 29.5% have stunting (Height- for-age) and 9.6% have wasting (weight-for-height) and 8.5% have thinness (BMI-for-age) (Table1). However, 22.1% and 33.5% of school children respectively have thinness and stunting (Table 2).

Table 1. Nutritional status of children d"5 years (pre-school) in rural Bhubaneswar block.

Malnutrition	Male n= 180	Female n= 125	Pooled n=305
Weight-for age			
Normal (>2SD)	65.5% (118)	77.6% (97)	70.5% (215)
Underweight (<-2SD)	34.5% (62)	22.4% (28)	29.5% (90)
Height-for-age			
Normal (>2SD)	65.5% (118)	77.6% (97)	70.5% (215)
Stunting (<-2SD)	34.5% (62)	22.4% (28)	29.5% (90)
Weight-for-height			
Normal (>2SD)	87.7% (158)	94.4% (118)	90.5% (276)
Wasting (<-2SD)	12.3% (22)	5.6% (7)	9.6% (29)
BMI-for-age			
Normal (>2SD)	88.3% (159)	96.0% (120)	91.5% (279)
Thinness (<-2SD)	11.7% (21)	4.0% (5)	8.5% (26)

Table 2. Nutritional status of school-age children in rural Bhubaneswar block.

Malnutrition	Male n = 158	Female n = 237	Pooled n = 395
BMI-for-age			
Normal (>2SD)	77.2% (122)	78.5% (186)	77.9% (308)
Thinness (<-2SD)	22.8% (36)	21.5% (51)	22.1% (87)
Height-for-age			
Normal (>2SD)	57.0% (90)	72.9% (173)	66.5% (263)
Stunting (<-2SD)	43.0% (68)	27.1% (64)	33.5% 132

Mean serum retinol levels estimated in a sample of 227 children is 33.05µg/dl; male children have significantly higher level of retinol than their female counterparts. Similarly female children have more (42%) prevalence of vitamin A deficiency (<20µg/dl) as compared to male children (33.3%). Pre-school children have higher level of vitamin A than that of school children.

Table 3. Serum retinol (µg/dl) and vitamin A deficiency in children by age and sex.

Age & Sex	N	Mean+SEM	P - Value	Vitamin A deficiency (retinol)		
				Normal (>20)	VAD (10-20)	Severe (<10)
Sex						
Male	102	37.34±3.28	0.035*	66.7% (68)	23.5% (24)	9.8%(10)
Female	125	29.56±1.95		57.6% (72)	36.8% (46)	5.6% (7)
Age group						
0-5 y	56	36.36±4.79	0.304	64.3% (36)	28.5% (16)	7.2% (4)
6-12y	171	31.97±1.86		60.8% (104)	31.6% (54)	7.6% (13)
Total	227	33.05±1.83		61.7%(140)	30.8% (70)	7.5% (17)

Figures in parenthesis are sample number. *Significant P<0.05.

Table 4. Distribution of Hemoglobin (µg/dl) and severity of anemia in study population.

Age & Sex	N	Mean ± SEM	P - Value	Grades of anemia			
				Normal	Mild	Moderate	Severe
Sex							
Male	148	10.11±0.29	0.11	38.6% (57)	14.8% (22)	24.3% (36)	22.3% (33)
Female	164	10.71±0.23		37.8% (62)	28.6% (47)	22.5% (37)	10.9% (18)
Age group							
0-5 y	105	10.53 ± 0.29	0.68	53.3% (56)	12.4% (13)	21.9% (23)	12.4% (13)
6-12y	207	10.37 ± 0.24		30.4% (63)	27.1% (56)	24.1% (50)	18.4% (38)
Total	312	10.43±0.19		38.1% (119)	22.1% (69)	23.5% (73)	16.3% (51)

The mean haemoglobin of 312 study sample is 10.43g/dl and boys have greater concentrations than girls. The prevalence of anemia is 61.9%, of which 22.1%, 23.5% and 16.3% are mild, moderate and severe categories (Table 4). Serum ferritin, the storage form of iron reflects iron deficiency in children. The percentage of hypoferritinemia is 16.3% (<15ng/ml). The male children have significantly higher level of ferritin than that of the female children.

Vitamin E (-tocopherol) estimated in a sample of 112 children is 693.2ìg/dl and its deficiency (<500ìg/dl) is 43%. C- reactive protein levels measured in 240 children, of which 49 (20.4%) indicative of infections (>10000ng/ml). The mean level of trace elements such as potassium, calcium, iron, zinc, copper, bromine, manganese, nickel, sulfur are 3082, 331, 875, 16.23, 7, 6, 20, 2, 4632 ppm respectively.

Future work

Data has to be collection on remaining samples to cover target of 1000 children.

Analysis has to be carried for blood vitamin A, E and C, transferrin receptor, C- reactive protein of remaining samples.

7. Risk factors associated with the spread of malaria in the Rengali left Bank Canal System of Odisha.

Research Scholar : Buli Kumari Panigrahi
Guide : Dr. N. Mahapatra
Status : SRF (ICMR)
Date of Joining : 10th Sept. 2008

Work Progress

A canal system is being constructed for irrigation in the district, which passes through Parjang and Analabereni Primary Health Centres (PHC), endemic for malaria. The water has been released only up to Parjang (Canal with water -CWW) area during the end of 2004 and construction work is still going on in Analabereni PHC (Canal under construction-CUC). Retrospective clinical data (2001–2008) collected from health services from two study sites showed average Slide Positivity Rate (SPR) before release of water (2001-2004) was 9.25% and 18.04% in CWW and CUC areas, respectively. After release of water (2005-2008) the SPR was 5.77% and 10.19%, in CWW and CUC areas, respectively. The average Annual Parasite Incidence (API) was 7.66 and 22.67 in CWW and CUC

areas before the release of water and 5.32 and 12.28 after release of water, respectively. A point fever survey was conducted in 2009 which revealed the presence of *Plasmodium falciparum* (Pf) and *P. vivax* (Pv) in both study areas. The survey found SPR of 18.82% and 24.54%, and Pf percentages of 75% and 85%, in CWW and CUC areas, respectively. Indoor resting mosquito collections showed the presence of nine *Anopheline* species. Overall, *Anopheles subpictus* predominated (44.6%), followed by *An. vagus* (21%), *An. culicifacies* (20.2%), *An. annularis*(10.5%) and *An. fluviatilis* (3.1%). Season wise analysis of vector density (Per Man Hour Density) of two important vectors of the region i.e. *An. culicifacies*, showed high density in rainy season(4.8±0.13) followed by winter(3.8±0.31) and summer(1.4±0.08) and *An. annularis* showed 2.1±0.02, 2.1±0.13 and 1±0.10 in rainy, winter and summer respectively. Sibling species *An. culicifacies* A, B, C and D and *An.annularis* A were found. Sporozoite rates were 1.1% and 0.5% in *culicifacies A* and *C* respectively and *annularis* A-2%. Both the vectors showed resistance to DDT, malathion and susceptible to deltamethrin. The malaria prevalence of the study area was 11.6%. The manmade ponds created during the digging of canal are the major breeding sites for both the vectors. Intensive use of insecticide treated bed nets along with source reduction and biocontrol should be implemented to control malaria.

8. Bacterial Meningitis and pneumonia among pediatric age group in Orissa.

Research Scholar : Chinmayee P. Khuntia
Guide : Dr. S.K.Kar
Status : SRF (ICMR)
Date of Joining : 23rd Oct. 2009

Background

Bacterial meningitis is an important disease especially of early childhood with high case fatality and risk of neurological disorders. The fatality rate associated with this disease is as high as 20-30% in neonates and children world-wide (Xavier et al., 2003) whereas in India and other developing countries fatality rate has been quoted as 16-30%. A wide range of bacteria are associated with meningitis and 80% of all cases of bacterial meningitis are caused by Haemophilus influenzae, Neisseria meningitidis, Streptococci pneumoniae (Hart, 2003). Over two third of all the cases of bacterial meningitis occur in children less than 5 years age group. The relative frequency of etiological agents of bacterial meningitis varies with age and geographical region. The burden of disease from bacterial meningitis is higher in low resource setting with poor health infrastructure of developing countries because of high rate of malnutrition generally poor living condition and inadequate access to preventive and curative services which may predispose individuals to infection and opportunities for optimal treatment.

Objective

To isolate Streptococci pneumoniae, Haemophillus influenzae and Neissseria meningitidis from hospitalized meningitis children under age group of 5 years.

Identification of the isolates on the basis of their biochemical properties and serological characteristics.

Surveillance of prevalence of serotypes of Streptococci pneumoniae, Haemophillus influenzae and Neissseria meningitidis in orissa.

To assess antibiogram trends in Streptococci pneumoniae, Haemophillus influenzae and Neissseria meningitidis.

Detection of species specific virulence genes of Streptococci pneumoniae, Haemophillus influenzae and Neissseria meningitidis using specific primers by PCR assay

Genetic lineage and clonality study of Streptococci pneumoniae, Haemophillus influenzae and Neissseria meningitidis isolates by PFGE and RAPD PCR assay.

Plan of work

Blood and CSF samples were collected from suspected pneumonia and meningitis cases of different pediatric age group less than 5 years for the isolation of Streptococci pneumoniae, Haemophillus influenzae and Neissseria meningitides.. Isolation and identification of the bacterial isolates wad done as per the procedure for identification (Manual of Medical Microbiology, ASM press). Antibiogram of the isolates of Streptococci pneumoniae, Haemophillus influenzae and Neissseria meningitidis was carried

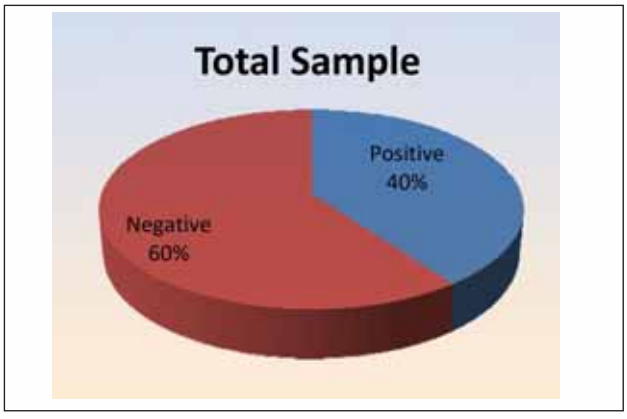
out by well and disc diffusion method (Kirby, 1966). Detection of virulence gene such as capsular transport (ctr A) in case of Neissseria meningitidis pneumolysin gene (ply) in Streptococci pneumoniae and capsulation (bexA) in Haemophillus influenzae by PCR assay. Genetic correlation and clonality study was done by PFGE, RAPD PCR assay, dendogram and sequencing.

Work progress

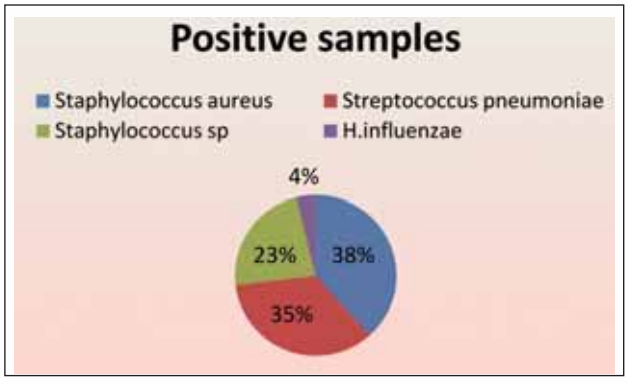
60 cases of suspected pneumonia and 130 cases of suspected meningitis were enrolled in the study. The children enrolled were different pediatric age group less than 5 yrs as per the inclusion criteria.

Out of 60 enrolled pneumonia cases, 36 samples (60%) are non-culturable whereas 24 samples (40%) are culture positive. Among the culture positive samples in most of the cases the causative organism found to be Staphylococcus aureus (38%) and Streptococcus pneumonia (35%). The other associated causative organisms are coagulase negative Staphylococcus sp and H. influenzae type b. The association of both Staphylococcus aureus and Streptococcus pneumoniae was confirmed in three cases (5%).

- Male child are more prone to pneumonia than the female child and the diseases is more frequent in children below 1 year (78.3%).
- Antibiotic profile of *S. aureus* reveals that it was sensitive to vancomycin, ampicillin, erythromycin, chloramphenicol, cefotaxime, gentamicin and resistant to cefazidime wheren as *S. pneumponiae* was sensitive to chloramphenicol, cefotaxime, penicillin, vancomycin and oxacillin.
- CSF and blood samples were collected from 130 cases of suspected meningitis. 128 CSF samples and 16 blood samples were collected for cytology, biochemistry and microbiological study.



S.aureus in Mannitol Salt agar plate



- Out of 128 CSF samples latex agglutination was done in 40 cases (31%) cases having WBC count more than 10/mm^3. Out of the 40 samples tested 2 samples were latex positive i.e. one is for *H.influenzae* type B and another is for Gr B Streptococcus. Cytology of collected CSF sample showed that WBC count varies between 0-16500/ mm^3 where as pus cell variation is 0-6/ HPF.

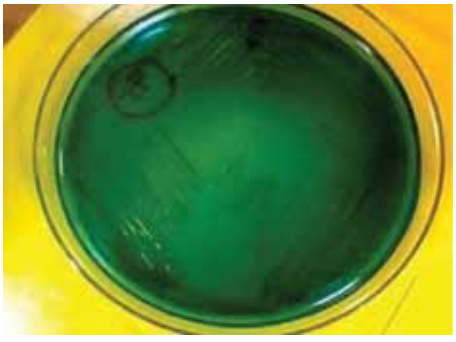
- Of the total CSF samples subjected to culture 5 samples were culture positive and the causative organism were identified as *S. aureus* in 3 cases, *Salmonella typhi* in one case and *S.pneumoniae* in one case. *S. typhi* was found to be sensitive to chloramphenicol and cotrimaxozole.
- Out of 16 blood culture carried one is found to be positive for *Klebseilla pneumoniae* and the antibogarm profile of the organism showed that it was susceptible to norfloxacin, cephotaxime, azithromycin, chloramphenicol, ciprofloxacin, gentamicin and ceftazidime and resistant to ampicillin and neomycin.

Future Work plan

- Real time PCR assay for the collected sample and study their comparative reliability and efficiency with respect to culture and latex agglutination method.
- Multiplex PCR method for detection of organism along with their serogroup in a single tube reaction.
- Antibiotic trends of these organisms and their resistance marker gene.
- Genetic correlation and clonality study of these organisms.

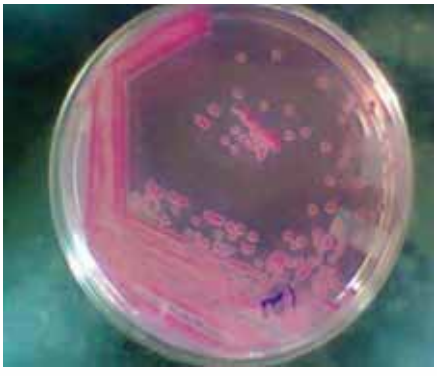
Expected outcome

The study will not only focus on the etiology of bacterial meningitis but also provide the idea on the prevalence of the specific serogroups of the *Streptococci pneumoniae*, *Haemophillus influenzae* and *Neissseria meningitidis* in this region. Further, this will be helpful in designing of Hib, pneumococcal and meningococcal vaccination program. Molecular assay are more accurate and rapid than conventional methods. Therefore, it will help in better and rapid identification of the etiological agents. The antibiotic profile will throw insight on the drug resistivity pattern and will emphasize the better management practices in hospitalized bacterial meningitis.



***Salmonella typhi* on HEA agar plate**

Biochemical test of *Salmonella typhi*



***Klebeseilla pneumoniae* on Mac conkey agar plate**

***S. pneumoniae* on Blood agar plate**

Publication & Information

Inauguration of Symposium on Biomedical Research in Medical Institutions at RMRC

26th SAC Meeting at RMRC Bhubaneswar

Publications

Publications in 2011

1. Bal M, Mandal N, Achary KG, Das MK and Kar SK. Immuoprophylactic potential of filarial glutathione-s-transferase in lymphatic filariasis. *Asian Pacific Journal of Tropical Medicine*.2011;4(3):185-91
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3. Dash S and Hazra RK. Mosquito diversity in the Chilika lake area, Orissa, India.*Trop Biomed*. 2011; Apr; 28(1):1-6.
4. Dwibedi B, Sabat J, Mahapatra N, Kar SK, Kerketta AS, Hazra RK, Parida SK, Marai NS and Beuria MK. Rapid spread of chikungunya virus infection in Orissa: India. *Indian J Med Res*. 2011; 133(3):316-21.
5. Khuntia HK, Samal SK, Nayak AN, Kar SK and Pal BB. Incidence and molecular anlysis of Entero-toxigenic E. coli causing diarrhoea among children in Odisha, India-2006. *Journal of Pure and Applied Microbiology*.2011; 8(1):223-227.
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Publications in 2012

1. Das B, Sahu A, Das M, Patra A, Dwibedi B, Kar S.K. and Hazra R.K. Molecular investigations of chikungunya virus during outbreaks in Odisha, Eastern India in. *Infect Genet Evol*. 2012; 12(5):1094-101.
2. Rout R., Dhangadamajhi D., Ghadei M., Mohapatra B.N., Kar S.K. and Ranjit M.R. Blood group phenotypes A and B are risk factors for cerebral malaria in Odisha, India. *Transactions of the Royal Society of Tropical Medicine and Hygeine*. 2012; 106(9):538-43.

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9. Behera S, Dixit S, Bulliyya G, Kar SK. Vitamin A status and hematological values in sickle cell disorder cases. *Indian Journal of Medical Sciences*. 2012; (Accepted).

10. Das D, Selvakumar N. Can LED fluorescence microscopy replace Ziehl-Neelsen microscopy in tuberculosis detection? *Int J Tuberc Lung Dis*. 2012 Nov;16(11):1558.

Facilities

Animal House Facility

The center conducts experimental studies on animals. Animal facility in the center continues to be used for all research projects requiring animal experimentation. Currently Rabbits, M. Coucha, Balb/c mice, and G pigs are available for experimentation. This animal facility has been registered with CPCSEA. All the projects concerning animal use/ experimentation are discussed in Animal ethical committee of the center. The facility is well maintained by animal house attendants. Staff has maintained periodic records of animal house. Pelleted feed procured from NIN, Hyderabad has been provided to the animals. Staff has maintained periodic records such as Form-C, Form-D etc of animal house as per provision of CPCSEA. This facility is maintained regularly with periodic inspection and health monitoring by veterinarian.

Insectorium

At present the centre has one Insectarium where cyclic colony of Aedes aegypti, Anopheles stephensi, Culex quinquefasciatus are maintained. The reared mosquito species were use in insecticide susceptibility status, Larvicidal and plant bioassay test. The institute also evaluates the Larviciding properties of different insecticides send from other institutes. The development of malaria and filariasis parasite in the reared vector species is done to investigate the transmission and vectorial capacity of the vector. The study on interaction between malaria parasite and the vector has been initiated. An.stephensi was fed on infected human blood by membrane feeding technique. Gene expressions by monitor up to 10 days till the development of sporozoite stages in the mosquitoes. Now we are proposing for conducting virology work on Chikungunya and Dengue for which Ae. aegypti and Ae. albopictus will be maintained.

Training

Trainings are given on the adult and larval identification of the vector and maintaining the colony to malaria technical Supervisor (MTS), Staffs of BMC and CMC, Insect Collector of state government and students of different universities.

The modernization of the insectariums will be done very soon having facilities with larval and adult rearing room and infected mosquito room.

Library, Information & Publications

RMRC Library is a repository of research wealth and is emblematic of research institute's intellectual and scholarly excellence. The Library of Regional Medical Research Centre, Bhubaneswar established in 1982 and developed manifold during this period.

Features

- RMRC Library is a fully automated library; it is using library automation software Libsys.
- Circulation Service
- Photocopy Service
- News clipping Service
- Wi-Fi enabled library
- Resource Sharing through ICMR network
- Off line MEDLARS

Library Hours

Library is kept open on all the days, except Saturdays & Sundays and National Public Holidays.

Timings

Monday- Friday 9.00AM to 5.30 PM

Library Computerization

The Library uses Libsys software package which is an integrated multi-user library management system that supports all in-house operations of the Library. The Libsys consists of modules on acquisition, cataloguing, circulation, serials, article indexing and OPAC. The Libsys package has been successfully implemented.

Services

RMRC Library & Information centre is the life-line for the research activities of the Institution. At present, it stands as a modern library & information centre with a lot of modern facilities with Wi-Fi enabled. It is regarded as one of the best Bio-Medical & Health Science Research libraries in Odisha. It is enabled the user services including OPAC, Inter-Library loan, Document Delievery, Reading, Access to E-Resources, Bibliographical Compilation, Information Service, Publication activities of the Centre, HRD activities like Ph.D program and M.Sc. dissertation program and digital printing and reprographic services.

Library Apprentice Trainees

The RMRC, Bhubaneswar Library is recruiting Apprentice library trainee with fixed stipend amount for the period of one year which is approved by ICMR, New Delhi and Board of Practical Training (BOPT), Kolkata since 2009 with fixed stipend amount is Rs. 11,500 per month. For apprentice trainee recruitment only freshly pass out M.L.I.S students are eligible to apply in the month of August.

LAN System

RMRC Local Area Network (LAN) is connected to all scientists, divisions and section for Internet & Internet connectivity. At present, the library is equipped with LAN Server connected with more than 50 computers in the RMRC building. Beside LAN server, Mail-server, antivirus-server and Libsys Server are also installed in Library for Networking. Two leased likes i.e NKN and NIC for Web OPAC with BSNL leased line and National Knowledge Network (NKN) for Internet connectivity.

Library collection

- Books:- 3859
- Bound Journals:- 4608
- Foreign Journals (Prints):- 31
- Indian Journals (Prints):-30

E-resources

- Online Journals- Science Direct (87)
- CD-ROM Databases- MEDLINE

E-Consortia

Presently RMRC have three major consortia for E-resources.

1. ICMR-EJC
2. JCCC@ICMR
3. ERMED Consortia.

Meeting/ Seminar/ Symposium Organised

1. A state level seminar was conducted on 4th Jan 2012 at RMRC, Bhubaneswar on **"Galvanization of Research in Medical Colleges of Odisha: Role of ICMR "**. Dr. V.M. Katoch, Secretary, DHR & DG, ICMR was the chairman of the seminar and Prof. K.K.Talwal, Chairman , MCI, New Delhi was the chief speaker in the seminar. Various faculties of three Govt. medical colleges of Odisha were participated the seminar. Dr. S.K.Kar, Director, was the organizing Secretary of the seminar and delivered the introductory remarks highliting the research activities being carried out at RMRC, Bhubaneswar.

2. A Symposium on **"Biomedical Research in Medical Institutions"** was organized on 1st April 2012 in RMRC Auditorium. Dr. V.M. Katoch, Secretary DHR & DG , ICMR was the chairman of the symposium and Chief Guest on the occasion. Sri Sanjiv Datta, Financial Advisor, ICMR and Dr.U.K.Sahoo, DHS, Govt of Odisha were guests of Honors. Dr. B. Seshikeran, Director, NIN, Hyderabad, Dr. A.C. Misra, Director, NIV, Pune, Dr. P. Vijayachary, Director, RMRC, Portplair and Dr. K. Venkatesan, Scientist-E, NJIL, Agra were chief speakers in the symposium. There were 31 presentations from various faculties of Medical colleges of Odisha for discussion on new research proposals for ICMR funding. The chairman of the symposium, Dr. V. M Katoch discussed on all 31 projects presented in the symposium. Dr. S.K.Kar, Director, RMRC and secretary of symposium delivered the concluding remarks.

3. SAC Sub Committee Meeting was held on 6-7 March 2012 under the Chairman ship of Dr. D.S. Agararwal, Chairman, RMRC, SAC and other SAC members like Prof. Sarman Singh, AIIMS, New Delhi , Dr. D.A. Gadkiri, Ex- Director, NIV-Pune , Dr. Satis Gupta, Scientist-G, NII, New Delhi, Dr. Subramaniyam, Scientist-E, VCRC, Pondichery , Dr. Krishnamurty , Scientist-E, VCRC, pondichery were present for review the project proposals of RMRC scientists.

4. RMRC Organised ICMR **Tribal Health Research Forum- 2012** on 8-9 August 2012 in the eve of International Day of World's Indegenous People. In the two day seminar the on 8th August the scientic presentations were made by various ICMR institutes .Dr. V.M. Katoch, Secretary, DHR & DG ICMR chaired the scientific session by realeasing the Souvenier on this occasion. On 9th August 2012 i.e on World's Indegenous People Day the formal inauguration of the forum was made by Honurable Minister of Health & Family Welfare , Govt. of Odisha. Honorable Minister of Finance, Govt. of Odisha Sri Prasana Acharya and Honorable Minister of Agriculture & Fisheries Sri Debi Prasad Mishra were gustes of Honors on this occasion. Sri Santhos Sarangi, IAS, Commissoner –cum-Secretary, SC / ST Minority Welfare Department , Govt. of Odisha was also the guest of honour in the ceremony. In the inaugural function Dr. S.K.Kar, Director, RMRC, Bhubaneswar welcomed the gueasts and participants followed by address by Dr. Neeru Sing, Director, RMRC, Jabalpur & Co-ordinator of ICMR Tribal Health research Forum. Dr. V. M. Katoch Secretary, DHR & DG ICMR , Govt. of India delivered on ICMR's health plan on Tribal Health of India . Sri Sanjiv Dutta,

Financial Advisor, ICMR also spoke on this occasion. Dr. A. Mahapatra, Scientist-D has given the vote of thanks.

5. Training for the project staff on Qualitative Research Method:

   The training on qualitative health research methodology for the project staff of the multicentric project on migratory population was conducted from 3rd to 5th March 2012 at RMRC in collaboration with Division of Health system Research (ICMR). A total of 35 participants attended the training. The teaching session encompasses the qualitative research tools like Key- Informant Interview, Qualitative sampling issues, case studies, FGDs, data management like transcription, translation, coding.. The trainees from various centers attended the workshop.

6. Foundation stone for new facilities:

   Stone lying ceremony for BSL -III Lab & OPD was held on 4th April 2012 at RMRC, Bhubaneswar. Dr. V. M. Katoch, Secretary DHR and DG ICMR laid the foundation stone of BSL-III Lab and OPD in the RMRC campus on 4th April 2012.

RMRC Foundation Day Celebration

The Centre observed the Foundation Day celebration on 29th March 2012 . In the colourful ceremony Dr. Prativa Ray, Eminent of odiya writer was the chief speaker in the function.

RMRC Journal Club

The Centre has started weekly journal club w.e.f. Februry 2012 on every Wednesday at 3.30 P.M . Dr. Tahziba Hussain, Scientist-D is in charge of the Journal Club of the Centre. During the period 23 speakers have presented Seminar presentation on various diseases.

Meetings/ Seminar Attended

Dr. S. K. Kar

1. Participated in the Annual Day meeting of NJIL, Agra on 17th Dec. 2011.
2. Participated in SAC meeting of VCRC, Pondicherry 20-21st December 2011.
3. Participated in the 24th Scientific Advisory Committee meeting of RMRC(T), Jabalpur 4-6th January, 2012.
4. Participated in the Directors' meeting held at RMRC, Jodhpur on 12th January 2012.
5. Attended a meeting organized by the Secretary Health on Bird flu at Secretariat Conference Hall on 16th January at 3:30 PM.
6. Attended Human Ethical Committee Meeting of RMRC on 17th January 2012
7. Attended SAC meeting of RMRC, Port Blair on 19-20th January, 2012.
8. Participated in the State Level function of "Anti Leprosy Day" organized by Hind Kusht Nivaran Sangh at NRHM Building on 30th January 2012.
9. Participated in the Technical Committee meeting on Sentinel Site Hospitals for Dengue at Conference Hall of NVBDCP on 30th January 2012.
10. Participated in Diamond Jubilee & Foundation Day Celebration at NIV, Pune on 2nd Feb. 2012.
11. Participated in the Meningitis meeting at Vellore on 06-08th Feb 2012 at CMC, Vellore.
12. Attended a Virology Networking meeting at ICMR HQrs on 14th & 15th Feb. 2012.
13. Participated in 30th Annual State Level IAPSM Conference at High Tech Medical College on 18th Feb. 2012
14. Participated in 2nd Brain Storming Meeting of Vector Science Forum Meeting on Japanese Encephalitis and Visceral and C. leishmaniasis at Institute of Pathology, New Delhi on 23rd Feb. 2012.
15. Participated in "Odisha Bio Tech Conclave 2012" at TACT, Bhubaneswar as a Chief Speaker on 29th Feb. 2012.

16. Participated in Tribal Health Research meeting at NIN, Hyderabad on 4th March, 2012.
17. Participated in the SAG meeting at ICMR, New Delhi 3-4th April 2012.
18. Participated in Vaccinology advanced training course at IVI, Seoul, Korea from 14-19th May 2012.
19. Attended selection committee meeting as an Expert member for Selection of Director (Technical) Biotechnology & DD (Technical), Biotechnology in the Conference Hall of Chief Secretary, Govt. of Odisha on 08th June 2012
20. Participated in the meeting with TB Lab experts at NIRT on researchable issues of Tuberculosis" on 20th June 2012
21. Participated in the Viva Voce Examination at Utkal University, P.G. Deptt of Bio Technology at 11 AM on 13th July 2012.
22. Participated in the Selection Committee meeting for the post of Scientist-C at RMRC on 18th July 2012.
23. Participated as Guest of Honour in the World Hepatitis Day and delivered talk on "Hepatitis B" at SCB Medical College, Cuttack
24. Participated in the workshop on "Triple Trouble Malnutrition, Tuberculosis and HIV in India" at NIRT, Chennai on 02-04 August 2012.
25. Participated in the Malaria Review Meeting organized by the Secy. Health at NVBDCP Conference Hall on 17th August 2012.
26. Participated as Chief Guest for the Annual Science Exhibition at Saraswati Sishu Mandir, Bhubaneswar on 31st August 2012.
27. Participated in the Emergency meeting on H1N1 organized by the State Health Department at Secretariat on 03rd Sept. 2012.

Dr. N. Mahapatra

1. Attended review meeting on malaria control with commissioner cum secretary (State Health Department) on 17th of each month from January to December 2012.
2. Attended SRC meeting on Biotechnology of Utkal University as a member on the month of February 2011 for assessing pre submission for Ph. D.
3. Attended meeting to control mosquito menaces and appropriate control measures in urban areas (BMC & CMC) on 16th March 2011 and presented protocol for mosquito control strategy in urban areas.
4. Attended Director's meeting at ICMR, new Delhi, on 8th and 9th May 2011at New Delhi, appraised the DG,ICMR on various research issues pertaining to The centre.
5. Attended Brain storming meeting of the Vector Science Forum on 4th and 5th October 2011 at new Delhi and and discussed about the research conducted by RMRC, Bhubaneswar in vector borne diseases prevalent in Orissa.
6. Attended meeting on translation research at Delhi on 5th March 2012and appraised DG,ICMR on the progress of translational research conducted in RMRC, Bhubaneswar.

Dr A. K. Satapathy

1. Attended 8th joint Annual conference of The Indian Society for malaria and other Communicable Diseases & The Indian association of Epidemiologist held at Bhubaneswar from 15-17April 2011
2. Attended a training program on Accreditation of laboratories held at Jaipur from 26th -29th March 2012.

Dr. B. B. Pal

1. Delivered a guest lecture in the 51st annual conference of national academy of medical sciences on Emerging V.cholerae and drug resistance in cholera at Sum Hospital, Bhubaneswar, 14th to 16th October, 2011.

2. Delivered a guest lecture at International seminar on "Environment occupational health: Issue and challenges" on Environment and water borne diseases organized by Asian institute of Public Health , 16th November 2011 at Bhubaneswar.

Dr.M.R. Ranjit

1. Attended and delivered a guest lecture on Drug resistance malaria: A challenge to researchers and policy makers in a national seminar jointly organized by National Academy of Medical Sciences (Orissa Chapter) and Institute of Medical Sciences & Sum Hospital, Bhubaneswar on 14th October 2011.
2. Attended the National Symposium on Vector and Vector Borne Diseases held at RMRCT, Jabalpur and organized jointly by RMRCT, Jabalpur and National Academy of Vector Borne Diseases form 15th to 17th October 2011 and presented the paper on Malaria in Orissa: Present and Future
3. Attended the UGC sponsored National Seminar on Living Systems in Post Genomic Era organized by the Department of Biosciences and Biotechnology, Fakir Mohan University during 20th and 21st December 2011 and delivered a guest lecture on" GENETICS OF CEREBRAL MALARIA" on 21st December 2011.
4. Attended and delivered a guest lecture on Malaria: parasites and pathology in a UGC sponsored national workshop organized for college Teachers by Trident School of Biotech Sciences, Bhubaneswar on 28th February 2012.
5. Acted as an expert member of the Animal Ethical Committee of Orissa Biological Products Institute, Department of Animal Resources Development, Government of Orissa for the year 2011-12 (meeting held on 20/07/2011)
6. Attended the meeting on identification of priorities areas of research in the field of Medical Biotechnology by Department of Biotechnology, Government of Odisha as director's nominee on 14/12/2011 and 10/02/2012.

Dr. R.K.Hazra

1. Attended "8th Joint Annual Conference of the Indian Society of Malaria and other Communicable diseases and The Indian Association of Epidemiologists" Organised by RMRC, Bhubaneswar, India.
2. "XI Symposium on Vectors and Vector Borne Diseases" Organised by RMRCT, Jabalpur, India and presented a paper on "**Emergence of arboviral diseases in Odisha".**
3. Presented a talk in Fakir Mohan University, 2011 on "**Molecular studies of vector borne diseases in Odisha with special reference to anophelines & aedes mosquito species".**

Dr. B. Dwibedi

1. Participated a meeting on Inter-sectoral collaboration on prevention of Dengue and other Vector Borne diseases at Conference Hall, Odisha on 13th Jan. 2012.
2. Participated in a meeting of State Partners on Emergency preparedness Response plans in an event of a wild Polio virus detection in Odisha on 13th January 2012.
3. Participated in a technical Committee meeting on Sentinel Site Hospitals for Dengue at Conference Hall, NVBDCP, Odisha on 30th Jan. 2012.
4. Participated in a meeting on Research & Ethical Committee at DHS Conference Hall, Health Directorate, Odisha on 27th Feb. 2012.
5. Participated as a speaker to deliver a talk on Hepatitis at Odisha Biotech Conclave 2012, Trident School of Biotech Sciences, Bhubaneswar on 29th Feb 2012.

6. Participated Media Sensitization & briefing on Mass Drug Administration (MDA) programme held at IMA Conference Hall (Behind Capital Hospital) on 20th April 2012.
7. Participated a meeting to discuss prevention and control of Vector-borne diseases and to evolve and to put in place an action plan before the onset of monsoon held at DHS, Bhubaneswar on May 2012.
8. Delivered Radio talks at "Sustha Bharat" for Health Serial Programme on Viral Hepatitis and Typhoid fever on May 2012.
9. Participated in a Tribal Health Forum meeting held at Port Blair on 3rd- 4th June 2012.
10. Participated in a Tribal Health Forum meeting held at RMRC, Bhubaneswar on 8th-9th Aug. 2012.
11. Delivered a talk on Dengue fever in Doordarshan as a health message on August 2012.

Dr. A.S. Kerketta

1. Delivered a Radio talk on Brain Malaria at All India Radio Cuttack on 13th July 2012.
2. Delivered a TV talk on Dengue at Duradarshan Kendra Bhubaneswar on 21st August 2012.

Dr. G. Bulliyya

1. Attended a meeting on "Training Program on Scaling up of Water Productivity in Agriculture for Livelihoods" as a resource person and presented a paper on 'Role of water enrichment of nutrients towards food and nutrition security' at Balipatna, Khurda district organized by Directorate of Water Management, Bhubaneswar on February 25, 2012.
2. Attended a meeting on "ICMR Workshop on Qualitative Health Research" organized by Department of Health System Research, ICMR, New Delhi at RMRC, Bhubaneswar on 1-2nd March, 2012.
3. Attended a quarterly meeting on "ICMR Tribal Health Research Forum" and presented 'RMRC-Bhubaneswar Research activities on Tribal studies for the period from December 2011-February, 2012 held at National Institute of Nutrition, Hyderabad on March 4, 2012.
4. Attended a meeting on "DBT-NIN Brainstorming Session on Food and Inflammation" and presented an accepted concept proposal on 'Essential fatty acids in modulation of oxidative stress and inflammatory conditions of cardiovascular disease and diabetes' held at National Institute of Nutrition, Hyderabad on April 10-11, 2012.
5. Attended a meeting on "Progress of Combating of Kidney Disease Affected Baramba and Narasinghpur Blocks of Cuttack district" and shared RMRC study finding on Exploratory study on epidemic kidney disease among rural population in Cuttack district' held at Conference Hall of Collectorate, Cuttack on May 11, 2012.
6. Attended a meeting on "National Workshop on Dissemination of finding of the NNMB Tribal 2nd Repeat Tribal Survey and Brainstorming Session on the Development of Intervention Strategies for Prevention and Control of Double Burden of Disease" held at National Institute of Nutrition, Hyderabad on May 23-24, 2012.
7. Attended a meeting on "Indo-US Bilateral Workshop on "Triple Trouble: Malnutrition, TB and HIV" and contributed in developing concept proposals on Malnutrition-related to TB & HIV held at National Institute of Research on Tuberculosis, Chennai on August 2-4, 2012.
8. Attended "3nd Annual Conference of Tribal Health Research Forum" on the eve of 'International Day of the World's Indigenous Peoples' held at 'Regional Medical Research Centre, Bhubaneswar, on August 8-9, 2012.

9. Attended a meeting on "Exploratory study on epidemic kidney disease among rural population in Cuttack district, Odisha" at Office Chamber of Collector, Cuttack on September 12, 2012.
10. Attended a meeting on "Nutrition: First 1000 Days of Life" as a Member in Panel discussion organized by Nestle Nutrition Institute, Science for Better Nutrition, held at Hotel Hindustan International, Bhubaneswar on November 11, 2012.
11. Attended a meeting on "Stakeholders Consultation on Improving lives and livelihoods of Rural and Tribal Communities' and panel discussion session organized by M.S.Swaminathan Research Foundation, Chennai, held at OUAT, Bhubaneswar on December 26, 2012.

Dr. D Das

12. Attended 99th Science Congress as resource person for ICMR stall held at KIIT University, Bhubaneswar from 3-7, January 2012.
13. Attended "Akhila Bharatiya Rajbhasha Sammelan" in KIIT, Bhubaneswar from 24-26, August 2012.
14. Delivered a radio talk on tuberculosis and its control on 15.11.2012 under Sushtha Bharat programme.

Dr. Tahziba Hussain

1. Attended Consultation titled 'Galvanizing Evidence for HIV Management' from 27th to 29thJanuary 2011 at NARI, Pune.

Dr. Sapna Negi

1. Attended "ICMR Expert Group meeting on Task Force on Noncommunicable Disease Research in Tribal Populations" held on 19th April 2012 at ICMR headquarter office, New Delhi. She represented RMRC Bhubaneswar and on its behalf proposed a concept paper on "Assessment of Non Communicable Diseases related Morbidity, Mortality and their risk factor amongst two major tribes of Kalahandi District,Orissa."

Dr. B. Sahoo

1. Participated 99th Science Congress as resource person for ICMR stall held at KIIT University, Bhubaneswar from 3-7, January 2012.
2. Participated and presented a paper on " E-Publishing in Biomedial Sciences: An overview" in the ICSSR National Seminar held on 19-20 May 2012 at OUAT, Bhubaneswar.
3. Attended "Akhila Bharatiya Rajbhasha Sammelan" in KIIT, Bhubaneswar from 24-26 August 2012.

Dr H K Khuntia

1. Participated in Workshop of "Global Food borne Infection Network (GFN) Level-1 Enteric diseases Training at national Institute of Cholera and Enteric Diseases, Kolkata, India, March 14-18, 2011.
2. Participated in a training program on "Epidemiology and outbreak Investigation" held at National Institute of Epidemiology, Chennai from 19-23, December 2011.
3. Participated in a training program on " Sentinel Hospital Based Surveillance of Bacterial Meningitis in India" held at Christian Medical College and Hospital, Velore from 6-8th February 2012.
4. Participated in the "99th Indian Science Congress" held at KIIT University, Bhubaneswar from January 3-7,2012.

Ph.D. awarded

1. Ms. Asima Tripathy, SRF (RMRC), has been awarded Ph.D from Utkal University, Bhubaneswar in January 2012 on the topic"Vectorial competence of *Anopheles culicifacies* under the guidance of

Dr. N. Mahapatra, Scientist-E, RMRC, Bhubaneswar.

2. Miss. Prajyoti Sahu, SRF (RMRC) has been awarded Ph.D from Utkal Univesity, Bhubaneswar under the Guidance of Dr. S.K.Kar, Director, RMRC, Bhubaneswar

3. Miss. Upasana Sahu, SRF (RMRC) has awarded Ph.D from Utkal University, Bhubaneswar under the guidance of Dr. M.R. Ranjit, Sc.-E.

4. Ms.Sunita Swain Submitted has awarded Ph.D from Utkal University, Bhubaneswar under the guidance of Dr. R.K. Hazra, Sc.-D.

Ph.D. submitted

1. Mr. Gunanidhi Dhangra Majhi, SRF (RMRC) has submitted Ph.D in Utkal University, Bhubaneswar under the guidance of Dr. M.R. Ranjit, Sc.-E.
2. Mrs. Ronaly Rout, SRF (RMRC) has submitted Ph.D in Utkal University, Bhubaneswar under the guidance of Dr. M.R. Ranjit, Sc.-E.

List of M.Sc. Dissertation students undertaken dissertation work.

Sl No	Name of the student	Guide	Name of the Topic
1	Sayed Niyamat Nishar	Dr. N. Mahapatra	Present stasus of transmission of Chickungunya virus by vector mosquitoes after an outbreak in Nayagarh district
2	Anmada Nayak	Dr. A. Mahapatra	Estimation of Brucellosis in pahala grampanchayat of Cuttack district
3	Aushariya Sengupta	Dr. A.K. Satapathy	Immune response to filarial carbohydrates antigens in individuals living in area endemic for bancroftian filariasis.
4	P. Sanjai Kumar	Dr. G. Bulliyya	Study on anemia in adolescents in Kalahandi district,Odisha
5	I Sriram Sandeep	Dr. B.B. Pal	Multiple antibiotic resistance among clinical isolates of V. Cholerae isolated during (2006-2008) in Orissa
6	Sushmita Sengupta	Dr. D. Das	Effect of CPC storage on isolation of M tuberculosis for solid culture and drug sensitivity testing
7	Nitusmita Das	Dr. A.S. Kerketta	Isolation and characterization of vibrio cholerae from environmental water sample
8	Truptimayee Satapathy	Dr. R.K. Hazra	Molecular strains of Wolbachia from mosquitoes of Orissa with special reference to Aedes albopictus
9	Smita Madhumita Mohanty	Dr. B. Dwibedi	Identification of Rotavirus from stool and rectal swab sample in the children upto 5 years of age
10.	Subhalaxmi Pradhan	Dr.N.Mahapatra	Xenomonitoring of Wuchereria bancropti in mosquitoes by PCR in Nayagarh district of Odisha

11	Sabyasachi Pattanayak	Dr. B.B. Pal	Comparison of drug resistance and Ct XB gene of normal alter and alter variant of V. Cholera isolated from different parts of Orissa
12	Sujit Ku. Mishra	Dr. R.K. Hazra	Molecular identification of anopheles culicifacies complex and vectorial role in different gergraphical areas of Odisha
13	Kaliprasad Pattnaik	Dr. D. Das	Study of Kanamycin resistance among drug susceptible and resistant M tuberculosis isolates
14	Richa Mishra	Dr. M.R. Ranjit	Diagnosis of Malaria by PCR
15	Sneha Singh	Dr.A.Mahapatra	An epidemiology study of Brucellosis in Khurda district of Odisha
16	Biswajit Sarangi	Dr. B.B. Pal	Expanding drug resistance among clinical isolates V. Cholerae isolates during 2009-2011 from Orissa
17	Demeyol Rhesto	Dr. D. Das	A comparison of Nitrate Reductase Assay with conventional solid culture for drug resistance testing of M tuberculosis.
18	Sunita Keshari	Dr. A.S. Kerketta	Isolation of V. Cholerae from environmental water sample.
19	Minushree Mishra	Dr. M.R. Ranjit	Molecular strain typing of plasmodium falciparium implication in diagnosis by Rapid diagnosis test.
20	Subhasis Palata	Dr. D. Das	Evaluation of the Nitrate reductase assay for rapid detection of drug-resistant tuberculosis.
21	Sayed Zeeshan Ali	Dr. R.K. Hazra	Identification of Malaria vectors and non-vectors by multiplex PCR.
22	Diptimayee Barik	Dr. A. Mahapatra	Brucellosis investigation at Jaipur, Nuapatna, Khurda.
23	Priyadarsani Samal	Dr. A.K. Satapathy	To study the protective efficacy of DSSd1 antigen along with chemotherapy in experimental filariasis.
24	Pratyasa Samal	Dr. A.S. Kerketta	Isolation, identification and characterization of enterobacteriaceae from hospitalized Diarrohea patients.
25	K. Keerti	Dr. G. Bulliyya	Study on nutritional status of mother and their children in Kalandi district, Odisha.
26	Debasmita Pradhan	Dr. D. Das	Study on ofloxain resistance among Mycobacterium tuberculosis isolates of Odisha.
27	Bithika Rath	Dr. B. Dwibedi	Seroprevelance of rubella infection and its exposure immunity among pregnant women in Odisha.

28	Rakhi Mishra	Dr. D. Das	A comparison of NRA with other biochemical tests for identification of M tuberculosis.
29	Monalisha Sahoo	Dr. M.R. Ranjit	Hypnozoite stage in plasmodium vivax: Is it due to genetic difference.
30	Abha Rasmi	Dr. B. Dwibedi	Identification of Rotavirus in the children upto 5 yrs of age.
31	Aryashree Arunima	Dr. B. Dwibedi	Seropervallence of Rubella infection and explosure immunity rate among antenetal women in Odisha.
32	Aiswarya Dash	Dr. D. Das	Biocidal activity of routinely used disinfectants against laboratory strain of M tuberculosis H37Rv.
33	Satarupa Sarangi	Dr. A.S. Kerketta	Isolation of Escherichia Coli from rectal sample.

M.Sc. Dissertation Works

The Centre is undertaking M.Sc. dissertation Program for M. Sc. Biotechnology / Microbiology / Bioinformatics and Molecular Biology for the period of six months from Jan- June 2012. During this period total 31 students have undertaken their dissertation works under various scientists.

Summer Training Program

The Centre has organized a summer training program for National Institute of Technology, Rourkela from the period of 8 weeks i.e 15th May to 13th July 2012. In this program eight students from NIT, Rourkela joined as trainees.

26th 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 ParkAundh,
Pune 411 007 — Member

4 Dr.Subrat K. Acharya
Prof,. & HoD Dept of
GastroenterologyAIIMS,
New Delhi 110 029 — Member

5 Dr. Satish Gupta
Staff Scientist-VII and
Chief Gamete Antigen
LaboratoryNational
Institute of ImmunologyAurana
Asaf Ali Marg, New Delhi 110 067 — Member

6 Dr. D.A. Gadkari
Ex-Director, NIV,
"Shilpayatan" Apt2/13 ,
Erandwane, Pune — Member

7 Dr. B. Sesikeran
Director National Institute of
Nutrition, P.O: Jamai Osmania,
Hyderabad- 500 007 — Member

8 Dr. P. Jambulingam
DirectorVector Control
Research CentreIndira Nagar,
Pondicherry 605 006 — Member

9 Director
Regional Medical
Research Centre For Tribals
Nagpur Road, P.O. GarhaJabalpur
(M.P) 482003 — Member

10	Director Regional Medical Research Centre,N.E. Region, Post Box No. 105, Dibrugarh-786001 (Assam)	Member
11	Director National Institute of Cholera & Enteric Diseases P-33, CIT Road, Kolkata-600031	Member
12	Director of Health Services, Directorate of Health ServicesGovt. of Odisha, Heads of the Deptt. Building Bhubaneswar	Member
13	Dr. Rashmi Arora Scientist- G, ECD Indian Council of Medical researchNew Delhi	Member
14	Dr. Harpreet Kaur Scientist-E, ECD Indian Council of Medical Research New Delhi-110029	Member
15	Dr.S.K. Kar Director, Regional Medical Research Centre Chandrasekharpur, Bhubaneswar	Member - Secretary
16	Prof. Sarman Singh Deptt. Of Lab Medicine AIIMS, Ansari NagarNew Delhi-110029	Special Invitee
17	Dr. D.C.S. Reddy C/o D. HimanshuBaidyanath Road, Opp. New Hydrabad Post Office, New Hydrabad, Lucknow-226007	Special Invitee

HUMAN ETHICAL COMMITTEE

1	Dr.Kabi Prasad Misra Sr. Consultant Cardiologist & 55, Ganesh Nagar Gandamunda, Khandagiri Bhubaneswar 751 030	Chairman
2	Prof.Aruna Mishra Laxmi ViharPO: Sainik School Bhubaneswar	Co-chairperson
3	Dr.P.K. Dash Director, Medical Education & Training Heads of the Dept Building Govt. of Orissa Bhubaneswar 751 001	Member
4	Mrs Kasturika Pattanayak Ex-Chair Person, Social Welfare BoardGovt. of Orissa, 1, Lewis RoadBhubaneswar.	Member
5	Dr P.K.Acharya N-1 A/10 IRC VillageNear CRP Square, Bhubaneswar 751 015	Member
6	Dr.Sisir Kumar Mahapatra Sr. Consultant PhysicianSurya Nivas, Plot No:B-1/91 Lingaraj Vihar, Pokhariput, Bhubaneswar 751 002	Member
7	Sri.Himadri Mohapatra Toshali Plaza, Iind floor Satyanagar, Bhubaneswar	Member

BUDGET OF RMRC (10-11) (In Lakhs), SOURCE : ICMR

Establishment	Administrative Expenses	Contractual Service	Others	Equipment	Capital
452.76	148.10	72.72	1.43	48.32	297.38

8 Prof. Rita Ray
HOD SociologyUtkal University
Vani Vihar, Bhubaneswar 751 004 Member

9 Dr. S. K.Kar
Director
Regional Medical Research Centre
Bhuabneswar Member- Secretary

Animal Experimentation Ethical Committee

1 Dr S.K. Ray,
Ex-Principal
Orissa Coll. of Anim. Husb. &
Vet. Sc.Qr.No.M-109
Baramunda H.B. Colony
Bhubaneswar 751 003 Chairman

2 Prof. Sachidananda Das
PG Dept. of
Zoology Utkal University
Bhubaneswar. Member

3 Mrs Kasturika Pattanayak
Ex-Chair Person, Social
Welfare BoardGovt. of Orissa,
1, Lewis RoadBhubaneswar. Member

4 Dr.M.R. Ranjit,
Scientist-E
Regional Medical Research Centre
Bhubaneswar Member

5 Dr R.C.Patra,
Prof. & Head,
Dept. of Veterinary Medicine OUAT,
Bhubaneswar – 751 003 Member

6 Dr R.K. Hazra
Scientist-D
Regional Medical Research
CentreBhubaneswar Member

7 Dr.Kishore Chandra Mohapatra
Plot No:17, Gautam Nagar PO:BJB
Nagar, BBSR 751014 Member(CPCSEA)

8 Dr.Dwarikanath Mohanty
Plot No:1215/1654, Khandagiri Bari,
Bhubaneswar 751 030 Member(CPCSEA)

9 Dr A.K.Satapathy
Scientist-D
Regional Medical Research Centre
Bhubaneswar Member- Secretary

10 Dr S.K.Kar,
Director, Regional
Medical Research Centre,
Bhubaneswar. Convener

Technical Equipment Purchase Committee

1 Dr. A.K. Sahoo Principal
ScientistCIFA, Kausalya gang
Bhubaneswar- 751 002 Chairman

2 Dr. P.Das
Sr. ScientistCIFA, Kausalya gang
Bhubaneswar- 751 002 Member

3 Dr. N. K. Debata
Prof. Microbiology SUM-Hospital,
Bhuabnesware Member

4 Dr. M. R. Ranjit
Scientist-ERMRC, BBSR Member

5 Dr. B. Dwibedi
Scientist-CRMRC, Bhuabneswar Member

6 Mr. G.Behera
Accounts officer, RMRC, BBSR Member

7 Dr. A. K. Satapathy
Scientist_DRMRC, BBSR Member –Secretary

Budget and Resource Generation

The total sanction budget in respect of the Centre (Non-Plan & Plan) for the year 2011-12 is **Rs. 1027** lakhs and sanctioned budget for 2012-13 is **Rs. 650** lakha up to Sept. 2012. The Head wise expenditure for 2011-12 of the budget is shown below. The resource generation during 2011-12 is 2.5 Crore and for 2012-13 is 1.5 crore from the extramural grant and Ph.D program through UGC, CSIR and others.

Staff position

Scientists

1.	DR. S.K. Kar, MD, Dip. Clin. Epid.	Scientist-G & DIRECTOR
2.	Dr. (Mrs.) N. Mahapatra, M.Sc., Ph.D.	Scientist-E
3.	Dr. M.R. Ranjit, M.Sc., Ph.D.	Scientist-E
4.	Dr. A. Mahapatra, M.Sc., M.Phil., Ph.D.	Scientist-D
5.	Dr. A.K. Satapathy, M.Sc., Ph.D.	Scientist-D
6.	Dr. G. Bulliyya, M.Sc., Ph.D.	Scientist-D
7.	Dr. B.B. Pal, M.Sc., Ph.D.	Scientist-D
8.	Dr. (Mrs.) A.S. Kerketta, M.B.B.S.	Scientist-D
9.	Dr. Dasarathi Das, M.Sc. Ph.D	Scientist-D
10.	Dr. Taziba Hussain, M.Sc., Ph.D	Scientist-D
11.	Dr. R.K. Hazra, M.Sc., Ph.D.	Scientist-D
12.	Dr. Sapna Negi, M.Sc., Ph.D	Scientist: D
13.	Dr. Bhagirathi Dwibedi, M.B.B.S, M.D	Scientist-C
14.	Dr. Madhusmita Bal, M.Sc.M. Phil, Ph.D	Scientist-B

Research & Technical Staff

1.	Dr. S.K. Parida, M.Sc., Ph.D.	Technical Officer-A
2.	Mr. P.K. Jangid, M.Sc.	Technical Officer-A
3.	Mr. R.K. Das, M.Sc.	Technical Asst.
4.	Dr. A.S. Acharya, M.Sc., M.Phil, LL.B., Ph.D	Technical Asst.
5.	Mrs. G. Mallick, M.Sc.	Technical Asst.
6.	Mr. R.C. Parida, M.Sc.PGDCA	Technical Asst.
7.	Mr. N.S. Marai, M.Sc., LL.B.	Technical Asst.
8.	Mr. D.P. Hansdah, M.Sc.	Technical Asst.
9.	Dr. N. Mandal, M.Sc., M.Phil., B.Ed.	Technical Asst.
10.	Dr. P. K. Sahoo, M.Sc., Ph.D.	Technical Asst.
11.	Mr. B. Murmu, M.Sc., M.Phil.	Technical Asst.
12.	Dr. H.K. Khuntia, M.Sc. Ph.D.	Technical Asst.
13.	Miss. Sujata Dixit, M.Phil, M.Sc.	Technical Asst.
14.	Mr. H.K. Tripathy, B.Sc, PGDME	Technical Asst
15.	Mr. R.N. Nayak, B.A.	Technician-C
16.	Mr. B.N. Sethi, Dip. MLT	Technician-C
17.	Mr. H.S. Naik, Dip. MLT	Technician-C
18.	Mr. S.C. Rout, ITI	Technician-C
19.	Mr. T. Moharana	Technician-B

20.	Mr. C. R. Samantray	Technician-A
21.	Mr. K. C. Dalai, B.A., ITI	Technician-A
22.	Mr. B. K. Kanhar	Technician-A
23.	Mr. G. D. Mansingh	Technician-A
24.	Mr. B. Pradhan	Technician-A
25.	Mr. C. S. Tripathy, B.Com. LL. B.	Technician-A
26.	Mr. S. S. Beuria	Technician-A
27.	Mr. G. Simhachalam	Technician-A
28.	Mr. K. C. Parichha	Technician-A
29.	Mr. S. C. Das	Attendant(Services)
30.	Mr. N. N. Pattnaik	Attendant(Services)
31.	Mr. K. C. Jena	Attendant(Services)
32.	Mr. S. K. Mallick	Attendant(Services)
33.	Mr. H.K.Jena	Attendant(Services)
34.	Mr. Banamali Nayak	Attendant(Services)
35.	Mr. Baburam Behera	Attendant(Services)
36.	Mr. K. C. Nayak	Attendant(Services)

Library & Information

1.	Dr. B. Sahoo, M.L.I.Sc., Ph.D.	Library & Information officer
2.	Miss. Nikita Bisi, M. Lib& Inf. Sc.	Apprentice Library Trainee
3.	Miss. Ratnapriya Bhoi, M.Lib & Inf. Sc.	Apprentice Library Trainee
4.	Mr. Chakradhar Naik	Attendant (Services)
5.	Mr. Rajim Sur Rai	Attendant(Services)

Administration & Accounts

1.	Mr. G. Behera	Accounts Officer (Admn. Officer Incharge)
2.	Mr. B. Sutar, M.Com	Section officer
3.	Mr. P. C. Nayak, B.A.	Personal Assistant
4.	Mr. R. C. Muduli, B.A.	Assistant
5.	Mr. A. P. Parida, B.A	Assistant
6.	Mrs. R. Varghese	Personal Asst
7.	Mr. S. K. Satapathy	U.D.C.
8.	Mr. B. S. Rao	U.D.C.
9.	.Mr. R. Rath	UDC.
10.	Mr. D. K. Mohanty, B.A	Steno
11.	Mr. S. Nayak	L.D.C

12.	Mr. S. K. Das, B.Com.	L.D.C.
13.	Mr. S. K. Majhi, M.A., LL.B.	L.D.C.
14.	Mrs. S. Beuria, M.A	L.D.C
15.	Mr. R. C. Dash	Attendant (Services)
16.	Mr. Sankar P Sharma	Attendant (Services)
17.	Mr. M. B. Thappa	Attendant (Services)
18.	Mr. T. Bahadur	Attendant (Services)
19.	Mr. D. C.Rao	Attendant (Services)
20.	Mrs. Triveni Nayak	Attendant (Services)

Director's Office

1.	Mr. L. S. Rao, B.A.	PS to Director
2.	Mr. K. G. Samal	Attendant (Services)
3.	Mr. R. K. Hembram	Attendant (Services)
4.	Mr. Pandav Sahoo	Attendant (Services)

Workshop & Maintenance Staff

1.	Mr. B. K. Biswal	Technician-A (E)
2.	Mr. S. Sutar	Technician-A (E)
3.	Mr. J. Behera	Attendant (Services)
4.	Mr. B. K. Moharana	Attendant (Services)
5.	Mr. Sankar Bisoi	Attendant (Services)

Animal House Staff

1.	Mr. A. Senapati	Attendant (Services)
2.	Mr. S. K. Das	Attendant (Services)
3.	Mr. Jaladhar Naik	Attendant (Services)
4.	Mr. Banamali Sahoo	Attendant (Services)

Transport Staff

1.	Mr. Md. Daulat Khan	Driver
2.	Mr. Sibaram Patra	Driver
3.	Mr. Anakar Nayak	Driver
4.	Mr. A.R. Khan	Driver
5.	Mr. P.K. Behera	Driver

Ph.D Students

1.	Rasmi Mishra, M.Sc	SRF (ICMR)
2.	K Gopinath Acharya, M.Sc	SRF (ICMR)
3.	Buli panigrahi, M.Sc	SRF (ICMR)

4.	Suchismita Behera, M.Sc	SRF (ICMR)
5.	Manisha Patnayak, M.Sc	JRF(CSIR)
6.	Biswadeep Das, M.Sc	JRF(UGC-CSIR)
7.	Chinmayee P Khuntia, M.Sc	SRF (ICMR)
8.	Susil Kumar Rathore, M.Sc	JRF (ICMR)

Staff of NNMB Unit

Mrs. S. Paikray	Asst. Research Officer
Dr. A.R Mohanta	Asst. Research Scientist
Mrs. Haraprava Sahu	Social Worker
Mr. G.C. Mantri	Lab. Technician
Mr. R.K. Sahoo	Driver
Mr. Santosh Kumar Juharsing	Field Attendant

RMRC field Activities at Raygada field stations

Regional Medical Research Centre
(Indian Council of Medical Research, DHR, Govt. of India)
Chandrasekharpur, Bhubaneswar-751 023, Odisha, India
Tel. : 0674-2301322, 2301332, Fax : 0674-2301351

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